A STUDY OF FITNESS AND SOCIO-CULTURAL ASPECTS OF GATKA: A SIKH MARTIAL ART

A

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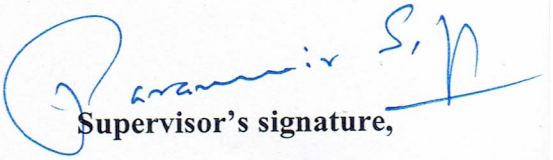
CERTIFICATE

This is to certify that this thesis entitled " **A Study of Fitness and Socio-Cultural Aspects of Gatka: A Sikh Martial Art**" Embodied the work carries out **Maninder Jeet Singh** himself under my supervision and that is worthy of consideration for the award of the Ph.D degree.



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Chapter 1

INTRODUCTION

Human body has been designed naturally in such a way that it has abandoned of movements and movement patterns which enable it to perform in any condition. In ancient time human has performed their movements for hunting, defence, offence, run, climb, escaping from any height of threat etc. Evidences have been there in the literature which had proved that in certain specific skill human population attained peaks through repetitively physical education. It enabled the human to perform with it peak abilities. The skilled pattern to use human body movements for any conditions of combat (favourable or unfavourable or threat) of combat has been designated as a particular tradition of human population. Human body movements have been demonstrated differently on different occasions in various geographical regions or under various religion imprints.

The Martial arts are codified systems and traditions of combat practices. They are practiced for a variety of reasons, including self-defence, competition, physical health and fitness, as well as for mental, physical, and spiritual development. The term Martial art has become heavily associated with the fighting arts of eastern Asia, but was originally used in regard to the combat systems of Europe as early as the 1550s. An English fencing manual of 1639 used the term in reference specifically to the "Science and Art" of swordplay. The term is ultimately derived from Latin, Martial Arts being the "Arts of Mars," the Roman God of war. Some Martial arts are considered 'traditional' and are tied to an ethnic, cultural or religious background, while others are modern systems developed either by a founder or an association (Clements, 2006).

Although traditional and historical evidence of stick fighting is available but in the modern set up of games this competitive sport has not got due attention at the hands of sports organizers. This isotonic sport with devised rules and regulations has changed its original and conventional appearance to take the shape of demonstrative game. The basic difference in traditional and modern sport is that, in olden days the left forearm and hand was practiced to defend the attack and in the modern stick fighting (Gatka), shield or stick defend the attack. In Sikh sports the stick fighting is known as Gatka (Singh, and Singh, 2014).

Gatka is one of the oldest and on the whole ancient martial activities known to man. The people of immense empires that in the Mediterranean were specialist in the art of stick fighting (Gatka). Paintings that have survived on the walls of tombs represent that this form of combating was not unknown to the Egyptian people (Kent, 1968).

In the same way, the wall paintings of Beni-Hasan (2000 BC-1000 BC) as well explain that stick fighting (Gatka) was a much admired activity at that time in Egypt. The people have practiced Gatka before the days of recorded the past and it was mostly connected to the folklore of graciousness. It can be healthy imaginary that this sport was put to use for martial preparedness as well. On one wall these are two battle performance, dagger throwing and stick fighting (Gatka). It possibly will be noted that stick fighting on the other hand, was retained while the weapon had lost its martial function (Kent, 1968).

In ancient times this sport was an integral part of social life and was compulsory for all those who were interested in becoming leader of a group. However, it may be noted that many of the martial arts and indigenous games did not originate in the social system at a particular time of history but grew all along with Cultural Revolution (Singh and Singh, 2014).

Gatka is an Indian Martial art established by the Sikhs Guru's in Punjab region. It is defensive as well as offensive in nature and focuses on infusing the physical movement with both the mental and spiritual activity. "Mahan Kosh" edited by Bhai Kahan Singh Nabha, describes Gatka - a three-hand span stick, used to teach the first part of club fighting and it has a leather covering. In the right hand holding a "Gatka" and in left hand a 'farri', two men play with each other. Persian - Khutka. Thus, Bhai Kahan Singh Nabha believes that the words 'Khutka' and 'Gatka' are used for same meaning (Nabha, 1999). 'Urdu-Punjabi-Hindi Kosh 'published by the Language Department, Punjab illustrates the word 'Khutka' as 'Kutka', 'Mota Danda' (cudgel), 'Thhosa' (thumb) etc. The another names of Gatka are Pullatha, Stick, Club, Rod, Sotah, Danda, Lakrrhi, Khuttaka, Pattah, Phuletha, Kuttak, Pulad, Slotar and Mutehara. The Gatkabazi is also known as Lakrrhibazi, Pattahbazi, Dueling, Stick fighting, Khuttakebazi, Pulathebazi, Kuttakabazi, Ek-angi and Do-angi. When Gatka is played only with stick then it is dubbed as Ek-angi and when played with stick and shield (dhall) it is known as Do-angi. To play Gatka either for self-protective or offensive way the body abilities were compulsory to recognize so and to meet the levels of performed (Singh and Singh, 2014). The word 'gat' means grace, liberation

and respect in one's own power, while 'ka' means someone who belongs or is part of a group. It was also a term of reference for the stick used instead sword training (Singh, and Singh, 2016).

In stick combating or duelling with sticks, the stick was held in the right hand while the left forearm and hand are held upright perceptibly in the direction off blows. Cushioned pad or thick leather protects the left forearm and hand. The defence was not adequate, as it is obvious as of the conclusion of mummies which bear multiple breaks on the bones of the forearms (Kent, 1968).

As for as Sikhism is concerned the history of the Gatka dates back to Guru Hargobind Sahib. The fifth Guru in order to train (Guru) Hargobind in martial arts such as Gatka, had selected Bhai Paraga Ji. The Gatka was a part of the everyday regular at Sri Akal Takhat at the time of sixth Guru. In the early morning the Sikhs used to play Gatka and training the use of a variety of arms in an open space between Sri Harminder Sahib and Sri Akal Takhat Sahib (Gobindpuri, 1996)

Guru Hargobind Sahib exhorted the Sikhs to learn the art of Gatka and horse riding. Most of the martial games, for which the Sikhs earned praise at the hands of their enemies, owe their origin to the initiative taken by Guru Hargobind Sahib. The martial arts training of Guru Tegh Bahadur was completed under the supervision of Guru Hargobind Sahib. Guru used to play archery, riding, shooting and Gatka, which were very popular at that time among the Sikhs. He used to play Gatka (stick fighting) with his companions (Bassen, 1997).

ਫਿਰ ਲਕੜੀ ਬਾਜੀ ਕਰੈ ਚੰਗ।

(Panth Parkash, G.G.S.-120)

The tenth Guru, Guru Gobind Singh started different types of sports and games. He himself was fond of archery, horse riding, Gatka and shooting. He encouraged the art of Gatka and he organised the competition between the pairs. The game of Gatka achieved the heights of the sports activities during his period. He conferred the sticks for his disciples (Macauliff, 1963)

ਕਿਸੇ ਫੜਾਵੈਂ ਮੋਟੇ ਸੋਟੇ।

ਕਰੇ ਕੁਵਾਇਦ ਦੁਇ-ਦੁਇ ਜੋਟੇ।

(Panth Parkash, R.S.B.-46)

Anandpur Sahib was developed into a cultural centre, vibrating with spiritual, mental and physical activities of the Sikhs. Guru Gobind Singh started training of swordsmanship with the conditioning practice instrument, wooden stick or Gatka. (Macauliff, 1963)

ਨਾਲੇ ਲੱਕੜੀ ਫੁਲਥੇ ਦੀ ਖੇਡ ਮਚਾਈ।

(Banaswali Nama-10, Chhiber, Chapter-10)

WEAPON USED IN GATKA

According to Guru Gobind Singh Ji, weapon holds very high and respective position as very popularly said, "Weapon is the extension of your body". In his writing Bachittar Naatak Guru Gobind Singh Ji describes God as a weapon master and worships the sword.

ਜੈ ਜੈ ਜਗ ਕਾਰਣ ਸ੍ਰਿਸ਼ਟ ਉਬਾਰਣ ਮਮ ਪ੍ਰਤੀਪਾਰਣ ਜੈ ਤੇਗੰ।

Bachittar Naatak-1

Mean "the sword is the power that supports the universe; the sword saves the universe form all kind of odds and obstacles. The sword supports me, I bow before the sword". He also warships and describes the Lord as a warrior who carries the sword. In this way weapons hold very respectable position in the eyes of a practitioner of Gatka. According to the Rule book of (World Gatka Federation 2016) the following are the basic demonstrative weapons used in Gatka.

- Stick/Soti
- Farri
- Sword/Kirpaan/Talwar
- Shield
- Bow Staff (one sided or two sided)
- Saffa Jung/Gandassi
- Daang/Lathi
- Katar
- Gurj/Gada
- Khanda
- Jamdarh
- Marhati
- Jaal

Stick/Soti

Stick is used in Combat Gatka as the sword is used in a real fight. The stick is used as a substitute of sword and retains the usage techniques of sword. Stick shall be made of Bamboo or Baint or Fibre and may have embedded digital chips for accurate recording of touches/strikes. It shall be straight, 39 inch (100 cm) long. Its weight shall not exceed 500 grams. Its thickness shall vary from ½ inch to ¾ inch. Its uncovered surface shall be covered with a cloth/tape/ribbon. For better grip and safety of the hand the stick shall have a fixed cushion at one end to hold it (Rule book WGF, 2016).

Farri

The Farri shall be made up of Leather or Rexene or Fibre. It shall be of 8 to 10 inches (20-25 cm) diameter. Its weight shall be from 350 to 500 gm. The use of Farri is same as the use of the shield i.e. for defence. The use of both stick and Farri simultaneously as well as independently during combat shall be essential for a Gatka player (Rule book WGF, 2016).

Sword/Kirpan/Talwar

Shamshir in Persian and talwar in Indian is the most common and ancient weapon used on battle grounds. The talwars comes in different sizes. The blade of talwar is curved in shape. The hilts of talwar have short heavy quelling and disk pommels. The Sikh gurus named this blade as kirpan (kirpa+aan) “kirpa” means the blessing of god and “ann” means prestige. A later this kirpan also become one of the five kakaars of Sikhism. Every Sikh carries a kirpan with him all the time; it can be very dangerous when used with special techniques (Nabha, 1999)

Shield/Dhal

Dhal means a shield. The dhal shall be made up of iron or hard metal. The fighters use it as a shield to defend him during the fight. It is usually round in shape, and can be flat or convex. It shall be of 8 inches to 24 inches diameter. Its weight shall be from 350 to 500 gm. It is held by two handles fastened to ring bolds that pass through the shield and are riveted to bosses on the outside, sometimes formed to spikes. Between the handles there is a square cushion for the knuckles to rest against. The handles are so placed that, when tightly grasped, they force the backs of the fingers against the cushion giving a very firm and comfortable hold (Nabha, 1999)

Bow staff one sided or two sided/Barcha

The Bow staff or spearhead or Barcha is to book behind the shield of the enemy. It is a long shafted weapon used for thrusting and cutting. It also has a small spike on its rear end. (Nabha, 1999)

Saffa Jung/Gandassi

Saffa Jung/Gandassi is a weapon developed from a tool which was used as an axe in our daily lives. They come in various sizes from light to heavy poles. Fights with Both hands are required to it. The European axes are heavier than Indian axes and their handles are made with flat plate of steel. Wooden pieces are riveted on both ends. The other from which is quite commonly used in India is a combination of pistol and axe is used as barrel of the pistol (Nabha, 1999)

Daang/Lathi

Lathi or Daang is easily available and an ordinary weapon but it can become lethal if used properly and with right training. The materials used to make lathi are ironwood or oak and fighters choose their lathis according to their height (Nabha, 1999).

Katar

The katar is a blade but its unique characteristic lies in the handle. It is made up of two parallel bars connected by two or more crosspieces, one of which is at the end of the side bars and is fastened to the blade. The katar is warped to the hand to optimize the gripe. The katars is an oldest Indian knife. Which are mostly straight and occasionally curved and blades are double-edged, the length of katar varies from few inches to about three feet. The Marathas often used the European blades of the 16th and 17th centuries. To use it against armours the katars are thickened and strengthened at the point. The European blades are riveted to projections from the

hilt. The native blades were forged from single piece. The fork shaped katars occurs as three different blades. The Indian armoires occasionally made katars that were hollows and serves as sheaths for smaller ones. The other variant that appeared to be single and when handle is pressed to open it, it comes out as three different blades (Nabha, 1999)

Gurj/Gadha

It is a weapon with heavy head on a solid shaft used to bludgeon opponents. The Persian influenced maces gave a whistling sound when they were struck at the heads. They usually have guarded hilt like the khanda (Nabha, 1999).

Khanda

Khanda is a broad and straight blade and with a while end. It is double edged blade which is generally quite blunt at the end. Sometimes it has a strengthening plate, the ornamental borders run through its length on the back of sword. The hilt has a broad plate guard and wide finger guard which join the large round, flat pommel. During the two handed stroke the spike on the pommel acts like a guard and grip. It is also used as a hand rest when the sword is sheathed. The finger guard and the inside of the guard are padded (Nabha, 1999).

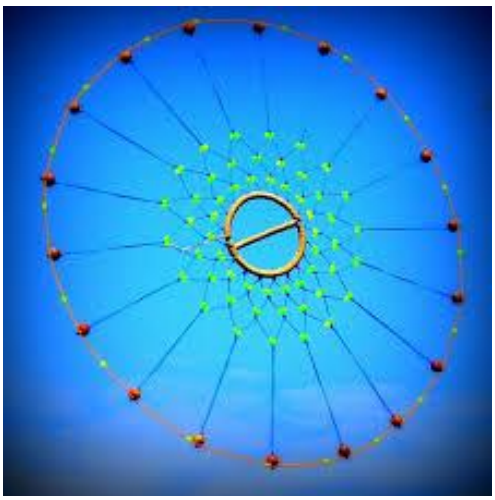
Jamdarh

In ancient times this weapon was used to blow the crown on top of the weapon, but now it is used only for demonstration (Nabha, 1999).

Marhati

The Marhati is a bamboo stick used by people called marhatas but Guru Hargibind Singh ji introduced it for training purposes in Gatka. It is made from bamboo with wooden or balls made of fabric on either ends of this stick. Marathis also comes in variants of blades and burning clothes at its ends (Nabha, 1999).

Jaal



In ancient times, the arrow was stopped with this weapon, but now it is used only for demonstration (Nabha, 1999).

Gatka also has its age group to play with the rules. Their group's names are as follows (Rule book WGF, 2016).

Sr. No.	Group	Age Limit	Events
1	Tufang	10-14 yrs (u14)	Weapons demo team & individual
2	Sool	14-17yrs (u17)	Combat & weapons demo both team & individual
3	Saif	17-19yrs (u19)	Same as above
4	Sipar	19-25yrs (u25)	Team & individual combat, individual weapons
5	Siprar	25-28yrs(u28)	Same as above
6	Amateur	28-35, 35-40	Same as above
7	Veterans	45-55, 55-65, 65-75	Individual combat & weapons

SIGNIFICANCE OF GATKA IN SIKH LEGANCY

Different martial arts have been existed in India since ancient times, perhaps the origin of martial arts has been found to be from many civilizations. But with the passage of time and development of society mankind as a whole, many forms of life style transformed into formal art forms. One such art which started as a need and then gradually took the shape of martial that is "Gatka". Gatka is one such martial art form of northern India which gained its well deserved importance in the fifteenth and sixteenth century. At that time there was need to amend and enrich the older form of Indian military activities so that the invading forces can be defeated (Singh, 2010).

In these progressive situation when Gatka as proper Martial Arts was first defined by Sikh Gurus. Analyzing the pathetic condition of common masses and the atrocity of the ruler Guru Nanak sahib concluded that society was heading towards the wrong direction. The saint had become so meek and helpless that he could not even defend himself and the power full ruler was so occupied with arrogance and self esteem that he had become ruthless and heart less killer. Both these conditions of mankind were so dreadful that it took over 200 years for to redress and resume society on the right path. When Guru Nanak sahib looked at the irrevocable face of humanity filled with remorse and grief seeking for help, the Sikh Gurus decided to build up the immaculate being, "Saint Soldier". The concept of saint soldier was not a task to set up as if it requires a clear thought concept and long sited vision. It took over 200 hundred years and 10 mortal lives of the Sikhs Guru to build up and develop the immaculate "Saint Soldier" (Singh, 2010).

Guru Nanak sahib started with the incorporation of the quality of saint into his disciples and mean while passed on the martial arts to Baba Buddha who had developed and reached the highest level of spiritualism. Carrying on the task of Guru Nanak Dev, Guru Angad Dev started and promoted wrestling along with the spiritual training amongst his disciples. It served as a recreational activity as well as the formal beginning of Gatka? Khadur sahib situated near Kapurthala in Punjab state was the very first center where other than the royal blood common people could practice wrestling for their own welfare. So Khadur sahib can be seen as the gifted place where the common man had started to build up their health concerns. After Guru Angad Dev Ji, Guru Amar Dass Sahib Ji and guru Ram Dass continued and promoted wrestling among the Sikh disciples. Guru Arjun Dev Ji compiled the Aad

granth (Sri Guru Granth Sahib) and gave to the world the ultimate source of spiritualism (Gandhi, 1978).

After that Guru Hargobind Sahib Ji the sixth guru, in order to protect the sainthood constructed the source of ultimate power the Akal Takht. The golden temple, the amrit sarovar and the Akal Takht together symbolize the combination of sainthood and valor Guru Hargobind sahib had taught the full fledged martial arts (Gatka) form Baba Buddha ji and wore to swards Miri and Piri representing both saint hood and bir ras (valor). At the time of Guru Hargobind sahib ji Gatka was practiced at Akal Takht Sahib, during that era the concrete shape of visionary thought given by Guru Nanak has developed (Dhillon, 1988).

In due course of time when the cult of Saint Soldier was building up, a time came when the ninth Guru Teg Bhadhar Ji who was also a very proficient martial artist give his martyrdom to protected Hinduism. This was the time when the Saint Soldier stood up tall in full attire and totally prepared for war against all evil. Guru Gobind Singh Ji the master of all arts enunciated a clear cut battle against the evil rulers. The Sikh forces with handful warriors faced the well-established enemy forces for sixteen times and all 16 times the enemy was very badly defeated Guru Sahib never attacked anybody nor did he fight for land or ownership, he always drew out the sword in defense of the curbed and helpless common masses (Singh, 2010).

The Sikh Gurus named the sword as kirpan kirpa + aan (which symbolizes the bliss of god almighty). In his writing guru sahib always worshiped the shastra (weapon) as god himself in this way he gave to his Sikhs a feeling of respect and admiration for the shastra to make sure that the followers would never misuse the shastra. In April 1699 when Guru Gobind Singh Ji granted amrit to his disciples to make sure that they should not lose their dignity, he gave kirpan as a kakar along with four other kakar by granting the kirpan as a kakar the Sikhs guru showered his blessing on each and every Sikh in the form of Gatka (Singh, 2010).

In this way the job of creating of the saint soldier which was started by Guru Nanak dev Ji? With the advancement of society all the art form took formal shape. A cult known as “Nihang Singh” adopted Gatka as well as gurbani in its traditional form. The Nihang Singh who preserved and kept the Sikh arts alive including Gatka in original form till today (Singh, 2010).

Now a day’s Gatka is recognized as well established traditional martial art of the Sikhs and is gaining more and more popularity. Gatka stands along with other games

as recognized by Punjab Olympic association .The Punjab school education board has included Gatka as a game in its sports calendar. Punjabi university Patiala has taken the initiative inters collage competition sports of Gatka and also guru Nanak Dev University will be taken it in the same mode. Gatka and similar forms are also practiced in a south India, Pakistan and other south East Asian countries even in gaining and Americas Gatka is gaining popularity. More and more students are showing interest in Gatka and the domain of Gatka is expanding day by day. Now Gatka is not only a tradition of Sikhs infect people from all over the world are learning and practicing the Gatka as a game and as a part of their life style (Singh, 2010).

GATKA AND FITNESS

The following are the requirements for over all fitness of Gatka players.

1. Agility
2. Cardiovascular Endurance
3. Coordination and Balance
4. Endurance
5. Flexibility
6. Power
7. Speed
8. Strength

- **Agility** (the ability of the body to change direction) Agility is important ability needed in Gatka. To rapidly change body positions and direction in precise manner helps in better and accurate defence and attack.
- **Cardiovascular Endurance (Stamina)** The ability of heart, lungs, and blood circulation to provide the amount of oxygen need to accomplish needs. Any physical activity which set off doing and found ourselves begging for air at some point, was likely caused because lack the stamina (unless of course it is due to a mental problem or a health condition) for the duration of a 3 min Gatka every one and every body part of the player requirements to be toned in such a way that can cardiovascular endurance is a must for a Gatka player. For weapons event in which a player needs to demonstrate with full speed for a given period of time. It is cardiovascular endurance that helps the player to endure the players in the event. When practicing with long heavy weapons cardiovascular endurance has much bigger role.

- **Coordination and Balance (**integration with hand and or foot movement with the input of the senses) the coordination and balance of all body parts is of paramount importance in Gatka. To carry out the proper attack and defence the brain, arms and feet should be in perfect coordination and balance or else no move can be performed properly.
- **Flexibility** (the range of movement possible at various joints) Flexibility has very importance role in Gatka. To carry out proper moves of both attacks and defence technique, flexibility of all the body part comes into play. A flexible back and shoulder helps in extending range while the attacking the opponent. As well as while defending, Flexibility also makes the player looks graceful during the activity.
- **Muscular Endurance** (the ability of a muscle group to continue muscle movement over a length of time.) During a 3 min combat Gatka fight each and every body part of the player needs to be toned in such a way that can muscular endurance is a must for a Gatka player. For weapons event in which a player needs to demonstrate with full speed for a given period of time. It is endurance that helps the player to survive the players in the event. When practicing with long heavy weapons endurance has much bigger role.
- **Muscular Strength** (the amount of force that can be produced by a single contraction of a muscle) All the body parts from head to toe are used in the practice of Gatka so mainly the legs, abdomen, back, arm, and shoulder of Gatka player should be strong. A Gatka player needs to move forward and backward the proper foot work swiftly. So the strength of thigh and calf is a must. While attacking with full range and defending the abdomen, back, shoulder, biceps, triceps, and wrist strength comes into play.
- **Power** (the ability to do strength work at an explosive pace) Power is the rate at which an athlete can expend energy. In Gatka the most important factor is muscular and bone power especially when using heavy and long weapon the momentum and balance of the body are very important which cannot be achieved without power.
- **Speed** (the ability to move quickly from one point to another) in Gatka player needs to move around very swiftly in the ground and carry out very hard and accurate moves with a lot of speed. For the defence and attacking

moves Speed plays an important role shorter reaction time means better is defence. More speed means better attack.

The learning of the Gatka offers numerous unique advantages to the fitness of the players. The training usually performed in almost any place without the use of weights or special apparatus; it may be practiced in isolation or in groups. Since the body sets its own limits, injuries or strains are rare and the physical situation of the players pace him automatically. The whole muscle system of the body, from the fingers to the toes is brought into play. The training does not produce large knotty and bulky muscles; it tends to exchange flabby fat tissue for lean tissue. The thick muscles developed through weight training tend to push the blood vessels apart without adding new ones to fill the gap. Such tissue has difficulty in receiving oxygen and disposing of waste through the blood stream and thus tire more easily. In Gatka high repetition of attack and defence technique in practice, low resistance to blood supply routes, thus producing maximum endurance and well being. The emphasis in attack or defence movements, in executing the jumping movements and in counter-balancing the hand movements build a firm, well-muscled abdomen. The high leg raise proceeding most of the pantra's in the Gatka also develops the side of the trunk and inner thigh muscles. The learning of the Gatka is particularly recommended for women because of this development of the lower abdomen, hips and inner thighs; areas which produce a youthful, feminine figure for women of all ages. After childbirth in particular, these areas are stretched and weakened; Gatka training is ideal to restore muscle tone for health as well as appearance. The typical training regime, involving extensive movements of the entire body, raises the pulse rate and oxygen characteristics of the heart and lungs over an extended period. This increased ventilation is termed an aerobic effect and provided the following benefits (Singh, and Singh, 2011).

- Helps the lungs operate more capably.
- Enlarges the blood vessels, making them more flexible and reducing the resistance to blood flow, thus lowering the diastolic blood pressure.
- Increases the blood supply, especially red blood cells and haemoglobin.
- It makes the body tissue healthier in supplying it with more oxygen.
- It conditions the heart, providing more reserve for emergencies.
- It promotes better sleep and waste elimination.

The training tends to be normalisers of body weight in that it results in a gain of solid tissue for the underweight and a loss of body fat for the obese. The estimated calorie consumption for a vigorous Gatka workout is about six hundred calories per hour, one of the highest for any sports activity. Since the expenditure of about 3,500 calories results in a weight loss of one pound, it will be seen that a weekly training schedule of only six hours will result in weight loss of one pound per week (Singh and Singh, 2011).

Gatka offer a superior means of developing the characteristics of good performance in other sports as well:

- Muscular strength
- Dynamic energy: the ability to throw oneself into performance with vigour.
- Ability---to change the direction of movement
- Ability---the ability to move the body quickly from one place in space to another
- Flexibility of joints, muscles and ligaments
- Peripheral Vision
- Concentration and the ability to avoid distraction
- Understanding the mechanics and techniques of body movements

"Focus" requires that players have muscular strength and balance and the exertion of dynamic energy when players concentrate all the power of the body at one point in space. A combination of basic techniques and patterns develops agility and the ability to change movements, while sparring develops attentiveness and peripheral vision. The prepared training procedures pressure a organized warm up of muscles and ligaments, increasing blood volume and flow through the muscles. These warming up workout encourage flexibility of joints, tendons and ligaments as well as serving to prevent injuries in training. The regime also stresses the warming down exercises after training, to pump down the accretion of blood and fluid present in the muscles after violent exercises. If this is not done, inflexibility and discomposure will result. These techniques of warming up and warming down as well as the breathing exercise taught are another example of the highly developed science of body mechanics and bodily processes contained within formal Gatka training. The attacking "yell" that is taught also has its basis in basic physiology. Aside from serving to demoralize the opponent, the "yell" serves also to tighten the lower

abdominal muscles to prevent injury in the event of unanticipated counter-offensive. In addition, the inhalation, or thoracic mumble as practiced also by weightlifters or wrestlers, serves to make equal the pressure increase in the thorax which may result from aggressive, effort, thus preventing injury to the vital organs. The complete exhalation of the "yell" serves to expel the tidal air of the lungs, thus increasing the breathing or vital capacity of the lungs. It can be seen that the practice of the Gatka is recommended for men, women and children. It may provide benefits in perceptual-motor organization, concentration, vision, body development, aerobic conditioning of the heart and lungs and provides training in body control which is valuable in the pursuit of any other sport or physical activity. Coupled with the obvious benefits in self-defence and the satisfaction of mastering an ancient art form, it would appear that the Martial Art Gatka should be a part of the life of all people for all of their life (Singh and Singh, 2011).

STATEMENT OF THE PROBLEM

Man is social animal. However, living in the society as an individual as well as a social being has always been a challenging and life-threading task for the human beings livings in various societies and through all ages of history. Reasonably, the intrinsic appetite inherent among human beings for acquiring more and more in the society gave birth to the constant competition among individuals, communities, societies and nations. In the scenario of constant competition, which generally aggravated altercations among individuals, violent conflicts among societies, battles among nations and wars among sovereign states the principle of the ‘survival of the fittest’ was more or less pertinent among individuals, communities and nations everywhere. It compelled the individuals enrolled in various communities and societies to prepare and equip themselves to counter the probable enemy. The communities, which had been very frequently vulnerable to the violent attacks by the enemy, considered it as a prerequisite to adapt them in a soldierly manner. These communities emerged as the Martial communities, which were formally trained, properly equipped and always prepared to combat the enemy forces. India, due to its territorial features, economic prosperity and political disintegration had been frequently vulnerable to the attacks by the invaders and plunders. The region of Punjab, which remained the only gateway for the strangers to enter Indian Territory since ancient times to the medieval period of history, had been one of the most vulnerable regions of the whole world to witness the invasions. Frequent attacks by

the Turks, Arabs and the Mughals on Punjab have been an obvious Socio reality. The invaders, not only acquired the crown, territory and economic sources of the region, but also started interfering in the cultural and religious lives of the local people of Punjab by forcing the masses to change their cultural traditions and convert their religion to Islam. Sikhism, which emerged as resentment against the religious bigotry, social injustice, economic disparities and political anarchy of its contemporary times explicitly, opposed the religious intolerance, social discrimination and economic exploitation of the masses. It gave birth to the violence conflict of the Sikh masses with the contemporary Mughal regime. The Sikh Gurus, especially Guru Hargobind Sahib and latter Guru Gobind Singh had converted the Sikhs into a Martial race to combat the Mughals. The Sikhs were formally trained in various forms of Martial Arts. Among various types of Martial Arts, the Martial Art of Gatka was a invariable, unique and most relevant Martial art that was introduced by the Sikh Gurus among the followers. The Martial art of Gatka, still practiced by the Nihangs (formally baptized Sikhs) is not only a form of military skill developed to apply in the battlefield, but it undoubtedly increases the physical capacity mental integration of the experts who perform it.

AIMS AND OBJECTIVES OF THE STUDY

The aims and objectives of the study are:

- To evaluate the physical fitness of the Gatka players. (Males & females)
- To find out the motor fitness of Gatka players. (Males & females)
- To observe and analyses the art of Gatka from socio-cultural perspectives.

HYPOTHESIS

- Gatka had been prevalent in Indian sub-continent, eminently in Northern region, much prior to the advent and emergence of The Khalsa and Nihangs.
- Gatka players are better in physical fitness and relatively better in motor fitness in their competitions.

SIGNIFICANCE OF THE STUDY

Gatka is a Martial art, which was adopted by the Sikhs during the mediaeval period as the most reliable form of Martial Art that could well prepare them to counter and combat the invading enemy. It was among others, the Martial art of Gatka that provided the Sikh community the status of a Martial community. It has restricted the invaders to enter in Punjab and helped in the formation of the great and grand Sikh

rule. Now days the Martial art of Gatka is no more apart of Sikhs' routine practice, religious principles and cultural parameters. Thus it is a relevant task to study the Martial art of Gatka in Punjab from fitness and Socio-cultural aspects and also the causes of its getting feeble among Martial race in the modern era. An activity improves the physical capacity, flexibility, endurance, strength, power, speed, agility, coordination and balance of the human body. But unfortunately, there is dearth of authentic and scientific researches on the Martial-art of Gatka especially from the physical fitness and motor fitness viewpoint. Hence, it is a significant task to study the Martial art of Gatka from fitness and socio-cultural View point. Martial communities worldwide have been constantly working to improve and develop their Martial arts and dedicated to provide a worldwide recognition to their Martial arts. But unfortunately the Martial art of Gatka has still not been able to gain that never popularity and recognition as enjoyed by the Martial arts like Judo, Tae-k-won do, karate, kick-boxing, fencing etc. Hence, the study is a relevant and significant attempt to compile the Socio-cultural and fitness aspects of the Martial art of Gatka in a form of a research work. This study entitled " A Study of Fitness and Socio-cultural Aspects of Gatka: A Sikh Martial Art" will facilitate to highlights the total fitness level of Gatka players.

SCOPE OF THE STUDY

The present study was an attempt to evaluate the socio-cultural, physical fitness and motor fitness of Gatka players. Undoubtedly, Gatka is an established form of Martial Arts that really affects the physical fitness and motor fitness of performers. Moreover, there is dearth of authentic and scientific researches on the Martial-art of Gatka in the field of Sports Science, especially from the physical fitness and motor viewpoint. Due to these reasons, the Martial-art of Gatka has been taken as the prime focus of the study. For conducting a precise and objective study, the universe of the research has been confined to the state of Punjab only. Reasonably, the Gatka, in its unique form, as formally attached to the Nihangs, has been majorly limited to the state of Punjab and north India. It is an established fact that the Gatka in Punjab has been predominantly performed by the males and females hence both males and females are taken into consideration for the present study.

Chapter 2

REVIEW OF LITERATURE

The purpose of the literature review here was to provide an overview of the current framework of theory in the area of Martial Art and to extract from the review a theory in terms of which the investigator plans to operate. The items of literature reviewed in this chapter include printed publications (books, Journals, magazines, periodicals, newspapers and other relevant sources), as well as electronic documents. The present study the investigator reviewed the related literature and brief reviews of some important studies have been presented fewer than two heads.

Literature Related to Fitness Aspect of Martial Art

Zarrilli, (1989) describes three interconnected conceptions of the body in kalarippayattu, the martial tradition of Kerala, south India. It traces continuities and discontinuities among concepts and practices recorded in classic source texts and contemporary martial practice for each of the three 'bodies of practice'. The first is the fluid body of humors and saps. The second is the body as superstructure composed of bones, muscles, and vital spots (marma-s), which supports the fluid body. The concepts and practices of the first two bodies are based on the regional tradition of Ayurveda. They constitute the external physical body (sthula-sarira). The third, subtle or interior body (suks-ma-sarira) is thought to be encased within the physical body. It provides an experiential map of practice and is the basis for higher stages of meditation. The long-term practice of the martial art (1) makes the body fluid so that healthful congruence of the humors occurs, (2) establishes an intuitive and practical knowledge of vital points (marma) useful in fighting (prayogam) and in treating injuries, and (3) purifies the subtle body and awakens the internal vital energy (pranna-vayu) that is manifest as the power (sakti) of the master in combat or medical practice. The paper concludes with a discussion of the interrelationship between these three concepts of the body in the accomplished practice of the martial practitioner.

Little, (1991) describe the physical performance abilities of high level, developing Juvenile men and Junior and senior men and women judokas. The subjects were 17 women and 43 men identified as members of the 1989 Alberta Judo Team by the Alberta Kodokan Black Belt Association. Physical characteristics and performance

abilities were assessed through a battery of tests which included: height, weight and skin fold thickness; static strength (grips, arms, back, and total (TST)); flexibility (trunk forward flexion (TF)); maximum aerobic power (VO2max) (treadmill run); and upper body maximal anaerobic power (PP) and capacity (MP) (upper body Wingate test). Physical performance abilities were not different between the Junior and Senior women and substantially better than normative values for untrained women. Combined values (+/- SD) for Junior and Senior women were: VO2max 44.45 (3.56) ml/kg.min; PP 342.68 (76.92) w; MP 234.99 (46.62) w; TF 39.77 (6.39) cm; TST 127.91 (20.95) kg. The physical performance abilities of the Juvenile men: VO2max 57.62 (3.42) ml/kg.min; PP 406.89 (171.55) w; MP 281.68 (113.42) w; TF 39.35 (6.89) cm; TST 164.63 (51.07) kg; were superior to those of similarly aged, untrained young men, but comparable to those reported for trained adolescent athletes. The Junior men's physical performance abilities: VO2max 59.26 (3.95) ml/kg.min; PP 573.13 (116.83) w; MP 395.12 (61.95) w; TF 39.00 (4.39) cm; TST 221.60 (30.24) kg; were not different from the Senior men's, except for relative maximum oxygen uptake, and generally better than those values reported for other Junior judokas and Junior athletes in some other sports. The Senior men's physical performance abilities: VO2max 53.75 (5.57) ml/kg.min; PP 674.50 (133.26) w; MP 447.85 (87.19) w; TF 38.06 (8.86) cm; TST 223.37 (46.15) kg, were comparable with those reported for other developing, high level Senior judokas, but lower than the values reported for elite judokas competing internationally. These data support the position that successful participation in judo by high level, developing athletes is dependent upon appropriate levels of technical skill supported by above average endurance capacity, upper body anaerobic power and capacity, static strength, and flexibility.

Zabukovec and Tiidus, (1995) investigated the anthropometric and physiological characteristics of kick boxers. Professional male middleweight (73-77 kg) and welterweight (63-67 kg) kick boxers were determined to have relatively higher aerobic capacities VO2max, 54-69 kg-1 min-1, anaerobic capacities (8.2-11.2 kg-1), and knee extension peak torques (2.8-3.3 Nm sec-1) than previously reported for many other power or combat athletes. Kick boxers also tended to be lean (6.1-10.8% BF) and were classified as meso medial body types on the Health-Carter somatotype scale. This suggests that elite kick boxers demonstrate a high level of aerobic and anaerobic conditioning along with the ability to produce high muscle forces.

Heller et. al., (1998) has collected the baseline physiological and kin anthropometric data of 11 male and 12 female elite tae-kwon-do athletes from the Czech national team for evaluation of anthropometry, aerobic and anaerobic capacities, strength, visual reaction time, pulmonary function, flexibility and explosive power of the lower limbs (vertical jump). Both male and female tae-kwon-do black belts demonstrated low adiposity (8.2 and 15.4% fat, BMI 21.9 and 22.0 kg m^{-2}, respectively), normal reactivity and pulmonary function, above average muscular strength, PWC-170 (3.4 vs 2.7 W kg^{-1}) and aerobic power (54 vs 42 ml min^{-1} kg^{-1}), and a high flexibility (37 and 38 cm) and anaerobic performance (peak power output from a 30 s Wingate test = 14.7 and 10.1 W kg^{-1}; anaerobic capacity = 334 and 242 J kg^{-1}, in males and females, respectively). In male athletes, competitive performance was significantly related to maximum power output and upper limb reaction time only, whereas in females, performance was related to maximum power output and ventilator threshold level. These variables accounted for 66 and 67% of the performance rank in males and females, respectively. Time-motion analysis of competition tae-kwon-do fighting (two times 2 min) revealed 3-5 s bouts of maximum exercise alternating with low-intensity periods. This elicits high heart rates (100% HR_{max}) and lactate responses (11.4 mol 1^{-1} = 81% La_{max}), which agrees well with the physiological characteristics of taekwon-do black belts measured in laboratory exercise tests.

Melhim, (2001) studied nineteen taekwondo (TKD) practitioners with an average age of 13.8 years and 10.4 months of TKD training experience were recruited to participate. Measurements included resting heart rate, aerobic power, anaerobic power, and anaerobic capacity. Paired *t* test analysis showed no significant differences in either resting heart rate or aerobic power after training. However, significant differences were observed in anaerobic power and anaerobic capacity ($p = 0.05$). The increases in anaerobic power and anaerobic capacity were 28% and 61.5% respectively. The practice of TKD promotes anaerobic power and anaerobic capacity, but not aerobic power, in male adolescents.

Martin, (2002) determines the physical and emotional benefits of martial arts training for persons with disabilities. Three specific research questions were asked: Does participation in martial arts training lead to a reduction in the functional limitations caused by an individual's disability? Does participation in martial arts improve self-esteem, and in still confidence in people with cognitive, developmental,

and/or physical disabilities? Can martial arts improve an individual's perceived quality of life through the development of physical and mental fitness? A survey questionnaire was used to gather relevant information. Results suggested that martial arts training does help improve physical functioning, especially in the areas of increased strength, balance, and stamina. In addition, survey respondents reported an increased sense of well being and overall improvement in quality of life. Implication for inclusion of individuals with disabilities in martial arts training was discussed.

Zazryn et. al., (2003) determined the rate and type of injuries occurring to registered professional kick boxers in Victoria, Australia over a 16 year period. Data describing all fight outcomes and injuries sustained during competition for the period August 1985 to August 2001 were obtained from the Victorian Professional Boxing and Combat Sports Board. A total of 382 injuries were recorded from 3481 fight participations, at an injury rate of 109.7 injuries per 1000 fight participations. The most common body region injured was the head/neck/face (52.5%), followed by the lower extremities (39.8%). Specifically, injuries to the lower leg (23.3%), the face (19.4%), and intracranial injury (17.2%) were the most common. Over 64% of the injuries were superficial bruising or lacerations. The nature of kickboxing, whereby kicking the opponent is the prime movement and the head a prime target, is reflected in the distributions of body regions most commonly injured by participants. Further research into injury patterns in different styles of kickboxing and the mechanism of injury occurrence is required. Exposure adjusted prospective studies are needed to monitor injury rates over time.

Lakes and Hoyt, (**2004)** examined the impact of school-based Tae Kwon Do training on self-regulatory abilities. A self-regulation framework including three domains (cognitive, affective, and physical) was presented. Children (N = 207) from kindergarten through Grade 5 were randomly assigned by homeroom class to either the intervention (martial arts) group or a comparison (traditional physical education) group. Outcomes were assessed using multidimensional, multimodal assessments. After a 3-month intervention, results indicated that the martial arts group demonstrated greater improvements than the comparison group in areas of cognitive self-regulation, affective self-regulation, prosaically behavior, classroom conduct, and performance on a mental math test. A significant Group × Gender interaction was found for cognitive self-regulation and classroom conduct, with boys showing greater improvements than girls. Possible explanations of this interaction as well as

implications for components of martial arts training for the development of self-regulation in school-age children are discussed.

Hamalaine et. al., (2005) presented Kick Ass Kung-Fu, a martial arts game installation where the player fights virtual enemies with kicks and punches as well as acrobatic moves such as cartwheels. Using real-time image processing and computer vision, the video image of the user is embedded inside 3D graphics. Compared to previous work, our system uses a profile view and two displays, which allows an improved view of many martial arts techniques. The author also explored exaggerated motion and dynamic slow-motion effects to transform the aesthetic of kung-fu movies into an interactive, embodied experience. The system is described and analyzed based on results from testing the game in a theater, in a television show, and in a user study with 46 martial arts practitioners.

Degoutte et. al., (2006) examined the effects of weight loss induced by restricting energy and fluid intake on the physiology, psychology, and physical performance of judo athletes. Twenty male judoka were randomly assigned to one of two groups (Group A: called diet, n = 10; height 174.8 ± 1.9 cm, body weight 75.9 ± 3.1 kg; they were asked to lose 5 % of their body weight through self-determined means during the week before the competition; Group B: called control, n = 10; height 176.4 ± 1.1 cm, body weight 73.3 ± 6.3 kg maintained their body weight during the week before the competition). A battery of tests was performed during a baseline period (T_1), on the morning of a simulated competition (T_2) and 10 min after the end of the competition (T_3). The test battery included assessment for body composition, performance tests, evaluation of mood, and determination of metabolic and hormonal responses. Dietary data were collected using a 7-day diet record. The nutrient analysis indicated that all the athletes followed a low carbohydrate diet whatever the period of the investigation. For the Group A, the food restriction (-4 MJ per day) resulted in significant decreases of the body weight and altered the mood by increasing Fatigue, Tension and decreasing Vigor. Dietary restriction had also a significant influence on metabolic and endocrine parameters and was associated with poor performance. After the competition, significant decreases of the levels in testosterone, T/C ratio, alkali reserve, and free fatty acid were observed in both groups, whereas the plasma concentrations in insulin, ammonia, urea, and uric acid were increased. In conclusion, our results suggest that the combination of energy restriction and intense exercise training, which causes weight reduction before a

competition, adversely affects the physiology and psychology of judo athletes and impairs physical performance before the competition. Our data are the first to demonstrate that a competition including five 5-min bouts induced the same changes of physiological and psychological variables and performance whatever the dietary intake (dietary restriction or not) during the seven days before the competition.

MA Bo, (2006) studies 61 male tae kwon do athletes from the team of Shanxi, Shanxi, Xi'an institute of physical education, Hebei, Heilunjiang and Fujian.4 indexes that effectively reflect male tae kwon dos' physical ability were selected from among 21 primary variables through questionnaire, principal components analysis and factor analysis, and evaluation model and evaluation criteria were established. This could help coaches in their training program for athletes' physical ability and selection of young talent tae kwon do athletes.

Franchini et. al., (2007) compare the morphological and functional characteristics of the male judo players of the Brazilian Team A (n=7) with the judo players of Teams B and C (reserves; n=15), and verify the association between the variables measured. Thus, 22 athletes from the seven Olympic weight categories were submitted to: a body composition evaluation (body mass, height, ten skin folds eight circumferences, three bone diameters and percent body fat estimation); the Special Judo Fitness Test (SJFT); maximal strength tests (one repetition-maximum, 1 RM, in bench press, row, and squat); and the Cooper test. One-way analysis of covariance was used to compare the groups. The relationships between variables were determined by the Pearson coefficient correlation. The significance level was fixed at 5%. No significant difference was found in any variable between them. The main significant correlations observed were between the following variables: VO_2max and number of throws in the SJFT (r=0.79); percent body fat and estimated VO_2max (r=−0.83) and number of throws in the SJFT (r=−0.70); chest circumference and bench press 1 RM (r=0.90) and in the row (r=0.80); and thigh circumference and squat 1 RM (r=0.86). However, there was no significant correlation between circumferences and 1 RM/kg of body mass. According to these results the main conclusions are: (1) the physical variables measured do not discriminate performance when analysis is directed to the best athletes; (2) a higher percent body fat is negatively correlated with performance in activities with body mass locomotion (Cooper test and the SJFT); (3) judo players with higher aerobic power performed better in high-intensity intermittent exercise;

(4) judo players with bigger circumferences present bigger absolute maximal strength.

Bell, (2008) reviews characteristics of resilience and various types of Asian martial arts and illustrates how Asian martial arts help to cultivate resiliency. Cultivation of internal energy (eg. chi kung), training the breath, meditative techniques and spiritual development, metaphors and models in Asian martial arts, and training 'heart' designed to enhance resiliency are mechanisms for how Asian martial arts cultivate resilience. Finally, a brief review of the health and mental health benefits of Asian martial arts is presented.

Tsang et. al., (2008) reviewed the health benefit of Kung fu. The aim of their systematic review was to assess the health effects of "hard" Kung Fu styles by performing electronic and manual searches of the literature. The aspects of health and the Kung Fu style examined varied between most studies in some cases; the martial art group consisted of practitioners of other martial art styles also. Of 2103 references identified, only nine papers were eligible and reviewed. All were observational studies, observing a range of health aspects possibly related to Kung Fu training or performance. Our findings suggest that there is no evidence that Kung Fu practice is associated with the prevention or treatment of any health condition. However, as a moderate- to high-intensity form of aerobic exercise, it may confer benefits similar to those attributed to other aerobic training modalities. However, this hypothesis remains to be tested in clinical trials. Physiological benefits (e.g., aerobic capacity and bone density) may be associated with long-term Kung Fu practice. Future research in this area should adopt experimental designs, clearly identifying eligibility criteria, testing and training protocols, and include health-related outcomes and documentation of adverse events, to advance knowledge in this field.

Zar et. al., (2008) discusses that performing exercises at a satisfactory level depends on physiological, anthropometric, psychological factors. These factors are found in many of the models which are used to analyze the performance in different exercises. The precondition for any progress is having physical abilities. Knowing the anthropometric and physiological characteristics of players in each type of exercise is the most important and effective factor in their performance. The purpose of this study is to survey the physical fitness of male Taekwondo athletes of the Iranian national team during the period from 2001 to 2005. This research is of the descriptive type. For this purpose we have examined members of the national team during the

period from 2001 to 2005, as a static society. The national team is composed of 10 member each year (N=10, M age=21 SD=1.78, M height= 172.06 SD= 4.68). Different factors of physical fitness and anthropometric characteristics were studied. Our findings show that the best records were registered during the year 2001 and 2002, while the worst ones were registered in 2005. Despite these facts, the fitness of the national team during these years has decreased.

Sterkowicz and Franchini, (2009) evaluate the reliability and accuracy of the Specific Physical Fitness Tests (SPFT); review the results of karate athletes who represent different weight categories, and who are at different stages of schooling; and establish grading criteria of physical fitness preparation. The research was conducted among 219 Kyokushin karate players, whose profiles were presented as mean ±SD and their main characteristics were the following: age 26.8±4.67 (19–39) years, body mass 75.2±8.35 (50–97) kg and body height 176.4±5.67 (160–196) cm. The value of the BMI amounted to 24.1±2.17 (17.9–29.4) kg/m2. All the subjects of the research had training experience of 10.5±3.71 (4–20) years and their degree of proficiency ranged from 4th kyu to 3rd dan. The physical fitness trials proposed by Story (1989) included: hip turning speed, speed punches, flexibility, rapid kicks, agility, and evasion actions. It was supplemented by a test of local strength endurance, composing a battery of the SPFT, which was implemented by first of the authors between 1991 and 2006. SPFT is characterized by high reliability and it can be used to diagnose the physical fitness preparation and monitor the individual results of training. It discriminates accurately competitors with different sports level and it is characterized by very high accuracy, it is correlated with the test results of motor general physical fitness abilities and coordination abilities as well as it is connected with the somatic build of the athlete. The performance classification table was developed on the basis of our research. Results obtained in SPFT were shortly discussed. The collected results of our research allowed us to come to, the conclusion the table can be applied not only to assess karate fighters, but also adepts in taekwondo, kick-boxing, ju-jitsu, hapkido or other mixed martial arts.

Singh, (2010) this is the dissertation thesis. It has been studied in the fitness parameter, which was only available to male players. It has been comparison among three male groups of Gatka players.

Bu et. al., (2010) summarize the evidence for the effects of martial arts on health and fitness, to show the strengths of different types of martial arts, and to get a more

complete picture of the impacts of martial arts on health, and also to provide a basis for future research on martial arts as an exercise prescription in exercise therapy. In this study searched for "martial arts" health and random in eight databases (n=5432). Randomized controlled trials and controlled clinical trials on the health effects of martial arts were included in the study. The final analysis included 28 papers (one general martial art, one kung fu, sixteen tai-chi, six judo, three karate, and one taekwondo). Among the disciplines of martial arts, tai chi was the well-studied, followed by judo, karate, and taekwondo. Research topics varied widely, and included health, injuries, competition, morals and psychology, and herbal medicine. Most found positive effects on health. Tai chi is no-contact, low-impact, soft body and mindfulness exercise, which has been widely adopted by elderly people and proven to be a beneficial health promotion exercise. Research on judo, karate, and taekwondo mainly focused on improvements to athletes' competitive abilities, rather than on health effects. We did not find any published randomized controlled trials or controlled clinical trials on aikido, kendo, sumo, kyudo, qi gong, or other disciplines. Since martial arts are widely practiced; their effects on physiology, morphology, immunology, and neurology should be further studied in order to help people to select the best discipline or style to accomplish their purposes. This necessitates categorizing and classifying the disciplines and styles according to their effects on different body systems and levels of contact, as well as standardizing evaluation criteria for martial arts. Martial arts as an exercise prescription can then move from an experience-based to an evidence-based treatment.

Tsang et. al., (2010) examined the efficacy of a six-month Kung Fu (KF) program on physical fitness in overweight and obese of adolescents. Subjects were randomly assigned to the KF or sham exercise (TaiChi, TC) control group. Physical measurements in cardiovascular fitness and muscle fitness occurred database line and after 6 months of training thrice weekly. Twenty subjects were recruited. One subject was lost to follow-up, although overall compliance to the training sessions was 46.7±27.8%. At follow-up, the cohort improved in absolute upper (P =.002) and lower (P =.04) body strength, and upper body muscle endurance (P =.02), without group deference's. KF training resulted in significantly greater improvements in sub maximal cardiovascular fitness (P =.03), lower body muscle endurance (P =.28; significant95%CI: 0.37–2.49), and upper body muscle velocity (P =.03) relative to TC training. This short-term KF program improved sub maximal cardiovascular

fitness, lower body muscle endurance, and muscle velocity, in overweight/obese adolescents with very low baseline fitness.

Miller, (2011) identifies correlations between general physical fitness (independent variable) and sports result (dependent variable) of junior taekwondo athletes. All the subjects n = 104 there were 62 male and 42 female juniors at the level of at least the 6th kup. The research was conducted with the use of the International Physical Fitness Test (IPFT). A sports result was defined by the place won at Polish Junior Championships in 10 weight classes. The analysis regarding the significance of differences between groups was done by means of one-way ANOVA variance. It was observed that a sports result in female junior taekwondo athletes was conditioned by the power of lower extremities, strength and endurance. In the case of males, however, it was not clearly determined what a sports result depended upon.

Fong et. al., (2013) divulges the Taekwondo (TKD) is a popular sport among adolescents, but the potential benefits of TKD training to young individuals are not well under- stood. The objectives of this cross-sectional exploratory study were to compare flexibility, muscular endurance, body composition, and simple reaction time between TKD-trained adolescents and controls. Twenty TKD-trained adolescents aged between 10 and 14 and 20 age-matched healthy controls were asked to perform five physical fitness tests: a sit-and-reach test, leg split test, skin fold measurement, one-minute curl-up test, and ruler-drop reaction time test. The results revealed no significance differences between the two groups in sit-and-reach distance ($p = 0.690$), leg split angle ($p = 0.789$), percentage of body fat ($p = 0.342$), or number of repetitions in the one-minute curl-up test ($p = 0.250$). How- ever, the TKD group had significantly faster re- action times in the ruler-drop test than the control group ($p = 0.005$). The results thus suggest that although TKD training may improve reaction times in adolescents, it may have little effect on flexibility, muscular endurance, and body composition (percentage of fat). TKD may be a suitable exercise for improving simple reaction time, but it may not be suitable for improving general physical fitness in adolescents.

Puri and Gaur, (2013) discover that both the IJF (International Judo Federation) and the IOC (International Olympic Committee) regulations require athletes to compete in set weight categories. Competitors are matched by weight divisions, thus players demonstrate relatively low levels of body fat with a high strength to mass ratio, and therefore the purpose of this study was to investigate the relation of body fats,

anthropometric factors and physiological functions of Indian female national judo players. The participants of this study were eight players of Indian Judo national team (age, 22.5± 2.4yr; weight, 66.01± 6.4kg; height, 165± 6.6cm).The physiological profile was composed of aerobic (maximal test) and anaerobic power (ergo amp test). For anthropometric and body composition profiles, height, weights, body fat percentage, body mass index (BMI), waist hip ratio (WHR) were measured. Correlations were found between weight and body fat percentage and WHR. However negative correlation was found between aerobic and anaerobic power. Also positive correlation was found between BMI and lean body mass. Finding has showed judo players in this study, were almost favourite in terms of aerobics power and weight. The judo players who presenting higher aerobic power present a better performance in high-intensity intermittent activities; judo players with larger circumferences present higher absolute maximal strength, but this relation was not significant when strength was expressed relative to body weight. While these variables do not necessarily predict performance in a sport where technique and tactics are essential elements for success, they may provide some goals for developing judo players.

Reishehrei et. al., (2013) investigates the influence of self concept and self-efficacy in martial and no martial athletics. This research was causal-comparative. The statistic community of this research was the martial and no martial athletics. A sample of 380 persons had chosen randomly. The research tools included: athletic self-efficacy, self concept tests. Both tests have high reliability and validity. The results showed that there was a significant relationship between confidence and martial arts ($r= 0.32$ $p<0.001$). Also, there was a significant difference between physical confidence of martial and no martial athletics ($t= 3.72$, $p<0.001$). Additionally, ethical confidence in martial athletics significantly was higher than no martial athletics ($t= 3.01$, $p<0/003$). Also, there was a significant difference between intellectual confidence of martial and no martial athletics ($t= 2.74$, $p<0.006$). In the same time, the findings showed that educational confidence of martial athletics was higher than other athletics ($t= 3.04$, $p<0.001$). But, there was no significant difference between social confidence of martial and no martial athletics. As the whole, exercise increases self concept and the sense of individual's self-efficacy, and improves individual's beliefs about himself and his dynamism in society. The findings showed that martial arts are effective in different aspects of self concept and

can provide a proper background to advance. Exercise in general has effect on improving mental health and self confidence. But martial arts can increase readiness and the ability of persons for more self confidence. Therefore, the martial arts from psychological view are critical and important.

Dijk et. al., (2014) assess the effect of hard martial arts on the physical fitness components such as balance, flexibility, gait, strength, cardio respiratory function and several mental functions in people over forty. A computerized literature search was carried out. Studies were selected when they had an experimental design, the age of the study population was >40, one of the interventions was a hard martial art, and when at least balance and cardio respiratory functions were used as an outcome measure. We included four studies, with, in total, 112 participants, aged between 51 and 93 years. The intervention consisted of Taekwondo or Karate. Total training duration varied from 17 to 234 h. All four studies reported beneficial effects, such as improvement in balance, in reaction tests, and in duration of single leg stance. In this study conclude that because of serious methodological shortcomings in all four studies, currently there is suggestive, but insufficient evidence, that hard martial arts practice improves physical fitness functions in healthy people over 40. However, considering the importance of such effects, and the low costs of the intervention, the potential of beneficial health effects of age-adapted, hard martial arts training, in people over 40, warrants further study.

Kayihan, (2014) aimed to knowledge about the physical fitness levels of adolescents according to sports participation: martial arts, team sports and non-sports. A total of 236 volunteers participated in this study: 84 martial arts athletes (16.57 years ± 1.06), 72 team sports athletes (16.61 years ± 1.16) and 80 non-sports participants (16.78 years ± 0.98) were investigated. According to AAHPERD and FITNESSGRAM batteries, valid and reliable tests were used to evaluate the physical fitness levels. Significant differences were found between the results of three sports groups for body weight, body mass index, body height, body fat, skin fold thicknesses, muscular endurance, flexibility and aerobic capacity ($p<0.05$). Muscular endurance and flexibility in the martial arts group were significantly higher ($p<0.05$) than in the team sports and non-sports groups. Body height and aerobic capacity in the martial arts group were significantly lower ($p<0.05$) than in the team sports group. The martial arts group had significantly lower body fat and skin fold thickness values ($p<0.05$) than the non-sports groups. The results of this study set forth the positive

effects of martial art training on health-related physical fitness for adolescents. Compared to non-sports participation, martial art has a more positive effect on muscular endurance and flexibility than team sports in adolescents. Therefore, these are important empirical evidence in order to martial arts in a wide range to promote the element of the physical education and the form of the physical activity in leisure time.

Ramesh kumar et. al., (2014) finds out the Influence of kalaripayattu skills with equipment training on selected physical fitness components namely arm strength, leg strength, maximum power, minimum power, average power and fatigue index among handball players. To achieve the purpose of the study thirty handball players have been randomly selected from various engineering colleges in and around Karur, Tamil Nadu in India. The age of subjects were ranged from 18 to 25 years. The subjects had past experience of at least three years in handball and only who those represented their respective college teams were taken as subjects. A series of physical fitness components was carried out on each participant. These included arm strength assessed by dip strength, leg strength assessed by 25 meters hopping test, maximum power, minimum power, average power and fatigue index assessed by running based anaerobic sprint test (RAST). The subjects were randomly assigned into two groups of fifteen each, such as control and experimental groups. The experimental group participated in the kalaripayattu skills with equipment training for 3 days a week, one session per day and for 12 weeks each session lasted 90 minutes. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups. The results of the study showed that there was significant differences exist between kalaripayattu skills with equipment training group and control group and also kalaripayattu skills with equipment training group showed significant improvement on arm strength, leg strength, maximum power, minimum power, average power, fatigue index and performance when compared to control group.

Schlaffke, (2014) discusses that physical exercises and motor skill learning have been shown to induce changes in regional brain morphology; this has been

demonstrated for various activities and tasks. Also individuals with special skills show differences in regional brain morphology. This has been indicated for professional musicians, London taxi drivers, as well as for athletes like dancers, golfers and judokas. However little is known about whether sports with different metabolic profiles (aerobic vs. anaerobic) are associated with different patterns of altered brain morphology. In this cross-sectional study investigated two groups of high-performance athletes, one group performing sports that are thought to be mainly aerobic, and one group performing sports known to have intermittent phases of anaerobic metabolism. Using high-resolution structural imaging and voxel-based morphometry (VBM), in this study investigated a group of 26 male athletes consisting of 13 martial artists and 13 endurance athletes as well as a group of non-exercising men (n = 13). VBM analyses revealed higher gray matter (GM) volumes in the supplementary motor area/dorsal premotor cortex (BA 6) in both athlete groups as compared to the control group. In addition, endurance athletes showed significantly higher GM volume in the medial temporal lobe (MTL), specifically in the hippocampus and parahippocampal gyrus, which was not seen in the martial arts group. The data suggest that high-performance sports are associated with changes in regional brain morphology in areas implicated in motor planning and motor learning. In addition high-level endurance sports seem to affect MTL structures, areas that have previously been shown to be modulated by aerobic exercise.

Anel et. al., (2015) studies the body composition and dietary intake of male Thang-Ta athletes of Huyen- Lallong and Thang-Ta training centres Irilbung, Manipur. 42 Thang-Ta male athletes (21 each from two training centres) who are undergoing training of Thang-Ta from Manipur were studied by using Tanita body composition analyzer, which is based on Bioelectrical Impedance Analysis method and 24 hour recall method in Dietary intake. In body composition, Huyen-Lanlong training centre athletes were having less in Body weight (49.22+ 5.35 kg) BMR (6206+307.37 kj) FFM (44.83+4.7kg) and TBW (32.33+3.70kg) then the Thang –Ta training centre athletes which was statistically significant ($P<0.05$). However, the food and nutrient intake of both the training centres athletes were less than the RDA. Both the training centre athletes body composition scores was similar to average athletes of today's sportspersons, but they have less intake of daily foods for energy as athlete.

Bak, (2015) resolves the issue whether combat sports and/or martial arts may be, according to the self-defence instructors, recommended as elements of health-related training? The study involved participants of self-defence course (n=30, including men n=28 and women n=2). The studied group consisted of 22 people who are teachers or students of physical education. The average age of respondents amounted to 26 years. All participants had experience in combat sports and/or martial arts and they have been practising such forms of physical activity on average for 4.5 years. They represented various types of combat sports and martial arts. This study uses the method of diagnostic survey with anonymous questionnaire as a research tool. The majority of respondents (63%) preferred recreational types of combat sports or martial arts. However, their reasons to undertake such physical activity included self-defence skills and high sports results. From the perspective of several years of experience, they believe that combat sports and martial arts had impact on maintaining high physical fitness and shaping personality. The majority of respondents (93%) think that combat sports and martial arts are an appropriate form of physical activity which may be used in health-related training. There are substantial grounds for recommending forms of physical activity considered as combat sports and martial arts as parts of health-related training with properly selected loads and the risk factor to health or life reduced to a minimum.

Bao et. al., (2015) establish the selection model for karate athletes ages 13-14 in Tien Giang province, Vietnam. 25 junior karate athletes ages 13-14 participated in this research. Using questionnaires for investigation the opinion of karate experts that to identify the indicators for selection karate athletes. Application the equation C scale to built up the criteria for selection and the multiple regression equation to predict the performance of karate athletes. The results showed that there were 23 indicators in five components such as morphology, function, general fitness, karate fitness, and psychology and too applied for selection male karate athletes ages 13-14 in Tien Giang province. They were body height (cm), difference of maximum and minimum of chest circumference (cm), leg length (cm), Achilles tendon length (cm), thigh circumference (cm), arms length (cm), arch foot (cm), signs of puberty, somatotype in morphology; Heart work (points), pulmonary volume (ml) in function; Cooper test, push-up 10s (pcs), maximal trunk extension (kg), arm grip (kg), 30m sprint (s), long jump (cm) in general fitness; Back hand punch 10s (pcs), 1800 turn back hand punch 30s (pcs), front kick10s (pcs), round kick 10s (pcs), 1800turn back

round kick 30s (pcs), fore hand punch10s (pcs) in karate fitness; Temperament test (808 scale) in psychology. It was also built the selection criteria and classification table of 23 indicators. The research was established the multiple linear regression equation to predict the performance of karate athletes ages 13-14 based on five components: morphology, function, general fitness, karate fitness and psychology: Y = -5.421 + 0.303X1 – 0.017X2 + 0.357X3 + 0.045X4 + 0.266X5. There were two components such as morphology and psychology that they were an independent factor significantly predicted performance of karate athletes with 62.5%, other components such as function, general fitness, karate fitness have little effect on the performance of karate athletes at the ages 13-14.

Bao et. al., (2015) reveals the most popular martial art in the world is Karate. Practicing karate consists of basic techniques (kihon), kata, and sparring or fighting (kumite) (Imamura, 1998). Nowadays sparring categories in karate tournaments follows the rule of competition of World Karate Federation. It is called non contact rule. Kumite training is one of important part of karate; it includes the execution of freely chosen defensive and offensive techniques applied against an opponent (Imamura, 2002). Kumite is a style fighting consists of explosive techniques by hands and legs separated by intermittent hopping movements that allow for rapid changes of body position (Iide, 2008). The modality of Kumite involves different muscular groups, with combined movements of explosive strength, suddent changes of accelerations and disaccelerations (Imamura, 1998). The attack and defence short duration techniques are characterized by performance with maximum intensity, interrupted by small intervals (Beneke, 2004) and make the modality comparable to an intermittent exercise (Ravier, 2006). Finding out an available athletes base on professional technically skill, physical fitness and physiological adaptation that have a crucial influence on sport performance, where genetic factors could be of considerable importance (Vaeyens, 2008). Ravier (2004; 2006) identified the effect on some test movement performance and the blood markers of anaerobic metabolism in different categories of kumite athletes so that suggest a valid kumite-specific test battery. The results show that power, speed, as well as the ammonia and lactate accumulation, could be sensitive enough to detect the difference in performance level. Finally, Blazevic (2006) determined the ‘motor structures’ that are strong relation for successfully in kumite competition and found that the most important abilities were power and speed. The literature reviewed above suggests that despite

the general importance of physical abilities and physiological characteristic for the objective of both selecting in sport and estimation of the training process (MacDougall, 1991; Sterkowicz, 2009), there is an apparent lack of data regarding the differences before and after preparative kumite training period in Vietnam's athletes. Therefore, within this investigation we evaluated the fundamental fitness and physiological performance of elite karate athletes. The expected results could be of importance not only for selecting in sport and training in karate, but also for designing discipline specific testing batteries for estimation of kumite athletes.

Murugan and kumar, (2015) investigate handgrip strength and reaction time in practitioners of silambam arts. The main objective was to examine handgrip strength (handgrip dynamometer) and reaction time in these participants by measuring simple reaction time (Yardstick reaction time scale) fifteen sedentary participants from rural students were selected for this study. Eight weeks of silambam training program were conducted to the subject, weekly five days from Monday to Friday on every evening 6.00 pm to 8.00 pm. The training group were measured the pre-test and post-test on handgrip strength and reaction time. Results indicated that there was insignificant in handgrip strength after eight weeks of silambam training. Results indicated that there was significant improvement in reaction time ($p > 0.05$) after eight weeks of silambam training. When compare with pre-test and post-test. Furthermore, the silambam participants have faster handgrip strength and reaction time to hand stimuli. These results are consistent with the physical aspects of the silambam arts.

Schwartz, (2015) evaluates health-related physical fitness in martial arts and combat sports practitioners. 935 adult, male practitioners of Brazilian jiujutsu, judo, karate, kung-fu, and taekwondo were evaluated using the fitness assessment tests proposed by the American College of Sports Medicine. Data were analyzed using descriptive statistics, correspondence analysis, and analysis of variance, with a significance level of 5 % in all analyses. Most subjects had a body mass index between overweight (karate, Brazilian jiu-jitsu and judo) and normal (kung-fu and taekwondo). Waist–hip ratio and body fat percentage indicated moderate risks for all groups. Regarding VO2max, the kung-fu group showed lower scores compared to the Brazilian jiu-jitsu and judo groups, although all groups were above average in comparison with the standard population. Furthermore, most practitioners were classified as below average concerning muscle strength in all styles, while the kung-fu group was rated

as poor. Concerning strength endurance all groups were classified as above average and the Brazilian jiu-jitsu group showed higher scores when compared to taekwondo and judo groups, the latter showing lower scores than the kung-fu group. Flexibility was classified as average in all groups, and the Brazilian jiu-jitsu group had lower scores when compared to the karate, taekwondo, and kung-fu groups, with this last one showing better results when compared to the judo group. Instructors should create strategies to improve muscle strength and body composition or practitioners should engage in other physical activities to achieve a better result in these components, the only ones not above average.

Sreedhar, (2015) reveals that silambam fencing is a martial art native to the soil of Tamil Nadu. It has been originated from 3000 B.C and practiced by the pre-historic Dravidian Tamils who were dwelling from the Mohan-ja-daro & Harappa regions and is still practiced today. Today the great martial art of Tamilnadu is just reduced to a demonstration art in public gatherings and folk art festivals despite the effort of many well wishers. The purpose of the study was to find out the effect of Silambam practice on body composition, cardio vascular endurance and explosive strength among college girls. To achieve this purpose of this study, 40 sedentary college girls were selected as subjects. The age of the subjects were ranged from 18 to 20 years. The subjects were further classified at random into two equal groups of 20 subjects each. Group - I underwent Silambam training for three days per week for sixteen weeks and group - II acted as control. The selected criterion variables namely body weight; BMI, lean body mass, percent body fat; cardio vascular endurance and explosive strength were assessed before and after the training period. The collected data were statistically analysed by using Analysis of Covariance (ANCOVA). From the results of the study it was found that there was a significant improvement in cardio vascular endurance and explosive strength; significant reduction in body weight, BMI, lean body mass, and percent body fat among the experimental group when compared with the control group.

Zago et. al., (2015) quantitatively investigate the motor strategies adopted by elite and non-elite karateka to maintain balance control in competition. The execution of traditional karate techniques (*kihon*) in two groups of elite Masters ($n = 6$, 31 ± 19 years) and non-elite Practitioners ($n = 4$, 25 ± 9 years) was compared assessing body center of mass (CoM) kinematics and other relevant parameters like step width and angular joint behavior. In the considered kihon sequence, normalized

average CoM height was 8% lower ($p < 0.05$), while CoM displacement in the horizontal direction was significantly higher in Masters than in Practitioners (2.5 vs. 1.9 m, $p < 0.05$), as well as CoM average velocity and rms acceleration ($p < 0.05$). Step width was higher in Masters in more than half of the sequence steps ($p < 0.05$). Results suggest that elite karateka showed a refined dynamic balance control, obtained through the increase of the base of support and different maneuvers of lower limbs. The proposed method could be used to objectively detect talented karateka, to measure proficiency level and to assess training effectiveness.

Singh and Singh, (2016) in this study entitled "Evaluation of health related fitness components of Gatka (The Sikh Martial Art) players in different age Groups" has an attempt made to evaluate the physical fitness of male member who participate in Gatka (Sikh marshal Art) so as to provide information about their physical fitness. Health related fitness parameters like Flexibility, endurance (cardiovascular), strength (arms), strength and muscular endurance, muscular strength and muscular endurance (arms and shoulders) were found to be values be 7.9±3.27 cm (8-14) 10.9±4.840 cm (14-18) 4.3±5.63 cm (18-25), 1558.26±119.47 meter (8-14) 1812.15±306.36 meter (14-18) 2009.63±621.82 meter (18-25), 20.3±6.73 (8- 14) 21.5±9.32 (14-18) 19.5±7.10 (18-25), 19.2±8.27 (8-14) 28±4.26 (14-18) 25.7±5.45 (18-25) and 2.2±2.48 (8-14) 8±4.49 (14-18) 6.6±3.23 (18-25) these components are flexibility, strength and endurance (muscular and cardiovascular). It is possible to judge the overall physical fitness of the individuals and conclude whether the result are significant or non significant.

Ghosh and Sebastian, (2016) find out the effect of Kalaripayattu exercises on motor components of national football players. To achieve the purpose of the study, sixty state football players were selected and they were divided randomly into three groups, each group consisting 20 players. The players were assigned to their responding groups such as kalaripayattu leg exercises group (KLEG), kalaripayattu animal posture exercises group (KAEG) and control group (CG). After assigning the group all the players were administered the tests on criterion variables which were considered as pre tests. The experimental groups were treated with kalaripayattu exercises for the period of 12 weeks five days a week and the control group did not participate in any training. After the treatment period was over all the subjects were administered the test on the criterion measured which was considered as post tests.The following variables were selected for the study such as motor component

variables namely Explosive strength, Speed, Cardio respiratory endurance and Flexibility. All subjects were tested prior to training and after completion of twelve weeks of training on the selected variables. To analyze the collected data, investigator used Analysis of Covariance (ANCOVA) to determine the significance of mean difference among the groups. The experimental groups showed significant difference than the control group after twelve weeks of kalaripayattu leg exercises and kalaripayattu animal posture exercises training in all the selected variables.

Marinho et. al., (2016) describes the morpho-functional characteristics of elite mixed martial arts athletes. Eight male Brazilian athletes (aged: 31 ± 5 years; training experience:5 ± 1 years;height:1.77 ± 0.05 body mass: 82.1 ± 9.6 kg) with national training experience were subjected to anthropometric evaluation to estimate body composition and somatotype, and maximal strength (1RM) in squat and bench press, abdominal and upper limb endurance, and lower limb power were determined. Body fat levels of 13.4 ± 5.6 %, lean mass levels of 69.6 ± 4.6 %, and mesomorphic component (6.4 ± 0.8) were observed. Athletes performed 42 ± 14 sit-ups and 37 ± 9 push-ups, and remained for 35 ± 10 s in the flexed-arm hang test. Athletes reached 2.19 ± 0.31 m in the horizontal jump test, and obtained absolute 1-RM values of 80 ± 15 kg and 68.5 ± 6.0 kg and relative values of 1.00 ± 0.2 kg/kg and 0.84 ± 0.10 kg/kg in bench press and squat tests, respectively. Results indicate body fat levels in accordance with other studies, high lean body mass, and a predominantly mesomorphic component. Abdominal and upper limb endurance was classified as excellent, while results of the flexed-arm hang test were similar to previous data. Mixed martial arts athletes' lower limb performance in the horizontal jump was classified as weak. Lower levels of maximal strength were obtained in squat and bench press tests.

Valenzuela et. al., (2016) explore that taekwondo is an Olympic sport characterized by the extensive use of kicking techniques which require a significant amount of explosive force and agility Valdes-Badilla et al. 2014; Perez-Gutierrez et al. 2015]. It is considered an intermittent-high intensity short duration discipline, in which the predominance of the aerobic and anaerobic systems is alternated [Campos et al. 2012; Bridge et al. f; Herrera et al. 2014; Matsushigue et al. 2009; Santos et al. 2011; Thompson, Vinueza 1991]. The aim of this study is thus to determine the effects of a 16-week multi-component training programme on the physical fitness of a group of young taekwondo athletes. A group of 22 well-trained athletes (8.8± 0.5 years old,

body mass 34.6 ± 6.7 kg, height 1.35 ± 0.1 m, and BMI 18.8 ± 2.7) was trained throughout the 16 weeks The training volume was divided in a constant ratio of 60% specific taekwondo training and 40% multi- component training. The multi-component training was divided into strength (10%), endurance (10%), speed (20%), agility (30%) and flexibility (30%) training. The athletes' performance in long jump, in the number of abdominal crunches completed in 30s and in speed-agility tests as well as their flexibility were measured before and after the 16-week training period. After the 16-week training period, an increase in long jump performance was observed in both the boys ($p<0.01$; ES=1.60) and the girls ($p<0.05$; ES=0.74). Likewise, improvements in the abdominal crunches in 30s test for both genders (boys, $p<0.01$; ES=1.50; girls, $p<0.05$; ES=0.89) were observed. Additionally, performance in the speed-agility test was improved in both the boys ($p<0.01$: ES=-1.37) and the girls ($p<0.05$; ES=-1.16). No significant differences were observed in the "sit and reach" test after the intervention. In conclusion, a multi-component training programme, in the initial stages of the sport, can be an effective way of improving physical fitness and consequently the performance of young taekwondo athletes in competition.

Witte et. al., (2016) studies demonstrate a slowdown in deterioration of cognitive functioning in old age through aerobic training. There is evidence that the combination of aerobic, balance, and coordination exercises leads to an improvement or maintenance of cognitive functions. Such age-related exercises can especially be found in East Asian martial arts. The purpose of the current study is to verify whether karate training for older adults improves cognitive functioning and, if an improvement can be found, which cognitive fields are influenced. Methods: Eighty-nine older women and men (mean age: 70 years) participated in this study. The participants were randomized into 2 intervention groups (karate group and fitness group, duration of intervention: 5 months) and a control group. All participants had to accomplish a cognitive test battery before and after the intervention. In a secondary study the karate group had an additional intervention for another 5 months. The results show that there is a significant improvement in motor reactivity, stress tolerance, and divided attention only after the 5-month karate training period. Additionally, the results of the secondary study indicate further improvements after 10 months. The 5-month karate training can help to enhance attention, resilience, and motor reaction time, but a training period of 10 months is even more efficient.

Douris et. al., (2017) quantifies and compares fitness levels of middle aged practitioners of Soobahk do (SBD; a Korean martial art similar to karate) with those of sedentary subjects. In these study eighteen volunteers, 14 men and four women (aged 40–60 years) participated. Nine sedentary subjects (mean age 46.7 years) and nine SBD practitioners (mean age 46.8 years) were matched for sex and age. All subjects participated in a one day battery of fitness tests. The following dependent variables were tested: body composition, balance, flexibility, quadriceps strength, grip strength, muscle endurance, and aerobic capacity. All dependent variables were analysed using paired t tests. Body composition (% body fat) for the SBD group was 18.9% v 30.8% for the sedentary group ($p = 0.004$). The SBD group was able to balance for 61.8 seconds v 26.2 seconds for the sedentary group ($p = 0.02$). The result for the sit and reach flexibility test was 22.3 cm for the SBD group v 10.4 cm for the sedentary group ($p = 0.01$). The number of push ups performed in one minute was 47.0 for the SBD group v 18.6 for the sedentary group ($p = 0.0003$), and the number of sit ups performed was 66.1 for the SBD group and 37.3 for the sedentary group ($p = 0.00006$). Aerobic capacity was 41.0 ml/kg/min v 31.1 ml/kg/min for the sedentary group ($p = 0.04$). Quadriceps strength was 99.5% (peak torque/body weight) v 83.0% for the sedentary group ($p = 0.02$). Only grip strength was not significantly different. There were significant differences between the groups for most of the physical fitness tests. The SBD practitioners displayed greater aerobic capacity, balance, flexibility, muscle endurance, and strength, and less body fat than the sedentary controls matched for age and sex. SBD can be considered an excellent form of exercise for the promotion of fitness in adults. Health professionals should be aware that there are alternative methods to traditional exercise that can increase the physical fitness and health of the middle aged population.

Podstawki et. al., (**2017)** determines the relationships between various forms of physical activities and anthropometric parameters and motor abilities of female students. Measurements took place at the beginning and at the end of the summer semester. It involved 303 first-year full-time female students. The body height, body mass and BMI of participants were determined. Thirteen motor tests were administered to assess motor abilities. The tallest and slimmer students chose martial arts and jogging followed by sauna, whereas the shortest students opted for aerobics and swimming. Students with higher body mass and higher BMI scores were more likely to participate in golf, aerobics, general Physical Education (PE) and swimming

classes. Students involved in martial arts, swimming and jogging scored highest in the majority of motor tests. The choice of physical activity (PA) correlated with body height; body mass, BMI and motor fitness. In most motor ability tests, a significant improvement in performance was observed in students who had opted for martial arts, swimming and jogging followed by sauna, which indicates that those activities had the most profound influence on the participants' motor fitness levels.

Zaggelidis, (2017) the specificity of the technical performance in judo and karate demands from athletes to perform fast and powerful actions at a high level, therefore, much importance is given to the development and supporting motor system, in particular, HGS function. Research aim was to determine the characteristic of maximal isometric HGS in Greek elite male judo and karate kumite athletes that may be important for competitive success in the aspect of age and BMI and identify any differences between these two compact sports. The studies were carried out in the competitive period of 2015 training cycles. The subjects were male judokas with mean weight 84.24 ± 12.38 kg and karateka's 76.63 ± 10.46 kg. Average BMI (kg/m2) was judokas 25.67±3.60 and karateka's 23.03±1.75. Research results showed that the HGS in dominant and nondominant hand in karateka's was 68.28 ± 7.3 kg and 63.28 ± 7.5 kg and in judokas 73.72 ± 7.85 kg and 71.34 ± 8.10 kg. karateka's had significant less stronger HGS compared to Judokas in dominant and no dominant hand, $t32 = -2.089$ and $p<0.05$ and $t32 = -3.016$ and $p<0.05$. Karateka's had significant higher differences between the two hands 4.94 ± 2.15 kg compared to judokas 2.38 ± 1.84 kg, $t32 = 3.722$ and $p<0.05$. The two groups had significant difference in BMI, $t32 = -2,771$ and $p<0.05$. Pearson correlation showed a significant correlation between HGS and BMI, $r=0.563$ and $p<0.05$. In conclusion judo and karate have different requirements and training methods due to the objectives and generally the technical training nature with judokas appearing stronger in the HGS compare to karateka's.

Literature Related to General traditional Martial arts in the world of Socio-Cultural Aspect

Looser, (2003) examines the martial arts in New-Zealand. It takes three approaches. The first is socio-historical, with a particular focus on the history and development of martial arts practice in New Zealand. The second is socio-cultural and is concerned with the characteristics of the people practising the various martial arts. The third is motivational and explores the reasons why people become involved in martial arts

training and why they continue. The theories of risk and the risk society, and popular or mass consumer culture are used to help explain, and provide a social context for understanding, people's motivations. In addition, the black belt is examined in terms of its symbolic nature and its role in motivating people to begin, and continue with, their training. The research participants were drawn from four different martial arts with prominent profiles in Christchurch, New Zealand. These were: Zen Do Kai Martial Arts, Seido Karate, Aikido and Tai Chi Chuan. The respondents· represented a range of martial arts experience, and included beginners, trainees with some experience and trainees with long-term experience/instructors. The study employed a mixed qualitative and quantitative research strategy. The chosen methods related specifically to the three approaches of the thesis. Documentary research was the dominant mode of enquiry for the socio-historical section. For the socio-cultural and motivational approaches, a two-stage data gathering method was used. General information was gathered initially by means of a questionnaire, while more specific information about trainees' personal experiences with their martial arts was gathered subsequently through semi-structured interviews. It was found that an extremely diverse range of people was drawn to the study of martial arts. The respondents identified a wide variety of reasons for beginning martial arts training. Their reasons for continuing training were almost always different from those reasons that led them to begin. Despite the respondents' various motivations, three underlying influences were particularly evident: popular culture representations of the martial arts; fears and anxieties arising from risk consciousness; and the myth of the black belt. As respondents progressed with their training, their perception of their martial art changed. Many began by thinking of their martial art as a sport, but, over time, gained an appreciation of it as an art form. Eventually, some came to understand their martial arts training as a way of life.

Cynarski et. al., (2005) uses of terminological instruments of the humanistic theory of Far-Eastern martial arts, the authors analyse the phenomenon of perception and adaptation of Asian martial arts in the West – particularly in Germany and the USA, in the perspective of culture and sport sociology. The paper discusses selected reports of authors undertaking humanistic reflection with reference to the phenomenon of martial arts. General tendencies in the martial arts practiced in the West were presented and detailed differences between American and Middle-European perceptions discussed. The ‘budo pedagogy’, as well as intercultural and intercontinental borrowings of budo leaders was emphasised.

McNamara (2008) examines the effect of modern marketing strategies upon martial arts activity in the United States. The concentration of the inquiry is twofold. How has marketing affected the economic activity of the martial arts business industry? How has marketing effect the martial arts culture? This paper begins with a historical analysis of the evolution of martial arts as a business practice involving the use of marketing to gain customers. Martial arts marketing practices have proven most effective when they are personal due to the geographic location of specific schools or the instructor-client relationship. Internet marketing is a synthesis of personal and mass marketing, providing readily available information in a client's home while offering to the martial school the potential audience of a large mass marketing campaign. Marketing has generated sufficient commercial interest in the field, transforming martial arts into a thriving business.

Angleman et. al., (2009) focused on modern self defence training as opposed to traditional martial arts instruction. Further, traditional martial arts training have been characterized by many as less useful for women than modern self defence instruction. However, no investigations have compared the effectiveness of these of these two approaches. Several misconceptions concerning traditional martial arts may explain why this form of self protection has not been unitized as often, or evaluated as frequently, as other method. This paper distinguishes traditional martial arts from modern self-defence training. Review research that has assessed behavioural outcomes of self-defence training strategies. Discuss factors of that influence perceptions and efficiency of such program. To assist in these efforts, in this study include the expertise and perspectives of an internationally recognized grandmaster in the Okinawan martial art of ShorinRyu Karate.

Flaherty, (2010) expresses the combat sport of Mixed Martial Arts (MMA) combines a number of diverse fighting styles including boxing, wrestling, jiu-jitsu, muay thai and judo. In the past five years, MMA has morphed from a fringe sport into the popular culture lexicon. MMA is now an internationally recognized mainstream sport, generating hundreds of millions of dollars in revenue annually. This rapid growth is due in large part to the efforts of the Ultimate Fighting Championship (UFC) – an American company whose name and events have become synonymous with MMA. Within a socio-political paradigm, the successful rise of MMA and the UFC in particular, offers an important point of comparison when considering select aspects of the American Empire. The popular culture status of

MMA offers insights into how an emerging sport contributes to the creation of social meaning; and how semiotic displays of sport are able to represent the cultural systems within a given society. MMA is a popular culture text that symbolically represents notions of power, hegemony, identity and capitalism within the American Empire.

Singh and Singh, (2011) in this research article, author has said that there is a relation between Sikh's heritage and Gatka. On the other hand, it has been said that there is a connection to the health of Gatka. Along with the religious aspect, in this article, there is a place of physical abilities in the religion and it is described in detail about how Gatka was adopted by the Sikh Gurus.

Vertonghen, (2011) reveals that a majority of the studies on the social-psychological outcomes of martial arts practice reported positive effects on several personality traits, though some studies referred to an association between martial arts practice and increased antisocial behaviour. The variations in these findings could possibly be due to the fact that most authors regarded martial arts as a unitary phenomenon and were primarily focused on measuring outcomes without considering the possible influence of contextual factors. Research regarding the underlying conditions that may explain these social-psychological outcomes is sorely lacking. The aim of this doctoral research was to determine and analyse the contextual factors that might have an influence on the social-psychological outcomes of martial arts practice among young participants. This should contribute to a better understanding of the true nature of these effects and will enable a more thought out and accurate approach when considering these outcomes. Based on the literature, these contextual factors are defined in this PhD study as (a) the structural qualities of the martial arts (i.e., type of martial art), (b) type of guidance, (c) characteristics of the participants and (d) their social context.

Vertonghen, (2011) analysed the views and experiences of 98 young martial artists aged between 8 and 13 years and practising judo, aikido or kick-/Thai boxing. Also, 15 trainers and 68 parents were involved to consider the type of guidance and children's social context. Based on the literature and findings of this study, two hypotheses were formulated: (a) "Youth participating in a hard martial art will be more inclined to adopt an instrumental (external) orientation towards their bodies, while youth practising a soft martial art will be more inclined to adopt an intrinsic (internal) orientation towards their bodies" and (b) "lower social class youths will be

more likely to choose a hard martial art, while higher social class youths will be more likely to choose a soft martial art". Finally, based on the results of this exploratory study and the classification system of Theeboom, De Knop and Wylleman (1995), a third hypothesis was also formulated. The traditional and sporting approach of martial arts practice will have more positive social-psychological effects than the efficiency approach.

Vertonghen, (2011) investigates the structural qualities of martial arts, the characteristics of participants and the social context. More specifically, it was examined whether the characteristics of young participants and the social context vary as a function of the type of martial art. In total, 477 youngsters aged between 11 and 18 years and practising aikido, judo, karate or kick-/Thai boxing, as well as 307 parents were involved in this study. Based on previous martial arts research, the characteristics of the young martial artists were related to their goal orientations, psychosocial behaviour and aggressiveness. The social context was measured by taking several social variables into account. With regard to the characteristics of the young participants, findings revealed that kick-/Thai boxers showed more physical aggression and conduct problems than participants of judo, aikido and karate. Furthermore, kick-/Thai boxers and judoka were more ego-oriented than aikidoka, whereas the latter were found to be more task-oriented than participants of judo and kick-/Thai boxing. Regarding the social context, it was found, as hypothesised, that young people practising kick-/Thai boxing were from a lower social class than participants in the other three martial arts. Hence, it was concluded that different martial arts attract different youngsters, which may produce different experiences and may have an impact on social psychological outcomes. As it is believed that the type of guidance might also have an influence on social psychological outcomes of martial arts practice, in chapter 4, different teaching approaches of martial arts teachers were analysed. Through the use of a qualitative design, 20 aikido, karate or kick-/Thai boxing teachers were interviewed as well as observed. Moreover, it was also examined how youngsters (N = 204) perceive the teaching approach of their martial arts teacher by taking the perceived motivational climate into account. In this study, empirical evidence was found for the classification system of Theeboom et al. (1995) (i.e., traditional, sporting and efficiency approach). In short, in a traditional approach, traditional aspects and pedagogically oriented aims are emphasised; in a sporting approach traditional aspects are still important, but martial arts are

considered rather more as a sport, and in an efficiency approach the focus is on competition and effectively performing a technique. Findings revealed differences in the teaching approach used by teachers of different martial arts (i.e., aikido teachers use a traditional approach and kick-/Thai boxing teachers an efficiency approach), as well as within one martial art (i.e., karate teachers use all three approaches). The results of this study also indicated that the participants perceived these teaching approaches differently. It was found that young martial artists within an efficiency approach perceive a more performance oriented climate compared to participants within a sporting or traditional approach. As in the literature higher perceptions of a performance climate are associated with more negative social-psychological outcomes, this might support the third hypothesis. In conclusion, this doctoral research has provided a better understanding of several contextual factors that might influence social-psychological outcomes of martial arts involvement by young participants. Although further research would be relevant to examine the interrelationships between these and possible other contextual factors, this study indicated that in order to formulate statements regarding outcomes of martial arts practice by young participants, the structural qualities of martial arts, type of guidance, participants' characteristics and social context have to be taken into consideration.

Kavour et. al., (2012) reveals the problem sport psychology research on martial artists and offers some suggestions for advancing our knowledge in this area of research and practice. First, the reviewed of the previous research in the field this research. Then we introduce "cultural praxis" as a theoretical framework that will guide our analysis. Finally, we engage sociological studies of female fighters in conjunction with the adopted theoretical lens to outline the limitations of sport psychological research with regards to the experiences of women. It seems that the majority of the studies have used the male athlete as the norm, while research on the female athlete remains limited and focused on "differences". Focusing persistently on gender differences, without drawing at all on genders theory reflects a gender bias, which seems to be engrained in sport psychology studies. Recent sociological studies have shed some light on the experiences of female martial artists, but have paid scant attention to the constantly changing locale in which female athletes operate. Here, we suggest "cultural praxis" as an intervention to gain insights into the behaviours, values, and emotions of the other sex athletes.

Kellet, (2012) discourses descriptions of fencing (schirmen) in German literature of the 13th and early 14th centuries mainly focusing on sword-and-buckler combat, in comparison with medieval fencing manuals such as Royal Armouries MS I.33 and the works of Liechtenauer and Talhoffer. What are the rules and restrictions imposed on fencing, and do these changes if the combat is undertaken for the sake of enjoyment or entertainment, or in the judicial combat? What penalties, if any, are applied to a fencer who breaks these rules?

Theeboom et. al., (2012) discuss the traditional Asian martial arts have often been associated with positive outcomes in youth. But despite the absence of empirical evidence, especially countries with a long tradition in martial arts (such as China and Japan) have reemphasised these pro claimed positive effects. A study was set up to investigate the way how contemporary Chinese youth experience distinct aspects of wushu, the collective noun for the Chinese martial arts. Data were collected among 150 youngsters (7–16 years) regarding, among other things, their views on wushu, the training sessions and their teacher. Data revealed that youth's experiences and views are not in line with the characteristics of wushu and its traditional teaching practice as described in the literature. In the present paper it is concluded that these youngsters seem to experience wushu as a modern sport, in which the focus is on learning technical skills rather than on ethical and spiritual cultivation.

Verelst, (2012) presents an accessible introduction to the emerging field of Historical European Martial Arts Studies (HEMAS) based mainly on Fechtbucher (Fight Books) as source material. It sketches some of the potential links to other fields in medieval history, as well as some of its methodological problems and possibilities. The crucial point made is that HEMAS (Historical European Martial Arts) present a totally new tool for and perspective upon research into European cultural transformations from VII AD to XVII AD. The point is illustated by means of a Renaissance example, the work and life of Gerard Thibault.

Cynarski, (2013) used the humanistic theory of martial arts and martial arts sociology, the author attempts to describe and explain the relationship between social stratification and martial arts. Author asks whether a person's position in the martial arts environment is, today, dependent on social background. Author asks: Who could practice with weapons, and which weapons, a hundred years ago? Who can study in the ancient fencing schools today? The analysis includes martial arts in ancient Japan, Europe and Brazil as well as today. He finds that positions originally went to

those in the privileged classes or social strata. Today, this does not matter. It can be concluded that there is simply a generational transmission of interest within families. Position in the martial arts, as in many other areas, is part of a person's long-term effort to determine their own position in society, or "position developed independently". Martial arts are part of the far-reaching democratization and leveling of society. Positions inherited from father to son arise only very rarely. This mainly now happens only in the ancient ancestral schools.

Dlouhy et. al., (2013) discusses the shaolin Kung Fu is a comprehensive and orthodox Chinese martial art which has often been surrounded by many superstitions and misinterpretations. The numbers of possibilities for its actual use are huge. The authors want to point out some inaccuracies and misunderstandings that have been passed down about this martial art (e.g. in some of its terms or the content of its training), that may discredit its importance and value. The main objective is to explain Shaolin Kung Fu from the perspective of the basic structure of its training and its relationship to other martial arts, and also to point out and highlight some as-yet unpublished inside information about this martial art.

Fong, (2013) exposes the martial art which includes a series of disciplines, schools and traditions are originated in China. Nowadays, it has become one of the world famous sports. This article will firstly give an introduction about Kung Fu (martial art) and distinguish between the "external/ hard" style Kung Fu and the "internal/soft" style Kung Fu, followed by highlight some of the characteristics that make external/ hard style Kung Fu unique. After reviewing the health benefits, including the physical, mental, and social benefits of external/ hard style Kung Fu, the author then give some basic ideas on training principles of external/ hard style Kung Fu and the recommendations on designing effective external/ hard style Kung Fu training programs.

Malmo, (2013) develops a reliable and valid social sciences instrument designed to measure the construct of Cultural Appreciation of Martial Arts. Data were collected from 114 adult martial arts participants. Study participants represented Taekwondo schools located in Arkansas and Filipino martial arts schools located in Arkansas, Missouri, Oklahoma, and Texas. Development of the instrument involved the use of an expert panel, a Q-sort, test retest reliability test, Exploratory Factor Analysis, and Cronbach's alpha. The study resulted in a 20-item, 3-factor scale that measures Cultural Knowledge, Cultural Sensitivity, and Cultural Awareness and is named the

Cultural Appreciation of Martial Arts Scale. Results indicate the scale is reliable and valid. Reliability for each of the three factors based on Cronbach's alpha were α = .962, .918, and .873 respectively. Initial validation of the instrument was established. However, further validation needs to occur. Future studies should be conducted with additional populations including other well known martial arts styles from countries such as Japan and China. The construct of Cultural Appreciation of Martial Arts could also be studied for its potential relationships to other leisure constructs. Study and instrumentation for other activities or endeavours that are associated with a particular culture would be another avenue for further study.

Channon et. al., (2014) discourses the late 1970s; social scientists have turned considerable attention to investigating martial arts and combat sports (MACS). In particular, this broad range of fighting disciplines has been shown to offer numerous avenues for scholarly enquiry into social change and personal transformation via processes of embodiment. Adopting a thematic structure, in this study assess the empirical literature in this area via four interconnecting categories pertaining to MACS and embodiment: body cultures, body pedagogies, the embodiment of gender and bodily harm. Following this review, identify several gaps in the existing literature, suggesting potential new topics and strategies for research connecting to the social world of physical culture more generally.

Fernandes's, (2014) study based in a 17 weeks internship in Icehearts, a NGO which promotes preventive social work for school-aged children through daily activities. In this period, a Brazilian Jiu-Jitsu (BJJ) project was implemented aiming to improve the socio-relational skills, self-confidence, self-concept and self-esteem of specific children. Exposure, observatory, and participatory methods were applied in order to recognize, with Icehearts' educators, four children who could benefit most from this project. The project consisted in weekly activities, twice a week, with BJJ for one hour period. Deliberate play, participatory, peer tutoring, and cooperative learning were methods applied during the sections. The analysis and evaluation are based on outcomes related to collective aspects, including social interaction, improvement of integration, and recognition of social position in a group. In short-term basis, it is possible to affirm that children have shown traces of improvement of self-esteem, self-confidence, and self-concept aspects. Therefore, this paper also permits to understand that professional guidance, clear social intentions and educational support are vital to accomplish the benefits that such project may offer as social instrument.

Singh and Singh, (2014) according to the author in this research article has been described as a sport of Gatka and its fitness aspect has been discussed. In this article, provided technical knowledge of the Gatka as well as its social and religious aspects have also been described.

Yu's, (2014) paper applies documents literature, on the basis of mathematical statistical knowledge, questionnaire survey, experts' interview and other methods to make analytic investigation on Chinese martial arts country status from two layers. The paper firstly uses Chinese martial arts documents research data, Chinese martial arts market industrial amount and other investigation data to make slight analysis of Chinese martial arts development and status, then goes deeper into analyzing Chinese martial arts from cultural value, fitness value, national policies and other aspects, so that analyzes Chinese martial arts country status, and further states its social responsibility. Research result shows that Chinese martial arts have important social values, it has important significances in promoting Chinese economic development, improving civil physical quality, cultural quality, spreading and carrying forward Chinese traditional excellent cultures, and enhancing Chinese soft powers so on; and meanwhile, Chinese martial arts national policies also further propel to Chinese martial arts development in present society, promote Chinese martial arts country status, and also put certain social responsibility on Chinese martial arts.

Aziz, (2015) explores the historicization of the rise of martial arts in urban, Black American communities during the Black Power Era. The Black Arts Movement's call to create economically and aesthetically independent institutions fostered an environment for African Americans to teach and learn martial arts inspired by East Asian and African influences. However, thus far, scholars have primarily used Bruce Lee and Afro Asian poly culturalism to historicize 20th century African American martial artistry. This scholarship has been valuable for demonstrating positive interethnic relations and drawing attention to African American participation in the martial arts. However, such work consistently uses Lee's popularity as the focal point for exploring the rise of martial arts practice in Black communities instead of the work of Black Power and Black Arts activists. By charting both Bruce Lee's rise in American martial arts and the rise of martial arts in Black communities, author contend that Black instructors who began martial arts programs in the 1950s and 1960s are the roots of martial arts participation in Black communities rather than

kung fu films stars such as Lee. By institutionalizing martial art spaces in Black communities, instructors like Shaha Mfundishi Maasi, who taught for the Committee for a Unified NewArk, provided Black Arts teachings that directly transformed community members' lives. While movies like those of Lee could inspire Black youth to improve themselves, it was these instructors who taught them self-defence skills as well as Black cultural knowledge and self-esteem. Many of these instructors had already established schools before Bruce Lee's rise to fame. Thus, the oral histories and primary documents examined here indicate that even though Bruce Lee inspired youth to study martial arts, they were able to do so because of martial arts spaces already established in their communities.

Bhunia, (2015) discusses the yoga is one of the most important nomenclatures of physical activities. The origin of Yoga is about 5000 years back in India. The Indian monks used to practice Yoga for spiritual development. The repetition of Om… Om… Om is not a ritual of the religion, but it makes the circulation of blood rush towards the skull. The experts say Yoga has three dimensional affects. Yoga can positively affects body, mind and spirit. Yoga is excellent for psychosomatic diseases. Psychosomatic diseases are those where body and mind are involved. Thus this culture has been widely accepted worldwide for global human resource development for its uniqueness of less requirement of space, time and no warm up and no cost for practices. In Yogic practices, there is a harmonious development of all the muscles of the body, internal organs, nerves and frame. Yogasana helps secretion of hormone from different glands in balanced condition, it regulates the blood circulation properly, it forms antibody to prevent diseases thus Yogasana makes the body strong. The Pranayam of yoga helps in breathing controls; this breathing control exercise gives extra energy to the heart and lungs. Meditation on the other hand through its practice helps us devotedly think something. Meditation of 5-10 minutes is really beneficial for the development of mind. The experts name few Yogasana and Pranayam for physical and mental health and advice for Meditation. Beside this, Traditional games and sports are part of intangible heritage and a symbol of the cultural diversity of our societies. They are different in nature and are of plenty in numbers worldwide. It is also raw form of many modern games and sports. Generally Traditional Games and Sports are indigenous in nature. Experts say it is one of the excellent ways to remain healthy, fit, well being, and recreate. Through

playing of these games human resource development is possible. However, Human resource development means improvement of working capacity.

Burkart, (2015) describes the oldest surviving manuscript in the tradition of the German martial arts teacher Johannes Liechtenauer, the ms. 3227a in the Germanische National museum in Nuremberg, is dated approximately to 1389. It provides the first known reference to a professional fencing instructor whose system influenced martial arts treatises for about 200 years. In this paper discussed several questions concerning the manuscript 3227a and its genesis. After a short summary of the research history of the codex, the problem of written communication about body techniques will be addressed. These written accounts face the challenge to transmit information about the practical knowledge of experienced fighters. However, following the works of Michael Polanyi, an integral part of these skills is bound to a subjective experience of movement and cannot be expressed explicitly by the use of speech or media. The key to understanding the described body techniques therefore rests on a form of tacit knowing that cannot be verbalised or depicted. Starting from this perspective, the studies of Jan-Dirk Muller on the communication strategies of medieval fight books (which use mnemonic verses, glosses and depictions in different combinations) gain a key relevance to understanding these attempts to describe body techniques. On the basis of a codicological autopsy of manuscript 3227a then argue that the codex first consisted of separate notebooks which were later bound together. The anonymous scribe seems to have used these notebooks to copy the mnemonic verses used in Liechtenauer's didactic system to preserve and memorize the concepts and techniques. The author then added his own comments in different stages of writing, sometimes correcting his former statements in the light of new insights. Therefore we do have a very early documentation of the intermixture of martial arts and academic culture and of the advancement of a martial arts practitioner in the late 14th century. These observations shed light on the development of late medieval fight books as a literary genre and underline the importance of a detailed dissection of the concrete fight book to determine its genesis, intended purpose(s) and the possible situations of reception.

Carter and Barber, (2015) present a political economic analysis of exploitation martial arts cinema through a study of ‘Brucesploitation’ - a sub-genre of martial arts films made primarily in the 1970s featuring look-alikes of the late martial artist and actor Bruce Lee. With reference to the production, distribution and licensing of key

films in this genre; we examine the relationship between exploitation cinema, home video in the 1980s, and western appetites for martial arts culture. This industry, which featured 'kung fu clones' like Bruce Li and Bruce Le, revealed a large (or perhaps undiscerning) international market for action films of this kind and consolidated a genre of films exploiting individual stardom, specifically Bruce Lee as a global icon. In this paper, the author explore the political, economic and cultural implications of satisfying such a demand and the ways in which the legacy of the 'kung fu clones' has continued to permeate movies and television shows around the world.

Chan, (2015) aims to introduce a style of martial arts that is not known nor written by many – the mo lei tau style; it is arguably invented, embodied, and popularized by Hong Kong comedian actor Stephen Chow through his films. Being a fan of Bruce Lee, Chow has always been interested in martial arts. However, instead of participating in serious fighting and training, he has developed his own style and ethos, by integrating Qi and the basic moves of martial arts into film narrative, in order to create a unique sense of humor. Author call such aesthetic as the mo lei tau (it means "being silly and pointless" in Cantonese) style. Since the early stage in his acting career, Chow has always been very active in adding his creativity in scripts. Importing the mo lei tau style of martial arts is one of the main contributions from him into popular Hong Kong filmmaking. Gradually, such style has become one of Chow's auteur signatures, which appear in almost every film that features him as a lead character. By introducing what mo lei tau style is through looking at different examples of Chow's creativity, this paper aims to argue that Chow's invention of a such new style demonstrates the mobility and circulation of a hybrid and global fantasy of martial arts. It will argue further that Chow has created and popularized a new connotation of martial arts, which it is very different from its original meaning and tradition. It questions, whether the phenomenon of martial arts has long lost its original meaning that it now only lives in a virtual state of cultural fantasy.

Channon and Matthews, (2015) addresses the broad question of how subversive constructions of gender might be articulated through and within contemporary combat sports settings. Conceived of here as activities primarily centred on preparing for and engaging in competitive, rule-bound fighting contests, 'combat sports' are sites which, in Western contexts, have long been conceived of as 'quintessentially masculine' pursuits, described as 'heterosexual male preserves' or

'bastions of masculinity' within otherwise 'feminising', gender-democratising societies. Within such a framework, women's (and gay men's) participation in combat sports have been seen to present specific difficulties, and yet also considered to hold possibilities for the subversion of heterosexist male hegemony – two themes which have recently begun receiving much academic attention. Attending primarily to the latter proposition, this presentation addresses the question of exactly how combat sport practices can be thought of as 'subversive' of gender, principally through discussing the potential for women's and men's participation in such activities to be interpreted in various, sometimes competing ways. The discussion will presuppose that gender exists through institutional, discursive, embodied and interactive dimensions, and will take shape around examples drawn from the presenters' various research projects and personal experiences, as well as critical commentary on the representation of gender within and around widely mediated combat sports events. The presentation will argue that while the possibility for gender subversion certainly exists within combat sports, claims as to the progressive potential of these activities must be tempered by attending to the numerous ways in which subversive impulses can be stalled, countered, or misrecognised in these settings.

Dom et. al., (2015) describes the martial arts involvement is often described in controversial terms. On the one hand, it is associated with negative effects to social and personal well-being and with the stimulation of aggressive and violent behaviour of those involved. On the other hand, however, there is a belief that martial arts practice can lead to positive socio-psychological outcomes. This paradox caused a public discourse on the value and legitimacy as socially accepted sports, often leading to a categorization between "good" and "bad" styles of martial arts. Empirical proof that this "good versus bad" perspective divides along the lines of specific martial arts styles is missing up until now. Consequently, the distinct moral and medical concerns regarding the effects of involvement in harder martial arts-combined with their increased popularity, as well as their perceived positive outcomes for specific target groups-had the consequence that policy makers and administrators often struggle with the regulation and organisation of full contact martial arts. Some of them have started to develop (or rethink) their policy concerning the regulation and support of these sports. By means of a case study this paper discusses some of the key issues regarding the regulation of full contact martial

arts (e.g., kick-/Thai boxing, MMA), which are considered to be problematic for (sport) authorities, and which confront sports policy makers in Flanders. These key issues are discussed from an organizational, pedagogical, ethical and medical, and governmental perspective. Furthermore, the different initiatives are described that Flemish policy makers have undertaken in response to the difficult issues related to full contact martial arts. Over a period of 17 months, a deeper insight into the organization and regulation of full contact martial arts in Flanders was obtained, using a number of means (i.e., document analysis, interviews with key witnesses, focus group discussions and observations of training sessions, competitions and events). This paper aims to highlight the need to develop a sound martial arts policy that can provide a legitimation base for the provision and organization of full contact martial arts, which have become increasingly popular in recent years.

Gehao's, (2015) in this research takes one of the primary contemporary icons of Chinese tradition – the popular practice of Tai Chi – and subjects its career in both China and the West, to a series of critical interrogations focusing on three main moments; the invention and (re)imagination of tradition, the practice's migration from China to the West, and its translation by its English practitioners. Based on ethnography in the United Kingdom it explores the contending understandings of Tai Chi among its British practitioners, both teachers and students. It explores the ways in which British practitioners' invention and translation of bodily sense such as rou (softness), xu (emptiness) and how these bodily senses shape the practitioners' understanding tai chi quan as a spiritual discipline rather than martial arts.

Gianni, (2015) explores a pedagogic trend occurring within Asian martial arts practiced in the "West", taking as a case study the Leung Ting lineage of WingTsunkuen. It compares the pedagogy adopted in South Korea to teach this traditional Chinese kung-fu system with teaching methods used in England, Germany, and Italy. The WingTsunkuen syllabus has been updated a number of times as various grandmasters have modified their pedagogies to fit a variety of purposes. Teachers attempt to remain loyal to the Chinese tradition while moderating their teaching methods to meet the desire of most students to learn practical self-defence techniques. Data for the initial comparison are drawn from historical and contemporary texts along with ethnographic field-work, including two years recent experience of participant-observation in WingTsunkuen classes in Seoul and long term past training experience in Livorno. This paper analyses the

comparative data and proposes reasons for the pedagogical differences between classes in Korea and Italy. It argues that WingTsunkuen pedagogical changes are the result of negotiating tradition with modernity in an attempt to provide an updated, efficient, and "realistic" course in self-defence, as preferred by the mass of students. Scholarly communities have also contributed scientific knowledge to this trend as martial arts classes have been adopted into the curricula of a growing number of institutions of higher education. No research has yet compared the pedagogies used in different classes of a single Chinese martial art. This article attempts to fill that gap in the scholarly literature of martial arts by providing a comparative theoretical model for researchers studying change in other martial arts. Martial art instructors may also find that this model will assist them in developing new training methods.

Hay, (2015) fencing manuals of the early modern period have undergone a resurgence of interest in recent decades thanks to the efforts of researchers and practitioners who have sought to recreate these fighting arts in a living context. Naturally, this can only be a hypothetical exercise as, in many cases, the lineage of these Western styles is extinct and so the recreationists must start from scratch, as it were. Yet beyond the sphere of recreation and what is, in effect, a very physical form of experimental archaeology, this paper seeks to demonstrate that these manuals and treatises are worthy of study not merely as historical documents but as works of both philosophy and literary merit, demonstrating, as they do, a clear ideological viewpoint as well as an engagement with the ideological and intellectual shifts of the Early Modern period. This, then, is also a study of a conflict between two very different approaches to controlled and systemic violence, as well as issues of national identity and a growing sense of what in the long term would become nascent modern nationhood, as well as a broader social, socioeconomic and cultural context within early modern England. The intellectual underpinnings of these texts demonstrate two differing ethical models and an attempt in both cases to integrate them into the context of Early Modern England. The two texts chosen for this initial study, namely, George Silver's Paradoxes of Defence (1599) and Vincentino Saviolo's His Practise (1595), not only contrast with one another, which was Silver's intention, but also demonstrate an engagement with humanistic and social concerns; we cannot detach these works from the literary and socio-political contexts in which they were written, nor would the authors have intended them to be.

Jizhen and Yingmei, (2015) provide the analysis of the current situation about the teaching of college Martial arts elective course, it is concluded that the students in our school "prefer Martial arts to Martial art lessons". Thus, in the reform of Martial arts teaching, some ways such as the dynamic practice of Martial arts basic skills, small group learning method and the explanation of the meaning of offensive and defensive actions are integrated used to change the organizational form of a class in order to encourage students to interact and participate in Martial arts classes with willingness. And at the same time, different evaluation grading systems are set and martial etiquette is reaffirmed to make students get psychological identity, thereby improving the quality of Martial arts teaching.

Stenius, (2015) aims to analyze the bodily constructions and productions within the MMA culture and especially the constructed human violence associated with the sport. Based on auto ethnographic participation in three Swedish MMA clubs, as well as shorter fieldwork case studies conducted in Hong Kong, Japan, Macau, Brazil, and the US, this thesis investigates the interrelationship between MMA, excitement, sensationalism, and the spectacular physical violence that stains the participants' bodies. Concepts taken from performance ethnography are applied to an analysis of what is reconstructed bodily. This is followed by an analysis that attempts to outline what body-violence means and how this understanding of the informants' bodies, as well as of the researcher's body-knowledge, reconstructs the definitions of MMA. A phenomenological approach to the concept of fighting is also included in relation to the MMA landscape. Thus, I present how the body learns the cultural enactments in fighting and how these forces shape the fighters' gender, habits, and way of resisting the discourse of critical opinions on MMA practice. Moreover, in trying to grasp the inner sense of MMA, I argue that the physical phenomenon of MMA is dependent on inter subjective engagement and on the control of one's inner coordination, which teaches a fighter how to deal with power, pain, suffering, aggression, and adrenaline flows.

Kavoura et. al., (2015) discuss the previous sociological research on women´s martial arts has revealed complex social structures and gender dynamics operating as obstacles in the development and wellbeing of the female athlete (e.g. Halbert, 1997; Hargreavers, 1997; McNaughton, 2012; Sisjord & Kristiansen, 2008). Feminist scholars have argued on the need of a progressive social change in the male domain of martial arts. Addressing the question of how this change could happen, this

presentation discusses (1) the strategies and (2) the social dynamics that can enhance female participation and career development in women's martial arts. Drawing on interview data with female athletes training in a Brazilian Jiu-Jitsu academy in Finland, we argue that women themselves can change their positioning in martial arts by integrating multiple strategies, such as building relationships, creating support networks, and taking responsibility in coaching and administrative issues. Moreover, besides the strategies implemented by female athletes themselves, specific social dynamics, such as a non-authoritative training environment that enables female athletes to make own choices and take the initiative can be beneficial for the development of women's martial arts. Concluding this presentation, we discuss implications for research and practice in the light of these findings.

Maofu, (2015) expresses that the administration played important role in the Wushu development but have not been studied historically as a collective entity. This article offers a way forward by developing a discussion with special emphasis on the history stages, characteristics and defects of the Chinese Wushu administration in the twentieth century. It argues that the administration of Chinese Wushu has experienced the process from desultoriness to centralization. Although both the folk Wushu organization and the government were involved in the management of Chinese Wushu and performed their functions in different historical period, in the middle of the Republic of China, the government has dramatically involved the management of Wushu that changed drastically the development of Chinese Wushu. To the late twentieth Century, the highly centralized power management system of Chinese Wushu management has been formed. It demonstrated some special features and characteristics on management. Meanwhile, the defects of the Chinese Wushu administration were discussed in the article.

Matthews, (**2015**) offers a wide-reaching overview of current academic research on women's participation in combat sports within a range of different national and trans-national contexts, detailing many of the struggles and opportunities experienced by women at various levels of engagement within sports such as boxing, wrestling, and mixed martial arts.

TraGiang, et. al., (2015) examine the motivation levels of students and evaluate the different in the motivation factors between male and female students toward participating in Martial Arts club at University of Social Science and Humanities – HCMC National University. The sample size in this study, 91 male and 65 female

students, was selected. Furthermore, Cronbach alpha and Independent t-test to analysis the data was used in this study. The results and discussions revealed that there were not significant differences between male and female students in 5 factors: Health and fitness, Recreational amusement, Sense of accomplishment, Social needs (Sig >0.05). But, only significant difference between male and female was found in item MF17 of Psychological needs factor. Especially, both of male and female students had low motivation in item "can boost my social status" of Sense of accomplishment factor. Thus, there should have solutions to satisfy students' motivation as well as their needs. For examples, coaches have to be caring, get close as well as encourage their students. In addition, they should praise and commemorate the students who have great effort in practising for them to see that practising Martial Arts in the club could increase their social status, within a narrow range though.

Wetzler, (2015) exposes the recent growth and integration of martial arts studies as a field of academic research raises fundamental methodological questions: Beyond attempts to define the objects taken into perspective, researchers should aim at a better mutual understanding concerning the sources that have to be studied, and the methods to be applied. Based on the experiences of the four conferences on martial arts studies held by the German commission Kampfkunst & Kampfsport (martial arts and combat sports), the lecture will argue for a comparative perspective on martial arts, and a poly-systemic approach to put the various meanings ascribed to a given martial art system into an comprehensible network. Among the most obvious/important dimensions of meaning in martial arts are the sportive, the violent, the per-formative, the philosophical, and the health care dimension; more dimensions could be found. In most cases, martial arts systems are defined by interplay of several of these dimensions. Consequently, the usefulness of a distinction between the terms 'martial arts' and 'combat sports' (or, further, 'self defence systems') shall be contested, and an alternative will be proposed, which tries to acknowledge the multifaceted character of martial arts. Possible objects of study include movements & techniques, weapons & material dimension, media representations, teaching methodology & training outline, myths & philosophies, individual self perception& social structures, and larger social context & cultural setting; they shall be discussed briefly. Once the dimensions of meaning and the physical/intellectual properties of a number of individual martial arts systems have been described, a comparative study can put them in perspective, thus helping to improve understanding of a given

system, of a cluster of systems, or of 'martial arts' as a cultural category sui generis. Methodological models for a comparative approach can be found in religious studies and can be transferred to the field of martial arts studies, mutatis mutandis, as the lecture will argue.

Yeates (2015) articulates the mindfulness meditation has become a widespread and influential set of concepts and practices within Western healthcare, education and neuro-scientific communities. However there are several limitations emergent in the rapid transition from the heterogeneous Buddhist spiritual and cultural context of origin, to secular set of techniques in the West. Perspectives on these limitations are shared in this presentation from two clinicians who are also martial artists working with enduring complex physical and mental health problems in the UK's NHS. Firstly the progressive disembodiment of mindfulness practices during their secularisation as psychotherapy techniques is explored, resulting in the restricted access/benefit of now predominantly sitting meditation practices to those with complex health conditions. A programme that uses Chinese martial arts movements, breathing practices and sequences to improve the accessibility of mindfulness concepts and benefits to these groups will be described. Secondly, the over-extension of mindfulness to many therapeutic mind-body practices within the Western lens is reflected upon, alongside the progressive loss of the original cultural and spiritual contexts of practices such as Tai Ji during their incorporation into Western healthcare. It is argued that these trends have inadvertently masked the unique applied potential of other ancient Eastern spiritual traditions. The Daoist concepts and practices of Flow (famously evangelised by Bruce Lee) and Neidan within Chinese internal martial arts will be shared as an example, together with their planned application within UK stroke rehabilitation.

Judkins and Nielson, (2016) explore the social history of southern Chinese martial arts and their contemporary importance to local identity and narratives of resistance. Hong Kong's Bruce Lee ushered the Chinese martial arts onto an international stage in the 1970s. Lee's teacher, Ip Man, master of Wing Chun Kung Fu, has recently emerged as a highly visible symbol of southern Chinese identity and pride. Benjamin N. Judkins and Jon Nielson examine the emergence of Wing Chun to reveal how this body of social practices developed and why individuals continue to turn to the martial arts as they navigate the challenges of a rapidly evolving environment. After surveying the development of hand combat traditions in Guangdong Province from

roughly the start of the nineteenth century until 1949, the authors turn to Wing Chun, noting its development, the changing social attitudes towards this practice over time, and its ultimate emergence as a global art form.“Martial arts was scorned by traditional Chinese literature, ignored by Western historians, and predicted to go extinct by Western and Chinese modernizers. However, as this book brilliantly demonstrates, late imperial and twentieth century Chinese history cannot be properly understood without it Wing Chun students will see the most definitive exposition of the roots of their art, historians will see twentieth-century China through a new lens, and martial arts studies scholars will see a high water mark and model in their field Martial Arts Studies.

Luo, (2016) drawing on positioning theory, this study investigates how the translator, based on a certain socio-cultural positioning, has reconstructed aspects of Chinese martial arts culture in the English translation of Jin Yong, with reference to The Book and The Sword. In so doing this study foregrounds the hold of positioning over linguistic and cultural production, and particularly how the translator, as opposed to a priori and fixed mode of positioning, can perform dynamic alternative positions even on the same issue, thus practicing an ethics of balance in translation. It also calls into attention the role of translation contributes to the reconstruction of Chinese national and cultural identity in the context of globalization.

Hoekstra, (2017) divulges the many martial arts are steeped in long standing traditions, both within the individual dojo, club or gym and within the art as a whole. This is part of what makes martial arts so successful. The ability to travel across the world and join a judo, aikido or karate class without speaking the local language is comforting. The practitioner will understand the warm-ups, frequently know the proper way to sit or stand and will have an idea of the class’s format. Despite these benefits, long standing traditions within martial arts can also lead to exclusion. Silent demonstration of techniques, for example, puts persons with visual impairments at a huge disadvantage while rigid conformity to specific kata can prevent people with physical impairments from participating. Similarly, teaching a child with ADHD requires a creative approach to discipline within the class. In a world where ever more people with disabilities are realizing their dreams of participating in sports, instructors need to change their teaching methods or risk excluding a valuable group of martial artists. In this presentation, we will discuss strategies for making the dojo, club or gym more inclusive. At the heart of this effort is insuring that the martial art

retains its value for the student. Inclusion does not simply mean allowing a person with disabilities onto the mat, but rather working within that person's abilities to participate to the maximum possible extent. We will use personal experiences of a person with a disability who has been both a student and an instructor. In addition, we will discuss how inclusive education strategies can be applied to martial arts.

Istas, (2017) states the physical education curricula have a long tradition in the history of the German public school system. Although military exercises and marching were part of German curricula long before Hitler's rise to power, martial arts – in particular boxing – were first introduced under Nazi rule in 1937. With the collapse of the Reich and the subsequent division of the remains of Germany, the national curriculum for physical education was replaced by a variety of different curricula. Whilst the curricula in the federal West German states did not include martial arts for several decades to come, the East German curriculum early promoted martial arts as an important feature of socialist education. In the West, martial arts were first reintroduced in the 1980 curriculum of North Rhine-Westphalia, which officially made judo and fencing optional subjects. In 1999, nearly one decade after the reunification of East and West Germany, North Rhine-Westphalia spearheaded a new wave of curricular revisions which led to an ongoing reconsideration of martial arts in all federal states.

Mroz and Honeycutt, (2017) stressed on the partner training exercises of the Chinese martial arts offer a unique matrix in which dance and theatre artists can develop physical and creative abilities. Damon Honeycutt and Daniel Mroz present a collaborative approach to martial partnering derived from TaijiquanTuishou and Shuai Jiao. In this practical research, martial arts are conceived of as a meta-discipline that informs the development of novel aesthetics in the performing arts. This presentation will also introduce a novel method for artistic research: originally proposed by performer MarijeNie, two artists use a single procedure to investigate their individual questions. Sharing a common research activity, each artist brings their own particular questions to the experience. In this instance, the sharing of martial partnering simultaneously allows the examination of the translational competence between art forms and expressive mediums as well as investigation of responsive physical play across a wide range of intensities from the subtle to the virtuosic.

Partikova, (2017) defined the Psychological collectivism as a tendency to internalize norms of people's in-groups and ability to understand hierarchy. Unlike the Hofstede's macro collectivism, psychological collectivism directs attention to individual rather than the society. It describes the way we organize relationships around our own. Chinese martial arts provide a unique environment for exploring psychological collectivism due to its strong concepts of sorted roles, such as student-master, community and transmitted philosophical influences. Is it therefore possible that psychological collectivism could be an important topic for traditional martial arts? Could it explain the functioning of foreigners inside such community and the acceptance of all its commitments? Psychological collectivism is moreover an actual topic for the sport field. Without surprise, it is said that sport teams should possess some degree of psychological collectivism to be more effective. But it nevertheless turned out that individual sports are not as individual as we thought. Indeed, close group mates can influence significantly not only the motivation of an athlete, but also the performance itself. Since individualistic and collectivistic attributes of self are likely sampled in separated cognitive structures rather than being dichotomous, the level of individualism and collectivism may therefore differ in various contexts. Thus, different environments would have different effects. Is martial art such salient environment to influence one's self orientation? And mainly what kind of impact would it have to the practice and theory of martial arts?

Porchet, (2017) communicates the martial arts, designated by the generic term *wushu* in Mandarin, can be observed in various forms in China nowadays. They can sometimes be observed as popular and/or professional sport practices, sometimes as political rhetoric, or in the entertainment industry through imagery mobilized by literary and cinema productions. Recently, this multiple presence can also be observed in new media such as video games, cartoons or online videos. It is characterized by a plurality of referents, as the combined use of body movements and as an explanatory model reflecting on various implications, which vary from one production mode to another. This research focuses on how representations of martial techniques and gestures, whether being executed by real practitioners or fictional characters, circulate from one medium to another, creating, conserving or dissipating their contents, according to particular modes, where the very idea of martiality appears in very different manners. What are the implications of this "body rhetoric"? What are its modalities? Using the theoretical and methodological framework of

Guillemette Bolens on the kinesic approach and the concept of circulation of forms defined by Basile Zimmermann, this research will focus on the modes of production and circulation of Chinese martial arts representations.

Thomas, (2017) describes the martial arts industry is experiencing immense growth, creating a highly competitive environment where challenges in attracting and retaining customers cause substantial losses and an inability to compete effectively. Customer memberships are the primary revenue source for fitness firms. Understanding buyer motivation is essential for marketing message creation and product development to attract and retain customers. The purpose of this qualitative, exploratory, single-case study was to investigate parent purchase motivation for children's martial arts classes and to document internal buying motives in order to address the problem of acquiring and retaining customers in the commercialized martial arts industry. The study sample consisted of seven parents, two instructors, and two owners. The data collection methods were semi structured interviews comprising open-ended questions. Interviews were analyzed using NVivo® qualitative analysis software to code and analyze themes. The semi structured interviews identified 10 themes. Three new themes emerged—ease of participation, alternative to team sports, and convenience. Study findings contribute to the theory of planned behaviour and theories used to predict purchase behaviour. Recommendations for practice include refinements of product offerings and marketing messages and the creation of a new market segment, resulting in customer alignment and increased ability to attract and retain customers. Future research is recommended to replicate this study in other geographies, to use the data gathered in this study to seed qualitative research studies, and to weigh the relative influence of the three types of behaviours influencing intention in the theory of planned behaviour.

Literature Related to Gatka

Singh, (1987) in this work entitled "Ethical Basis of Education in Adi Granth" Laid emphasis on the disciplined life in Sikhism. The author commented that disciplined life in Sikhism is based on the Education of mind, body and spirit. According to the author the body occupies a central place in Sikhism and healthy body leads to spiritual, moral and intellectual progress. As the human body is a Gift of God so it is not to be tortured by keeping fast sad following Ascetic practices.

Kahlon, (1989) has worked on, study of educational implications of the concept of man emanating from the Bani of Guru Nanak Dev. Author has discussed aims of life and its attainment, aims of education, Guru Nanak's views about life, educational aims, and methodology of teaching and role of a teacher in the thesis. Author has studied Guru Nanak's educational concept of the perfection of life. Guru Nanak's educational philosophy has great possibilities for the reconstruction of our present day educational malady. The author has described that Guru Nanak is primarily concerned with the inner aspect of man, at the same time he does not undervalue his physical life. Both physical and mental health is important for Guru Nanak. Author explained that man to Guru Nanak is essentially a spiritual being, but he does not underestimate the role of a body. The Guru regards human body as the abode of God because of the presence of spirit in it.

Nankanvi, (1995) in this work explained the Personality and achievements of the sixth Guru. The author mentioned that Guru Hargobind ordered his disciples to be perfect in physique, martial arts horse riding physical exercises swordsmanship and javelin throwing. The Guru himself used to play and watch wrestling and martial art.

Singh, (1996) has described some aspects of historical development from Guru Nanak to Guru Gobind Singh. The author mentioned that in 1540 Guru Angad Dev Ji established, Akhara (arena for wrestling) for exercise and wrestling. In 1673 there was full arrangement of horse riding and martial arts training for child Gobind Rai' Bhai Bajar Singh Shahdara arranged all these activities. In 1679 the Guru laid emphasis on the training of martial arts, archery, horse riding, Gatka and physical exercise.

Gobindpuri, (1996) has discussed the life of Guru Hargobind and his training. He has remarked that Bhai Paraga Ji and Bhai Ganga Ji taught martial arts and horse riding respectively to the guru. Guru continued to learn martial arts till the age of eleven.

Bassen, (1997) in this work commented upon the life and philosophy of Guru Hargobind Sahib. Guru Arjun Dev gave the responsibility of the training of Guru Hargobind to Baba Budha Ji. Author says Guru Arjun dev pointed out that Baba Budha Ji himself taught riding, swordsmanship, archery, shooting and martial arts to the child Hargobind.

Singh, (1998) in this article stated that competitions were organized at Anandpur Sahib to encourage various sports. This tradition encouraged the Sikhs to be healthy in mind and body

Gill, (1999) has explored the life sketch of Guru Gobind Singh. He has described the early career of Guru Gobind Singh at Anandpur Sahib and commented upon how he grew up and learnt the art of horsemanship, archery and shooting. This became the daily routine of Guru and his disciples. From here and there Sikh groups used to visit Anandpur sahib. Gurus engaged them into training of shooting after breakfast and in the evening horse races were arranged. Guru encouraged all the participants.

Singh, (1999) according to the author this work explained the short life sketch of Sikh Gurus in general and Guru Gobind singh in particular. The author asserts that the Sikh gurus demanded the whole development of their follower, personality-physical as well as intellectual attitude.

Raina, (2000) in her work entitled "conception and aim of education according to guru nanak" has expounded the concept of education, its aim and self-realization. She pointed out of education, its aim and self-realization. She pointed out that in sikh philosophy knowledge helps in the harmonious development of body, mind and soul which she terms the harmonious development of personality, the author also commented upon the relation between education and body. She has described that the education is essential for the enlightment of body, mind and soul.

Singh, (1950) has described the relationship between body and mind development and the use of arms in the Sikh way of life. He has also stated a few segments about the martial spirit of conventional festival Holi to Hola Mohalla, horsemanship, physical feats and exercises, feats of Power and skill, sports and games, martial display and fully dressed mock war.

Macauliff, (1963) has explained in the volume of the History of the sikh religion that in Anandpur Sahib after daybreak Guru Gobind Singh gave his Sikhs divine Instruction and then practiced martial exercises. In the afternoon He along with his Sikhs used to go for shooting, horseracing, archery and gatka. The Guru used to feel delighted to wear uniform and arms. He enjoyed Himself in the and practice and induce others to practice archery and musket shooting. In Paonta Sahib, the Guru's troops used to do some fencing, practicing arch others were involved in Martial exercises in their daily routine.

Gill, (1967) according to the author in this book has described the early career of the tenth Guru Gobind Singh. The author enumerates the training process of Guru Gobind Singh in the field of martial arts. The Guru learnt and ordered his disciples to learn martial sports. In Paonta Sahib, there was daily routine of martial games and the town became the training camp.

Singh, (1967) described that guru angad dev ji established second centre of power and motivated his Sikhs to perform wrestling. Guru Arjan Dev Ji was also interested in horse and encouraged his followers to trade in horses. Guru Hargobind Sahib opened martial training centers at various places in which he prepared horse riders, wrestlers and fencers. Guru Teg Bahadur was a fine sword player and tenth Guru was an ace archer, shooter, fencers, horse rider, and the same attainments he wanted from his followers.

Singh, (1973) has discussed the life sketch of Guru Gobind Singh and mentioned the historical importance of various incidents, which happened during his life. He has disclosed that guru Teg Bahadur Sahib arranged training for horse riding, swimming, archery and javelin throwing.

Singh, (1974) in this publication has summed up the Philosophical aspects of Sikhism, The author has stated that the Sikh gurus while adopting efforts, to lift the moral of the masses also devised new and unique means to make them physically strong.

Sachdev and Singh, (1975) have explained some fragments of the life of Guru Gobind Singh. They have remarked that after receiving Gurtagadhi, the Guru took keen interest in riding, javelin throwing and Gatka. The author has narrated that the Guru became an expert in shooting and archery at the age of 15 and he used to undertake Boating, Kabbadi, horse riding, shooting, archery and martial art.

Mann, (1975) the education of Guru Tegh Bahadur was not only oriented to scriptures but also towards martial arts. The Guru used to practice archery, riding, shooting, swordsmanship and Gatka (stick fighting) which were very popular at that time.

Byng and kapadia, (1976) in their work explained some fragments historical development of Sikh sports and exercise culture. They concluded that the sixth Guru al s valued fine physique and healthiness, both of mind and body.

Johar, (1976) author explain in the work emphasized the philosophy of life given by Sikh Gurus. He has described that Guru Angad special stress on physical fitness and

his disciples took part in and competitive games after the morning service. The wrestling arenas were opened in each community centre. The sixth Guru himself learnt the use of offensive and defensive weapons, besides riding, hunting, wrestling and many other sports. He grew up to be an all-round trained man, healthy and strong in body and mind as well as saintly and enlightened. He disclosed that at time of tenth guru, poetry was wedded to martial music. In a short span of time people were imbued with a martial spirit. The guru started different types of sports and games for his followers to enable them to build themselves up both physically and mentally.

Sodhi, (1977) has describes life sketch and philosophy of Sikh Gurus. He has described that Guru Angad Dev had done a great work to improve the physical aspect of life. The Guru laid special stress on physical fitness and ordered his disciples to take part in drill and competitive games after the morning service. The author also narrated that Guru opened wrestling arenas in each community centre. He has discussed the various games started by the Sikh Gurus. The indoor and outdoor games such as wrestling, shooting, horse riding and many other sports were very popular in the Gurus' time. The main emphasis was on the all round development of an individual. Martial music was started. The tenth Guru, Guru Gobind Singh started different types of sports and Games for his followers to enable them to build them up physically, socially, morally and spiritually.

Singh, (1976) has engrafted Guru Hargobind used to encourage physical training, wrestling, Gatka, Horse-riding and Swordsmanship in daily routine. In a very comprehensive and Detailed study on the life of Guru Tegh Bahadur, Saran, (1978) maintained that guru Tegh Bahadhar was fond learning horse riding and shooting.

Gandhi, (1978) in history of the Sikh gurus, has described the physical culture of Sikh gurus. He claimed that side by side with the organization steps, the Sikh gurus paid full attention to body and physical exercises. He emphasized that the gurus were fully aware of the spiritual, martial and physical development of their Sikhs. He has spiritual, martial and physical development of their Sikhs. He has discussed the training of Sikh gurus by Baba Budha ji, in the field of martial arts and physical developments.

Singh, (1981) the author give details in this book entitled “A history of Sikhs” has described that Guru Angad dev was very keen on physical fitness. He ordered his followers to take part in drill and competitive games after the morning service. He

commented that the sixth Guru trained soldiers and spent much time in martial exercises. He wrote that Guru Gobind Singh learnt to ride and shoot under the supervision of his father.

Manuskhani, (1982) in Aspects of Sikhism published by Cooperative lndustrial Society Ltd., New Delhi, has revealed that guru Angad dev paid full attention to the health and well being of his followers. He set up wrestling arenas and centres for games, sports and physical exercises.

Singh, (1986) author clarify in this work has emphasized the socio-economic and religious political fundamental of Sikhism. He has described the significance of physique in Sikhism. He has explained that there is no space for weakness in moral character and Physique in Sikhism.

Dhillon, (1988) author make clear in this work entitles, Sikhism Origin and Development has pointed out that physical activity took great importance in the hands of Guru Hargobind Sahib. The author has commented that Guru used to enjoy wrestling bouts at Sri Akal Takhat. He has discussed various aspects of martial activities, Miri-Piri and militarization.

Virdi, (1992) has thrown some light on the Sikh Olympians and internationals. He has explored in detail that how Sikh gurus prepared their Sikhs to be strong and sturdy, agile and alert. He has discussed the doctrine of Sikh sports and various places associated with Sikh sports and games.

Dhillon, (1997) has described that Guru Angad Dev laid great Importance on the proper education for children. Apart from the studies, Guru Angad Dev Ji realized that they should also be physically strong and insisted that they should take part in sports. He asked their teachers to organize competitions and he himself gave away prizes to the winners. He said that physical fitness was Necessary because healthy mind can live only in a healthy body. As soon as the child Hargobind could walk he was put in the charge of special teachers who taught him riding, sword, fencing, wrestling and boxing. By the time Hargobind Sahib was ten years old and he was well on his way to mastering all the skills.

Singh, (1999) has discussed the life style of Sikh Gurus. He says that's ports act activities were part of the daily routine at the time of Sixth Guru. He has mentioned that the early, morning, all the Sikhs would come out in an open space between Sri Harminder Sahib and Sri Akal takhat, where they would drill and practise the use of various arms. There were wrestling bouts also. The Guru gifted the sikhs with martial art of gatka (sword practice with wooden swords or sticks).

Singh, (1999) has give explanation in this work entitled, philosophy of Guru Tegh Bahadur and its Contribution to Modern Indian Education has explored that the Sikh Gurus tried their best to transform their disciples into a spiritually, socially, physically and morally sturdy people. The author has studied the Bani of Guru Tegh Bahadur and revealed that according to Sikhism the education should lead to intellectual, spiritual, moral, cultural, emotional, aesthetic and physical development of the individual.

Singh, (2002) author described in this article has the life sketch of Guru Gobind Singh and mentioned that the Guru Paid full attention to mental and physical strength. To induce physical strength, swimming, horse riding, wrestling and physical exercise were encouraged. During Hola Mohalla Martial arts in AnandPur Sahib were made for fifteen days.

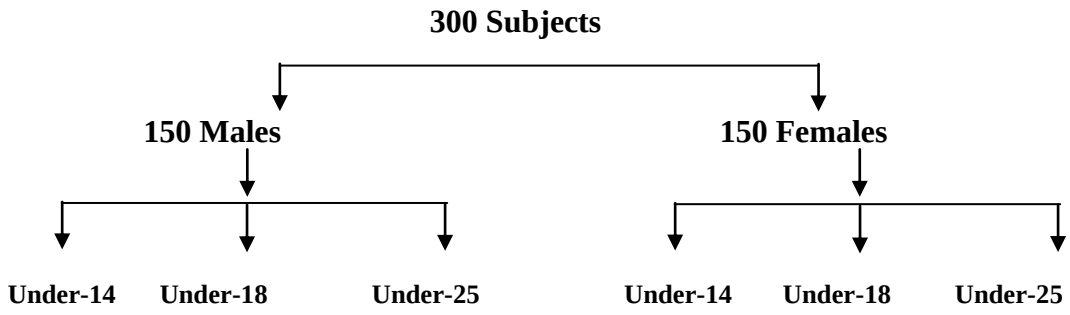
Chapter 3

MATERIAL AND METHODS

The primary objective of the study was observed and analyse the Martial art of Gatka from physical fitness and motor fitness aspects. Furthermore the study was also aimed at evaluating the role and influence of the socio-cultural aspects on the performance of Gatka players. The approach, methods and techniques used to attain these aforesaid objectives have been thoroughly mentioned below. This study has been done throgth empirical methods i.e. both observational and experimental. The observation part had been completed with general random survey method and that of experimental parts had been done with standardized batteries.

Selection of Subjects

The focus of the study was to evaluate the physical fitness of the Gatka players along with finding out their motor fitness. The prime part of the study was investigated through empirical methods and techniques to make the study scientific, precise and objective. The subjects for the study were taken from the major Gatka training centers (Akharas/Institutions) of the north India known for the Sikh Martial Art skill training centers. There were a total 300 subjects from different age groups under-14 (8-14), under-18 (14-18) and under-25 (18-25) 50 each of males and females.



The data was taken from Punjab, Haryana, Delhi and Himachal Pradesh state because the Gatka playing groups had been available in these four states of north India. The secondary part of the study observing and examining the Martial art of Gatka from Social and cultural viewpoint was conducted with the help of literature and questionnaire made for interviewing the people. The questionnaire was made for the evaluation socio-cultural aspect of Sikh Martial Art Gatka. The physical and motor fitness was taken with the help of standardized test batteries available.

Selection of variables

Keeping in view, the feasibility criteria and the relevancy of the variables of the present study, various anthropometric variables, components of physical fitness variables, components of motor fitness variables and socio-cultural aspect have been studied. The selected variables are furnished hereunder.

Anthropometric variables

Anthropometric variables like age, body weight, body height and body mass index (BMI) were evaluated. The anthropometric variables and their units are presented.

1. Age - Years (yrs.)
2. Body Weight - Kilogram (kg)
3. Body Height - Centimetres (cm)
4. Body Mass Index (BMI) - Kilogram/meter^2 (kg/m^2)

Physical fitness variables

The physical fitness variables include body composition, cardiovascular endurance, flexibility, muscular strength and muscular endurance (arms and shoulders) and strength and muscular endurance (abdominal). The physical fitness variables and their units are presented.

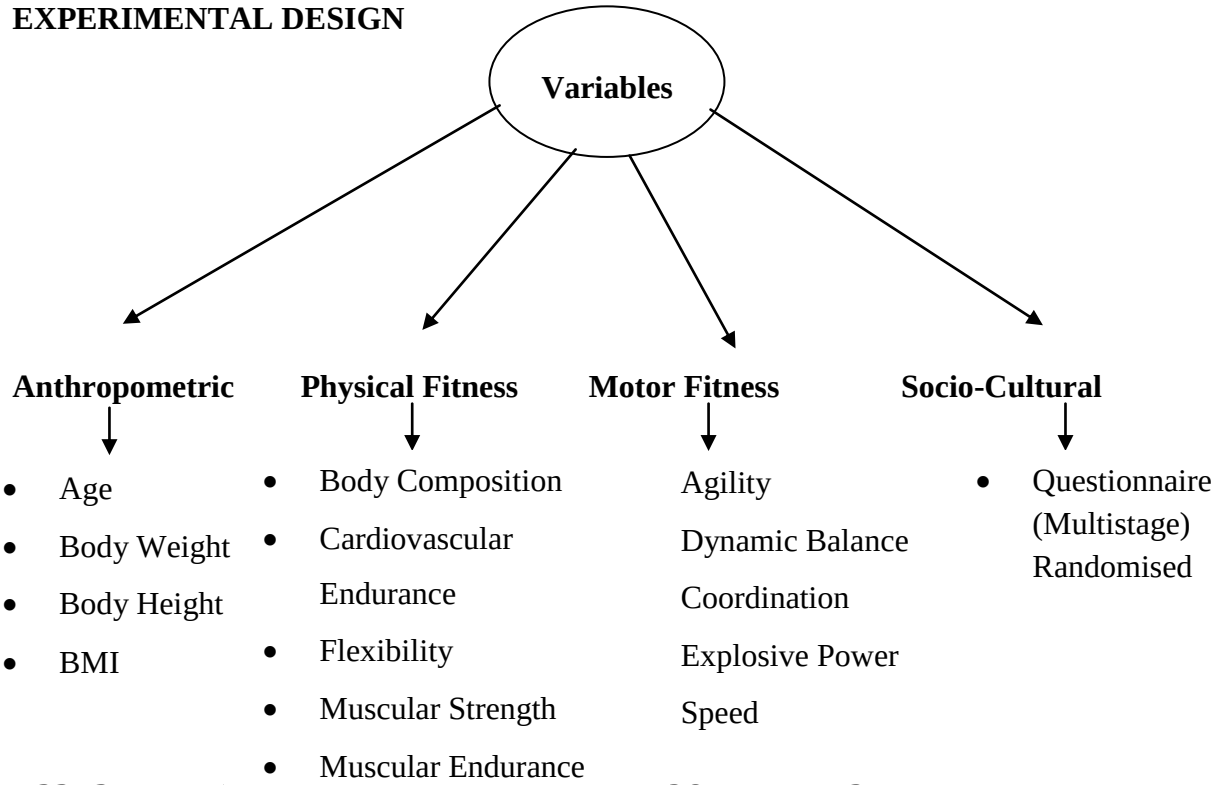
1. Body Fat % - Percentage (%)
2. Cardiovascular Endurance – Score (no.)
3. Flexibility - Centimetres
4. Muscular Strength and Muscular Endurance (Arms and Shoulder)–Score (no.)
5. Strength and Muscular Endurance (abdominal) – Score (no.)

Motor fitness variables:

The motor fitness variables include agility, dynamic balance, coordination, explosive leg power and speed. The motor fitness variables and their units are presented.

1. Agility - Seconds (sec)
2. Dynamic balance - Score (no.)
3. Eye-foot Coordination - Seconds (sec)
4. Explosive leg power - Centimetres (cm)
5. Speed - Seconds (sec)

EXPERIMENTAL DESIGN



Age (years)

All the demographic details of the subjects including name, age, address etc. were noted on the recording performa.

Body Weight (Kg)

The body weight of the subject was taken on a standard electronic weighing machine, having accuracy recorded to the nearest 50gm. The subject was examined in clothing of known weight in order to record nude weight and 12 hours after the last meals, and after voiding. The subject stood at the centre of the weighing machine looking straight. The body weight was recorded to the nearest kilogram.

Body Height (cm)

The body height was measured by the Anthropometric-rod. The subject stood barefoot, and erect with heels together and arms hanging naturally by the sides. The heels, buttocks, upper part of the back and the back of the head were in contact with the vertical wall. The subject looked straight ahead and took a deep breath during measurement. The distance from the standing platform, to the highest position of the Head (vertex) was measured as body height with the help of Anthropometric-rod. The height was recorded to the nearest centimetre.

Body mass index

Body mass Index corresponds to the relative fatness of the body. The body mass index was computed as body weight in kilograms divided by square of height in meters. The measurement unit of BMI is Kg/m^2.

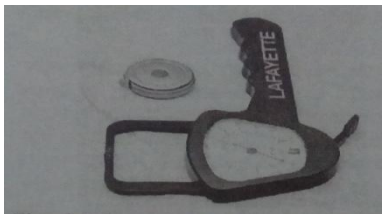
Body Mass Index = $\frac{\text{Body Weight (Kg)}}{(\text{Height in meters})^2}$

ASSESMENT OF PHYSICAL FITNESS

Body composition

The direct measurement of body composition in living human is not feasible, so various models for indirect estimation of the constituents of the body have been developed. Measurements of body composition provide sensitive indices of body fatness and therefore, a mean of describing relatively subtle changes in energy balance, which may have the potential influence on performance or in the longer form healthy life. Body Mass Index, percent body fat and total body fat with skin fold method was used to measure body composition in the present study.

Percent body fat



Steel Tape and Skin-fold Calliper

A Harpenden skin fold calliper was used to assess the body, fat percentage. The instrument consists of accurately calibrated dial which indicates the thickness of the skin fold in millimetres, when the skin fold is held by the opened jaws (Siri, 1961). The right side of the body was used to determine the percentage of the fat. The thickness of the skin and the subcutaneous fat was grasped between the thumb and index finger and the measurement was taken to the nearest millimetre from four different sides of the body, using the skin fold calliper. To estimate the errors, the reading was made between three to four seconds, when essentially all compression has taken place and the measurements were established. If this precaution was not taken, the skin fold would have gradually decreased because of the tissues being squeezed out, from the jaws of the calliper. The skin fold measurements were taken at the following four prescribed sites of the body and the addition of these four skin fold values led to total skin fold value.

Biceps

The skin fold was measured by raising a vertical fold at the Biceps muscle of the arm. The subject stood with the arms hanging down freely.

Triceps

The skin fold was taken on the posterior surface of the arm, 1 cm above the midpoint of triceps muscle with the arms hanging down freely.

Subscapular

The skin fold was raised beneath the inferior angle of the scapula in the direction, running obliquely downwards at an angle of about 45° from the horizontal.

Suprailiac

The skin fold was taken about 1cm superior and 2 cm medial to the anterior superior iliac spine.

Calculation of body density

Durnin and Womersley (1974) equations for calculating body density for males and females according to age of the subject are given here:-

- (For 17 to 19 years males) body Density = 1.1620-0.0630 log (Biceps+ Triceps +Subscapular + Suprailiac skinfolds)
- (For 20 to 29 years males) body Density = 1.1631-0.0632 log (Biceps+ Triceps +Subscapular + Suprailiac skinfolds)
- (For 16 to 19 years females) body Density = 1.1549-0.0678 log (Biceps+ Triceps +Subscapular + Suprailiac skinfolds)
- (For 20 to 29 years females) body Density = 1.1599-0.0717 log (Biceps+ Triceps +Subscapular + Suprailiac skinfolds)

Calculation of Body Fat Percentage for children and youth

Slaughter et al. (1988) gave equations as follows:

- Around 10 years (black) boys Body fat percent= 1.21 (triceps + subscapular) -0.008 (triceps + subscapular)^2 -3.2
- Pubescent (black) boys Body fat percent= 1.21 (triceps + subscapular) -0.008 (triceps + subscapular)^2 -5.2
- Around 10 years (black) boys Body fat percent= 1.21 (triceps + subscapular) -0.008 (triceps + subscapular)^2 -3.2
- For 8 to 16 years females Body fat percent= 1.33 (triceps + subscapular) -0.013 (triceps + subscapular)^2 -2.5

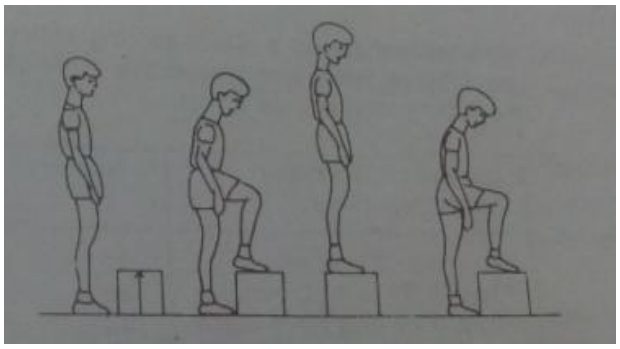
Body Density calculated with the help of above mentioned equations was converted to percent body fat by using the formula by Brozek et. al., (1963)

For 17 to 29 males and females Percent Body Fat = $\frac{(4.95 - 4.50)}{\text{Body Density}} \times 100$

Cardiovascular Endurance

It may be defined as the ability of heart and lungs to take in and to transport adequate amounts oxygen to the working muscles for activities (that involve large muscle masses), to be performed over long periods of time.

Tuttle Pulse Ratio Test



The testing of cardiovascular endurance by this method is based on the assumption that the person having better endurance will have lesser increase in his/her resting pulse-rate after step exercise or one minute. The test was constructed by Tuttle in1931 for rating one's physical efficiency.

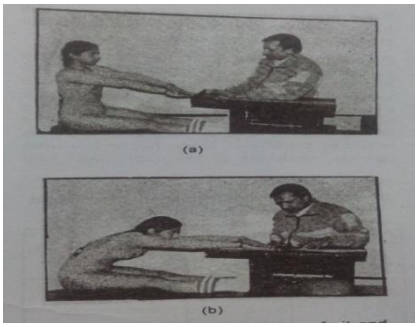
Test Administration

The resting pulse rate of the subject is counted for one minute in a sitting posture. It is assured that the subject has not performed any exercise at least one hour before the count. After the resting pulse count, the subject is asked to step up and down on the 13 inch high stool at the rate of complete 30 steps per minute. The subject was assisted to keep the proper Pace by announcing four counts to one complete step-up and down. In order to assist the subject either a tape recorder counting 1-2-3-4 for each step at the rate of 30 step-ups for one minute or a metronome set at a cadence of 30x4 = 120 per minute have been used for the proper test administration After 30 step-ups completed in one minute, the subject is asked to sit down. The pulse rate is counted immediately and continuously for two minutes.

Scoring

A pulse ratio is computed dividing the after exercise two minutes pulse count by one minute resting pulse count. This ratio is known as the Tuttle Pulse Ratio was known as the Tuttle pulse ratio score which was the direct indicator of one's cardiovascular efficiency but in the inverse order that is larger the ratio, lower is the efficiency.

Flexibility



Flexibility may be defined as "the range of motion around a joint as determined by the elasticity of the muscles, tendons and ligaments associated with the joint under consideration.

Sit and reach test

The subject was asked to sit without shoes and soles of the feet flat against the sit and reach box. The participant was asked to slowly reach forward with both hands as far as possible, holding this position for about 2 seconds. Fingertips were in contact with the measuring portion of the sit and reach box. The score was the most distant point in centimetres reached with the fingertips. The better of two trails was recorded. The patient was instructed to exhale and drop the head between the arms, when reaching without holding the breath. The knees remained extended during testing.

Muscular Strength

Muscular strength may be defined as the maximal muscular force or tension used in the creation or prevention of the movement in one maximal effort of a muscle group.

Muscular Endurance

Muscular endurance is the ability of a muscle to maintain a certain level of tension or to repeat identical movements or pressures over the maximal period of time with one's maximal effort.

Pull-Ups for Boys

The bar is located at such a height so that the feet of the tallest subject do not touch the ground while hanging on the chinning bar. The boy subject is asked to hang from the bar by his hands with forward grip and to chin up b pulling himself up until his chin is above the bar. Then he has to lower the body until his arms are straight and is asked not to use kick or jerky motion. If he does not straighten his arms completely when lowering the body or if he kicks, jerks or keeps (keeping one's chin on the bar) in performing the movement, then half counts are recorded. Only four half counts are permitted.

Pull-Ups for Girls

Either an adjustable horizontal bar or one bar of the parallel bar which permits convenient raising and lowering is used for this test item. A mat is laid on the floor to prevent the feet from slipping. The bar is adjusted to a height equal to the level of sternum of the girl subjects so that each girl has to pull approximately the same proportion of her weight. To save time the girls are arranged according to their heights at the beginning of the test. The girl grasps the bar with, palms outward and slides her feet under the bar until the body and arms from nearly a right angle when the body is held straight. The weight rests on the heels. The girl subject is asked to pull-up to the bar with the body keeping straight as many times as possible. If the body sags, if the hips rise or if the knees bend in a kip motion or if the subjects does not pull completely up or go completely down, half credits are given, up to four half credits.

Scoring

The numbers of complete pull-ups one half of the counts (if any) constitute the scoring.

Bent knee sit-ups

This test is used to measure the dynamic (isotonic) strength and endurance of abdominal muscles, this test is common for both boys and girls aged 8 years and above.

Equipment

A stopwatch and a mat or dry turf or clean floor

Test Administration

The subject is asked to lie on back with knees bent, feet on the floor with heels not more than 12 inches from the buttocks. The angle of the knees should be less than 90°. The subject is asked to put his or her hand on the back of the neck with fingers clasped and to place the elbows squarely on the mat or turf or floor. The subject's feet are held by a companion to ascertain that the feet do not leave the surface and remain touching it, Then the subject is asked to tighten the abdominal muscles and to bring the head and elbows forward so as to curl up to touch the elbows to the knees. The entire above process constitutes one sit-up. The subject is asked to return to starting position with his/her elbows on the surface before sitting up again. The tester gives the above demonstration to all the subjects to be tested before the actual performance of the test. The timer gives the starting signals ready, go! At the word

'go' the timer starts the stopwatch and the subject starts the sit-up performance as quickly as possible with his/ her best efforts. The tester starts counting the number of sit-ups performed. After 60seconds, the timer gives the signal stop and the subject stops, while the tester records the number of correctly executed sit-ups performed by the subject in 60 seconds. This gives the score of the test. Only one trial is given unless the tester believes that the subject has not had a fair opportunity to perform. A subject is not allowed any rest in between sit-ups during his performance. No incorrect sit-up is counted in which the subjects does either of the following mistakes:

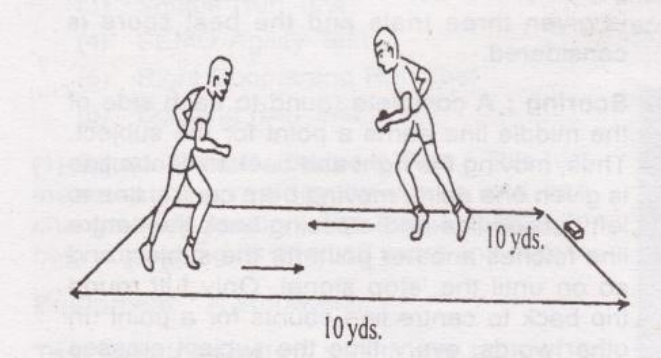
a) Keeps the fingers unclasped behind the neck.
b) Returns to the incomplete starting position with elbows not flat on the surface before starting the next sit-up.
c) Brings both elbows forwards by pushing off the floor with any elbow.

ASSESMENT OF MOTOR FITNESS

Agility

Agility is defined as "one's controlled ability to change body position and direction rapidly and accurately.

Shuttle run (boys and girls)



Test Administration

Two parallel lines are marked on the floor 10 yards apart or the width of the regular volleyball courts may be used for the test. The two wooden blocks are placed behind one of the lines. The subject is asked to start from behind the other line. On the signal ready Go, the timer starts the watch and the subject runs towards the blocks, picks-up one block, runs back to the starting line, places the block behind the starting line, runs back and picks-up the seconds block to be carried back across the starting line. As soon as the second block is placed on the ground, the timer stops the watch and records the time.

Scoring

Two trials are allowed to each subject with some rest in between. The time of the better of the two trails is recorded to the nearest 10^{th} of a second as the score of the test item.

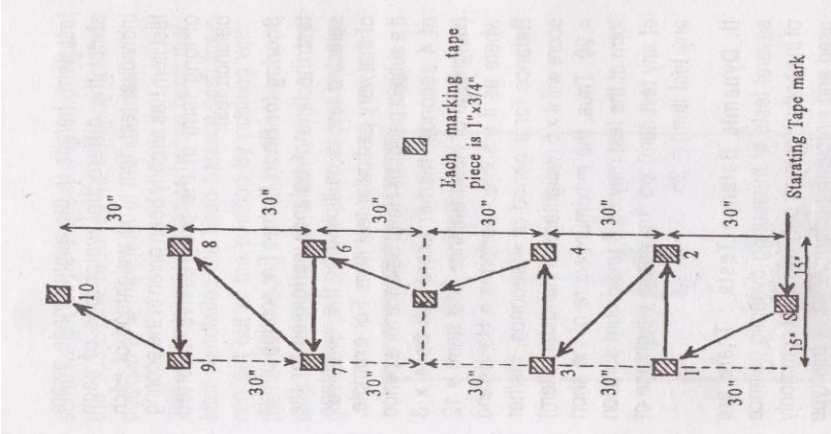
Dynamic Balance

Dynamic balance may be defined as one's ability to maintain body balance during vigorous movements in comparatively less stable movements.

Modified bass test of dynamic balance

This test is used to measure /one's ability to jump accurately and to maintain balance during repeated jumping. The test was originally designed by Ruth I. Bass in 1939 which was later modified by Johnson and Leach in 1968. This test is suitable for both boys and girls aged 12 years and above.

Test Administration



First of all eleven pieces of coloured marking tape, measuring 3/4 x 1"size are cut and pasted on the floor as shown in Figure at levels S and I to 10. These marking spots are obtained by the proper measurement of 30" and 15" distances. After marking the required Floor pattern, demonstration of the test is given with the help of a trained helper having a good dynamic balance then the tester repeats the instructions the subject is asked to stand with the right foot on the starting tape mark and to leap to the first tape Mark with the left foot. His/her is required to maintain a steady balance on the ball of the left foot for as long as possible up to a maximum of five seconds after which he is to leap to the second tape mark with right foot, and is told to repeat the process completed at first mark and to proceed to next tape spots serially with alternate foot up to the 10th tape mark. The subject is told clearly that he/she will get one point for each second of balance maintained at a spot up to a maximum of five seconds and that his/her foot must cover the tape marked at each

spot completely so that the tape cannot be seen by the tester/timer when the subject is maintaining the balance of the body on a particular tape mark. The subject must also know that hopping or moving the supporting foot ball will invite penalty,

Scoring

The maximum points which may be scored at each landing spot are ten and thus making a theoretically maximal score of the test at box 10 = 100. At each landing point, five points are given to proper landing and five for each second of steady balance on the ball of the concerned foot. ! If the performer lands improperly and does not cover the tape marked at the spot or fails to stop on the landing spot or touches his/her heel or any other part of the body to the floor, he/she gets zero point out of five points of landing, However, on wrong landing, the subject is allowed to reposition by hopping for the 5-second balance points and to continue the test. In case-the performer commits balancing error either by touching any part of the body other than ball of the foot to the floor or by moving the foot, the performer is asked to step back on the spot just previous to balancing error and then leap afresh for the next spot and so on. It is recommended that the tester counts loudly the seconds of five second balance time so that the performer knows his/her performance and is encouraged to perform better.

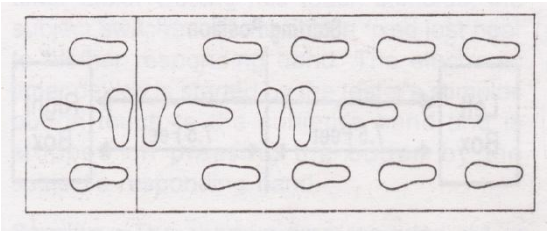
Coordination

Coordination may be defined as "the ability of the performer to integrate types of body movements into specific pattern".

Eye-Foot Coordination Test

This test is used to measure coordinators between eye and foot and it is satisfactory for both boys and girls aged 4 years and above.

Test Administration



The tester gives a demonstration to a group of 10 to 15 children with the help of a trained helper. He/she now asks a subject to hop according to the printed foot prints or other marks as quickly as possible. The subject may be allowed two trials after a slow practice trial.

Scoring

There are two alternative methods of scoring-either the number of errors committed by the subjects are counted or the time taken may be recorded, In case, the errors are counted, the number of times the subject fails to hit the indicated foot prints, is recorded, zero is the best score. In case, time is to be recorded, the subject is asked to repeat at the errors, then he/she must start again at the point at which he/she misses a footprint/footprints, Total time elapsed from the starting to the completion of the test, gives the score of the test. Best of the two test trials is considered for the final score.

Power

Power may be defined as "one's ability to release muscular force per seconds.

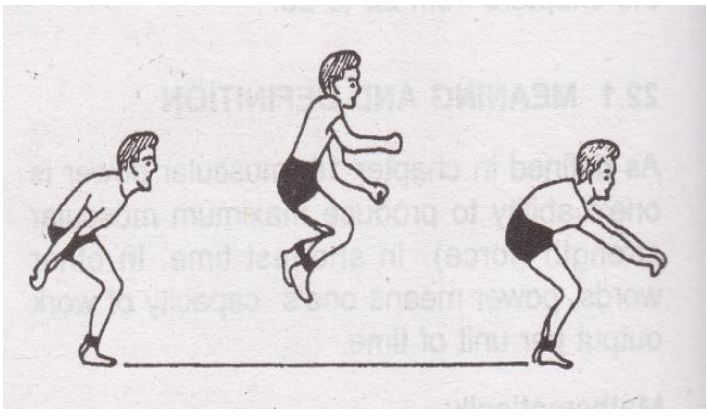
Leg Power Test

The power measurement in which the body is propelled through space and the distance propelled is measured, is known as the athletic power measurement. Common tests of athletic power measurement are standing broad-jump, standing vertical jump, vertical arm-Bull test (distance), shot-put, medicine ball throw, soft ball throw etc. Although, all these tests involve force and velocity but the factors of force and velocity are not considered for measurement.

Standing broad jump

This test measures the power of legs in jumping horizontal distance and may be applied to children of both sexes aged seven years and above.

Test Administration



A demonstration of the standing broad jump is given to a group of subjects to he tested, The subject is then asked to stand behind the starting line with the feet parallel to each other, The subject is instructed to jump as farthest as possible by bending knees and swinging arms to take off for the broad jump in the forward direction (Fig, 22,1), The subject is given three trials.

Scoring

The distance between the starting line and the nearest point of landing provides the Score of the test. The best (maximum distance) trial is used as the final score of the test.

Speed

Speed is defined as "one's ability to perform successive movements of the same pattern at a fast rate".

SPEED TEST (50 METER)

The purpose of the test is to measure speed. The test is suitable for both boys and girls aged 8 years and above.

Test Administration

The tester should give in advice, instructions to a group of 10-15 subjects as follows "subjects are required to take any position behind the starting line. Wait for the staring signal. On receiving the command go! Subjects are to start running as fast as possible till you reach the finish line. Subjects are to slow down gradually only after crossing the finish line. Warm up just before the sprint test. After the warm up, subjects preferably in pairs are asked to take the starting position behind the starting line and to wait for the signal 'go'. A separate helper with a stopwatch is required to watch each subject at the finish line. The tester gives command ready, steady, go! So that these are audible easily to subjects at the start line and the timers at the subjects start their sprints. As soon as the subject crosses the finish line, the respective timer switches off his/her stopwatch and records the time accurate up to 0.01 second. Only one correct trail is permitted. The subjects restart the sprint in case he/she starts before the word go or fails to start quickly at the command go! Sometimes a gunshot may be used to give the starting signal so as to facilitate correct simultaneous start of stopwatches by the timers and the sprints by the subjects especially when the sprint is for more than 40 yards.

Scoring

The time elapsed from the start to the instant, subject crosses the finish line is the score expressed usually up to hundredth of a second.

The materials used for this study are:-

- 13-inch high stool
- Anthropometric rod
- Chalk powder

- Flexomeasure box
- Mats (5)
- Metronome
- Skin fold caliper
- Steel measuring tape
- Stop watch (2)
- Weighing machine
- Wooden blocks (2)

Questionnaire for Socio-cultural evaluation of Sikh Martial art Gatka player

- Name of player
- Gender
- Age
- City/State
- Qualification of player
- Religion of player
- Caste of player
- Caste Name
- Demographic profile of the player (Urban or Rural)
- Occupational profile of the player (Agriculture, Business, Govt. Job and Private Job)
- Levels of Income
- Socio-Cultural perception of Gatka among Gatka players (free to choose more than one options)
    1. Religious Sports
    2. Cultural Sports
    3. Physical Sports
    4. Recreational Sports
    5. Martial Art

Statistical Consideration

In the present study, data have been divided into two aspects. Primary data is in under the fitness aspect and secondary data considered in socio-cultural aspect. Two variables of data collection and data interpretations have been taken into consideration. These two variables are i.e., gender and age. Furthermore, two

primary statistical techniques, i.e., mean and standard deviation and at secondary level, the statistical techniques, i.e., one way ANOVA test has been used to compare within and between all the age groups (under 14, under 18, under 25 males and females) and post hoc least significant difference test have been used to check the significant mean difference in the group on comparison with each other, only if one way ANOVA revealed significant F-value. The results revealing differences are evaluated through the one way ANOVA and post hoc least significant difference test are verified on the scale of 0.05. The secondary data means socio-cultural aspect evaluated through percentage.

Chapter 4

RESULT AND DISCUSSION

In the present study, entitled **"A Study of Fitness and Socio-Cultural Aspect of Gatka: A Sikh Martial Art"** data have been divided into two aspects, primarily data was taken to understand the fitness aspects and secondarily data was considered in socio-cultural aspects. The data collection and data interpretations have been taken into consideration having two ways i.e., gender wise and age wise. Furthermore, two statistical techniques, i.e., mean and standard deviation and one way ANOVA test has been used to compare inter group and intra group at whole data i.e. the age wise groups (under 14, under 18, under 25 of males and females) and least significant difference (LSD) test have been used to check the significant mean difference among the groups. The results revealing differences were evaluated through the one way ANOVA and least significant difference test were verified on the scale of P ≤0.05≥. The secondary data means socio-cultural aspect was evaluated through percentage method.

DATA INTERPRETATION OF FITNESS ASPECT THROUGH GENDER WISE[1]

BODY WEIGHT (MALES) Kg

Table: 1 Mean and Standard Deviation Values of Body Weight

Variable	**Body Weight (Kg)**	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	34.55±6.41	32.74±6.51
Under 18	55.35±8.72	56.08±9.65
Under 25	66.22±8.87	54.27±8.37

Table: 2 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Male for Body Weight

Variable		**SS**	**Df**	**MS**	**F**	**Sig.**
Body Weight (Kg)	BG	25899.20	2	12949.60	198.18	.000
	WG	9604.99	147	65.34		

[1] All the figures related to the results of fitness aspects through gender wise present in appendix 1

Table: 3 LSD test between all the Male groups (Under 14, under 18 and under 25) for Body Weight

Variable	Age Group	MD	SE	Sig.
Body Weight (Kg)	Under 14 & 14 to 18	-20.79*	1.61	.000
	14 to 18 & 18 to 25	-10.87*	1.61	.000
	18 to 25 to Under 14	31.67*	1.61	.000

From The table 1 mean and SD values of body weight of different age groups were respectively 34.55±6.41 kg (8-14), 55.35±8.72 kg (14-18), and 66.22±8.87 kg (18-25). It had showed that the mean weight has been as per the development of chronological phase, table 2 one way ANOVA test had clearly showed that significant difference between (at least two groups) of males in weight categories. According to the table 3 the post hoc least significant difference test shows the weight difference between age groups of under-14 males and under-18 males was significant at 5% level of significance. It means body weight may depend upon age group under-14 and under-18, it shows that under-18 was heavy as compared to under 14 (see figure-1). Whereas the body weight difference between age group of males under-18 and under-25 was significant at 5% level of significance, it shows that under-25 males group was heavier as compared to under-18 males group of Gatka players (see also figure-1). Further the body weight difference between age groups of male under-25 and under-14 was again significant at 5% level of significance. In this case, it shows that age group of under-25 have more heavy as compared to under-14. MD have depicted that the age groups of upper chronological age have been significantly better than the junior ones. It is obvious that the increase in age increases the muscle mass and body weight this result has shown it (Puri and Gaur, 2013).

BODY WEIGHT (FEMALES) Kg

Table: 4 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Female for Body Weight

Variable		SS	Df	MS	F	Sig.
Body Weight (Kg)	BG	16866.18	2	8433.09	122.88	.000
	WG	10088.07	147	68.62		

Table: 5 LSD test between all the Female groups (Under 14, under 18 and under 25) for Body Weight

Variable	Age Group	MD	SE	Sig.
Body Weight (Kg)	Under 14 & 14 to 18	-23.34*	1.65	.000
	14 to 18 & 18 to 25	1.80	1.65	.278
	18 to 25 to Under 14	21.53*	1.65	.000

In view of the fact that table 1 the mean and SD values of weight of different age groups of females Gatka players were respectively 32.74±6.41 kg (8-14) 56.08±9.65 kg (14-18) 54.27 ± 8.37 kg (18-25). From table 4, one way ANOVA test had clearly showed that significant difference between all groups (at least two groups) of females in weight categories. According to the table 5 the least significant difference test shows that the body weight difference between age groups of under-14 females and under-18 females was significant at 5% level of significance. It means body weight may depend upon age group under-14 and under-18, it shows that under-18 was heavy as compared to under 14 (see figure-2). While the body weight difference between age group of female's under-18 and under-25 was no significant difference at 5% level of significance. Further the body weight diversity between age groups of female under-25 and under-14 was again significant at 5% level of significance. In this case, it shows that the age groups of under-18 and 25 are heavier than the age group u14. The MD value have depicted that the age group of under-18 heavier than under-25 which was just due to sampling fluctuations. Because of excessive exercise the muscle mass of the under-18 female group was high, which was also effect on body weight. That why the under-18 females body weight was too high (Zar et. al., 2008)

BODY HEIGHT STATURE (MALES) cm

Table: 6 Mean and Standard Deviation Values of Body Height

Variable	Body height (cm)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	142.40±7.69	139.92±7.15
Under 18	165.30±6.95	155.36±9.60
Under 25	169.66±5.28	149.98±13.37

Table: 7 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Male for Body Height (cm)

Variable		SS	Df	MS	F	Sig.
Body Height (cm)	BG	21442.12	2	10721.06	237.44	.000
	WG	6637.22	147	45.15		

Table: 8 LSD test between all the Male groups (Under 14, under 18 and under 25) for Body Height (cm)

Variable	Age Group	MD	SE	Sig.
Body Height (cm)	Under 14 & 14 to 18	-22.90*	1.34	.000
	14 to 18 & 18 to 25	-4.36*	1.34	.001
	18 to 25 to Under 14	27.26*	1.34	.000

Since the table 6 the mean and SD values of body height of different ages groups of males were respectively of 142.40±7.69cm (8-14), 165.30±6.95cm (14-18) and 169.66±5.28 cm (18-25). The mean height of male's respondents has been as increased sequentially age group wise. According to the table 7 one way ANOVA test had evidently showed that significant difference between (at least two groups) of males in height categories. Table 8 the least significant difference test shows that the body weight difference between age group of under-14 males and under 18 males was significant at 5% level of significance. It resources body height of males depend upon age group under-14 and under-18, it shows that under-18 was tall as compared to under 14 (besides see figure-3). Although the body height difference between age group of male's under-18 and under-25 was significant difference at 5% level of significance. Further the body height difference between age groups of male's under-25 and under-14 was again significant at 5%level of significance. In this case, it shows that age group of under-25 have longer as compared to under-14. The MD value have depicted that the age group of under 25 males group of Gatka players have been significantly longer than the under-14 and under-25 groups of Gatka players. As per the sequentially age groups, the mean height of male's respondents were increases (Puri and Gaur, 2013).

BODY HEIGHT STATURE (FEMALES) cm

Table: 9 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Female for Body Height (cm)

Variable		SS	Df	MS	F	Sig.
Body Height (cm)	BG	6142.36	2	3071.18	28.58	.000
	WG	15794.18	147	107.44		

Table: 10 LSD test between all the Female groups (Under 14, under 18 and under 25) for Body Height (cm)

Variable	Age Group	MD	SE	Sig.
Body Height	Under 14 & 14 to 18	-15.44*	2.07	.000
	14 to 18 & 18 to 25	5.38*	2.07	.010
	18 to 25 to Under 14	10.06*	2.07	.000

Table 6 shows that the mean and SD values of height of different age groups of females were respectively 139.92±7.15 cm (8-14) 155.36±9.60 cm (14-18) 149.98±13.37 cm (18-25). Table 9 one way ANOVA test clearly show that significant difference between (at least two groups) of females in body weight. Table 10 the least significant difference test show the body weight difference between age group of under-14 females and under 18 females was significant at 5% level of significance. It resources body height of females depend upon age group under-14 and under-18, it shows that under-18 was tall as compared to under 14 (see figure-4). Although the body height difference between age group of female's under-18 and under-25 was significant difference at 5% level of significance. Further the body height diversity between age groups of female's under-25 and under-14 was again significant at 5% level of significance. In this case, it shows that age group of under-25 have longer as compared to under-14. The MD value have depicted that the under-18 females group of Gatka players have been appreciably taller than the under-14 and under-25 groups of Gatka players (Zar et. al., 2008).

BODY MASS INDEX (MALES)

Table: 11 Mean and Standard Deviation Values of Body Mass Index

Variable	Body Mass Index (Kg/m^2)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	16.96±2.38	16.66±2.86
Under 18	20.19±2.35	23.66±6.01
Under 25	22.96±2.49	24.70±5.75

Table: 12 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Male for Body Mass Index

Variable		SS	Df	MS	F	Sig.
Body mass index (Kg/m^2)	BG	903.565	2	451.78	77.67	.000
	WG	855.014	147	5.81		

Table: 13 LSD test between all the Male groups (Under 14, under 18 and under 25) for Body Mass Index

Variable	Age Group	MD	SE	Sig.
Body Mass Index (Kg/m^2)	Under 14 & 14 to 18	-3.22*	.48	.000
	14 to 18 & 18 to 25	-2.77*	.48	.000
	18 to 25 to Under 14	6.00*	.48	.000

Table 11 and figure 5 shows that the body mass index among males mean ± SD age group of 19 to 25 had been found 22.96±2.49, which is higher than the other two groups. Further the level of BMI among males of the age group of under 18 appeared as 20.19±2.35 and again, in the age group of under-14, the BMI of males had been witnessed as 16.96±2.38.

According to the table 12 one way ANOVA test there was significant difference between BMI of male participants. According to the table 13 least significant difference test showed the BMI difference between age group of under-14 males and under-18 males was significant at 5%level of significance. Although the BMI difference between age group of male's under-18 and under-25 was significant difference at 5% level of significance. Additionally the BMI range between age groups of male's under-25 and under-14 was once more significant at 5% level of significance. . Noticeably, as per the established norms, the age group 14 males appeared in the "under-weight" category. Quite reasonably, this age group has been going through the phase of adolescence and yet they have to gain the completions of

their height and weight. The other categories (under-18 and under-25) have been found as maintaining appropriate weight. Obviously, they have gained complete or approximate physical growth. Therefore, their body weight has been found as significantly normal category (see figure 5) (Puri and Gaur, 2013).

BODY MASS INDEX (FEMALES)

Table: 14 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Female for Body Mass Index

Variable		SS	Df	MS	F	Sig.
Body mass index (Kg/m^2)	BG	1914.075	2	957.03	37.059	.000
	WG	3796.201	147	25.82		

Table: 15 LSD test between all the Female groups (Under 14, under 18 and under 25) for Body Mass Index

Variable	Age Group	MD	SE	Sig.
Body Mass Index (Kg/m^2)	**Under 14 & 14 to 18**	-7.00*	1.01	.000
	14 to 18 & 18 to 25	-1.04	1.01	.306
	18 to 25 to Under 14	8.04*	1.01	.000

In the test examining the table 11 and figure 6 BMI of the females, to the BMI of under-14 has been attributed mean ± SD as 16.66±2.86 while in the age group of under-18; it has been measured as 23.66 ± 6.01. Thirdly, in the age group of under-25 the level of the BMI has been found as 24.70 ± 5.75.

According to the table 14 one way ANOVA test the comparative analysis of inter categories had established that there was a significant difference at least two groups. While conducting the least significant difference test table 15 show the BMI difference between age group of under-14 females and under-18 females was significant at 5%level of significance. Although the BMI difference between age group of female's under-18 and under-25 was no significant difference at 5% level of significance. Additionally the BMI range between age groups of female's under-25 and under-14 was significant at 5% level of significance. The females of the age group of under-14 are under-weight while the females belonging to the categories of under-18 and under 25 belong to the categories of overweight (see figure 6) (Podstawki et. al., 2017)

PERCENT BODY FAT (MALES)

Table: 16 Mean and Standard Deviation Values of Percent Body Fat

Variable	Percent Body Fat (%)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	5.50±1.52	8.0 ± 1.01
Under 18	5.84±1.64	10.00±2.34
Under 25	6.45±1.07	11.87±2.19

Table: 17 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for percent body fat

Variable		SS	Df	MS	F	Sig.
Percent Body Fat (%)	BG	22.85	2	11.42	5.53	.005
	WG	303.4	147	2.06		

Table: 18 LSD test between all the Male groups (Under 14, under 18 and under 25) for Percent Body Fat

Variable	Age Group	MD	SE	Sig.
Percent Body Fat (%)	Under 14 & 14 to 18	-.33	2.87	.244
	14 to 18 & 18 to 25	-.60*	2.87	.036
	18 to 25 to Under 14	.94*	2.87	.001

It is an established fact table that the percent body fat represents to the body composition of a person. In the table 16 and figure 7 test conducted various age groups of males, mean ± SD under-14 5.50±1.52, under-18 5.84±1.64, under-25 6.45±1.07.

The noticeable concern which emerge here that the table 17 tests of one way ANOVA revealed that there was significant difference of percent body fat in at least two groups. Further, according the table 18 least significant difference test show the percent body fat variation among age under-14 and under-18 males was not significant at 5 % level of significance. It means percent body fat of males does not depend upon age group under-14 and under-18. Although the percent body fat difference between age group male's under-18 and under-25 was not significant difference at 5% level of significance. Further the percent body fat diversity between age groups of male's under-25 and under-14 was significant difference at 5%level of

significance. It has come to be seen in the result that because of the economic conditions being poor, the percentage of body fat of all age groups of males has not been greater (Douris et. al., 2017).

PERCENT BODY FAT (FEMALES)

Table: 19 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for percent body fat

Variable		SS	Df	MS	F	Sig.
Percent Body Fat (%)	BG	374.63	2	187.31	49.46	.000
	WG	550.67	147	3.78		

Table: 20 LSD test between all the Female groups (Under 14, under 18 and under 25) for Percent Body Fat

Variable	Age Group	MD	SE	Sig.
Percent Body Fat (%)	Under 14 & 14 to 18	-1.99*	.389	.000
	14 to 18 & 18 to 25	-1.87*	.389	.000
	18 to 25 to Under 14	3.87*	.389	.000

The percent body fat of females Gatka players, it was obtained table 16 shows that the mean ± SD in the age group of under-14 was measured as 8.0±1.01. In the age group of under-18, it was found as 10.00±2.34. Further, in the age group of under-25, the percent body fat was found as 11.87±2.19.

Above all the results of the table 19 the one way ANOVA test prove that there was significant difference in the at least two groups in their percent body fat. Further, according the table 20 least significant difference test show the percent body fat variation among age under-14 and under-18 females was significant at 5 % level of significance. It means percent body fat of females depends upon age group under-14 and under-18. It show that under-18 age group of females was more percent body fat as compared to under-14 females group of Gatka players. Although the percent body fat difference between age group female's under-18 and under-25 was again significant difference at 5%level of significance. Further the percent body fat diversity between age groups of male's under-25 and under-14 was another time significant difference at 5%level of significance. According to the table 16 and figure 8 mean and SD values show that age group of under-25 was more percent body as compared to under-14 and under-18 groups of females Gatka players (Douris et. al., 2017).

CARDIOVASCULAR ENDURANCE (MALES)

Table: 21 Mean and Standard Deviation Values of Cardiovascular Endurance

Variable	Cardiovascular Endurance	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	2.54±.330	2.58±.220
Under 18	2.41±.224	2.33±.225
Under 25	2.35±.248	2.44±.220

Table: 22 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Cardiovascular Endurance

Variable		SS	Df	MS	F	Sig.
Cardiovascular Endurance	BG	.923	2	.462	8.36	.000
	WG	8.109	147	.055		

Table: 23 LSD test between all the Male groups (Under 14, under 18 and under 25) for Cardiovascular Endurance

Variable	Age Group	MD	SE	Sig.
Cardiovascular Endurance	Under 14 & 14 to 18	.121*	.08250	.000
	14 to 18 & 18 to 25	.068	.08250	.988
	18 to 25 to Under 14	-.189*	.08250	.000

The data of the cardiovascular endurance among males showed very interesting finding. According to the table 21 and figure 9 in the age group of under-14 mean ± SD was 2.54 ± .230. In the age groups of under-18 and under-25 it was respectively found as 2.41 ± .224 and 2.80 ± .248.

Table 22 the one way ANOVA table revealed that there were significant variations among at least two. Table 23 the least significant difference test table revealed that cardiovascular endurance difference between age group of under-14 males and under-18 males was significant at 5% level of significance. Although the cardiovascular endurance difference between age group of male's under-18 and under-25 was no significant difference at 5% level of significance. In the age group of under-25 and under-14 the cardiovascular diversity was significant at 5% level of significance.

Interestingly, the age groups of under-18 and under-25 have been found as significantly better in comparison to age group of under-14. It is very much understandable and acceptable as the age groups of under-18 and under-25 are most matured and physically fit as well as trained group. Therefore, their anthropometric features established them as the advantageous age group (Ghosh and Sebastian, 2016).

CARDIOVASCULAR ENDURANCE (FEMALES)

Table: 24 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Cardiovascular Endurance

Variable		SS	Df	MS	F	Sig.
Cardiovascular Endurance	BG	1.63	2	.816	16.58	.000
	WG	7.23	147	.049		

Table: 25 LSD test between all the Female groups (Under 14, under 18 and under 25) for Cardiovascular Endurance

Variable	Age Group	MD	SE	Sig.
Cardiovascular Endurance	Under 14 & 14 to 18	.245*	.44	.000
	14 to 18 & 18 to 25	-.107*	.44	.017
	18 to 25 to Under 14	-.147	.44	.001

Table 21 figure 10 the data expresses that in the female's age group of under-14 the value of the mean ± SD was 2.58 ± .220. while, in the age group of under 18 and under 25, it was noticed respectively as 2.33 ± .225 and 2.44 ± .220.

The findings of table 24 the one way ANOVA test disclose that there were significant differences among at least two groups. The findings revealed by the table 25 least significant difference test also verify the same. The cardiovascular endurance difference between age group of under-14 females and under-18 females was significant at 5% level of significance. Although the cardiovascular endurance difference between age group of female's under-18 and under-25 was significant difference at 5 % level of significance. Also, in the age group of under-25 and under-14 the cardiovascular endurance diversity was significant at 5 % level of significance. The cardiovascular endurance test has highlighted very interesting facts. Noticeably the cardiovascular endurance of the age group of under-18 years has been found as significantly better in comparison to other age groups. Obviously, that age

group is comparatively more physically grown and trained from the age group of under 14 years and less effected to the negativities of over-weight. Hence, that age group is the better group from the other two (Ghosh and Sebastian, 2016).

FLEXIBILITY (MALES)

Table: 26 Mean and Standard Deviation Values of Flexibility

Variable	Flexibility (cm)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	9.48±3.06	9.93±2.81
Under 18	10.54±4.49	13.91±4.55
Under 25	6.14±5.60	15.23±4.98

Table: 27 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Flexibility

Variable		SS	Df	MS	F	Sig.
Flexibility (cm)	BG	527.50	2	263.75	12.95	0.00
	WG	2992.93	147	20.36		

Table: 28 LSD test between all the Male groups (Under 14, under 18 and under 25) for Flexibility

Variable	Age Group	MD	SE	Sig.
Flexibility (cm)	Under 14 & 14 to 18	-1.05	.90	.24
	14 to 18 & 18 to 25	4.40*	.90	.00
	18 to 25 to Under 14	-3.34*	.90	.00

Table 26 and figure 11 the data expressed that the value of the level of flexibility in males (tested through mean ± SD) in the age group of under 14 were 9.48 ± 3.06. In the age group of under-18 the level of flexibility was noticed as 10.54 ± 4.49.in the age group of under-25, the level of flexibility was found as 6.14 ± 5.60.

According to the table 27 the one way ANOVA test has found significant difference of flexibility in the three age groups. This difference in flexibility has further been explained through the least significant difference test. The least difference test table 28, disclose that the flexibility difference between age group of under-14 males and under-18 males was no significant difference at 5% level of significance. Although the flexibility difference between age group of male's under-18 and under-25 was significant difference at 5 % level of significance. In the age group of under-25 and under-14 the flexibility diversity was again significant at 5 % level of significance.

The data established that the levels of flexibility were significantly better in the age groups of under-14 and under-18 than age group of under-25 marginally better in the age group of under-14 and comparatively least in the age group of under-25 years. Reasonably, the age group of under-18 years has double advantage in comparison to other two groups. They are more experienced and trained in comparison to under-14 age group and there body mass index is better than the age group of under 25. On the other side, the age group of the under 14 is better in flexibility due to less fat on their abdominal part (Fong et. al., 2007).

FLEXIBILITY (FEMALES)

Table: 29 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Flexibility

Variable		SS	df	MS	F	Sig.
Flexibility (cm)	BG	760.47	2	380.23	21.31	0.00
	WG	2621.86	147	17.83		

Table: 30 LSD test between all the Female groups (Under 14, under 18 and under 25) for Flexibility

Variable	Age Group	MD	SE	Sig.
Flexibility (cm)	Under 14 & 14 to 18	-3.97*	.84	.00
	14 to 18 & 18 to 25	-1.32	.84	.12
	18 to 25 to Under 14	5.29*	.84	.00

The levels of flexibility have found in the table 26 figure 12 age groups of under-14, under-18 and under-25 respectively as 9.93 ± 2.81, 10.54 ± 4.49 and 6.14 ± 5.60. Table 29 the one way ANOVA test highlights significant differences of flexibility among three age groups of females. The table 30 least significant difference test has proved and further interpreted these differences.

The conclusions of least significant difference test disclose that the flexibility difference between age group of under-14 females and under-18 females was significant difference at 5% level of significance. Although the flexibility difference between age group of female's under-18 and under-25 was no significant difference at 5 % level of significance. In the age group of under-25 and under-14 the flexibility variety was again significant at 5 % level of significance.

It has been found that the flexibility of the female respondents improved with the chronological growth of their age. Hence, the females belonging to age group of under 14 were found as least flexible, the age group of under 18 as marginally flexible and the females of the age group of under-25 as the significantly flexible. Reasonably, the females acquired more flexible with more practice and training (Fong et. al., 2007).

MUSCULAR ENDURANCE AND MUSCULAR STRENGTH OF ARMS AND SHOULDER (MALES)

Table: 31 Mean and Standard Deviation Values of Muscular Endurance and Muscular Strength of Arms and Shoulder

Variable	**Muscular Endurance and Muscular Strength of Arms and Shoulder**	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	3.74±1.92	3.08±1.89
Under 18	8.04±3.64	3.50±1.65
Under 25	5.70±2.95	2.88±1.91

Table: 32 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Muscular Endurance and Muscular Strength of Arms and Shoulder

Variable		**SS**	**df**	**MS**	**F**	**Sig.**
MEMSAS	BG	463.45	2	231.72	26.99	.00
	WG	1262.04	147	8.58		

Table: 33 LSD test between all the Male groups (Under 14, under 18 and under 25) for Muscular Strength and Muscular Endurance for Arms and Shoulders

Variable	**Age Group**	**MD**	**SE**	**Sig.**
MEMSAS	Under 14 & 14 to 18	-4.30*	.58	.00
	14 to 18 & 18 to 25	2.34*	.58	.00
	18 to 25 to Under 14	1.96*	.58	.00

As for as the level of muscular endurance and muscular strength of arms and shoulders among the males were concerned in the table 31 and figure 13 age group of under 14, it was found as 3.74 ± 1.925. In the age group of under-18, the level of muscular endurance and muscular strength of arms and shoulders was 8.04 ± 3.647. While, in the age group of under-25, the level was 5.70 ± 2.957.

Table 32 the one way ANOVA test has shown that the levels of muscular endurance and muscular strength of arms and shoulders that vary significantly with respect to age groups of male. The least significant difference test table 33 has shown that the muscular endurance and muscular strength of arms and shoulders difference between age group of under-14 males and under-18 males was significant difference at 5% level of significance. Although the muscular endurance and muscular strength of arms and shoulders difference between age group of male's under-18 and under-25 was significant difference at 5% level of significance. In the age group of under-25 and under-14 the muscular endurance and muscular strength of arms and shoulders range was again significant difference at 5 % level of significance. The data reveals significant difference of muscular endurance and muscular strength of arms and shoulders as for the comparative analysis of the three age groups is concerned. The level of muscular endurance and muscular strength of arms and shoulders in the age group is found significantly better in the age group of under-18 years. It has been found as better in the age group of under-25. However, the level of the muscular endurance and muscular strength of arms and shoulders, in the age group of under-14 is found as least better. It was reasonably due to their physically minimal and undergrowth status (Little 1991).

MUSCULAR ENDURANCE AND MUSCULAR STRENGTH OF ARMS AND SHOULDER (FEMALES)

Table: 34 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for MEMSAS

Variable		SS	Df	MS	F	Sig.
MEMSAS	BG	10.01	2	5.00	1.50	.22
	WG	489.46	147	3.33		

Table: 35 LSD test between all the Female groups (Under 14, under 18 and under 25) for MEMSAS

Variable	Age Group	MD	SE	Sig.
MEMSAS	Under 14 & 14 to 18	-.42	.36	.25
	14 to 18 & 18 to 25	.62	.36	.09
	18 to 25 to Under 14	-.20	.36	.58

The enquiring table 31 and figure 14 the muscular endurance and muscular strength of arms and shoulders of the females, in the age group of under-14, it was found as 3.08 ± 1.89. Further, in age group of under-18 the level of muscular endurance and muscular strength of arms and shoulders was 3.50 ± 1.65 and in the age group of under-25, it was measured as 2.88 ±1.91.

The one way ANOVA test table 34 revealed no significant difference of muscular endurance and muscular strength of arms and shoulders among three different age groups of females Gatka players. The least significant difference test table 35 has also shown again no significant differences between the levels of muscular endurance and muscular strength of arms and shoulders with respect to different age groups (Tsang et. al., 2010).

MUSCULAR STRENGTH AND MUSCULAR ENDURANCE OF ABDOMINAL (MALES)

Table: 36 Mean and Standard Deviation Values of Muscular Strength and Muscular Endurance of Abdominal

Variable	Muscular Strength and Muscular Endurance of Abdominal (n)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	21.14±6.37	17.96±4.87
Under 18	26.48±5.43	18.62±5.90
Under 25	24.78±5.34	17.84±4.80

Table: 37 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Muscular Strength and Muscular Endurance of Abdominal

Variable		SS	df	MS	F	Sig.
MSMEA	BG	744.25	2	372.12	11.29	0.00
	WG	4843.08	147	32.94		

Table: 38 LSD test between all the Male groups (Under 14, under 18 and under 25) for Muscular Strength and Muscular Endurance for Abdominal

Variable	Age Group	MD	SE	Sig.
MSMEA	Under 14 & 14 to 18	-5.34*	1.14	.00
	14 to 18 & 18 to 25	1.70	1.14	.14
	18 to 25 to Under 14	3.64*	1.14	.00

When for as the level of muscular strength and muscular endurance of abdominal among the males were concerned in the table 36 and figure 15 age group of under 14, it was found as 21.14 ± 6.47. In the age group of under-18, the level of muscular strength and muscular endurance of abdominal was 26.48 ± 5.43. Although in the age group of under-25 the level was 24.78 ± 5.74.

Table 37 the one way ANOVA test has exposed that the significant differences in the levels of muscular strength and muscular endurance of abdominal was significant at 5% level of significance with respect to age group of male. The table 38 post hoc least significant difference test has shown that the muscular endurance and muscular strength of abdominal difference between age group of under-14 males and under-18 males was significant difference at 5% level of significance. Although the muscular endurance and muscular strength of abdominal difference between age group of male's under-18 and under-25 was again no significant difference at 5 % level of significance. In the age group of under-25 and under-14 the muscular endurance and muscular strength of abdominal range was significant difference at 5 % level of significance.

The figures revealed significant difference of muscular strength and muscular endurance of abdominal as for the comparative analysis of the three age groups is concerned. It has been found that the level of muscular strength and muscular endurance of abdominal significantly better in the age groups of under-18 and under-25. Yet, the level of the muscular strength and muscular endurance of abdominal, in the age group of under-14 was found as least well (Kayihan, 2014).

MUSCULAR STRENGTH AND MUSCULAR ENDURANCE OF ABDOMINAL (FEMALES) (score)

Table: 39 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Muscular Strength and Muscular Endurance of Abdominal

Variable		SS	df	MS	F	Sig.
MSMEA	BG	17.64	2	8.82	0.32	0.72
	WG	4008.42	147	27.26		

Table: 40 LSD test between all the Female groups (Under 14, under 18 and under 25) for Muscular Strength and Muscular Endurance for Abdominal

Variable	Age Group	MD	SE	Sig.
MSMEA	Under 14 & 14 to 18	-.66	1.04	.52
	14 to 18 & 18 to 25	.78	1.04	.45
	18 to 25 to Under 14	-.12	1.04	.90

The table 36 and figure 16 muscular strength and muscular endurance of abdominal of the Females in the age group of under-14 was found as 17.96 ± 4.87. Further, in age group of under-18, the level of muscular strength and muscular endurance of abdominal was 18.62 ± 5.90 and in the age group of under-25, it was measured as 17.84 ± 4.80.

The one way ANOVA test table 39 revealed that there was no significant difference of muscular strength and muscular endurance of abdominal among three different age groups of Female's Gatka players. The noticeable concern which needed to be discussed here was that no age group of the Female Gatka players fit into the category of good level of muscular strength and muscular endurance of abdominal. Further, the least significance test verified the same (see the table 40 and figure 16) (Valenzuela et. al., 2016).

AGILITY (MALES) (sec)

Table: 41 Mean and Standard Deviation Values of Agility (sec)

Variable	**Agility (sec)**	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	12.34±.55	13.41±1.14
Under 18	11.51±.72	12.62±1.31
Under 25	11.33±.68	12.49±1.28

Table: 42 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Agility

Variable		**SS**	**df**	**MS**	**F**	**Sig.**
Agility (sec)	BG	29.13	2	14.56	33.52	.00
	WG	63.87	147	.43		

Table: 43 LSD test between all the Male groups (Under 14, under 18 and under 25) for Agility

Variable	**Age Group**	**MD**	**SE**	**Sig.**
Agility (sec)	Under 14 & 14 to 18	-.83	19.29	.00
	14 to 18 & 18 to 25	.17	19.29	.17
	18 to 25 to Under 14	-1.01	19.29	.00

In the test of measuring the agility table 41 and figure 17 of male's significant data were found. In the age group of under-14, the mean ± SD level of agility was found as 12.34 ± .55. The level of agility in the age group of under 18 years was 11.51 ±.72. On the age group of under-25 years, the level of the agility was found as 11.33 ± .68.

Significant difference has been found in the agility among the age groups of male by the one way ANOVA test table 42. According to the table 43 the LSD test has shown that the agility difference between age group of under-14 males and under-18 males was significant difference at 5% level of significance. Even though the agility difference between age group of male's under-18 and under-25 was again no significant difference at 5 % level of significance. Further in the age group of under-25 and under-14 the agility range was this group significant difference at 5 % level of significance. The agility of the age groups of under-18 and under-25 was found significantly better than the age group of under-14. However it has been found in the figure 17 that the agility of the male's respondents improved with the chronological growth of their age. Reasonably, the males acquired more agile with more exercise and training (Sterkowicz and Franchini, 2009).

AGILITY (FEMALES) (sec)

Table: 44 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Agility

Variable		SS	df	MS	F	Sig.
Agility (sec)	BG	24.66	2	12.33	7.85	.00
	WG	230.81	147	1.57		

Table: 45 LSD test between all the Female groups (Under 14, under 18 and under 25) for Agility

Variable	Age Group	MD	SE	Sig.
Agility (sec)	Under 14 & 14 to 18	.78	19.27	.96
	14 to 18 & 18 to 25	.13	19.27	.22
	18 to 25 to Under 14	-.92	19.27	.24

Despite the fact that, while measuring the agility of Female Gatka players, it was found that table 41 and figure 18 show that the level of mean ± SD the same was 9.93 ± 2.81 in the age group of under 14. In the age group of under-18, it was found

as 13.91 ± 4.55. Even as in the age group of under-25 the level of significance was 15.23 ± 4.98.

Table 44 the one way ANOVA test reveal significant difference in the levels of agility in three age groups of Females. According to the table 45 the LSD test has shown that the agility difference between age group of under-14 males and under-18 males was significant difference at 5% level of significance. Even though the agility difference between age group of male's under-18 and under-25 was no significant difference at 5 % level of significance. Further in the age group of under-25 and under-14 agility range was this group significant difference at 5 % level of significance. Noticeably, no age group could be established as the significantly better in regard to agility. However, according to the value of mean ± SD (see table 41 and figure 18) the age group of under-18 and under-25 were better in comparison to the age group of under-18.

DYNAMIC BALANCE (MALES)

Table: 46 Mean and Standard Deviation Values of Dynamic Balance (marks)

Variable	**Dynamic Balance (marks)**	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	61.10±12.02	59.88±13.28
Under 18	68.50±12.12	69.46±12.57
Under 25	67.68±12.69	60.06±14.65

Table: 47 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Dynamic Balance

Variable		**SS**	**df**	**MS**	**F**	**Sig.**
Dynamic Balance (marks)	BG	1645.48	2	822.74	5.45	0.00
	WG	22191.88	147	150.965		

Table: 48 LSD test between all the Male groups (Under 14, under 18 and under 25) for Dynamic Balance

Variable	**Age Group**	**Mean Difference**	**SE**	**Sig.**
Dynamic Balance (marks)	Under 14 & 14 to 18	-7.40*	2.45	.00
	14 to 18 & 18 to 25	.82	2.45	.73
	18 to 25 to Under 14	6.58*	2.45	.00

While measuring the level of dynamic balance among male respondents it was found that in the (see table 46 and figure 46) age group of under-14 the mean ± SD level of balance was 61.10±12.02. In the age group of under-18 years it was 68.50 ± 12.12 and the level of balance in the age group of under 25 was found as 67.68 ± 12.69.

Table 47 show that the one way AVOVA test revealed significant differences of dynamic balance in three age groups. According to the table 48 LSD test has shown that the dynamic balance difference between age group of under-14 males and under-18 males was significant difference at 5% level of significance. Even though the dynamic balance difference between age group of male's under-18 and under-25 was no significant difference at 5 % level of significance. Further in the age group of under-25 and under-14 dynamic balance assortment was this group significant difference at 5 % level of significance. Most accurate balance was displayed by the age group of under-14. That can be understood with a fact that the minors were more able to adjust to various dimensions of testing the dynamic balance. That was again reasonably due to their comparatively lower body mass index and percent body fat.

DYNAMIC BALANCE (FEMALES)

Table: 49 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Dynamic Balance

Variable		SS	df	MS	F	Sig.
Dynamic Balance (marks)	BG	3002.81	2	1501.40	8.19	0.00
	WG	26922.52	147	183.14		

Table: 50 LSD test between all the Female groups (Under 14, under 18 and under 25) for Dynamic Balance

Variable	Age Group	MD	SE	Sig.
Balance (marks)	Under 14 & 14 to 18	-9.58*	2.70	.00
	14 to 18 & 18 to 25	9.40*	2.70	.00
	18 to 25 to Under 14	.18	2.70	.94

The results of the dynamic balance of Females shown the table 46 figure 20 that the age group of under-14 was at the level of mean ± SD 59.88 ± 13.28. The balance of the age group of under-18 was bringing into being at the level of 69.46 ± 12.57. In the age group of under-25 the value of balance was found as 60.66 ± 14.65. According to the table 49 the one way ANOVA test expressed significant difference

in the three age groups of Females. The data disclosed by the LSD test (see table 50) analysis further verified the differences whereas enlightening that the age groups of under-14 and under-18 represented difference was significant at 5% level of significance. Even as the age groups of under-18 and under-25 were found at the level of 5% significance was again significant difference. The level of difference between the age group under-25 and under-14 was found at the no significant difference at the level of 5% level of significance. Evidently the age groups of under-14 and under-25 were comparatively better than the age group under-18 (see figure 20).

EYE-FOOT COORDINATION (MALES)

Table: 51 Mean and Standard Deviation Values of Eye-foot Coordination (sec)

Variable	**Eye-foot Coordination (sec)**	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	7.23±1.55	7.31±1.46
Under 18	6.54±.693	6.63±.602
Under 25	6.67±1.03	7.14±1.22

Table: 52 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Eye-foot Coordination

Variable		**Sum of Squares**	**df**	**MS**	**F**	**Sig.**
Eye-foot Coordination (sec)	BG	13.23	2	6.61	5.01	0.00
	WG	193.94	147	1.31		

Table: 53 LSD test between all the Male groups (Under 14, under 18 and under 25) for Eye-foot Coordination

Variable	**Age Group**	**MD**	**SE**	**Sig.**
Eye-foot Coordination (sec)	Under 14 & 14 to 18	.68*	.22	.00
	14 to 18 & 18 to 25	-.12	.22	.57
	18 to 25 to Under 14	-.55*	.22	.01

The stage of eye-foot coordination in the (see table 51 and figure 21) age group of under-14 years was found at the point of mean ± SD was 7.23 ± 1.55. In the age

group of under-18 years, it was establish as 6.54 ± .693. The level of 6.67 ± 1.030 of the coordination was ascertained in the age group of under 25.

The one way ANOVA (notice table 52) test has found significant difference in at least two age groups. The least significant test perceives table 53 has revealed that the difference between the age groups of under-14 and under-18 was significant at the level of 5% level of significance. The difference was not significant at the 5% level of significance in the age groups of under-18 and under 25. In the age groups of under-25 and under 14, the difference was significant at 5% level of significance. The age groups of under-18 and under-25 were found as significantly better than the age group of under-14. Reasonably, it has been found that the agility also plays important role in the maintenance of eye-foot coordination.

EYE-FOOT COORDINATION (FEMALES)

Table: 54 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Eye-foot Coordination

Variable		SS	Df	MS	F	Sig.
Eye-foot Coordination (sec)	BG	12.591	2	6.2	4.71	0.01
	WG	196.122	147	1.334		

Table: 55 LSD test between all the Female groups (Under 14, under 18 and under 25) for Eye-foot Coordination

Variable	Age Group	MD	SE	Sig.
Eye-foot Coordination (sec)	Under 14 & 14 to 18	.68*	.23	.00
	14 to 18 & 18 to 25	-.51*	.23	.02
	18 to 25 to Under 14	-.17	.23	.46

In Females the rank of eye-foot coordination was found in the table 51 and figure 22 mean ± SD as 7.31 ± 1.46 in age group of under-14. In the age group of under-18 years, it was established as 6.63 ± .602. The level of 7.14 ± 1.22 of the eye-foot coordination was ascertained in the age group of under 25.

The one way ANOVA test table 54 has found significantly differences of eye-foot coordination among three different age groups of Females Gatka players. In the table 55 LSD test analysis, the difference of eye-foot coordination has been found to the significant at 5% level of significance in the age groups of under-14 and under-18. In

the age groups of under-18 and under 25, the difference of eye-foot coordination was also significant at 5% level significance. The difference between the age groups of under-25 and under-14 was not significant at 5% level of significance. Noticeably the age group of under-18 appeared as the most accurate group in eye-foot coordination and the age group of under-14 emerged as the least among all three. In this case dynamic balance also plays important role in the maintenance of eye-foot coordination test.

EXPLOSIVE LEG POWER (MALES)

Table: 56 Mean and Standard Deviation Values of Explosive Leg Power (cm)

Variable	Explosive Leg Power (cm)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	138.36±9.06	136.64±7.02
Under 18	170.42±16.90	153.86±20.02
Under 25	182.52±13.29	142.86±15.19

Table: 57 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Explosive Leg Power

Variable		SS	Df	MS	F	Sig.
Explosive Leg Power (cm)	BG	52072.65	2	26036.33	143.37	0.00
	WG	26694.18	147	181.593		

Table: 58 LSD test between all the Male groups (Under 14, under 18 and under 25) for Explosive Leg Power

Variable	Age Group	MD	SE	Sig.
Explosive Leg Power (cm)	Under 14 & 14 to 18	-32.06*	2.69	.00
	14 to 18 & 18 to 25	-12.10*	2.69	.00
	18 to 25 to Under 14	44.16*	2.69	.00

The table 56 and figure 23 testing of the leg power of the male respondents, it has been found that the age group of under-14 maintained 138.64±7.02 level of leg power while the age groups of under-18 and under-25 respectively obtained 170.42±16.90 and 182.52±13.29 levels of leg power.

In the one way ANOVA test, table 57 significant differences seemed to be occurring. In the LSD test table 58 analyses the difference of leg power was noticed significant

at the 5% level of significance between all the age groups. The age group of under-25 had been found as maintaining the most accurate leg power in comparison to the other two groups. The age group of under-18 was second in that segment while the age group of under-14 has been verified as the group with least leg power. Reasonably, more physical growth, along with more experience and training helped more matured age groups to grasp more leg power (Sreedhar, 2015).

EXPLOSIVE LEG POWER (FEMALES)

Table: 59 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Female for Explosive Leg Power

Variable		SS	df	MS	F	Sig.
Explosive Leg Power (cm)	BG	7603.61	2	3801.80	16.73	0.00
	WG	33391.56	147	227.15		

Table: 60 LSD test between all the Female groups (Under 14, under 18 and under 25) for Explosive Leg Power

Variable	Age Group	MD	SE	Sig.
Explosive Leg Power (cm)	Under 14 & 14 to 18	-17.22*	3.01	.00
	14 to 18 & 18 to 25	11.00*	3.01	.00
	18 to 25 to Under 14	6.22*	3.01	.041

In regard to the mean ± SD (see the table 56 and figure 24) levels of leg power among Females, the age group of under-14 maintained 136.64 ± 7.02 level of leg power while the age group of under-18 and under 25 were found to be maintaining respectively 153.86 ± 20.02 and 142.86 ± 15.19 levels of leg power. While evaluating the one way ANOVA test table 59 applied significant differences have been found in the leg powers among three age groups. The LSD test table 60 regarding the leg power analysis revealed that all the age groups were significantly differing at 5% level of significance. Noticeably, the leg power of the age group of under-18 had been found as best among three groups while the age group of under-25 and under-14 stood second and third respectively. Reasonably, the Females up to 14 years were underweight, and hence could not express much leg power and on the other side, the Females belonging to the age group of under-25 were found with symptoms of obesity and lack of coordination could not obtain much leg power (Sreedhar, 2015).

SPEED (MALES)

Table: 61 Mean and Standard Deviation Values of Speed (sec)

Variable	Speed (sec)	
Age Category	**Male (n=50)**	**Female (n=50)**
Under 14	9.40±.812	11.60±2.46
Under 18	7.95±1.01	13.10±1.08
Under 25	7.88±.718	12.24±1.82

Table: 62 One way ANOVA Table for Different Age Groups (Under-14, 14 to 18 and 18 to 25) of Male for Speed

Variable		SS	Df	MS	F	Sig.
Speed (sec)	BG	73.85	2	36.92	50.28	0.00
	WG	107.96	147	0.734		

Table: 63 LSD test between all the Male groups (Under 14, under 18 and under 25) for Speed

Variable	Age Group	MD	SE	Sig.
Speed (sec)	Under 14 & 14 to 18	1.45*	.17	.00
	14 to 18 & 18 to 25	.066	.17	.70
	18 to 25 to Under 14	-1.52*	.17	.00

The data regarding table 61 and figure 25 the measurement of speed among males reveals that the age group of under-14 carried 9.40 ± .812 speeds. The age groups of under-18 and under-25 obtained respectively 7.95 ± 1.012 level and 7.88 ± .718 level of speed.

The one way ANOVA test from table 62 established that there was significant differences in the levels of speed at least two age groups. According to the table 63 the least significance test analysis of the speed found that the age group under 14 was significantly differ from the age group of under-18 and under-25 at 5% level of significance. In the age group of under-18 and under-25, the level of difference was no significant at 5% level of significance. Interestingly, the age groups under-18 and under-25 carried accurate level of speed as compared to age group under-14. Reasonably, more training and practice resulted into more speed in that case.

SPEED (FEMALES)

Table: 64 One way ANOVA Table for Different Age Groups (Under 14, 14 to 18 and 18 to 25) of Female for Speed

Variable		SS	df	MS	F	Sig.
Speed (sec)	BG	56.63	2	28.31	8.02	0.00
	WG	518.72	147	3.52		

Table: 65 LSD test between all the Female groups (Under 14, under 18 and under 25) for Speed

Variable	Age Group	MD	SE	Sig.
Speed (sec)	Under 14 & 14 to 18	-1.49*	.37	.00
	14 to 18 & 18 to 25	.86*	.37	.023
	18 to 25 to Under 14	.63	.37	.092

In regard of table 61 and figure 26 to the speed in Females groups, the age group of under-14 maintained mean ± SD 11.60 ± 2.46 level of speed. The age groups of under-18 and under-25 obtained respectively 13.10 ± 1.08 level and 12.24 ± 1.82 level of speed. The one way ANOVA test table 64 confirmed significant differences of speed at least two groups. According to the least significant difference test table 65, it has been verified that the age group under-18 was significantly differ from other two groups at the 5% level of significance. The difference was not significant at 5% level of significance in case of age group of under-25 and under-14. The noticeable concern here is that no age group of Females could obtain and maintain the speed which is generally prescribed for and expected from sportswomen. Although, in that poor performance of speed, the Females belonging the age groups under-14 and under-25 were fast as compared to the age group of under 18. The Females of the age groups of under-14 were faster due to their less weight and more coordination.

DATA INTERPRETATION OF FITNESS ASPECT THROUGH AGE GROUP WISE[2]

If F-test in 4th columns gives value of significance less than 0.05 then T-test with respect to "equal variance not assumed" (EVNA) will be used otherwise T-test for "equal variance assumed (EVA) will be used".

[2] All the figures related to the results of fitness aspect of age group wise present in appendix 2

BODY WEIGHT

(Male and Female Group of Under-14)

Table: 66 T-test for Body Weight of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Weight (Kg)	U14 M & U14 F	EVA	.012	.164	-1.81	1.29
		EVNA		.164	-1.81	1.29

From table 1 the results show that reading of body weight males and Females group of under-14. The mean ± SD reading for males was 34.55 ± 6.41. While the mean ± SD reading for Females group was 32.74 ± 6.51. In table 66 since the value significance-value under t-test was 0.164 which was greater than 0.05. This shows that there was no significance difference between under-14 males and under-14 Females with respect to their body weight at 5% level of significance.

(Male and Female Group of Under-18)

Table: 67 T-test for Body Weight of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Weight (Kg)	U18 M & U18 F	EVA	.518	.692	.73	1.84
		EVNA		.693	.73	1.84

According to the table 1 the descriptive statistics shows the mean and SD value of male Gatka players on the variable of body weight as 55.35±8.72 respectively. However, Female Gatka players had mean and SD values as 56.08 ± 9.65 respectively. In table 67 the significance-value under t-test was .692 which was greater than 0.05. This shows that there was no significance difference between under-18 males and under-18 Females with respect to their body weight.

(Male and Female Group of Under-25)

Table: 68 T-test for Body Weight of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Weight (Kg)	U25 M & U25 F	EVA	.443	.000	-11.94	1.72
		EVNA		.000	-11.94	1.72

Results evidently had explained according to the table 1 that mean and standard deviation value of body weight for males and Females Gatka players of under-25 were 66.22 ± 8.87 and 54.27 ± 8.37 respectively. In table 68 shows the significance-value under t-test was .000 which was smallest than 0.05. This shows that there was significance difference between under-25 males and under-25 Females with respect to their body weight. It means under-25 male body weight was higher than the Female body weight.

BODY HEIGHT

(Male and Female Group of Under-14)

Table: 69 T-test for Body Height of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	F-test (Sig.) (2tailed)	MD	SED
Body Height (cm)	U14 M & U14 F	EVA	.719	.098	-2.48	1.48
		EVNA		.098	-2.48	1.48

Results clearly show that in table 6 mean ± SD value of height for males and Females Gatka players of under-14 were 142.40 ± 7.69 and 139.92 ± 7.15 respectively. According to the table 69 showed the significance-value under t-test value was .098 which was greater than 0.05. This showed that there was no significance difference between under-14 males and under-14 Females with respect to their body height.

(Male and Female Group of Under-18)

Table: 70 T-test for Body Height of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Height (cm)	U18 M & U18 F	EVA	.003	.000	-9.94	1.67
		EVNA		.000	-9.94	1.67

The descriptive statistics shows in the table 6 mean and SD value of male Gatka players on the variable of height of as 165.30 ± 6.95 respectively. However, Female's Gatka players had mean and SD values as 155.36 ± 9.60 respectively. According to the table 70 shows the value significance under t-test value was .000 which was smaller than 0.05. It means that there was significant difference between

both groups. It shows that male group of Gatka players was significantly taller than Female group of Gatka players (see figure 31).

(Male and Female Group of Under-25)

Table: 71 T-test for Body Height of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Height (cm)	U25 M & U25 F	EVA	.000	.000	-19.68	2.03
		EVNA		.000	-19.68	2.03

Results evidently had explained that in the table 6 mean and standard deviation value of height for male and Female Gatka players of under-25 were 169.66 ± 5.28 and 149.98 ± 13.37 respectively. According to the table 71 shows the significance-value under t-test was .000 which was smallest than 0.05. It means that there was significant difference between male and female group of Gatka players. It shows that male group of Gatka players was significantly taller than Female group of Gatka players (witness figure 32).

BODY MASS INDEX

(Male and Female Group of Under-14)

Table: 72 T-test for Body Mass Index of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Mass Index (Kg/m^2)	U14 M & U14 F	EVA	0.312	0.571	-0.29	0.52
		EVNA		0.571	-0.29	0.52

Results evidently had explained in the table 11 mean and standard deviation value of body mass index for males and Females Gatka players of under-14 were 16.96 ± 2.38 and 16.66 ± 2.86 respectively. According to the T-test table 72 the difference between under-14 male and under-14 Female was as not significant at 5% level of significance. Noticeably, the mean ± SD value show (see table 11 and figure 5) that as per the established norms, the age group 14 males and 14 Females group appeared in the "under-weight" category. Quite logically, this age group had been gone through the stage of adolescence and yet they had to increase the completions of their height and weight.

(Male and Female Group of Under-18)

Table: 73 T-test for Body Mass Index of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Mass Index (Kg/m^2)	U18 M & U18 F	EVA	0	0	3.47	0.91
		EVNA		0	3.47	0.91

The descriptive statistics showed table 11 the mean and SD value of male Gatka players on the variable of body mass index as 20.19±2.35 respectively. However, Female Gatka players had mean and SD values as 23.66 ± 6.01 respectively. The T-test reveal that in table 73 the under-18 male was significantly better level of BMI had been noticed in the group of Female respondents. Clearly, as per the recognized norms, the age group of under-18 male and 18 Female had been found as, maintaining appropriate weight. Obviously, they had gained complete or approximate bodily growth. For that reason, their body weight had been found as significantly normal category.

(Male and Female Group of Under-25)

Table: 74 T-test for Body Mass Index of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Body Mass Index (Kg/m^2)	U25 M & U25 F	EVA	0	0.053	1.73	0.88
		EVNA		0.054	1.73	0.88

The expressive figures in table 11 show the mean and SD value of male Gatka players on the variable of body mass index as 22.96 ± 2.49 respectively. However, Female Gatka players had mean and SD values as 24.70 ± 5.75 respectively. The T-test shows that in table 74 the age group under-25 male was significantly better than corresponding females group. In the group of under-25 males have been found as maintaining apposite weight. The Females of the group under 25 belong to the category of over-weight. Consequently the under-25 Females can be placed in the category of in poor condition sports persons.

PERCENT BODY FAT

(Male and Female Group of Under-14)

Table: 75 T-test for Percent Body Fat of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Percent Body Fat (%)	U14 M & U14 F	EVA	.006	.000	2.49	.25
		EVNA		.000	2.49	.25

It was recognized statement that the percent body fat represents to the body composition of a person. The probing percent body fat of the males, in the table 16 age group of under-14, the mean ± SD value was found as 5.50 ± 1.52. Further, in age group of Females the level of percent body fat was 8.0 ± 1.01. Further, according to the T-test table 75 the MD of the group of under-14 male and under-14 Female was 2.49. Since significance-value was 0.000 so there was significance difference between both the groups that was male respondents were significantly better than Female respondents. A significant finding which can be discussed here is that the percent body fat among males of the age group of under-14 was found as less than the under-14 Female groups. Reasonably that deficiency of percent body fat in that age group was due their minimal and yet-growing age.

(Male and Female Group of Under-18)

Table: 76 T-test for Percent Body Fat of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Percent Body Fat (%)	U18 M & U18 F	EVA	.007	.000	4.158	.405
		EVNA		.000	4.158	.405

Among the males were concerned in the age group of under 18, it was found that in table 16 mean ± SD as 5.84 ± 1.64. In the age group the Female the level of percent body fat was 10.00 ± 2.34. The measuring percent body fat of under-18 males and under 18 Females, it was obtained that the MD was 4.15. The evident alarm which

emerge here that the T-test table 76 reveals that there was significant diversity of percent body fat in the both age groups of males and Females. Again in these groups male players were significantly better than Female players of Gatka. A considerable finding which can be discussed here is that the percent body fat among males of the age group of under-18 was found less than the under-18 Female groups. Reasonably that increases the level of percent body fat in that age group was due to their stored fat in the hip and chest portion of the body, hence, male individuals who have a lower percent body fat have the advantage in body mass index.

(Male and Female Group of Under-25)

Table: 77 T-test for Percent Body Fat of Male and Female Groups of under-25

Variable	**Age group**		**F-test (Sig.)**	**T-test Sig. (2-tailed)**	**MD**	**SED**
Percent Body Fat (%)	U25 M & U25 F	EVA	.000	.000	5.42	.346
		EVNA		0	5.42	.346

Although enquiring the percent body fat of the male and Female groups under-25, it was found in table 16 mean ± sd as 6.45 ± 1.07 and 11.87 ± 2.19 respectively The MD of the percent body fat of under-25 male and under 25 Female, it was obtained that 5.42. The clear apprehension which emerge here that the t-test table 77 reveals that there was significant variety of percent body fat in the both age groups of males and Females. A large finding which can be discussed here is that the percent body fat among males of the age group of under-25 was found as a reduced amount than the under-25 Females groups. But the mean value was depicted that males were significantly better than Female group. Reason was same as age group of under-18 Females that increases the level of percent body fat in that age group was due to their stored fat in the hip and chest portion of the body, hence, male players who have a minor percent body fat have the benefit in Body mass index and body weight (see figure 38).

CARDIOVASCULAR ENDURANCE

(Male and Female Group of Under-14)

Table: 78 T-test for Cardiovascular Endurance of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Cardiovascular Endurance	U14 M & U14 F	EVA	.528	.296	.047	.45
		EVNA		.296	.047	.45

In T-test table 78 which presented the weighted of cardiovascular fitness levels for males and Females group of under 14. Among there was no significant difference between males and Females groups of Gatka players. However, males mean ± SD value (2.54 ± .230) achieved in cardiovascular fitness and Females mean ± SD value (2.58 ± .220) (see table 21). According to the table 78 males group was not significantly better as compare to Females group of Gatka players. Reasonably, the mechanisms by which the cardiac output is increased during exercise may differ between men and women. Certain other factors that may modify the cardiovascular response to exercise include phase of the menstrual cycle, age, exercise mode, length of the exercise session, and environmental conditions such as heat and stress. Although there are some physiologic differences that may affect the mechanism of the changes, the overall response of the cardiovascular system to exercise is similar in men and women. But no much thing has ever happened in the female group, that's why performance of the female person has remained even as males group under-14.

(Male and Female Group of Under-18)

Table: 79 T-test for Cardiovascular Endurance of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Cardiovascular Endurance	U18 M & U18 F	EVA	.984	.060	-.085	.44
		EVNA		.060	-.085	.44

In table 21 the males and Females group of under-18 Gatka players had mean ± SD of cardiovascular endurance of 2.41 ± .224 and 2.33 ± .225 respectively. In these groups the cardiovascular endurance test has highlighted in the t-test table 79 was

very interesting facts. Noticeably to the table 79 shows the value significance under t-test value was 0.4492 which was smallest than 0.05. It means that there was no significant difference between both groups.

(Male and Female Group of Under-25)

Table: 80 T-test for Cardiovascular Endurance of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Cardiovascular Endurance	U25 M & U25 F	EVA	.369	.059	.896	.47
		EVNA		.059	.896	.47

According to the table 21 male and Female groups of under-25 Gatka players had mean ± SD of cardiovascular endurance of 2.35 ± .248 and 2.44 ± .220 respectively. The data expresses that in T-test table 80 there was no significant difference between both groups of Gatka players.

FLEXIBILITY

(Male and Female Group of Under-14)

Table: 81 T-test for Flexibility of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Flexibility (cm)	U14 M & U14 F	EVA	0.67	0.446	0.45	0.58
		EVNA		0.446	0.45	0.58

The eloquent data showed in table 26 the mean and SD value of male Gatka players on the variable of flexibility as 9.48 ± 3.06 respectively. However, Female Gatka players had mean and SD values as 9.93 ± 2.81 respectively. The data expresses that the table 81, the significance-value 0.44 of t-test which was greater than 0.05. So that the levels of flexibility were not significantly differ for age groups under-14 male and under-14 Female between in the both group of players. So both the age groups have same flexibility.

(Male and Female Group of Under-18)

Table: 82 T-test for Flexibility of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Flexibility (cm)	U18 M & U18 F	EVA	0.619	0	3.37	0.90
		EVNA		0	3.37	0.90

The Mean score of flexibility was 10.54 where as in Female players it was 13.91. The SD was 4.499 and 4.553 (see table 26). The levels of flexibility found in the groups of males and Females under-18 respectively as 3.37. According to the t-test table 82 shows that the Female group of the Gatka players was found significantly better than males group of under-18. Statistically significant differences in terms of flexibility between the male and female groups of Gatka were determined in the tests used to estimate the flexibility of the hamstring and hip is highly better in Female group of under-18.

(Male and Female Group of Under-25)

Table: 83 T-test for Flexibility of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Flexibility (cm)	U25 M & U25 F	EVA	0.028	0	9.09	1.06
		EVNA		0	9.09	1.06

According to the table 26 the Mean score of flexibility was 6.14 where as in Female players it was 15.23. The SD was 5.606 and 4.986. The MD between males and Females Gatka players of under-25 9.09 and according to the t-test table 83 the difference has been found to be statistically significant. Female group was significantly superior to male group of Gatka players. In all groups of Females (under-14, under-18 and under-25) achieved better results in flexibility. For improving flexibility of all groups of male Gatka player's trunk, various lower back and hamstring stretch exercises are advised which are to be done regularly and executed properly and gradually.

MUSCULAR ENDURANCE AND MUSCULAR STRENGTH OF ARMS AND SHOULDER

(Male and Female Group of Under-14)

Table: 84 T-test for MEMSAS of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
MEMSAS	U14 M & U14 F	EVA	0.658	0.087	-0.66	0.38
		EVNA		0.087	-0.66	0.38

According to the table 31 male and female groups of under-14 Gatka players had mean ± SD of muscular endurance and muscular strength of arms and shoulders of 3.74 ± 1.92 and 3.08 ± 1.89 respectively. As for the level of muscular endurance and muscular strength of arms and shoulders among the male and Female groups were concerned in the table 84 age group of under 14, it was found T-test value as 0.087 which is greater than 0.05. The level of muscular endurance and muscular strength of arms and shoulders in the age group under 14 was found no significant difference between both groups. Reasonably, males and Females have the same combination of mutually slow twitch and fast twitch fibers.

(Male and Female Group of Under-18)

Table: 85 T-test for MEMSAS of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
MEMSAS	U18 M & U18 F	EVA	0	0	-4.54	0.56
		EVNA		0	-4.54	0.56

In the table 31 show age group of under-18, the mean ± SD value was found as 8.04 ± 3.64 and in group of Females the level of muscular endurance and muscular strength of arms and shoulders was 3.50 ± 1.65. The enquiring the muscular endurance and muscular strength of arms and shoulders of the males and Females, in the age group of under-18, it was found T-test value was 0 show in the table 85. The t-test significance-value revealed male groups of Gatka players were significantly better with comparison to Female group (also see figure 46). Reasonably, muscular strength and muscular stamina factor that is logically resolute is limb length. Players

with small limbs are likely to be able to pick up more weight and more time because of advantageous power and endurance factors (arms). Likewise, differences in strength and endurance growth may come about because of difference in muscle measurement lengthwise. A number of players have lengthy muscles, and some players have small muscles. Players with comparatively lengthy muscles have bigger potential for developing size, strength and endurance than players with relatively smaller muscles.

(Male and Female Group of Under-25)

Table: 86 T-test for MEMSAS of Male and Female Groups of under-25

Variable	**Age group**		**F-test (Sig.)**	**T-test Sig. (2-tailed)**	**MD**	**SED**
MEMSAS	U25 M & U25 F	EVA	0.012	0	-2.82	0.49
		EVNA		0	-2.82	0.49

Since table 31 probing the muscular endurance and muscular strength of arms and shoulders of the males, in the age group of under-25, the mean ± SD value was found as 5.70 ± 2.95. Further, in group of Females the level of muscular endurance and muscular strength of arms and shoulders was 2.88 ± 1.91 and the t-test significance-value (witness table 86) of the age groups of under-18 males and Females was noticed as 0 which was smaller than 0.05. The level of muscular endurance and muscular strength of arms and shoulders in the group is found significantly better in the group of male Gatka players. Interestingly, step achievement and vigorous physical activity were strongly related to pull-ups achievement. There was significant difference in muscular strength and endurance achievement between male and Female Gatka players in under-18 and under-25 groups. Logically, the most important aspect that affects muscular strength and muscular endurance is muscle fiber type. Players perform wide variety of performance combining varying composites of speed, power and stamina and no single type of muscle fibers possesses all the characteristics.

MUSCULAR STRENGTH AND MUSCULAR ENDURANCE OF ABDOMINAL

(Male and Female Group of Under-14)

Table: 87 T-test for MSMEA of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
MSMEA	U14 M & U14 F	EVA	0.092	0.006	-3.18	1.13
		EVNA		0.006	-3.18	1.13

The level of muscular strength and muscular endurance of abdominal among the males were concerned in the table 36 age group of under 14, it was found mean ± SD as 21.14 ± 6.37. In the Females the level of muscular strength and muscular endurance of abdominal was 17.96 ± 4.87. The t-value of the table 87 both groups of males and Females have been found as 0.006. According to this value the level of muscular endurance and muscular strength of abdominal in the age group under 14 is found significant difference between both groups. According to the figure 48 these results support the research' that males will performed better than Females on the sit-ups in fatigue test as having a faster number of repetitions of sit-ups in fatigue test.

(Male and Female Group of Under-18)

Table: 88 T-test for MSMEA of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
MSMEA	U18 M & U18 F	EVA	0.564	0	-7.86	1.13
		EVNA		0	-7.86	1.13

Although enquiring the muscular strength and muscular endurance of abdominal muscle of the males and female group's under-18, it was found in the table 36 the mean ± SD as 26.48 ± 5.43 and 18.62 ± 5.90 respectively. While the significance value t-test was 0. The t-test value in the table 88 shows male group of Gatka players was significantly superior in evaluation to Female group. Rationally, the result shows that the obese Females have low level of agility than fit males. The results are to conclude the relation among body mass index and muscular strength and muscular endurance of abdominal muscle in strong players. As the physical capacities such as muscle strength and endurance are dependent on body or muscle mass. Different characteristics or physical factors such as variations in height and weight have been

connected with changes in muscle strength and muscle endurance (perceive figure 50).

(Male and Female Group of Under-25

Table: 89 T-test for MSMEA of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
MSMEA	U25 M & U25 F	EVA	0.174	0	-6.94	1.01
		EVNA		0	-6.94	1.01

There was a significant difference in muscular strength and muscular endurance of abdominal among the both groups of males and Females of under-25. Among the males concerned in the age group of under-25, it was found in the table 36 the mean ± SD value as 24.78 ± 5.34. In the Females the level of muscular strength and muscular endurance of abdominal was 17.84 ± 4.80 and according to the t-test value in the table 89 of both groups was 0, which was less than 0.05. Again, males were significantly better than Females. The end result of the study exposed decrease in muscle strength and muscle endurance of abdominal of obese Females than that in standard categories in weight of males. These results confirmed to the studies approved on obese Gatka Female players who were engaged in less moderate physical activity are physically less fit than non-obese male Gatka players.

AGILITY

(Male and Female Group of Under-14)

Table: 90 T-test for Agility of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Agility (sec)	U14 M & U14 F	EVA	0	0	1.068	0.18
		EVNA		0	1.068	0.18

In the under-14 age group, statistically significant difference was determined between the male and Female Gatka players, in agility, where the male Gatka players showed better results. Despite the fact that, while measuring the agility in the table 41 shows mean ± SD value was 12.34 ± .552 in the group of males. In the group of Females, it was found as 13.41 ± 1.149. The MD of the group of under-14 males and Females was witnessed as 1.068 and t-test value was 0 which was clearly showed in

table 90. Males group under-14 significantly better than Female's group under-14. Justifiably, agility preparation has a positive result on movement practice and the skill to create force in leg muscle extra powerfully. Single leg movement improves balance, power and coordination, which results in a better muscular power performance in sprinting. This is one of the reasons why the male Gatka players from the under 14 group had better results in shuttle run.

(Male and Female Group of Under-18)

Table: 91 T-test for Agility of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Agility (sec)	U18 M & U18 F	EVA	0	0	1.118	0.21
		EVNA		0	1.118	0.21

Male and Female group of under-18 Gatka players had mean ± SD agility of 11.51 ±.724 and 12.62 ± 1.319 (distinguish table 41) respectively and MD was 1.118 (observe table 91). According to the table 91 the t-test value show the agility of males was significantly better than Females. Rightly, agility is more based on hereditary factors, though there is forever a training potential to be considered. It was possible that differences of agility values related to the players' genetic characteristics. In figure 52 the mean value was reported that there was significant difference between males and Females, and agility could transfer to change of direction speed.

(Male and Female Group of Under-25)

Table: 92 T-test for Agility of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Agility (sec)	U25 M & U25 F	EVA	0	0	1.158	0.20
		EVNA		0	1.158	0.20

There was a significant difference in agility among the both groups of males and Females of under-25. Among the males concerned in the table 41 age group of under-25, it was found mean ± SD as 11.33 ± .687. In the Females the level of agility was 12.49 ± 1.283 and the MD of both groups were 1.15 (perceive table 92). The t-test value of table 92 the males group of Gatka players was significantly better than

Females Gatka player in agility. Body mass index of Gatka players had significant impact on agility, which is a major determinant of fighting efficiency in Gatka. Male Gatka players also undergo continuous training that might have also had positive impact on shuttle run score since it improves the efficiency of leg muscles by generating ground output power.

DYNAMIC BALANCE

(Male and Female Group of Under-14)

Table: 93 T-test for Dynamic Balance of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Dynamic Balance (marks)	U14 M & U14 F	EVA	0.499	0.631	-1.22	2.53
		EVNA		0.631	-1.22	2.53

As a result of independent-samples MD to examine the differences in dynamic balance in table 46 by the gender of under 14, like males mean ± SD as (61.10±12.02) had somewhat higher values than Females (59.88±13.28) and the t-test value of table 93 was 0.63 did, there was no statistical significant difference between both groups. Practically, muscular weakness and increases in body fat, which is also related to balance and mobility problems that bring about physical disabilities and loss of independence. The strength of lower extremity of the Gatka players has a high correlation with walking ability and balancing ability.

(Male and Female Group of Under-18)

Table: 94 T-test for Dynamic Balance of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Dynamic Balance (marks)	U18 M & U18 F	EVA	0.751	0.698	0.96	2.470
		EVNA		0.698	0.96	2.470

The mean values of dynamic balance of males and Females groups were respectively 68.50±12.12 and 69.46 ± 12.57 shows in table 46. The results of dynamic balance of under-18 group were very interesting when seen in the MD values as 0.96. It has been depicted that in table 94 the t-test value was 0.69, which shows that there was

no significant difference between both groups. The results of this study showed that there is no significant effect between gender factor and balance performances. This means that gender does not affect players' scores in their balance performance.

(Male and Female Group of Under-25)

Table: 95 T-test for Dynamic Balance of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Dynamic Balance (marks)	U25 M & U25 F	EVA	0.34	0.007	-7.62	2.74
		EVNA		0.007	-7.62	2.74

There was no significant difference in dynamic balance among the both groups of males and Females of under-25. Among the males concerned in the table 46 age group of under-25, it was found mean ± SD as 67.68 ± 12.69. In the Female the level of dynamic balance was 60.06 ± 14.65 and the T-test value of both groups was 0.007 (see table 95). It is significant to tip out that the connection of balance with open eyes was expected. The result can be explained by the biggest number of errors that Female players in Gatka make during the execution of movement step, turn, and little rotate are due to failure of balance in the final segment of this movement, i.e. during the challenge of the players to wait in stance after the movement "little rotate" – when, after a relatively speedy 45 degree turn just about axis, should stay in situation without losing the balance.

EYE-FOOT COORDINATION

(Male and Female Group of Under-14)

Table: 96 T-test for Eye-Foot Coordination of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Eye-Foot Coordination (in sec)	U14 M & U14 F	EVA	0.891	0.773	0.0872	0.30
		EVNA		0.773	0.0872	0.30

The results showed that time duration in eye foot coordination test for males and Females group of under-14 in table 51. The mean ± SD time duration for males of

eye-foot coordination was 7.23 ± 1.55. While the mean ± SD of eye-foot coordination of Female group was 7.31 ± 1.46. The MD was 0.08 (witness table 96). In table 96 clearly show the t-test value was 0.773. It means there was no significant difference between both groups. Reasonably, Anthropometric variables the stability limits of the coordination and can affect the motor strategies relating to coordination control. Some variables, such as body mass index, muscular strength, muscular endurance and leg power are directly related to postural coordination.

(Male and Female Group of Under-18)

Table: 97 T-test for Eye-Foot Coordination of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Eye-Foot Coordination (in sec)	U18 M & U18 F	EVA	0.211	0.491	0.08	0.12
		EVNA		0.491	0.08	0.12

The result shows that in table 51 the time duration in eye foot coordination test for male and female groups of under-18. The mean ± SD time duration for males was 6.54 ±.693 while the mean ± SD time duration for Females was 6.63 ± .602 and the MD was 0.08 (witness table 97). T-test value (0.491) of table 97 shows that there was no significant difference between both groups. An important finding was the results of the eye foot coordination test and time trail test were strongly associated with the level of agility. The time trail test includes balance and coordination capabilities, being the most related to the agility test. In shuttle run test the performance of Females players were already less than males. That's the reason; the coordination was less in Female as compared to males Gatka players. But coordination was not significant.

(Male and Female Group of Under-25)

Table: 98 T-test for Eye-Foot Coordination of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Eye-Foot Coordination (in sec)	U25 M & U25 F	EVA	0.087	0.04	0.47	0.22
		EVNA		0.04	0.47	0.22

There was a significant difference in coordination among the both groups of males and Females of under-25. Among the males were concerned in the table 51 age group of under 25, it was found mean ± SD as 6.67 ± 1.030. In the age group Female the level of coordination was 7.14 ± 1.22 and the MD of both groups were 0.47 (see table 98). At the same time as t-test value of table 98 and figure 59 evidently prove that male group of Gatka players was significantly better on stage as compared to Female Gatka player in coordination in under-25 age group. Leg power and balance of Gatka players had significant impact on coordination. The strength of lower extremity of the Gatka players has a high correlation with walking ability and coordinating ability. That's why male Gatka players were much better than Females group of Gatka players.

EXPLOSIVE LEG POWER

(Male and Female Group of Under-14)

Table: 99 T-test for Explosive Leg Power of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Explosive Leg Power (cm)	U14 M & U14 F	EVA	0.619	0.291	-1.72	1.62
		EVNA		0.292	-1.72	1.62

Results clearly show that in table 56 the mean ± SD value of explosive leg power for males and Females Gatka players of under 14 were 138.36 ± 9.06 and 136.64 ± 7.02 in that order. The significance-value of t-test was 0.291 which was greater than 0.05 (see table 99). This shows that there is no significant difference between both groups.

(Male and Female Group of Under-18)

Table: 100 T-test for Explosive Leg Power of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Explosive Leg Power (cm)	U18 M & U18 F	EVA	0.091	0	-16.56	3.70
		EVNA		0	-16.56	3.70

The expressive data shows that in table 56 the mean and SD value of male Gatka players on the variable of explosive leg power as 170.42±16.90 respectively. However, Female Gatka players had mean and SD values as 153.86 ± 20.027 respectively. The t-test value 0 (see table 100 and figure 61) as shown in the result above was found statistically significant. Male groups were significantly better than Female groups of Gatka players. Standing long jump performance has been directly related with maximal lower limb strength and sprint performance in male Gatka players. Because of this reason males were much better than Female Gatka players in age group of under-18.

(Male and Female Group of Under-25)

Table: 101 T-test for Explosive Leg Power of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Explosive Leg Power (cm)	U25 M & U25 F	EVA	0.904	0	-39.66	2.85
		EVNA		0	-39.66	2.85

Consequences manifestly had explained that mean and standard deviation value of table 59 explosive leg power for males and Females Gatka players of under-25 were 182.52 ± 13.29 and 142 ± 15.198 respectively. The significance-value of t-test on leg power was 0 (see table 101), which was smaller than 0.05. This indicates that male Gatka players were significantly better than Female Gatka players. This result also shows the figure 62. Rationally, standing long jump distance, of martial artists unswervingly connected with body mass index and percent body fat. That's why the standing long jump for males mean average was higher than for Female Gatka players. Reducing body fat of Females by proper dietary planning and training will help to improve their leg power.

SPEED

(Male and Female Group of Under-14)

Table: 102 T-test for Speed of Male and Female Groups of under-14

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Speed (sec)	U14 M & U14 F	EVA	0	0	2.198	0.36
		EVNA		0	2.198	0.36

The outcome showed that in table 61 the time duration in 50 meter sprint for male and female group of under-14. The mean ± SD time duration for males was 9.40 ±.812. While the mean ± SD time duration for Females was 11.60 ± 2.469 and the MD were 2.19. According to the t-test, see table 102 the significance-value which was smaller as compared to 0.05, this indicated that Females spend more time as compared to males. Plausibly, in this age groups speed is dependent on the cardiovascular endurance. The anaerobic system was responsible for producing energy with the limited use of oxygen-hence the name anaerobic meaning "without oxygen." It can see the variable of cardiovascular endurance of Female Gatka players were very low as compared to male Gatka players of age groups of under-14. For this reason male Gatka players were significantly better than Female Gatka players in under-14 age groups (also see figure 63).

(Male and Female Group of Under-18)

Table: 103 T-test for Speed of Male and Female Groups of under-18

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Speed (sec)	U18 M & U18 F	EVA	0.536	0	5.15	0.20
		EVNA		0	5.15	0.20

The descriptive statistics shows in table 61vthe mean and SD value of male Gatka players on the variable of speed as 7.95±1.012 respectively. However, Female Gatka players had mean and SD values as 13.10 ± 1.083 respectively. The t-test significance-value was 0 as shown table in 103 which was less than 0.05. The result above was found statistically significant. Male groups were significantly better than Female groups of Gatka players. In comparison the male players are better performers (also see the figure 64). But in this age groups Speed was reliant on the leg power generated and how well the players can continue this power. For 50 meter sprinters, the winner is the Gatka player who doesn't slows down the least. Power is one of the most important fundamentals to speed. On this basis of performance of speed in males were better than Female group of under-18.

(Male and Female Group of Under-25)

Table: 104 T-test for Speed of Male and Female Groups of under-25

Variable	Age group		F-test (Sig.)	T-test Sig. (2-tailed)	MD	SED
Speed (sec)	U25 M & U25 F	EVA	0	0	4.35	0.27
		EVNA		0	4.35	0.27

Results clearly clarify that in the table 61 the mean and standard deviation value of leg power for male and Female Gatka players of under-25 were 7.88 ± .718 and 12.24 ± 1.821 respectively. The obtained MD in table 104 evidently show on speed was 4.35 and the t-test significance-value was 0, which was smaller than 0.05. This shows that male Gatka players were significantly better than Female Gatka players. In this group agility was to play a role. In order to be fast the players must also be agile. The ability to change directions, high-speed, accelerate and reduce speed, it all contributes to the pace of players. The second reason was male players have normal body mass index and percent body fat. So they are more agile and speedy than Female group of Gatka players of under-25.

DATA INTERPRETATION OF SOCIO-CULTURAL ASPECT[3]

EDUCATIONAL QUALIFICATION

According to the table-105 data regarded Socio-Cultural profile of Gatka players was taken up to evaluate the level of literacy among there acquired educational qualifications. The levels of educational qualifications were categorized into four groups, i.e. up to matriculation, up to 10+2, up to graduation and up to post graduation. The data revealed that 49.3 percent respondents had acquired education up to matriculation. In the category of 10+2 level, 30 percent respondents represented that, further in the categories of graduation and post graduation, there were respectively 19 percent and 2.7 percent respondents.

Table: 105 Percentage of Educational Qualification of Gatka Players

Educational Qualification	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
Up to 10	79	52.7	69	46.0	46.0	49.3
Up to +2	52	34.7	38	25.3	90	30.0
Up to Graduate	19	12.7	35	23.3	54	18.0
Up to Post-Graduate	0	0.0	8	5.3	8	2.7
Total	150	100.0	150	100.0	300	100.0

[3] All the figures related to the socio-cultural aspect of Gatka present in appendix 3.

In table 105 the study had disclosed that approximate 50 percent respondents were educationally qualified only up to the level of matriculation or below that level. Reasonably, the literacy rate, especially the rate of higher education was much lower in the rural areas of North India. Most of the respondents belonging to the rural areas are qualified up to lower than matriculation another noticeable finding which emerges here was that only approximate twenty percent respondents had acquired or had been pursuing the higher education (graduation and post graduation). The trend was quite understandable because majority of the youth after completing their school and pre-college/university education start aspiring for jobs or got engaged in professional academic courses. Reasonably, they have less time and minimal intentions to continue Gatka as their hobby or enthusiasm.

RELIGION

In table 106 to identify the socio-cultural aspect of the Gatka players Religion was considered as a prominent attribute when the respondents were asked about religious affiliations, as many as 91 percent disclosed their religion as Sikhism while other 09 percent identified themselves as Hindus.

Table: 106 Percentage of Religion of Gatka Players

Religion	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
Hindu	0	0.0	27	18.0	27	9.0
Sikh	150	100.0	123	82.0	273	91.0
Total	150	100.0	150	100.0	300	100.0

The fact which emerges from the abovementioned data was that Sikh Gatka was predominantly played patronized and practiced by the Sikhs. However, a noticeable number of persons belonging to Hinduism have also adopted Gatka. The nine percent Hindus playing Gatka were actually Females belonging to urban areas. In rural segments and among males, Gatka can be attributed as a Sikh phenomenon.

CASTE

In table 107 in response to the determinant of the caste, a variety of responded were received in which it was found that Gatka players belonged to different caste groups. Noticeably, 33 percent Gatka players belonged to the scheduled caste while 24.6 percent represented the group of OBCs (other backward classes). The remaining 42 percent belonged to the general caste group.

Table: 107 Percentage of Caste of Gatka Players

Caste	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
General	70	46.7	57	38.0	127	42.3
O.B.C	45	30.0	29	19.3	74	24.6
Scheduled Caste	35	23.3	64	42.7	99	33.0
Total	150	100.0	150	100.0	300	100.0

The data had revealed very interesting facts in regard to the caste variable. Gatka is overwhelmingly popular among the general castes. Reasonably, Gatka has predominantly recognized as a Sikh Martial Art generating from the socio-religions and religions-political historical legacy of Sikhs. And among Sikhs, the Jat-Sikhs, who belong to the general caste group, comprise the majority of Sikh community. The enthusiasm of the Jat-Sikhs, accompanied by a noticeable number of Sikh-Khatris, can be featured as the primary or core group the art of Gatka.

This was the salient feature of Sikhism that it denounces the hierarchies of castes and promotes the equality of castes. Therefore, there has been a noticeable and glorified contribution of the OBCs as well as the scheduled castes in Gatka. The contribution of the OBCs and the SCs in Gatka can very much relate to the historical legacy of the Dalits and Backward caste groups to the Sikh Religions-political where there two communities displayed their warrior skills equally with the general caste groups.

CASTES NAME

Table: 108 Percentages of Castes Name of Gatka Players

Castes Name	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
Ghumair	3	2.0	5	3.3	8	2.7
Jat	57	38.0	39	26.0	96	32.0
Khatri	11	7.3	7	4.7	18	6.0
Majbi Sikh	13	8.7	1	.7	14	4.7
Mehra	3	2.0	1	.7	4	1.3
Other	14	9.4	21	14.0	35	11.7
Ramdasiea	21	14.0	54	36.0	75	25.0
Ramgariea	27	18.0	19	12.7	46	15.3
Ravidasiea	0	0.0	1	.7	1	0.3
Valmiki	1	.7	2	1.3	3	1.0
Total	150	100.0	150	100.0	300	100.0

According to the table 108 among varies sub-castes, 32 percent are Jat-Sikhs, 25 percent are Ramdasias, and 15.3 percents Ramgarhias while Khatris also comprise 06 percent of the total number. Besides these, Ghumair comprise 2.7 percent, Majhahbi Sikh 4.7 percent, Mehra 1.3 percent, Ravidasias 0.3 percents and Valmiki 1 percent. Remaining 11.4 percent are categorized as belonging to other sub-castes as this category consists of those respondents who did not disclose their sub-castes.

DEMOGRAPHIC PROFILE (URBAN/RURAL)

In table 109 to obtain the formal demographic profile of the respondents there locations of habitats were identified on the bases of two constituents, i.e. urban and rural. In the study 46 percent Gatka players have been found as living in the urban area while there 54 percent reside in the rural segments.

Table: 109 Percentages of Demographic Profile (Urban/Rural) of Gatka Players

Area	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
Rural	97	64.7	65	43.3	162	54.0
Urban	53	35.3	85	56.7	138	46.0
Total	150	100.0	150	100.0	300	100.0

The data divulges that Gatka cannot be attributed either as a port of rural folklore or a formal practice among urban of the cities. Though, Gatka has established more in the rural areas but it cannot be said that it has been neglected in the urban areas. Obviously, Gatka being recognized as a part of Sikh heritage, has been adopted more in villages where there is more population of Sikhs.

OCCUPATIONAL PROFILE

In table 110 while acquiring the information about the occupational profile or the sources of income of the families of Gatka player, it has been found that 26.3 percent belong to the agrarian families. 19.3 percent belong to the families pursuing business. There are 21 percent players whose parent's pursue governmental jobs while parents of other 33.3 percent were involved in the jobs in private sector.

Table: 110 Percentages of Occupational Profile of Gatka Players

Occupation	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
Agriculture	55	36.7	24	16.0	79	26.3
Business	42	28.0	16	10.7	58	19.3
Govt. Job	19	12.7	44	29.3	63	21.0
Private job	34	22.7	66	44.0	100	33.3
Total	150	100.0	150	100.0	300	100.0

This totally denounces the existing perception or misconception that Gatka was a rural phenomenon as has been practiced mostly by the agrarian class involved in agricultures. Contrary to the existing perception the study confirms that Gatka has been adopted variety of belonging to different occupational structures.

LEVELS OF INCOME

In table-111 another enquiry in the study was to know that whether the levels of income of the families play any roles in promoting or demoting enthusiasm towards Gatka. The objective behind that was to check and verify the existing perception that Gatka was practiced by the youth belonging to lower income groups. For the purpose the incomes of the respondents were divided into two categories, i.e. 01 to 02 Lakhs per annum and 02 to 0 Lakhs per annum. 66.7 percent Gatka players have been found as belonging to category of 01 t0 02 Lakh per annum while 33.7 percent belong to the income group of 02 to 03 Lakh per annum.

Table: 111 Percentages of levels of Income of Gatka Players

Income Class	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
1 Lakh to 2 Lakh	108	72.0	92	61.3	200	66.7
2 Lakh to 3 Lakh	42	28.0	58	38.7	100	33.3
Total	150	100.0	150	100.0	300	100.0

The data here confirms the fact Gatka has been overwhelmingly adopted and practiced by the families with lower incomes. Reasonably, the families living in the rural areas, especially belonging to the SC and OBC castes and working as landless formal or agrarian labor are more enthusiastic towards Gatka. On the other side families pursuing large scale agriculture and business compel their children to avoid traditional sports or martial arts and engage into more advanced sports activities.

SOCIO-CULTURAL PERCEPTION OF GATKA AMONG GATKA PALYERS

In table-112 the most prominent and relevant enquiry in regard to the Socio-Cultural aspect of Gatka was to ask the Gatka players about their socio-cultural perception about Gatka. The respondents were given five options and were free to choose more than one options. The query was how they perceived Gatka, i.e. as a religion sports, as a cultural sports, as a physical sports, as a recreational sports and as a martial art. Interestingly, 100 percent respondents revealed Gatka for them as a religion sports.

No one claimed Gatka as cultural sports. Again, all 100 percent considered Gatka as physical sports. Further, 29 percent respondents recognized Gatka as recreational sports while 57.7 percent perceived Gatka as a martial art.

Table: 112 Percentages of Socio-Cultural Perception of Gatka among Gatka players

Socio-cultural Perception	Male		Female		Total	
	(n)	Percent	(n)	Percent	(n)	Percent
Religious Sports	150	100	150	100	300	100
Cultural Sports	0	0.0	0	0.0	0	0
Physical Sports	150	100	150	100	300	100
Recreational Sports	55	36.6	32	21.3	87	29
Martial Art	87	58.0	86	57.3	173	57.7

The findings rescaled by the data are very much reasonable and hence understandable. Are Gatka players considering Gatka as a religion sports because they relate it to the Sikh heritage. Again, all Gatka players recognize Gatka as physical sports obviously as Gatka is very much a complete sports activity, formally recognized even by the sports experts as well as the government. Those who relate Gatka with Sikh heritage, it was obvious for them to recognize as a martial art and it otherwise also fullfils conditions to be recognized as a martial art. There was a noticeable number (29 percent) of those who perceive Gatka as recreational sports. Again, quite reasonably those who observe Gatka as more than a religion sports actually perceive it in a broader manner by perceiving it as a recreational sports as well.

Chapter 5

SUMMARY

Human body has been designed naturally in such a way that it has abundant of movements and movement patterns which enabled to perform in any condition. In the ancient time human has performed these movements for hunting, defence, offence, run, climb, escaping from any hazards of threat etc. Evidences have been there in the literature which has proved that in certain specific skills through repetitively physical activity which help the humans to perform with peak abilities. The skilled pattern to use human body movements for any conditions of combat (favourable or unfavourable or threat) has been treated as a particular tradition of specific human population. Human body movements have been demonstrated differently on different occasions. The present study entitled "A Study of Fitness and Socio-Cultural Aspects of Gatka: A Sikh martial Art" primarily aimed at examining various aspects and dynamics of fitness among the Gatka players. The study was further an attempt to investigate the impact of socio-cultural background such as demography, caste, social status religions affiliations, economic class, level of literacy etc. To evaluate the all aspects of fitness this study has been designed in such a way that it would curtain all-embracing patterns which will help to justify the contribution of Gatka as an art, as a physical activity as a way activity and as a way of life. Furthermore, the study was comprehensive and distinguished attempt which evaluated the impact of socio-religious and socio-economic as well local castes factors on the changing patterns of the fitness levels among males as well as females. In regard to the origin and social acceptance of Gatka as a martial art in India in general and in Punjab in particular, the study had revealed that Gatka had been considered as a typical indigenous form of martial art. It has not been adopted or borrowed by Indians from any other society or territory and it was neither introduced in the region by any alien person or community. In context of Punjabi community while borrowing it from any other Indian community but it has completed the process of evolution in Punjab to be established as a martial art of Sikhs. The political, social and demographic conditions of people in Punjab compelled them to be trained and properly equipped to face, counter and defeat the enemies entering India through Punjab.

As for as the physical and motor fitness perspective of Gatka were concerned, the study explains that physical and motor fitness components among Gatka players have been found significant in comparison to the normal population, not pursuing Gatka or any other formal physical activity. It had established that this martial art has the visible vigorous potential to improve the physical and motor fitness levels of the performers. If performed with accurate training and regularly, it would increase the components of physical and motor fitness and any peak level.

The data of present study had been divided of age wise variable among males, and males performers belonging to the age group of under-14 year have been found as underweight (16.96±3.38). Noticeably, the age groups of under-18 year (20.19±2.35) and under-25 (22.96±2.49) year have been found as maintaining an appropriate body mass index. In regard to percent body fat, a part of body composition, it has been found that all three above mentioned age groups of males players possessed appropriate percent body fat and it was not measured as less or more than the prescribed norms and standards. However, there were dissimilarities among these three age groups in regard to percent body fat (under-14 year (5.50±1.52), under-18 year (5.84±1.64) under-25 year (6.45±1.07). The cardiovascular endurance in the age group of under-25 year (2.35±.248) has been found as significant while in the under-14 year (2.54±.230) age group it has been found as non significant. The component of flexibility was found at least significant in the age group of under-25 year (6.14±5.60) and significant flexibility was found in the age group of under-14 year (9.48±3.06) and under-18 year (10.54±4.49). Muscular endurance and muscular strength of arms and shoulders were found as significant in the under-14 year (3.74±1.92) age group. The age group of under-25 year (5.70±2.95) also contains significant muscular endurance and muscular strength of arms and shoulders. Muscular strength and muscular endurance of abdominal part of the body was most significant in the age group of under-18 year (26.48±5.43) age group while under-14 year (21.14±6.37) age group has been found as least significant. The overall agility score has been found as significant among male players of Gatka (under-14 year (12.34±.552), under-18 year (11.51±.724) under-25 year (11.33±.687)). In regards to dynamic balance, the performance of males has been found as satisfactory. Even significant the data indicates (under-14 year (61.10±12.02), under-18 year (68.50±12.12) under-25 year (67.68±12.69)). The results of the eye-foot coordination test confirmed that male performers of Gatka were significantly weak in this aspect

(under-14 year (7.23±1.55), under-18 year (6.54±.693) under-25 year (6.67±1.03)). The explosive leg power of males was found as significantly appropriate (under-14 year (138.36±9.06), under-18 year (170.42±16.90) under-25 year (182.52±13.29)). The speed of male players was measured as below the established norms of fitness (under-14 year (9.40±.812), under-18 year (7.95±1.01) under-25 year (7.88±.718)).

In regard to the females in the test of body mass index majority of females have been found over-weight under-14 year (16.66±2.86), under-18 year (23.66±6.01) under-25 year (24.70±5.75). The percent body fat has been overall as below the prescribed norms under-14 year (8.0±1.01), under-18 year (10.00±2.34) under-25 year (11.87±2.19). Cardio-vascular endurance of females has been found as average under-14 year (2.58±.220), under-18 year (2.33±.225) under-25 year (2.44±.22). The flexibility, dynamic balance, eye-foot coordination and explosive leg power has been found as above the average and hence significant good under-14 year (9.93±2.81), under-18 year (13.91±4.55) under-25 year (15.23±4.98), under-14 year (59.88±13.28), under-18 year (69.46±12.57) under-25 year (60.06±14.65), under-14 year (7.31±1.46), under-18 year (6.63±.602) under-25 year (7.14±1.22) and under-14 year (136.64±7.02), under-18 year (153.86±20.02) under-25 year (142.86±15.19). The muscular endurance and muscular strength of arms shoulder under-14 year (3.08±1.89), under-18 year (3.50±1.65) under-25 year (2.88±1.91) and abdominal under-14 year (17.96±4.87), under-18 year (18.62±5.90) under-25 year (17.84±4.80) have been found as poor. Moreover the agility under-14 year (13.41±1.14), under-18 year (12.62±1.319) under-25 year (12.49±1.28) and speed under-14 year (11.60±2.46), under-18 year (13.10±1.08) under-25 year (12.24±1.82) have been measured as poor among female players of Gatka.

The data of Gatka players has provided a clear status at health and fitness parameters of male and female players in all age groups i.e. under-14 years, under-18years, and under-25years respectively. The results of certain health and fitness parameters BMI, % body fat, cardiovascular endurance, flexibility, coordination, balance etc have been found better in female players whereas the parameters of strength, muscular endurance, cardiovascular endurance, power, agility and speed were found better among the male players. Although the performance of both gender players varied with the age and training too but fundamentally the player were not equipped with the adequate coaching facilities and lack of tactical techniques.

As for as the justification of fitness among Gatka players was concerned, it has been observed that particular groups, due to their differences of gender and age are comparatively better generally in the fitness aspects and particularly in one or other components of fitness, but the overall level of fitness among the Gatka players was significantly lower in proportion to the norms of fitness for a professional or amateur players at other sports. The main reason for the minimal or dissatisfactory levels of fitness among them can be attributed as physical, social, economic and professional. Physically, the Gatka players have not been prepared themselves and compatible to the measurement of fitness. They were not practice to adopt their fitness related physical component to remain adequately fit. Socially, most of the Gatka players belong to those families where there persistent dietary and fatigue trends of fitness. Economically, majorly belonging to the economically marginalised families, the Gatka players were not in positions to expend appropriately on their diet, fitness supplements, and professional training required for fitness. From the perspective of professional training, the Gatka players, due to their unawareness about that martial art of Gatka and marginalised economic conditions were not able to here or get associated with the professional trainers and coaches of Gatka. Therefore these findings partially the second hypothesis composed in the study that Gatka players were better in physical fitness and relatively better in motor fitness in their competitions. This martial art, due to the disinterest of the society and unwillingness of the governments had not availed any reasonably good infrastructure mostly in the traditional Akharas, play ground of schools as well as colleges and community places by the traditionally and pastorally trained masters, in spite of separate arenas and professional trainers and coaches. It was sturdily required that community should promote the martial art of Gatka among the new generations as a recreational sport, a physical-fitness and motor-fitness activity and a defence technique as a martial art. The organisations associated with the task the promotion of traditional sports, martial arts and fitness among youth come forward to promote Gatka as an indigenous martial and a sports activity.

All martial arts have been introduced as defensive training part and traditionally have been demonstrated as a regional or religious act of populations. To maintain the diversity of these movement arts further studies have to be done on their regional requirements and religious needs. Also as human body movements and medico-physiological aspects of training should be studied in detail which may ethically and aesthetically helped to establish the human body peak performances.

Chapter 6
CONCLUSION

The present study entitled "A Study of Fitness and Socio-Cultural Aspects of Gatka: A Sikh martial Art" primarily aims at examining various aspects and dynamics of the levels of fitness among the Gatka players. The study is further an attempt to investigate the impact of socio-cultural background such as demography, caste, social status religions affiliations, economic class, level of literacy etc. In the fitness of the Gatka players, the study was an all-embracing attempt to study the contribution of Gatka martial art as a physical activity changing the levels of fitness among people. Furthermore, the study was comprehensive and distinguished attempt evaluated the impact of socio-religions and socio-economic as well racial factors on the changing patterns of the fitness levels among males as well as females.

FINDINGS OF THE STUDY

In regard to the origin ride and social acceptance of Gatka as a martial art in India in general and in Punjab in particular, the study reveals that Gatka can be considered as a typical indigenous form of martial art. It has not been adopted or borrowed by Indians from any other society or territory and it was neither introduced in the region by any alien person or community. In context of Punjabi community while borrowing it from any other Indian community but it has completed the process of evolution in Punjab to be established as a martial art. The political, social and demographic conditions of people in Punjab compelled them to be trained and properly equipped to face, counter and defect the enemies. This unavoidable condition enthused people of the region to adopt the martial art of Gatka.

While narrating the religions roots of the martial art Gatka, the study divulges that though, there had been general trends persistent among all males of Punjabi communities to keep a bamboo or wooden stick or swords with then as a symbol of force and as an instrument of self defence, but in Sikh practices Gatka has been perceived and patronised as a formal activity of self defence. Sikh Gurus especially the sixth guru Hargobind formally patronised Gatka as a martial art and the tradition was adopted by the tenth guru Gobind Singh, who formally made sword an advanced instrument of Gatka as part of the religions code of the Sikh, to be carried forever. Consequently, the finding approve the first hypothesis constructed the beginning of

the research work that Gatka had been prevalent in Indian sub-continent, eminently in northern region, much prior to the advent of the Khalsa (Pure) and Nihangs (Baptised Sikh).

As for as the physical and motor fitness perspective of Gatka were concerned, the study explains that physical and motor fitness components among Gatka players have been found significant in comparison to the normal population, not pursuing Gatka or any other formal physical activity. It establishes that this martial art has the visible and vigorous potential to improve the physical and motor fitness levels of the performers. If performed with accurate training and regularly, it does increases the components of physical and motor fitness.

In the context of age wise variable among males, the performers belonging to the age group of under-14 have been found as underweight. Noticeably, the age groups of under-18 and under-25 have been found as maintaining an appropriate body mass index. In regard to percent body fat, a part of body composition, it has been found that all three abovementioned age groups of males possess appropriate percent body fat and it was not measured as less or more the prescribed norms. However, there were dissimilarities among these three age groups in regard to percent body fat. Further, the cardiovascular endurance in the age group of under-25 has been found as significant while in the under-14 age group it has been found as non significant. Flexibility was found at least significant in the age group of under-25 and significant flexibility was found in the age group of under-14 and under-18. Muscular endurance and muscular strength of arms and shoulders were found as significant in the under-14 age group. The age group of under-25 also contains significant muscular endurance and muscular strength of arms and shoulders. Muscular strength and muscular endurance of abdominal part of the body was most significant in the age group of under-18 age group while under-14 age group has been found as least significant. The overall agility has been found as significant among male players of Gatka. In regards to dynamic balance, the performance of males has been found as satisfactory. The results of the eye-foot coordination test confirmed that male performers of Gatka were significantly weak in this aspect. The explosive leg power of males was found as significantly appropriate. The speed of male players was measured as below the established norms of fitness.

In regard to the females in the test of body mass index majority of females have been as over-weight. The percent body fat has been overall as below the prescribed norms.

Cardio-vascular endurance of females has been found as average. The flexibility, dynamic balance eye-foot coordination and explosive leg power has been found as above the average and hence significant good. The muscular endurance and muscular strength of arms shoulder and abdominal have been found as poor. Moreover the agility and speed have been measured as poor among female players of Gatka.

In regard to the inquiry of the impact of socio religions, socio demographic, socio cultures and socio-economic conditions on the Gatka players, it has been found that male players are comparatively more fit than the females, the levels of fitness have been found as better in comparison to the urban players of Gatka. The players belonging to the economically marginalised classes have been found as less fit in various aspects, in comparison to the players belonging to the families with sufficient economic resources. More noticeably, the levels of fitness have been found as better among formally baptised Sikh players (males and females) in comparison to general players of Gatka. As far as impact of caste on the levels of fitness was concerned, the players (males as well females) belonging to Mazhabi Sikh, Ramdasiea Sikh and Jat Sikh was found as comparatively more fit than other castes.

As for as the verification of fitness among Gatka players is concerned, it has been observed that particular groups, due to their differences of gender and age are comparatively better generally from the fitness aspect and particularly in one or other phases of fitness, but the overall level of fitness among the Gatka players is significantly lower in proportion to the norms of fitness for a professional or amateur players. The main reason for the minimal or dissatisfactory levels of fitness among them can be attributed as physical, social, economic and professional. Physically, the Gatka players do not prepare themselves ad compatible to the measurement of fitness. They do not practice to adopt and meld their fitness related physical parts to remain adequately fit. Socially, most of the Gatka players belong to those families where there persistent dietary and fatigue trends of fitness. Economically, majorly belonging to the economically marginalised families, the Gatka players are not in positions to expend appropriately on their diet, fitness supplements, and professional training required for fitness. From the perspective of professional training, the Gatka players, due to their unawareness about that martial art of Gatka and marginalised economic conditions are not able to here or get associated with the professional trainers and coaches of Gatka. Therefore these findings partially the second hypothesis composed in the study that Gatka players are better in physical fitness and

relatively better in motor fitness in their competitions. This martial art, due to the disinterest of the society and unwillingness of the governments had not availed any reasonably good infrastructure mostly in the traditional Akharas, play ground of schools as well as colleges and community places by the traditionally and pastorally trained masters, in spite of separate arenas and professional trainers and coaches. Other conscious communities of the world, facilitated by the governments, have been very much able to provide international recognition to their traditional martial arts. But Gatka has been neglected by the community and orphaned by the state. As a result, this martial art which had trained and equipped the people of Punjabi, especially the Sikh masses to successfully challenge and defeat the invaders and plunders, is about to vanish its significance as well as identity. It is sturdily required that community should promote the martial art of Gatka among the new generations as a recreational sport, a physical-fitness and motor-fitness activity and a defence technique as a martial art. The organisations associated with the task the promotion of traditional sports, martial arts and fitness among youth come forward to promote Gatka as an indigenous martial and a sports activity.

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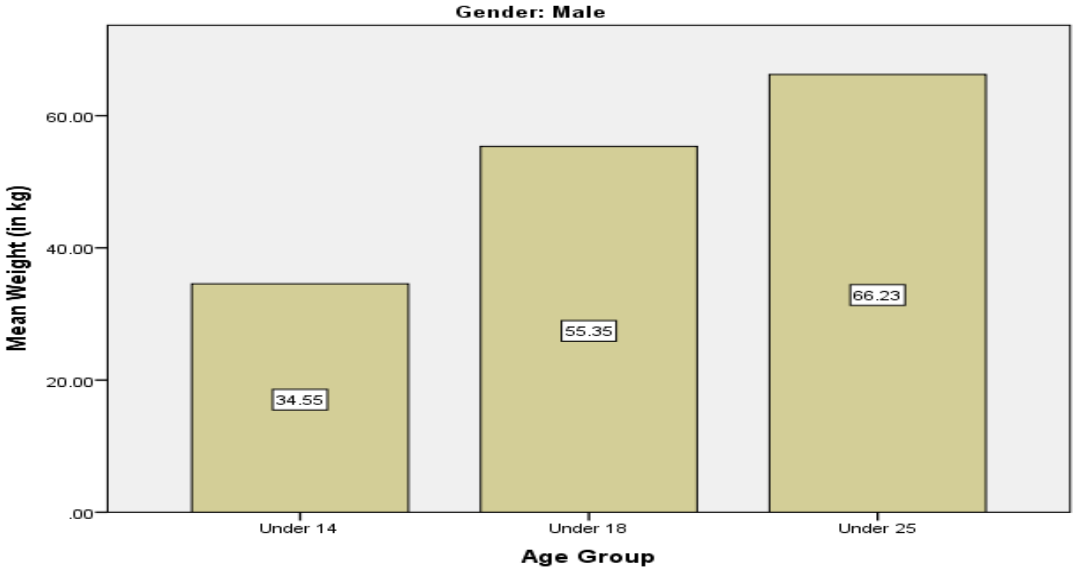
Appendix 1

Figure: 1



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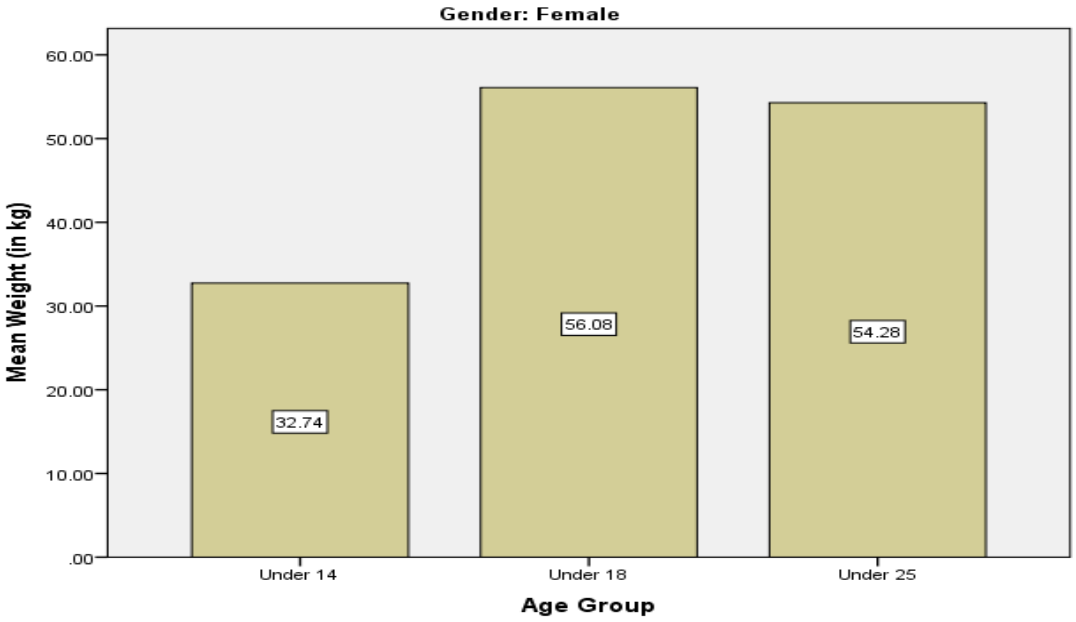

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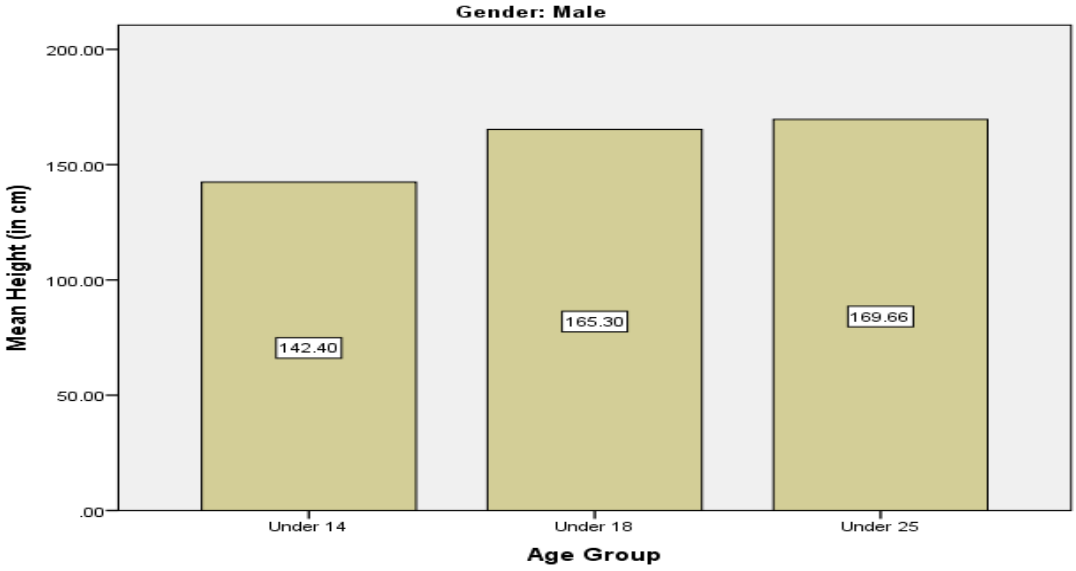

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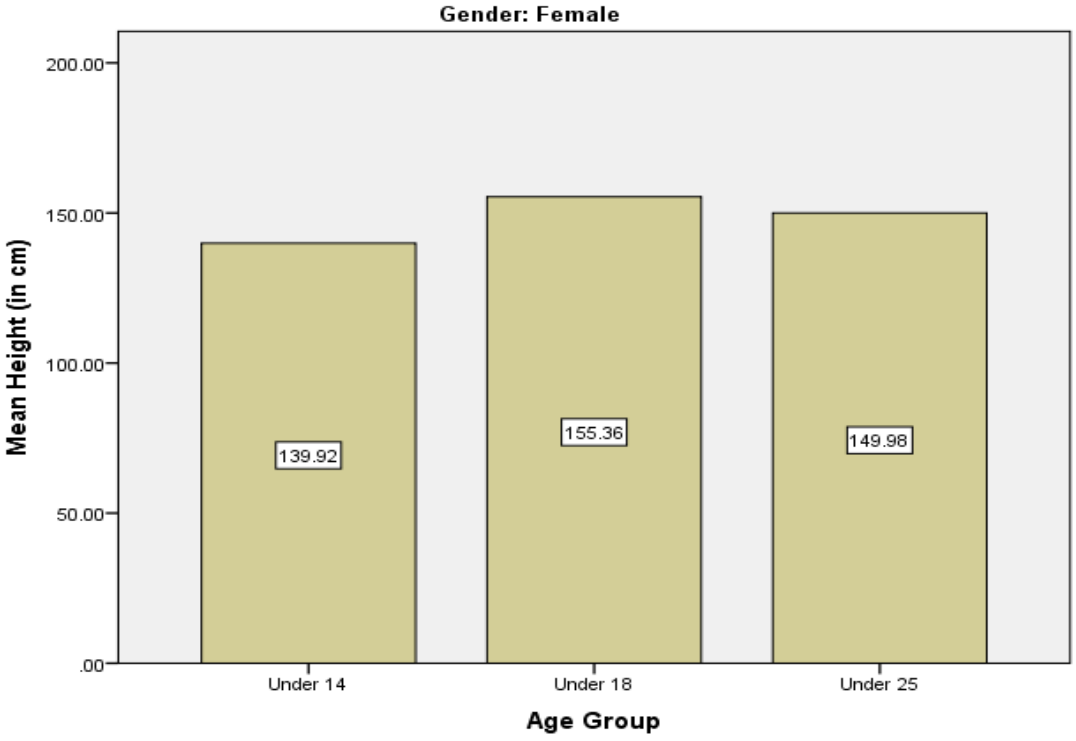

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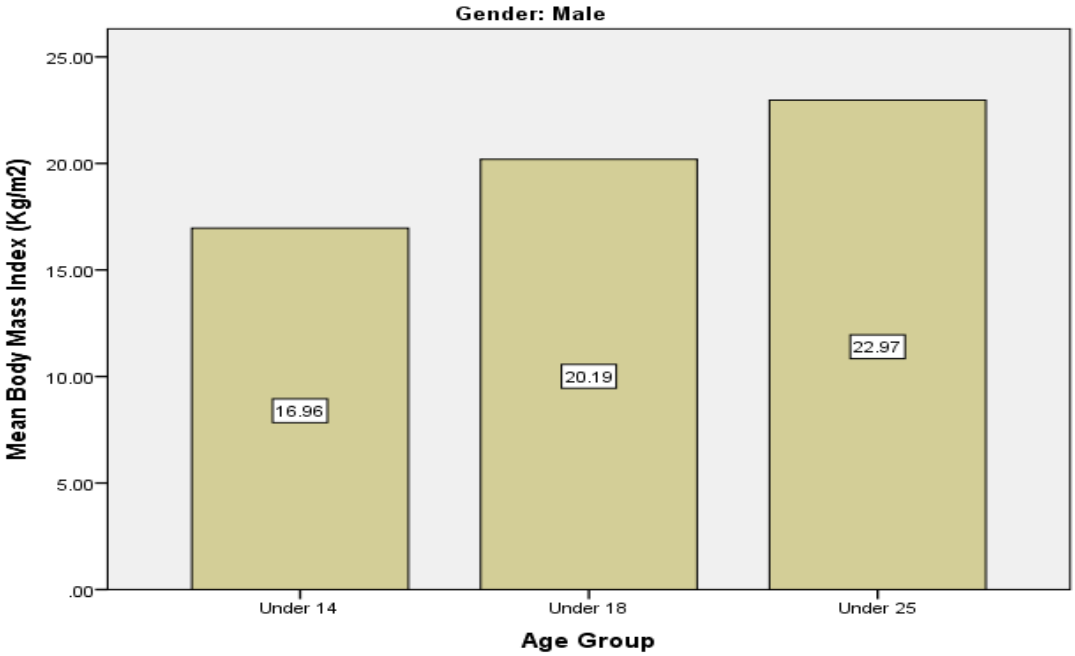

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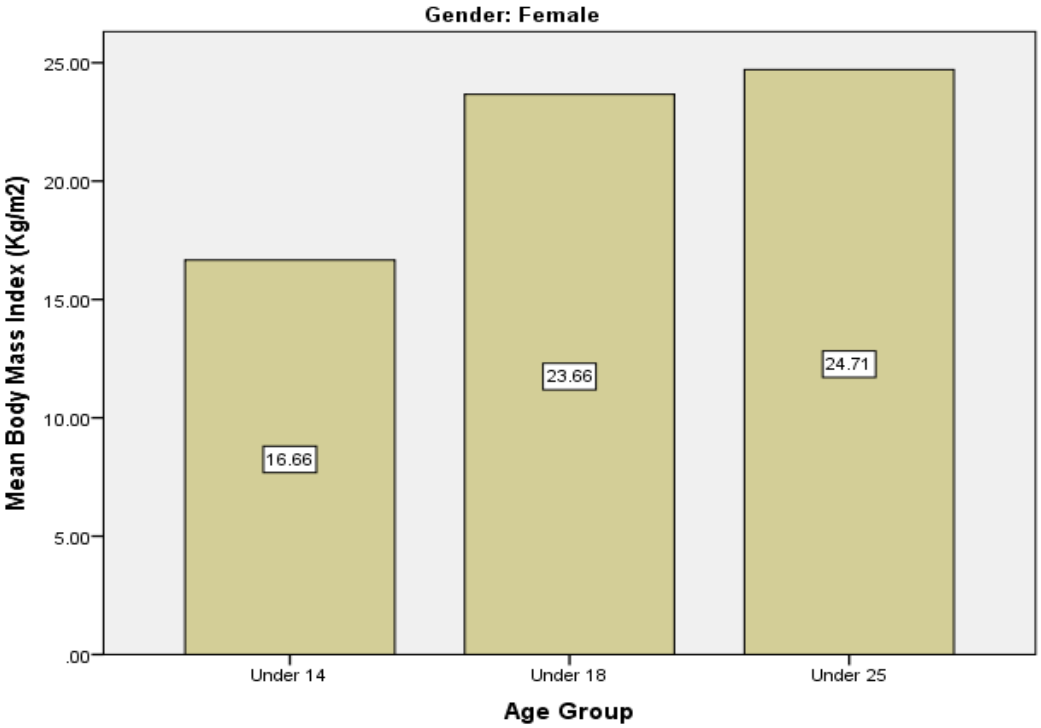

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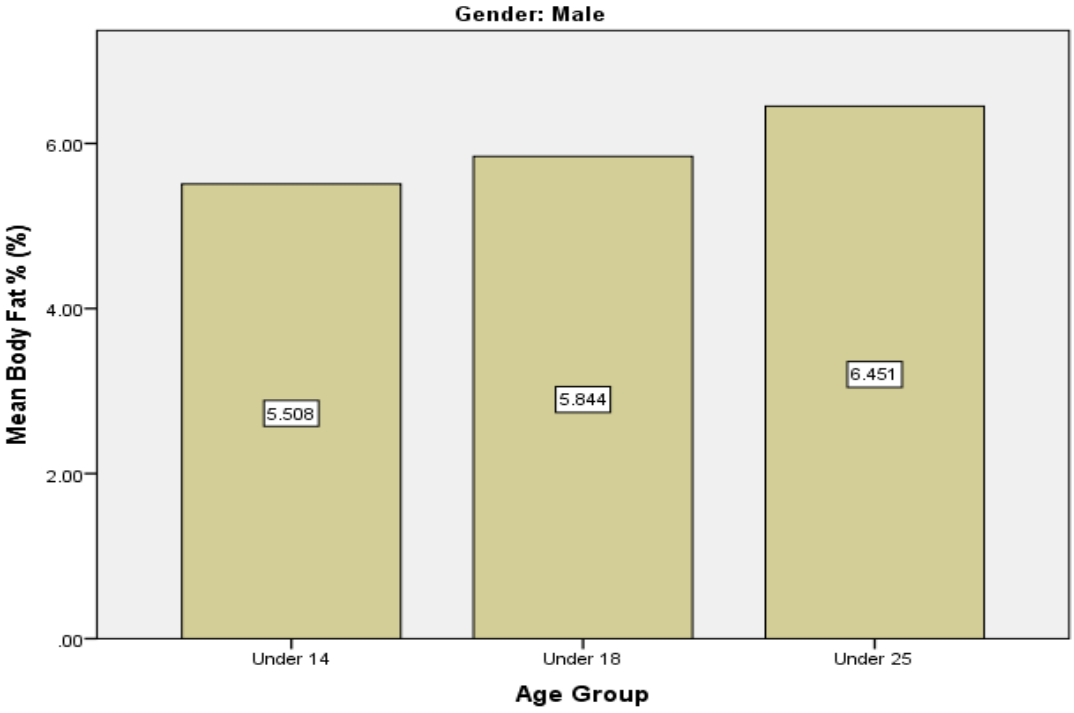

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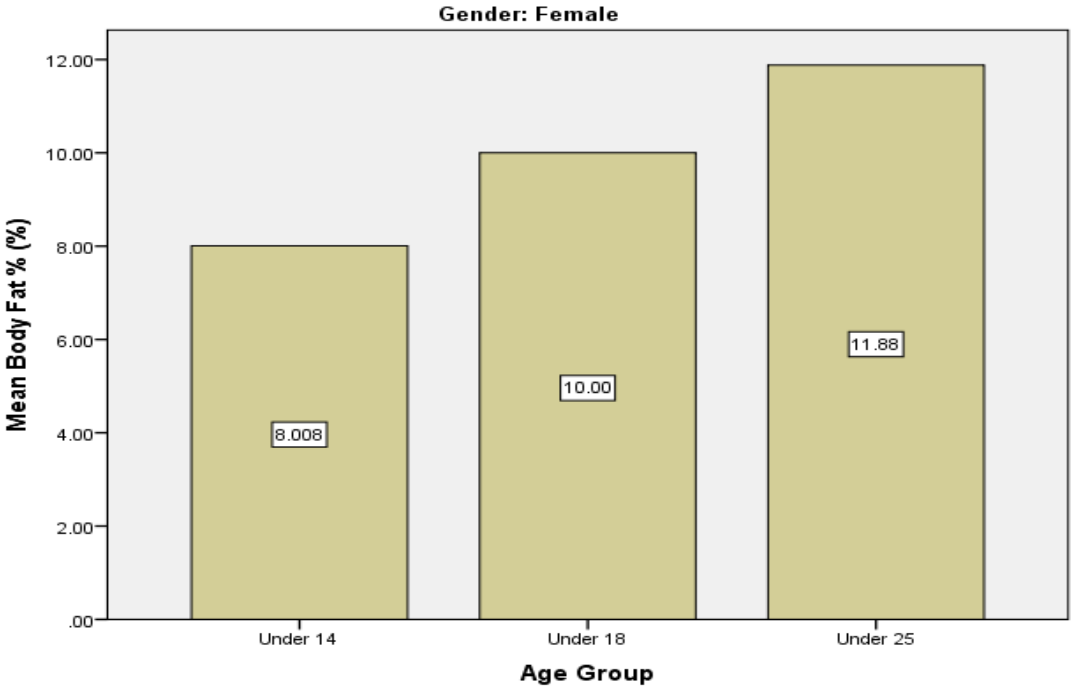

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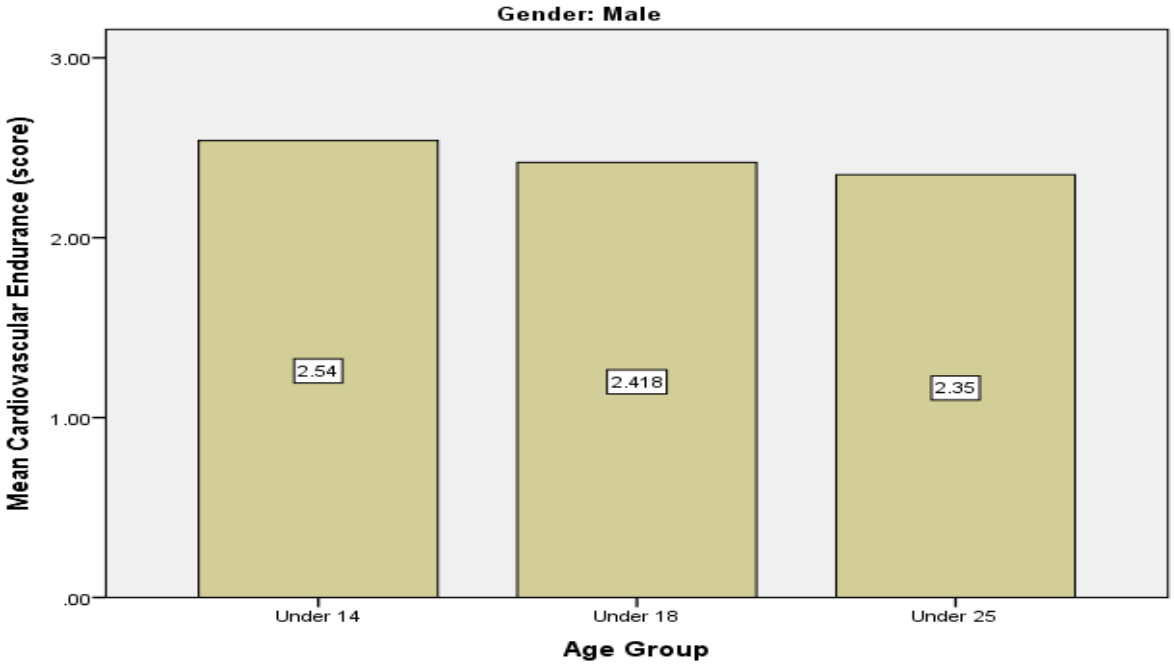

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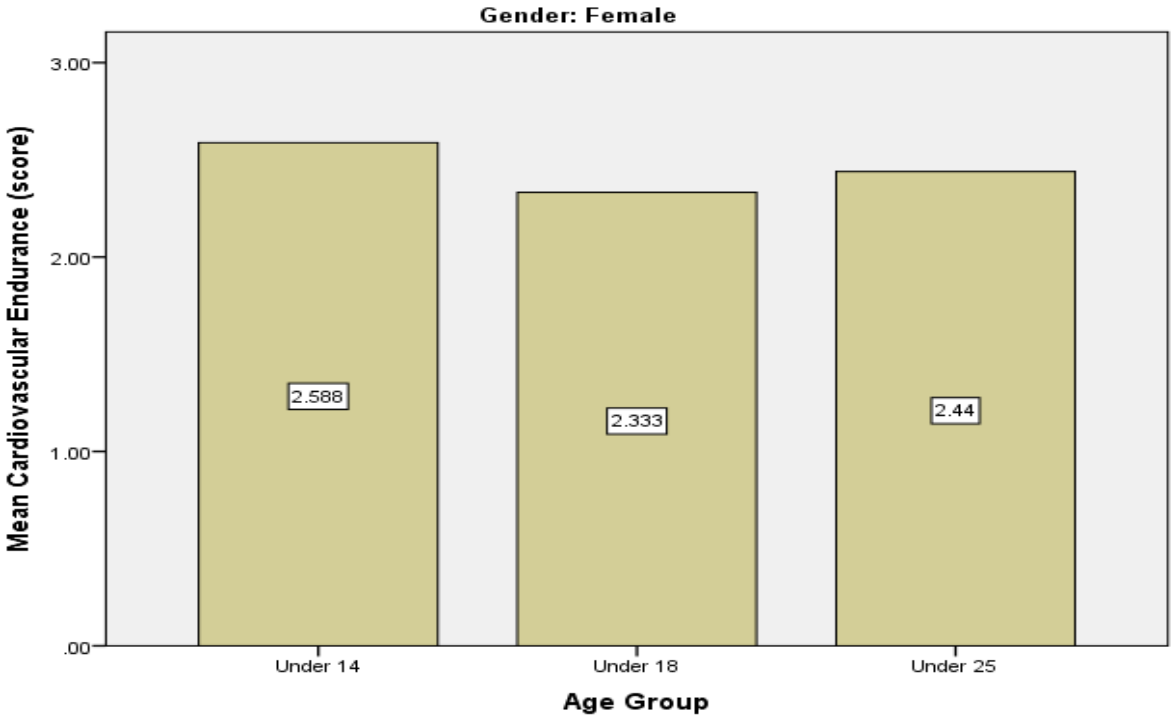

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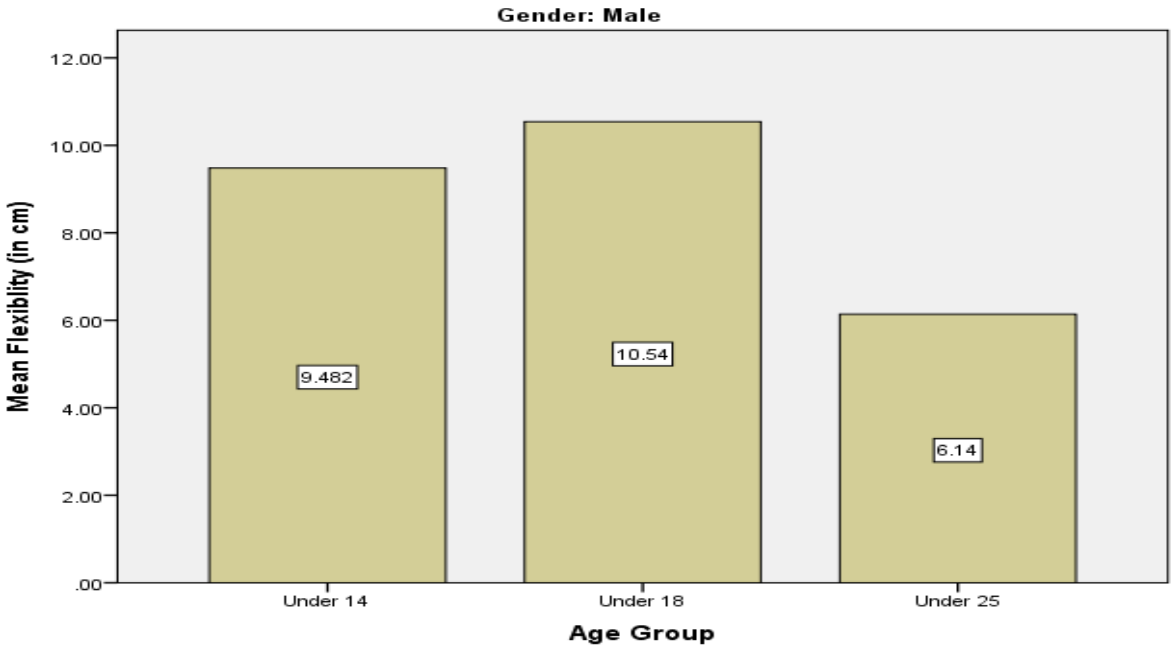

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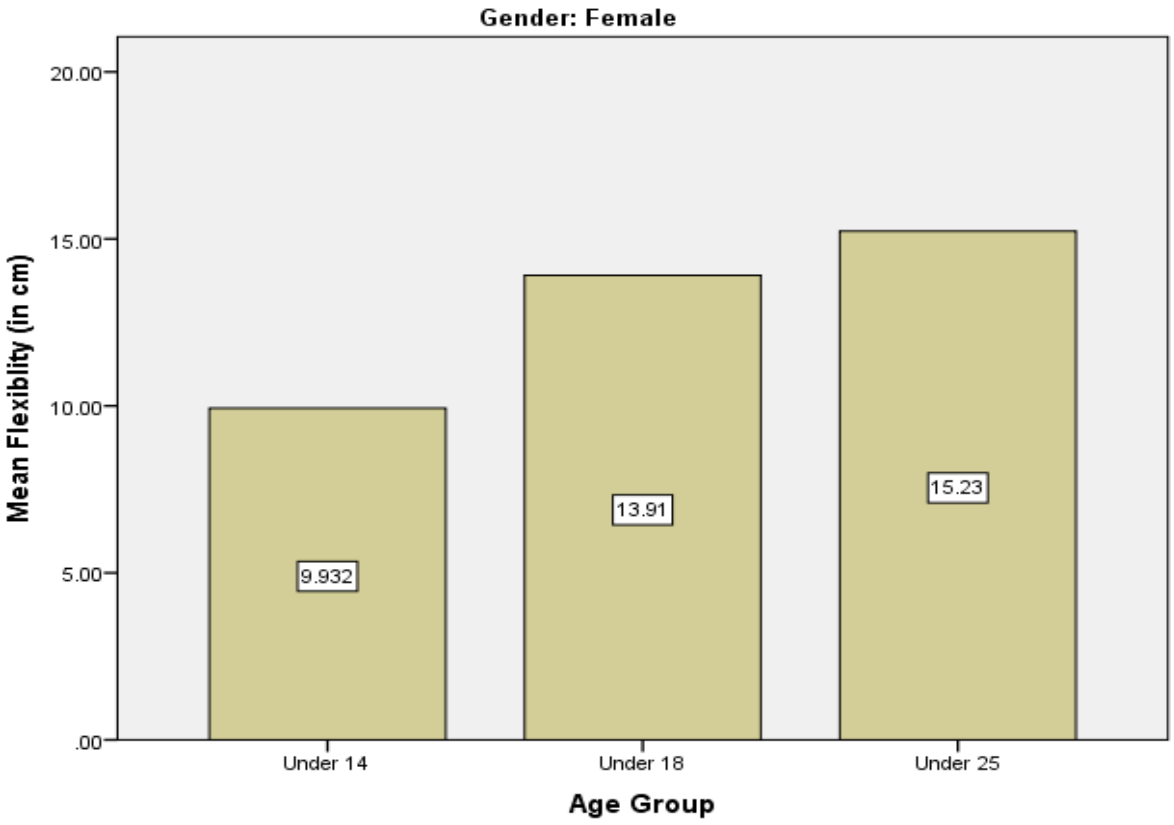

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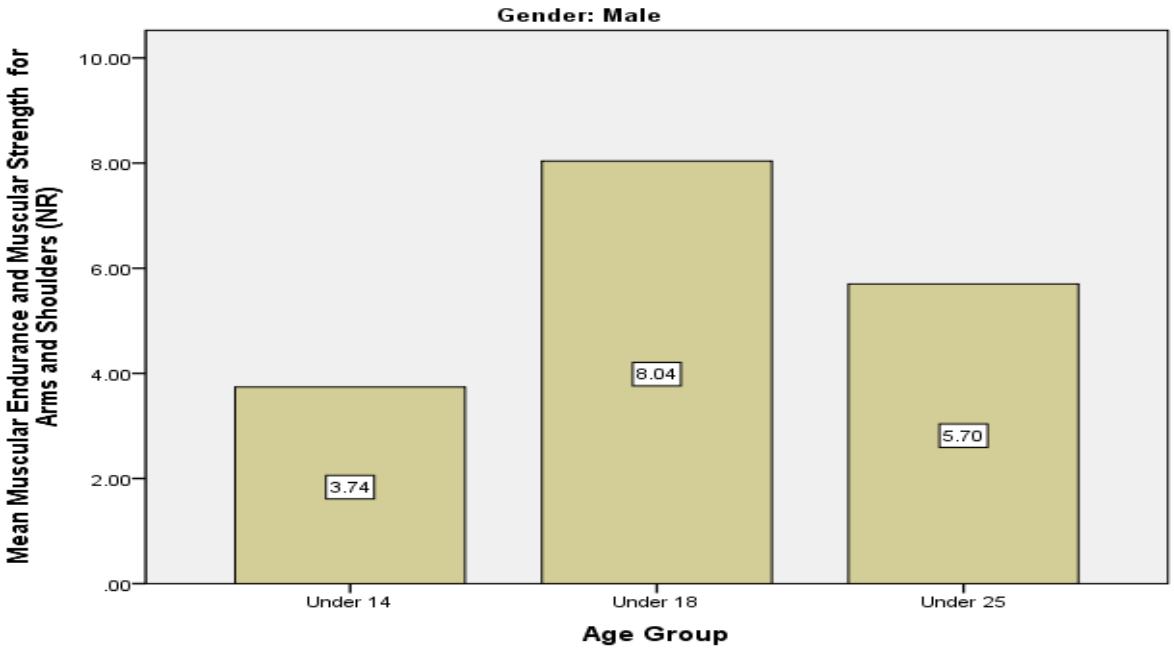

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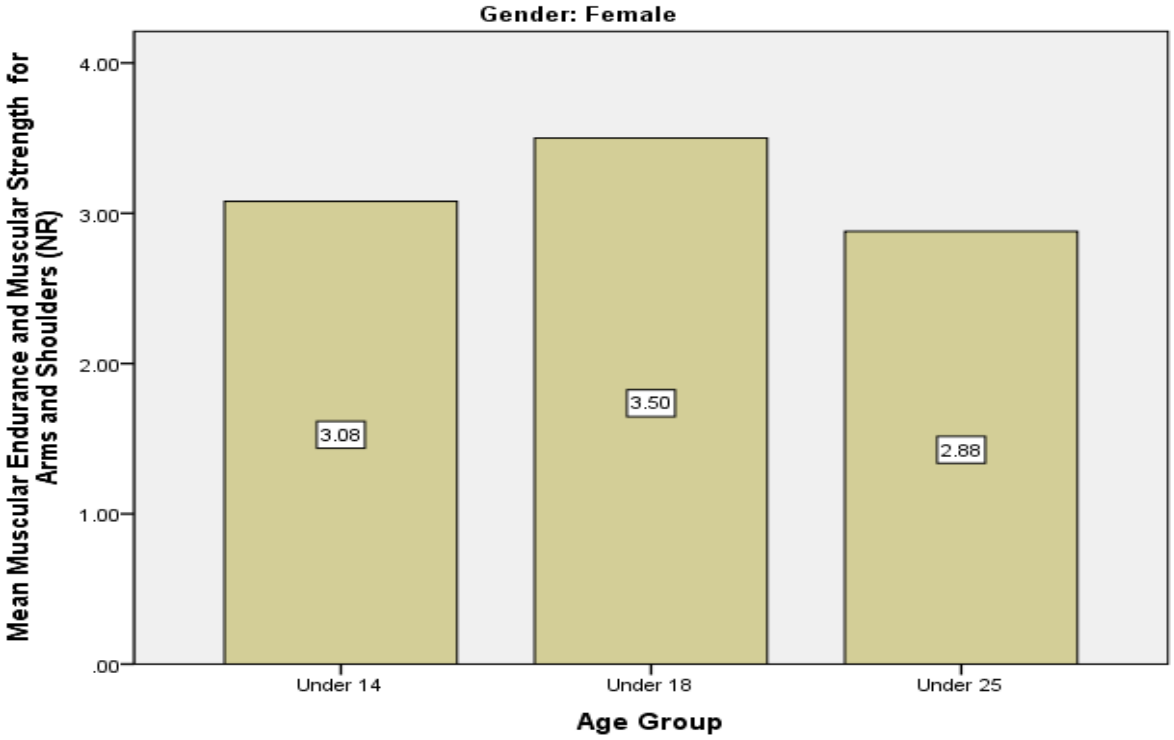

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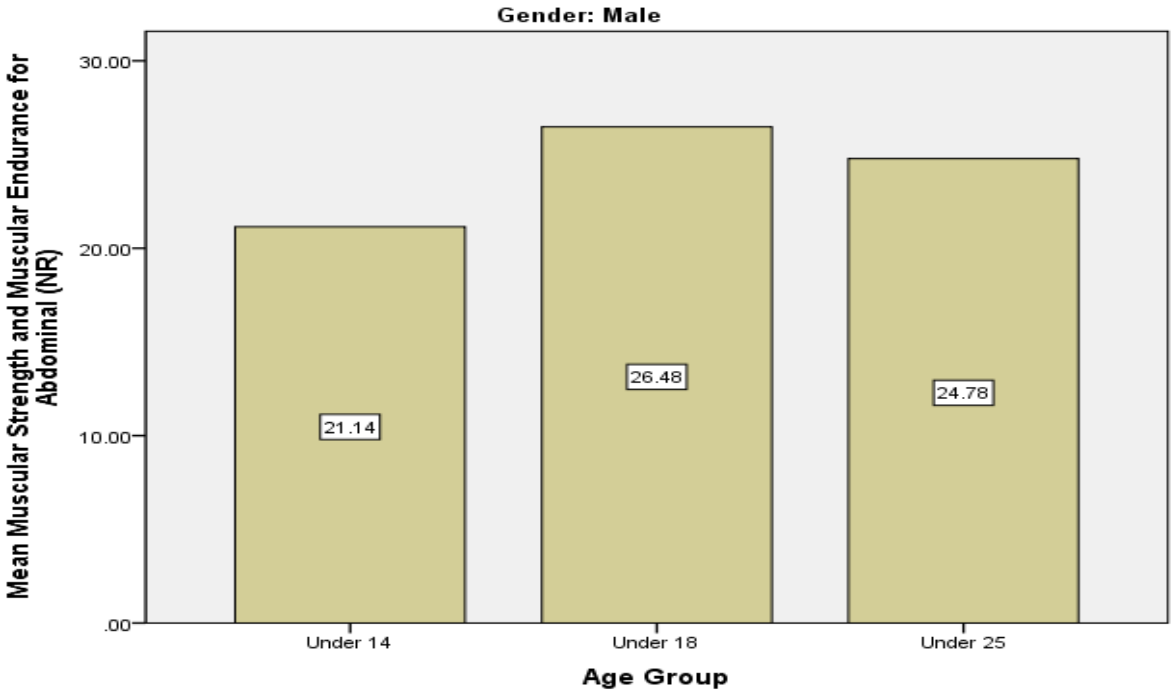

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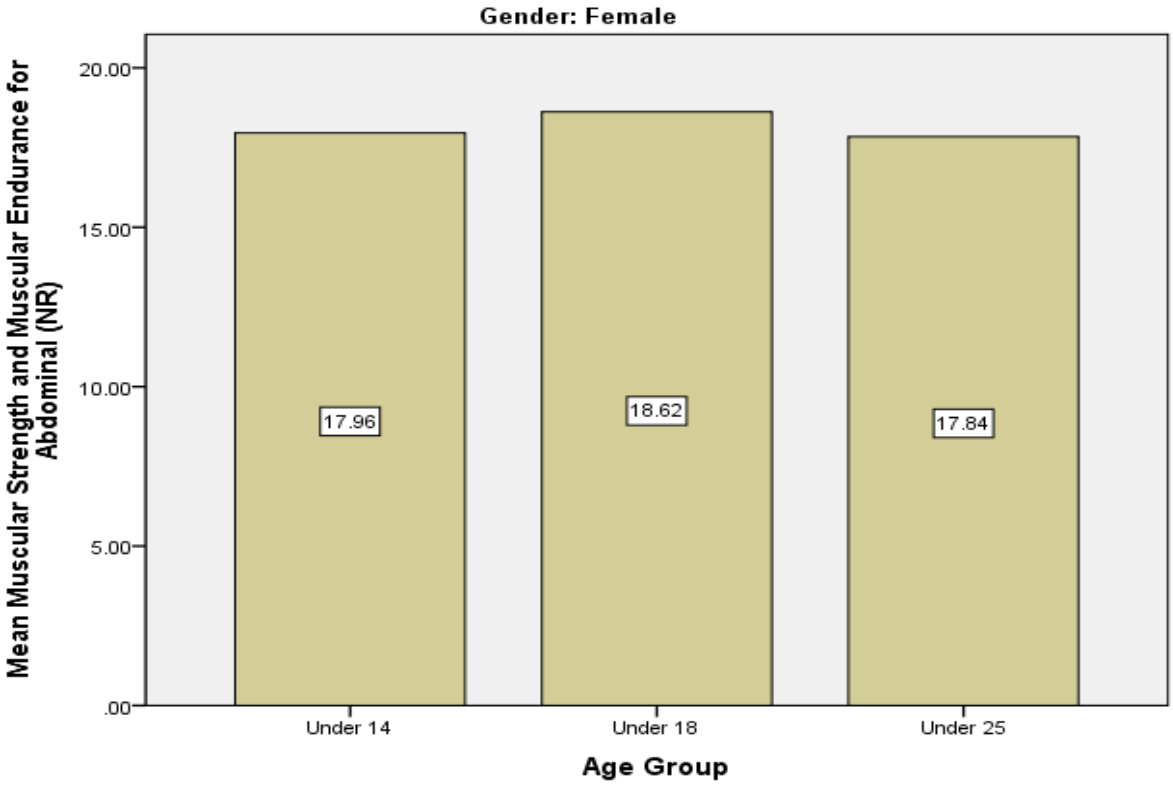

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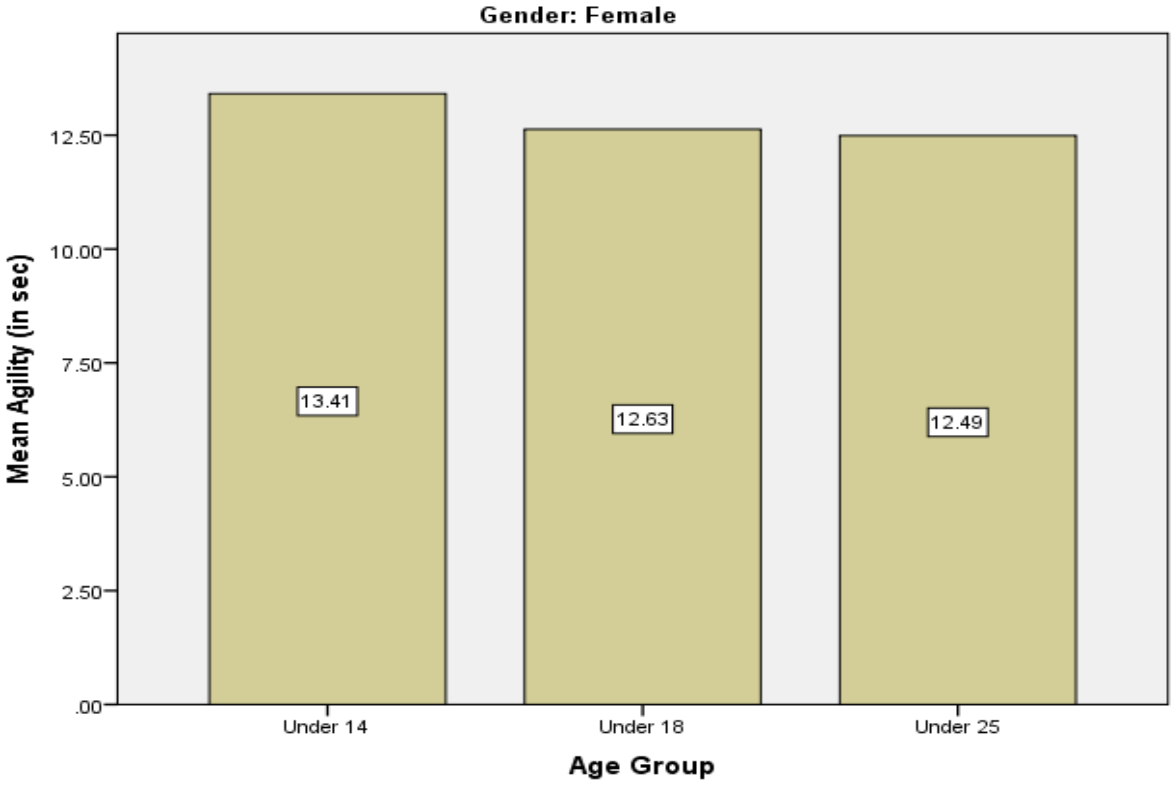

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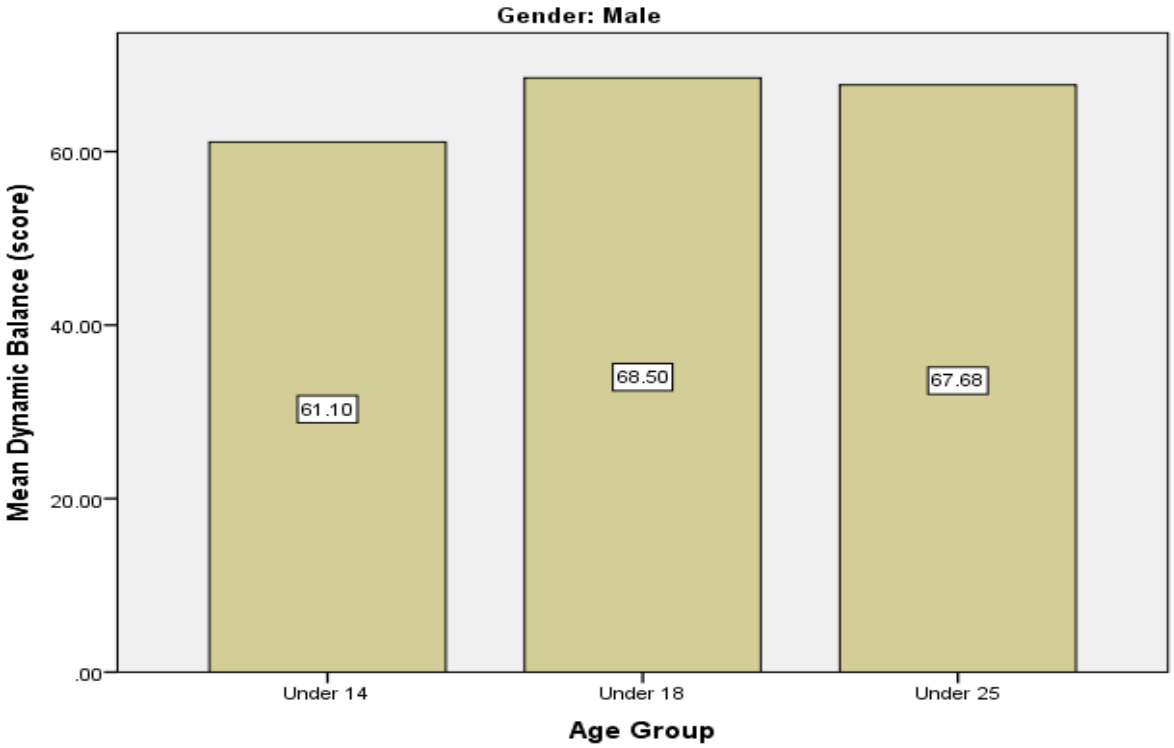

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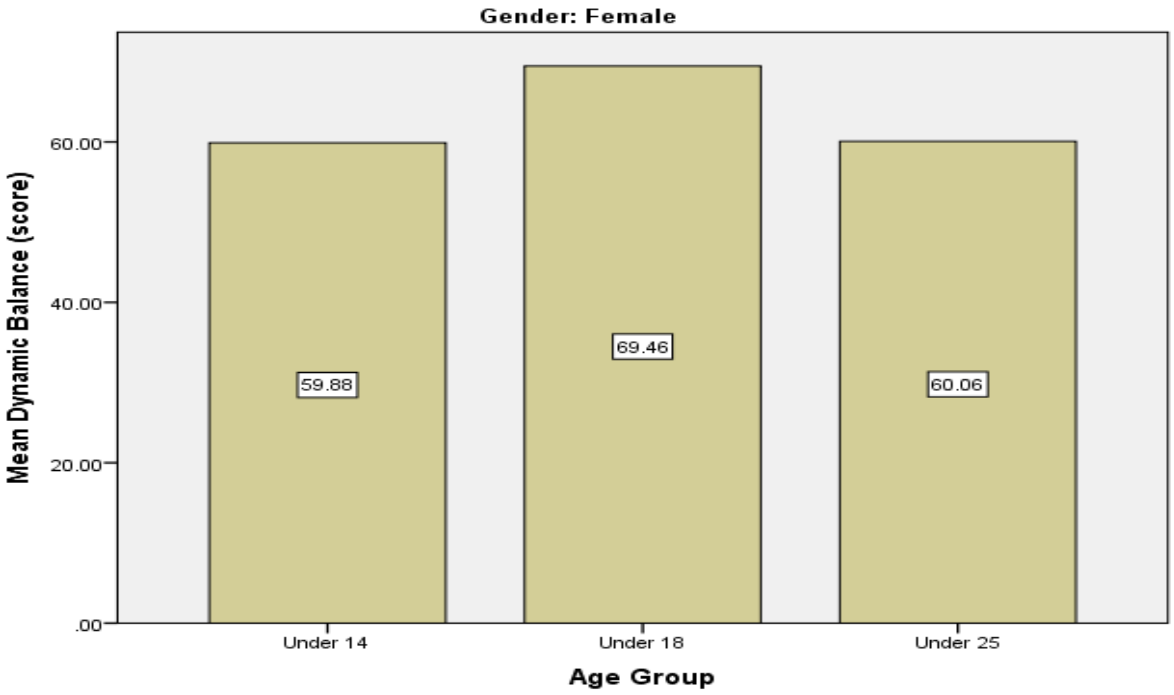

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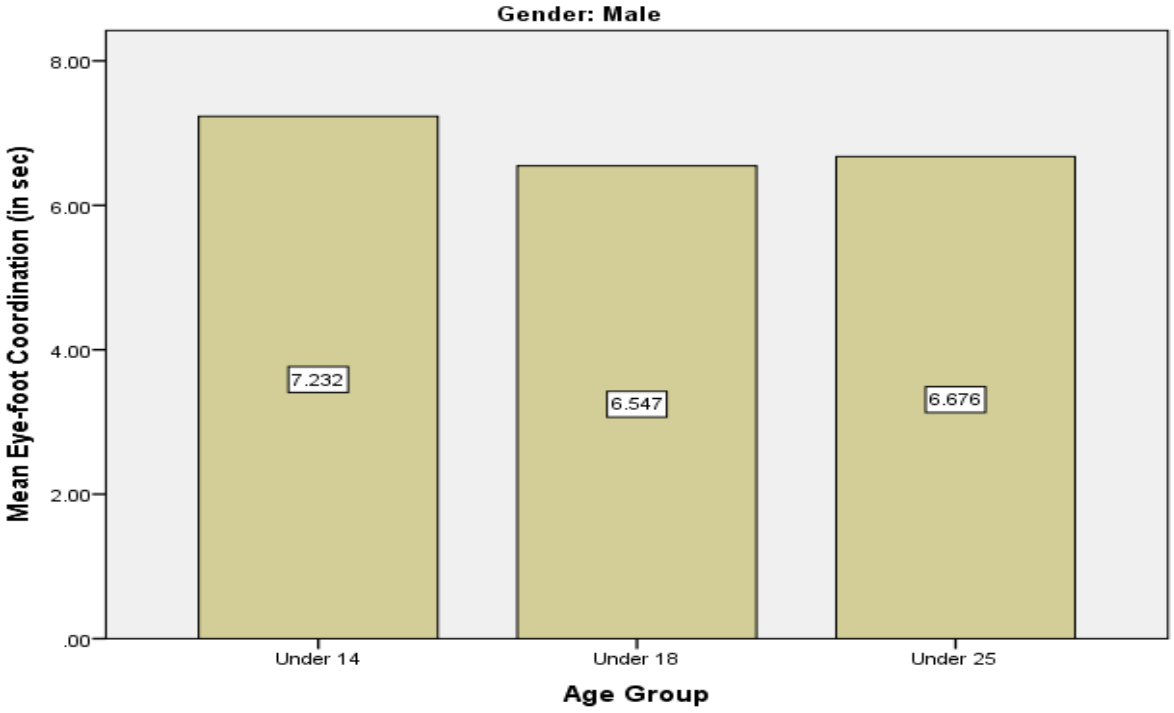

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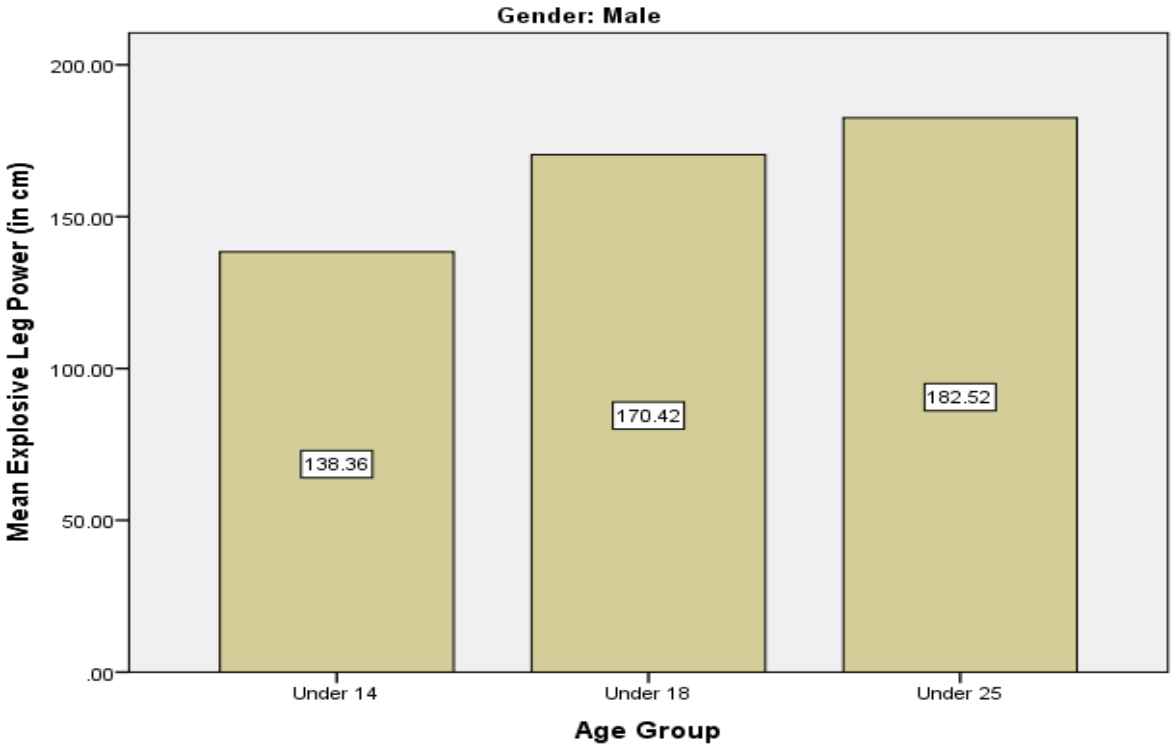

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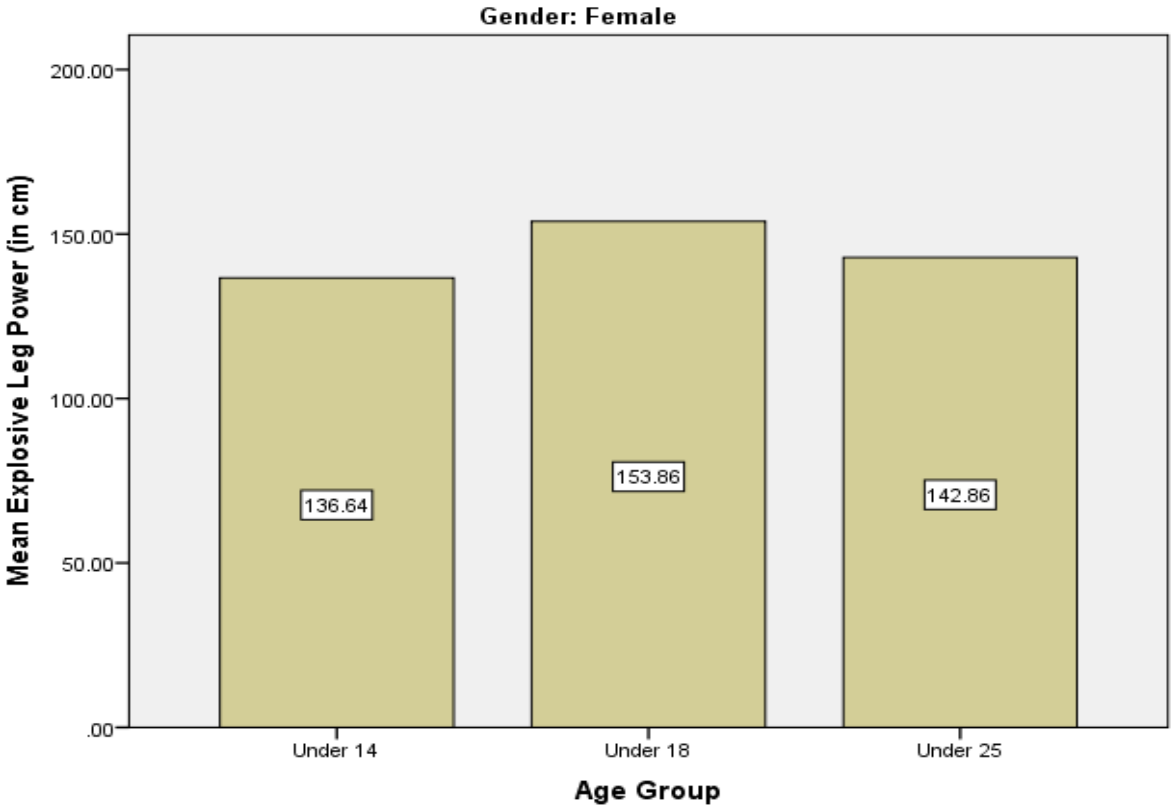

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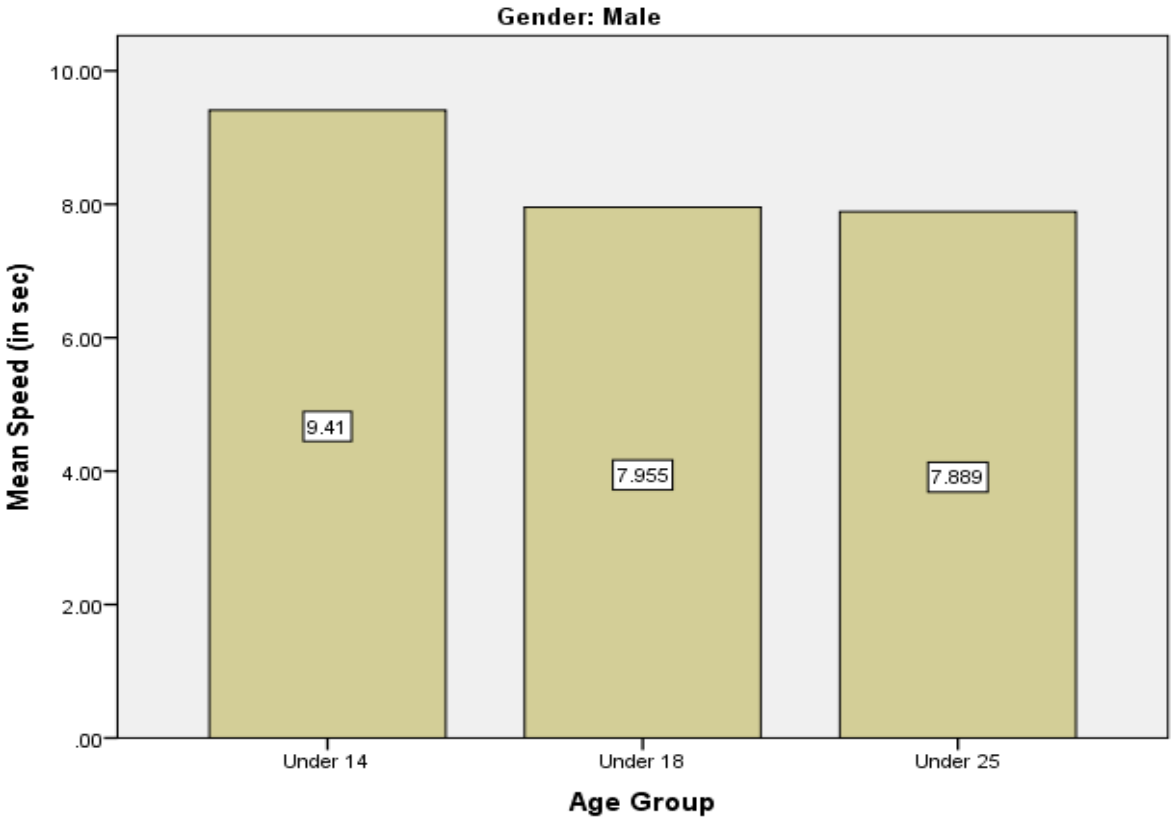

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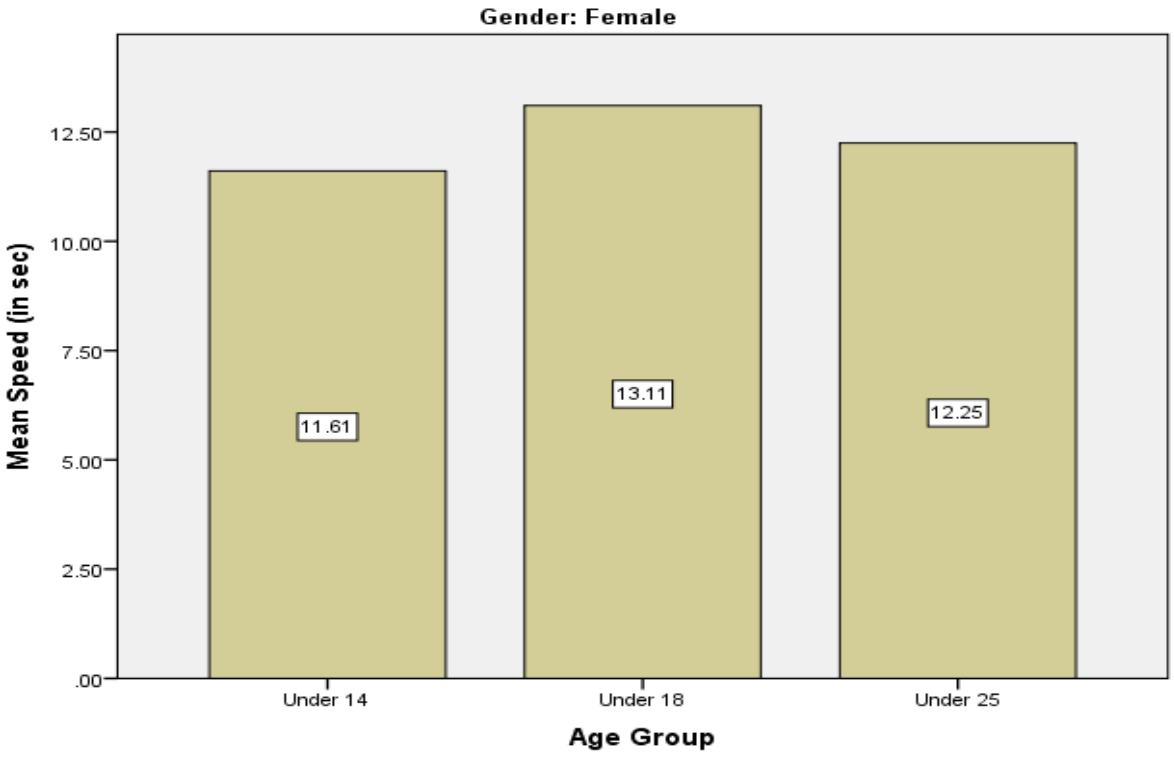

Appendix-2

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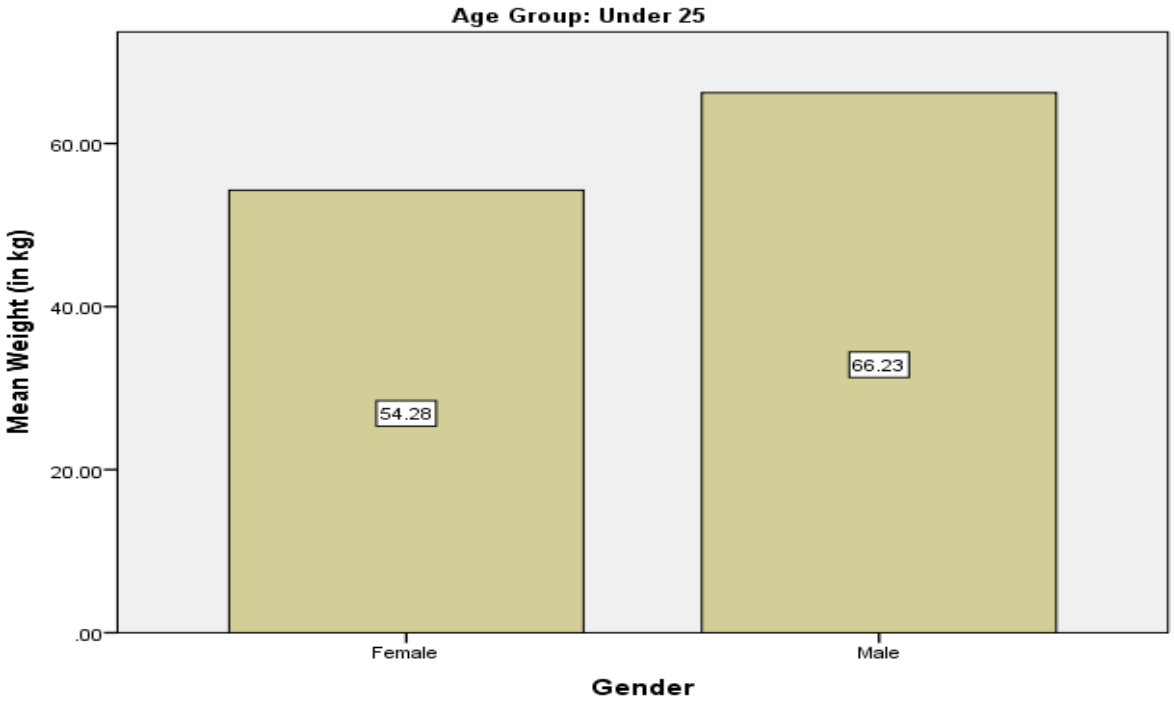

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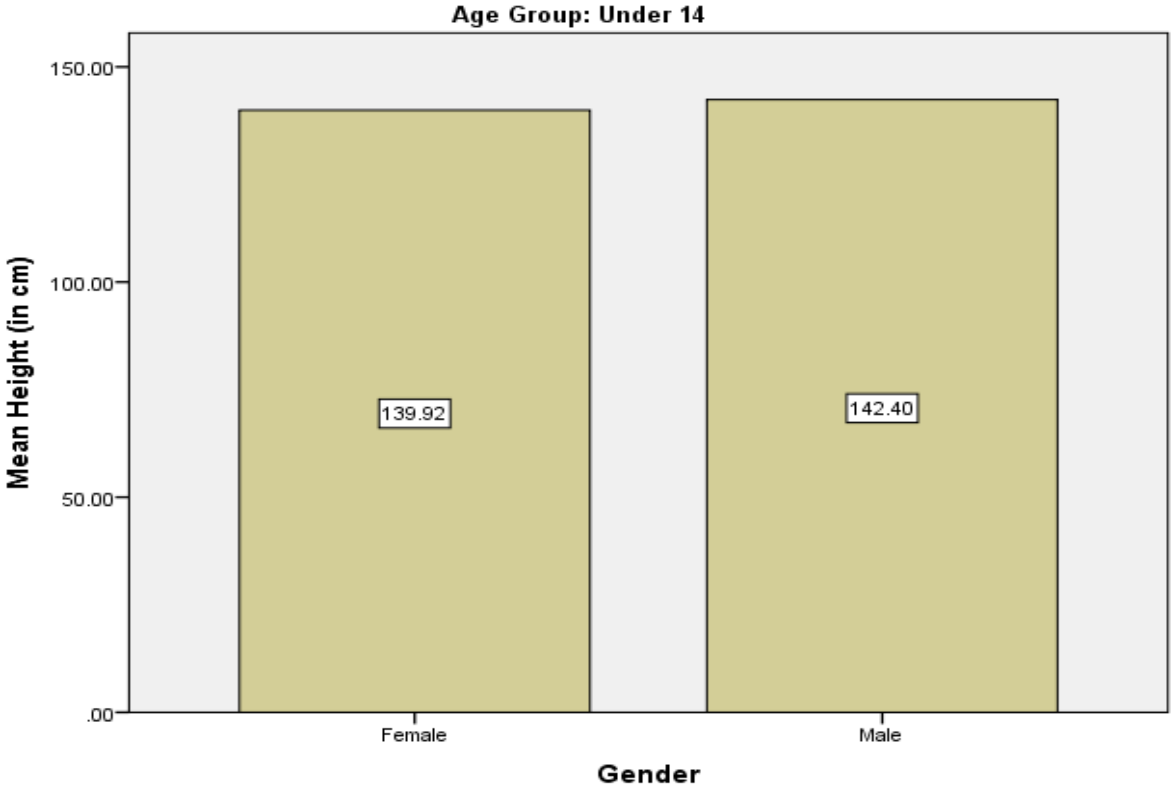

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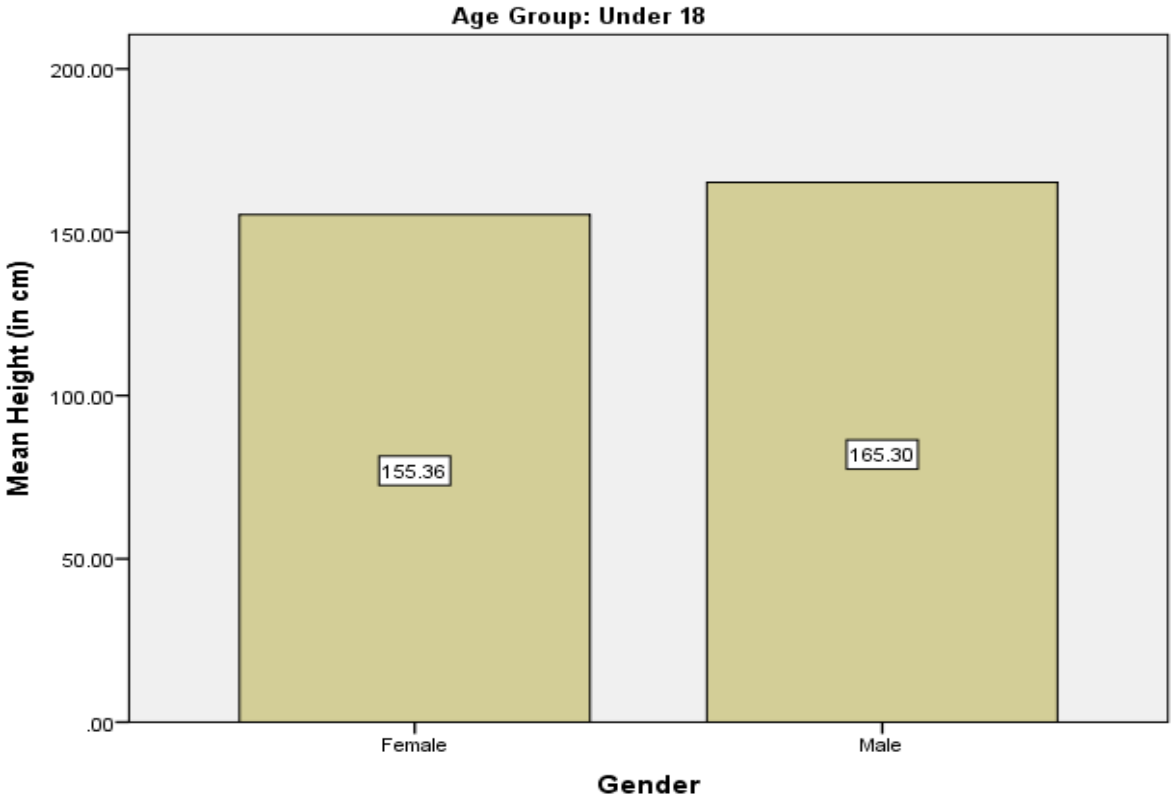

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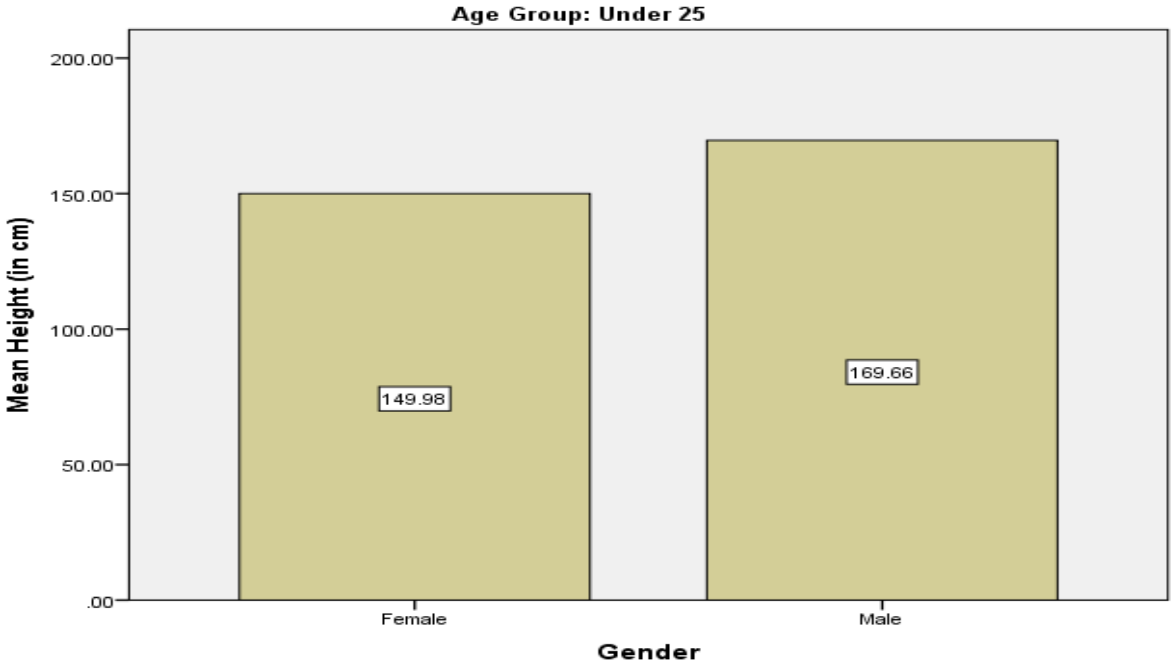

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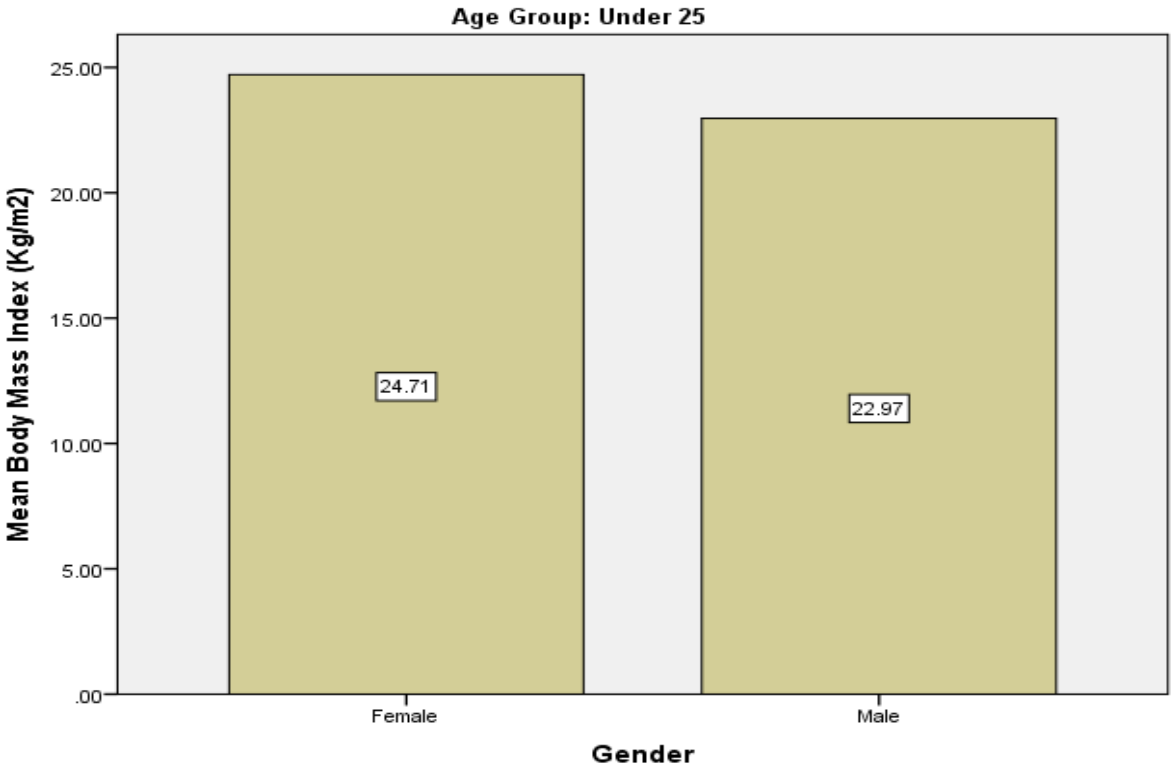

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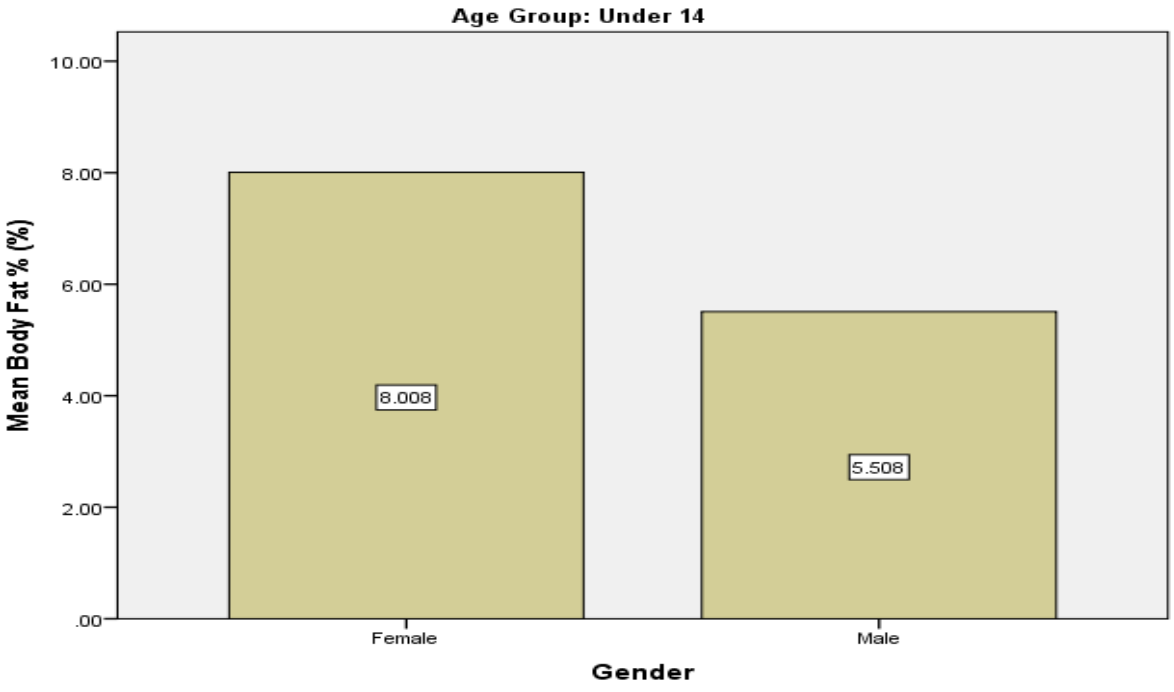

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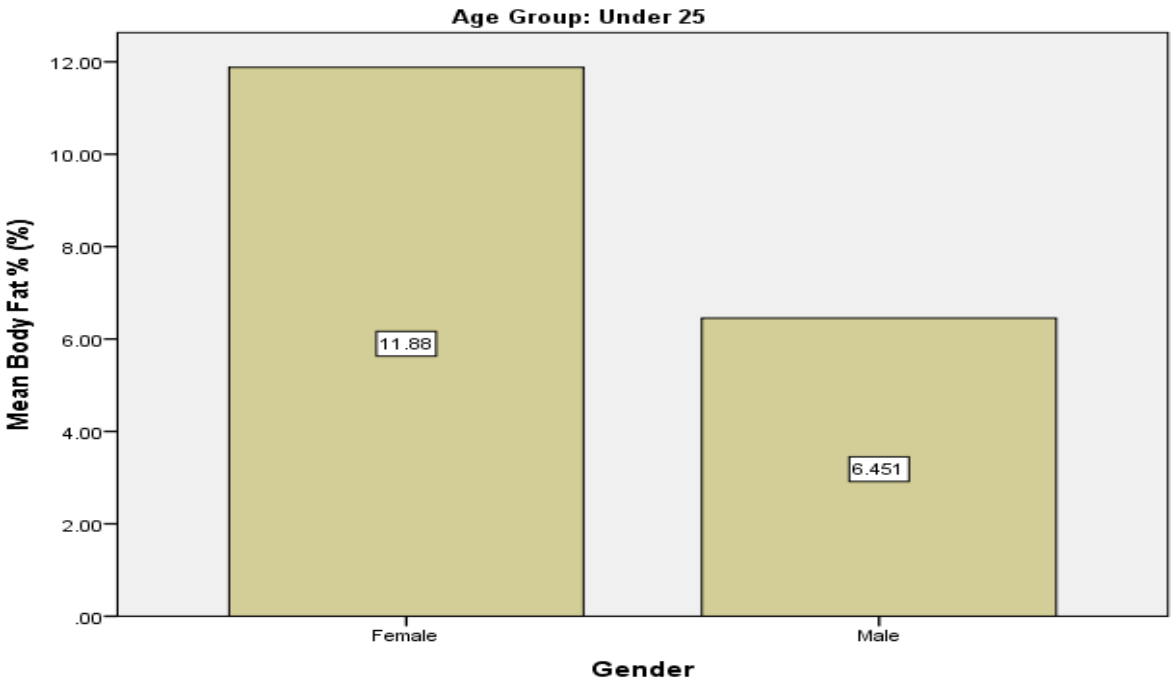

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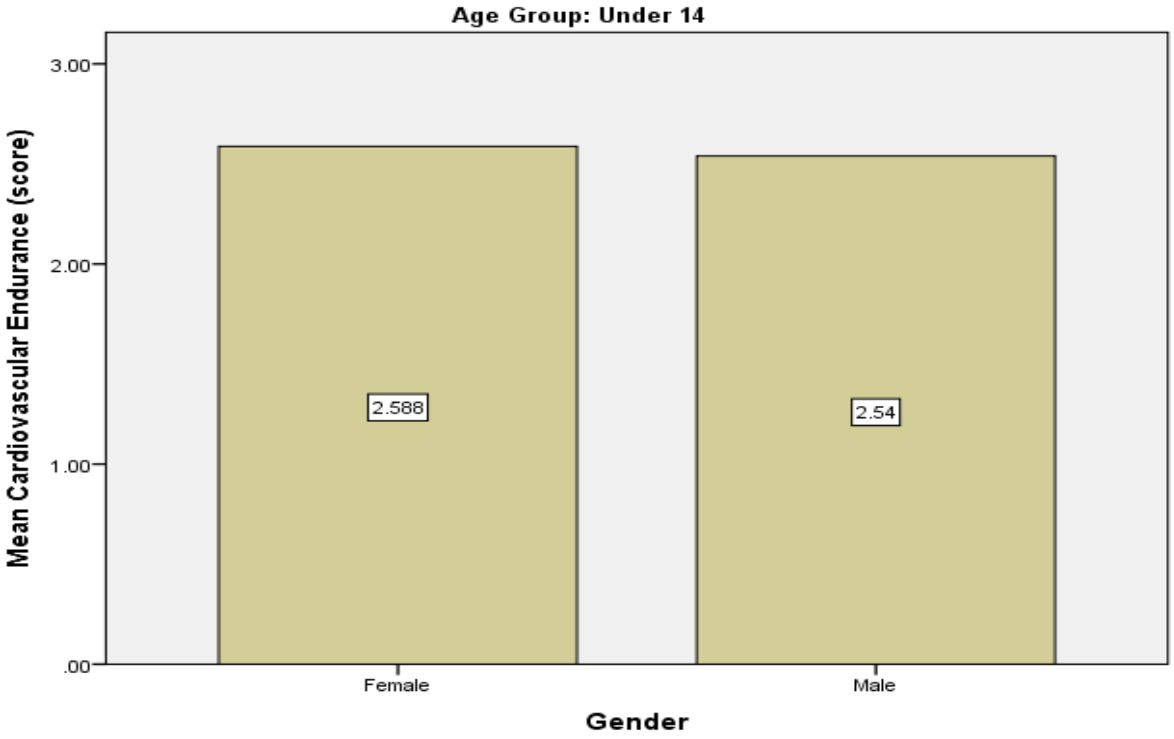

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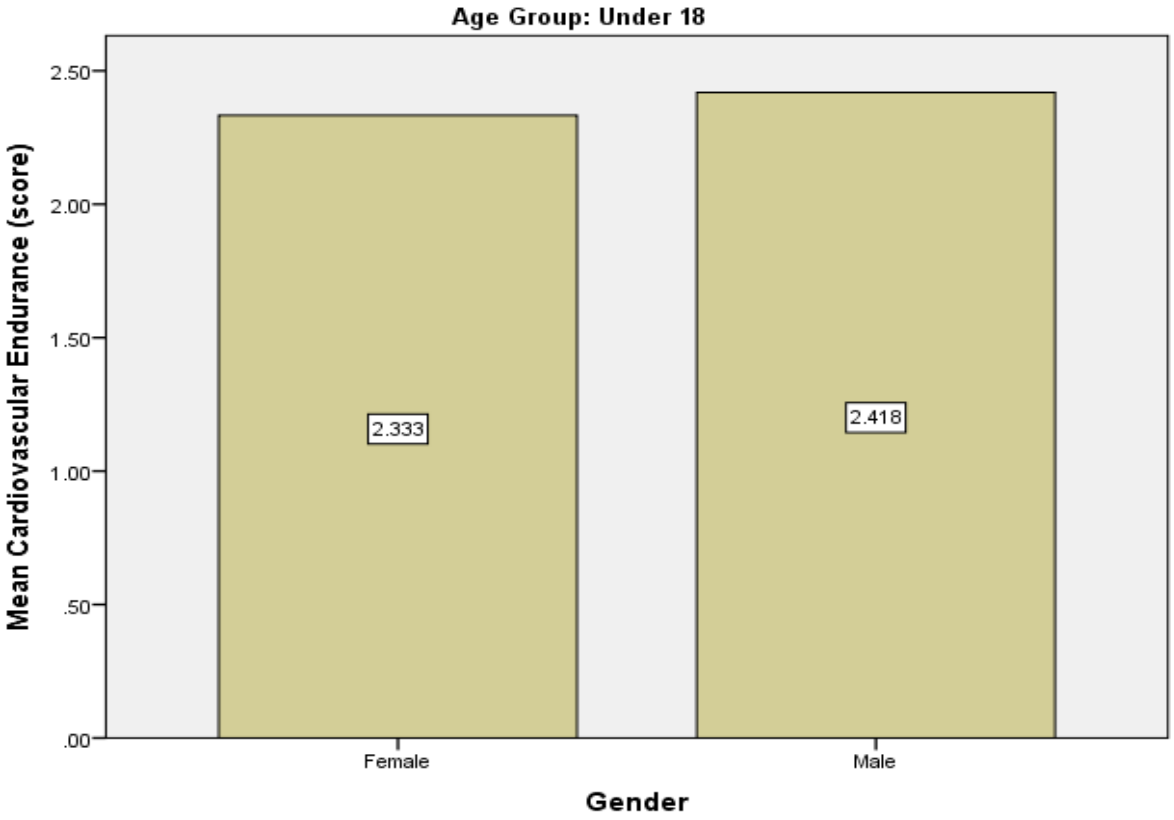

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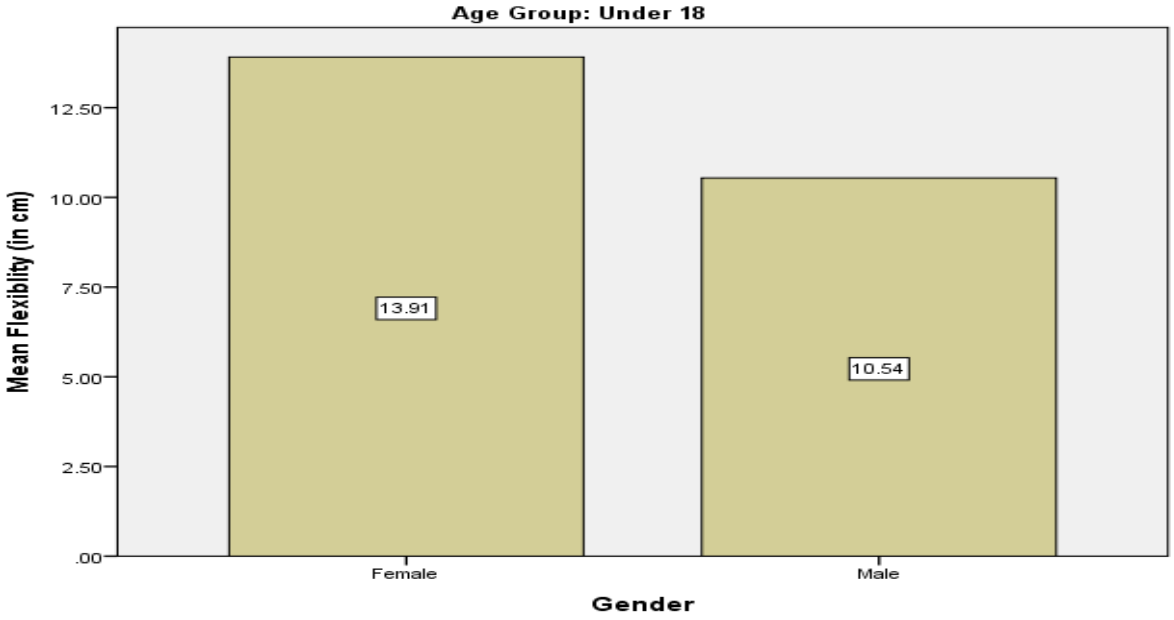

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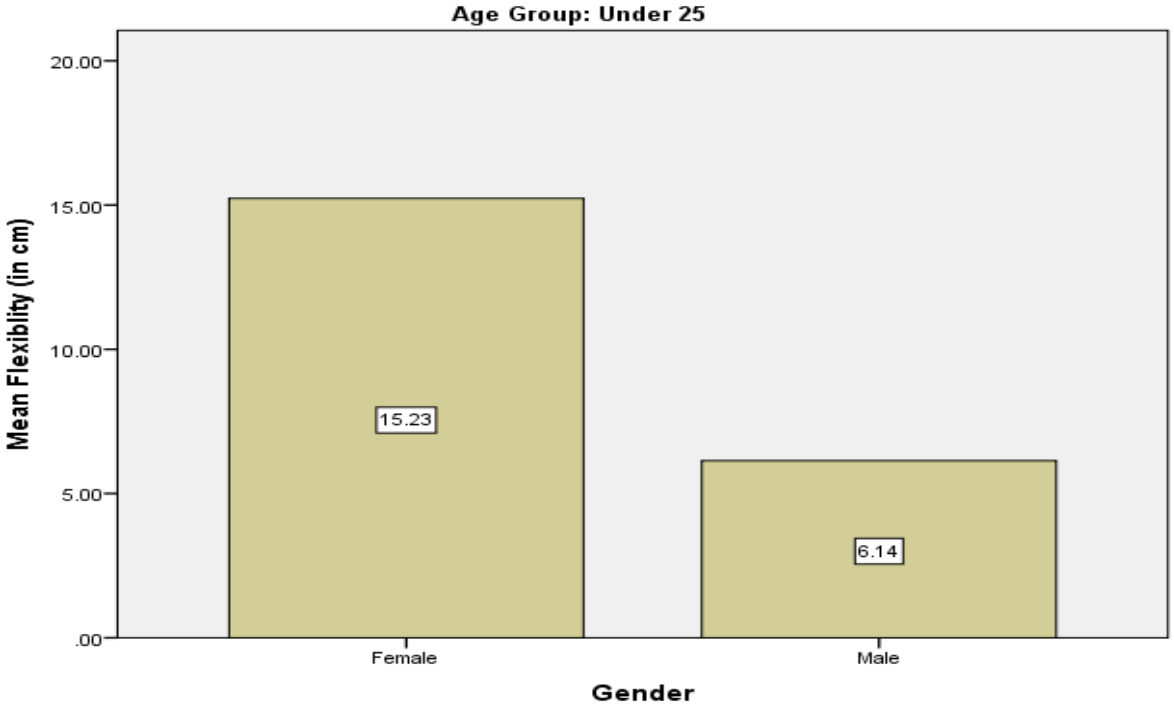

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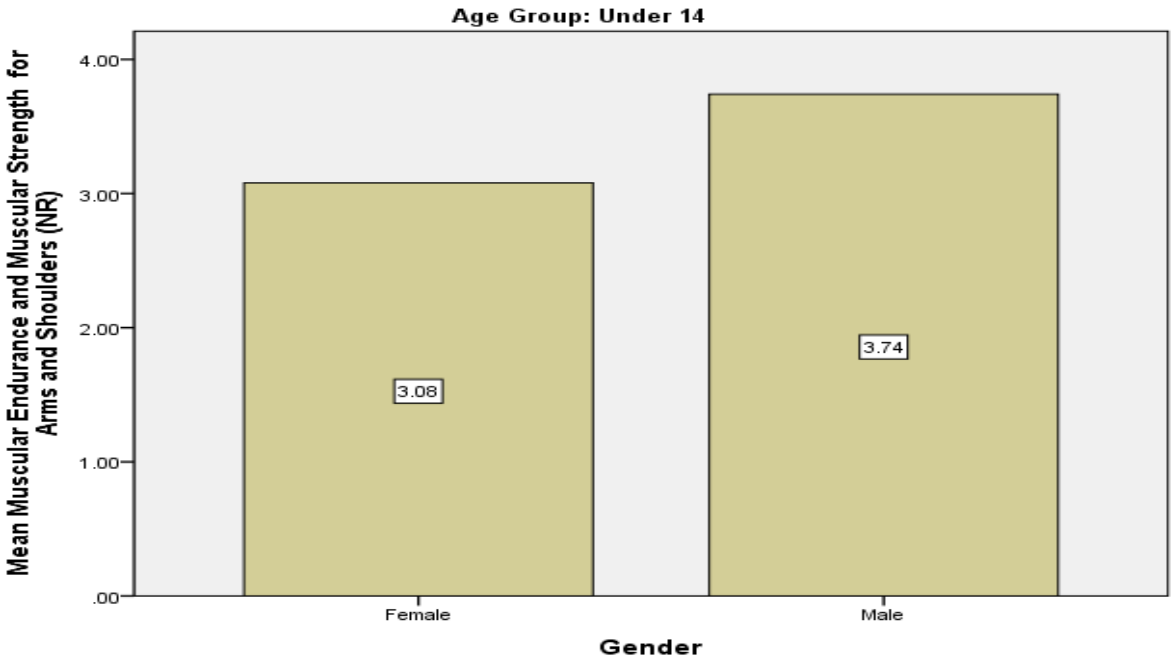

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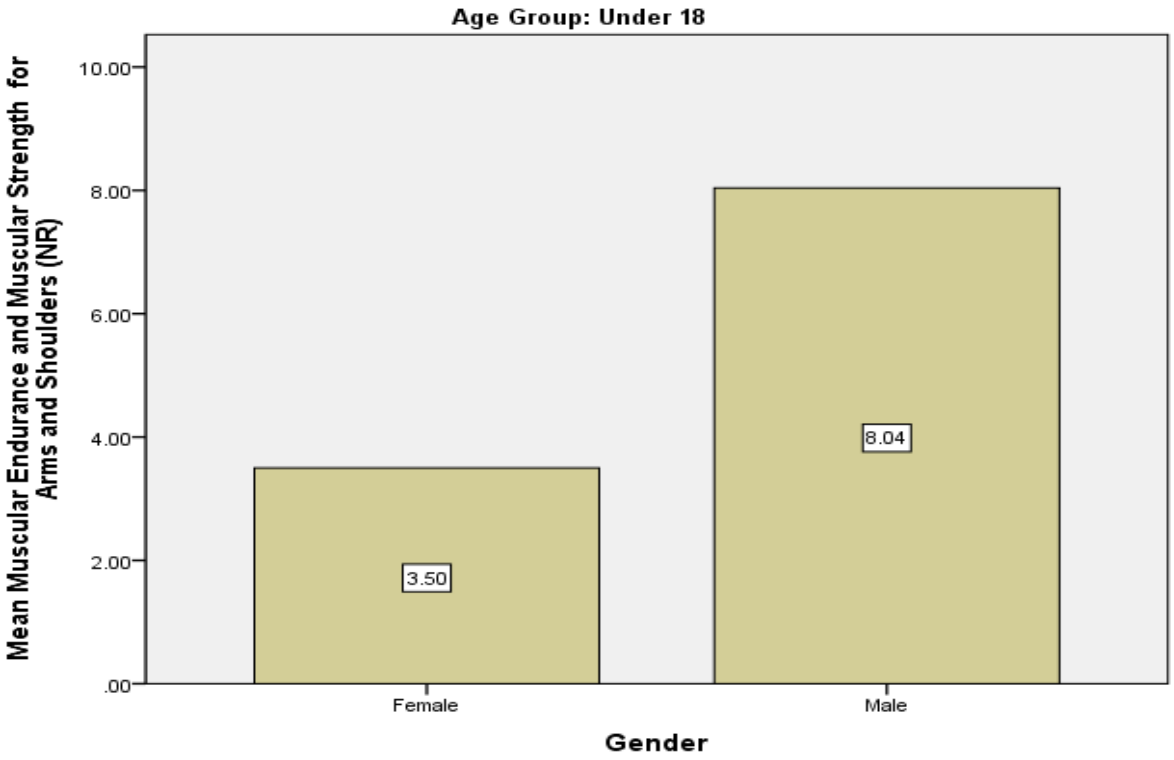

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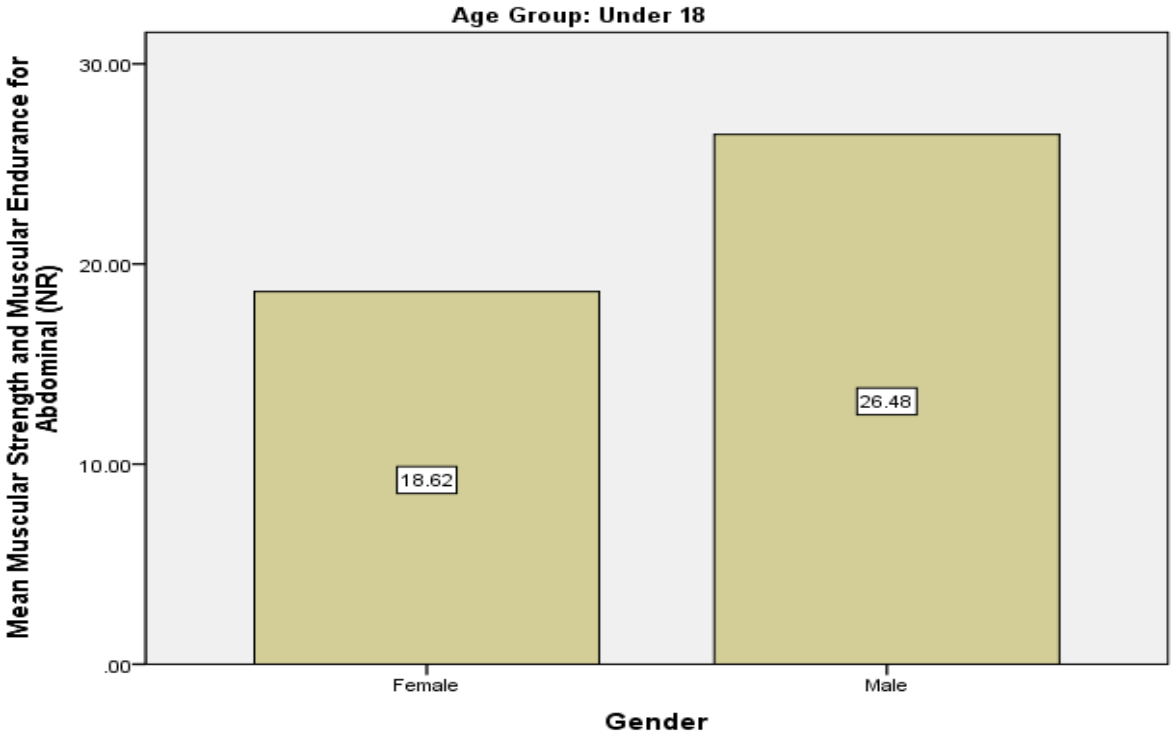

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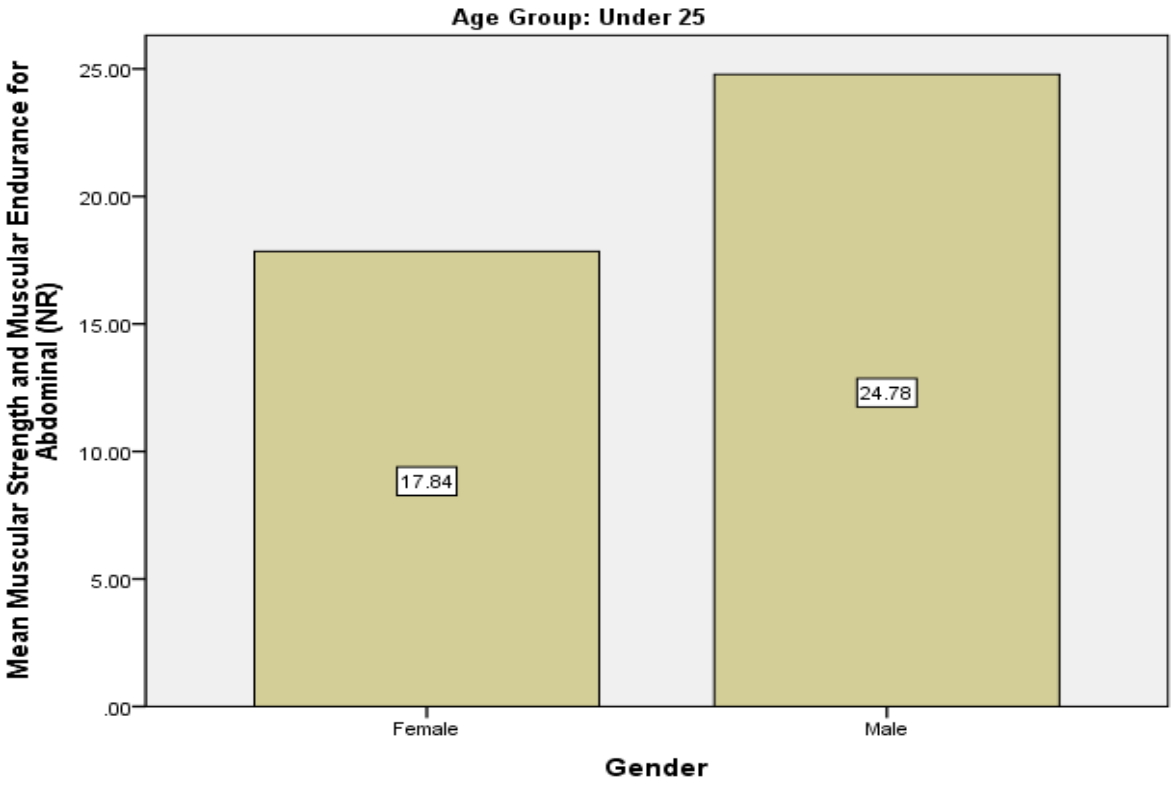

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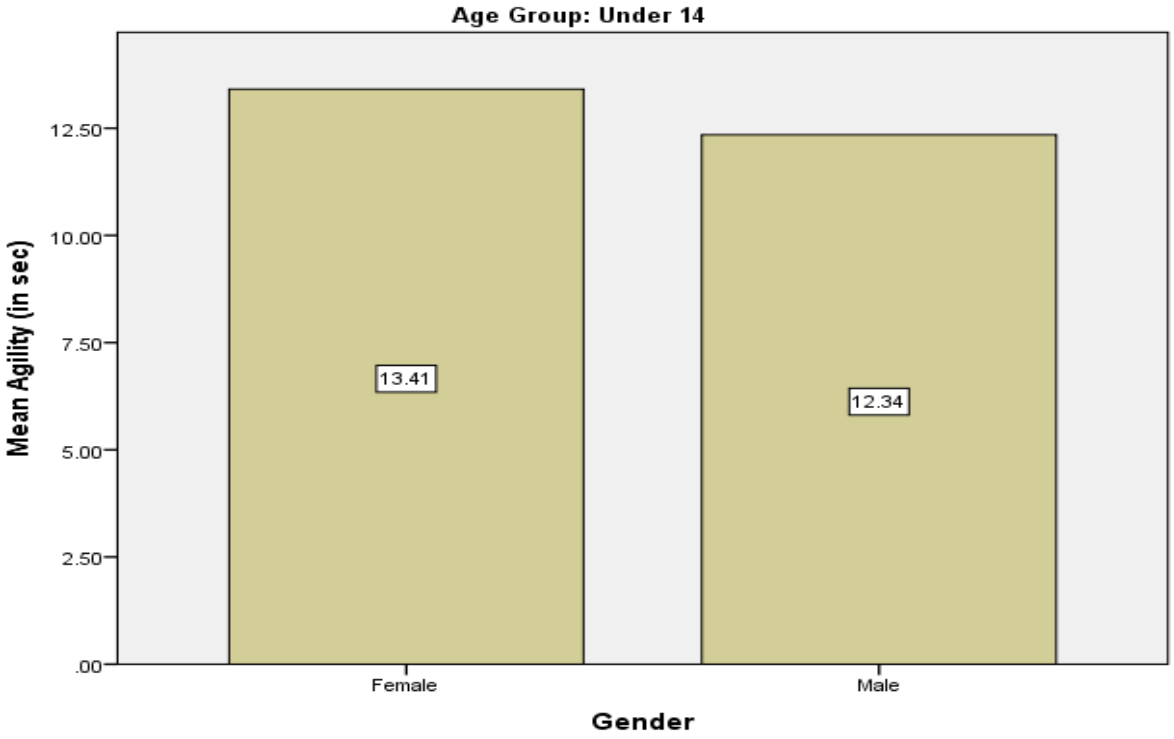

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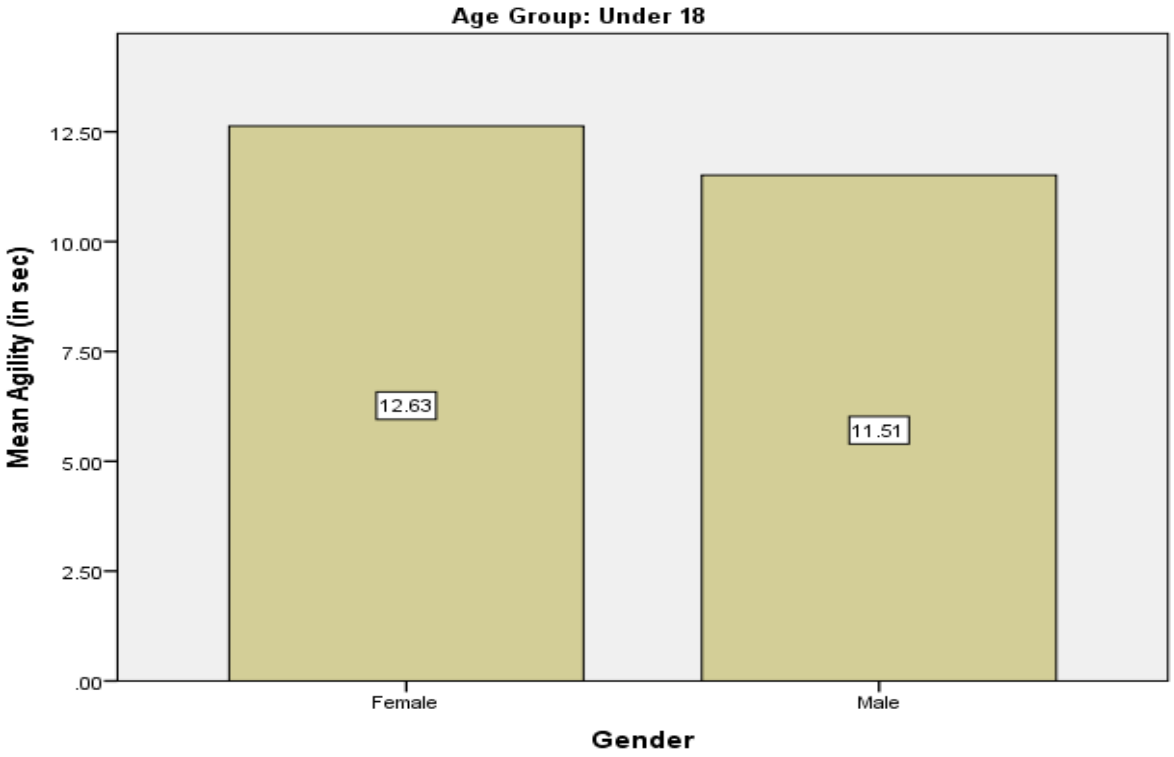

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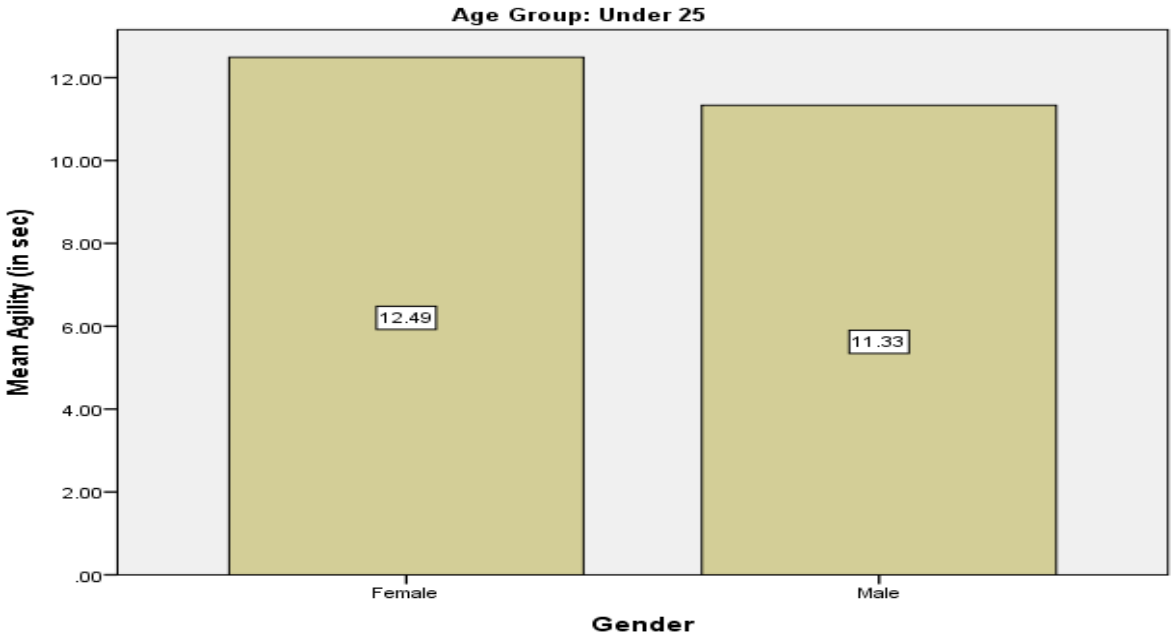

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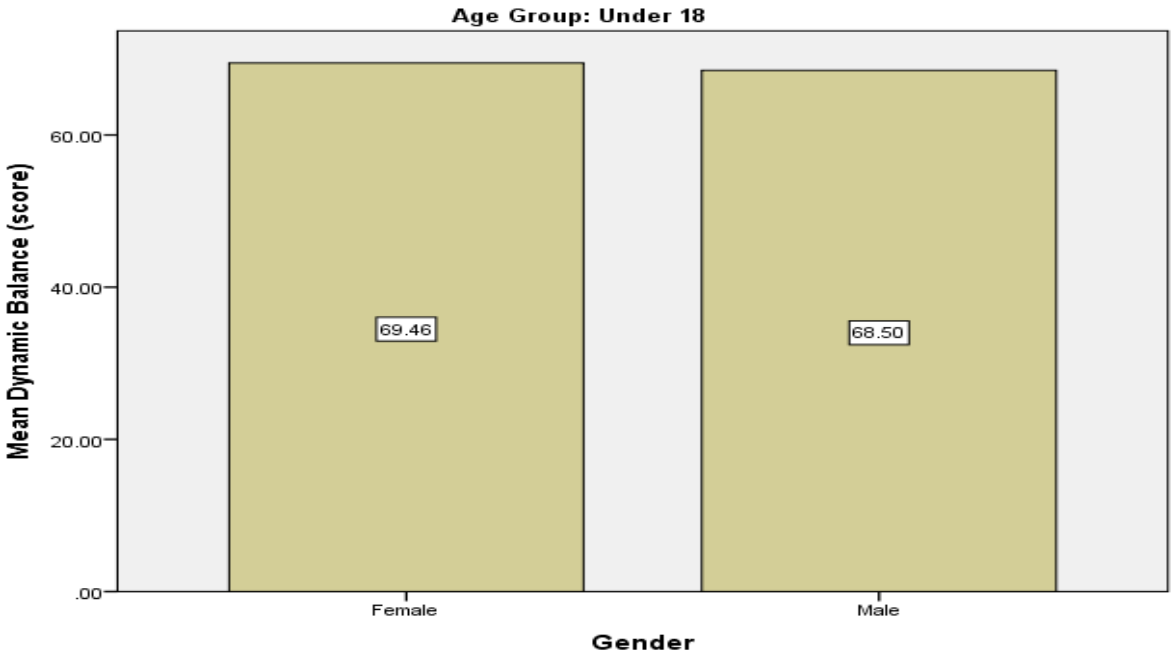

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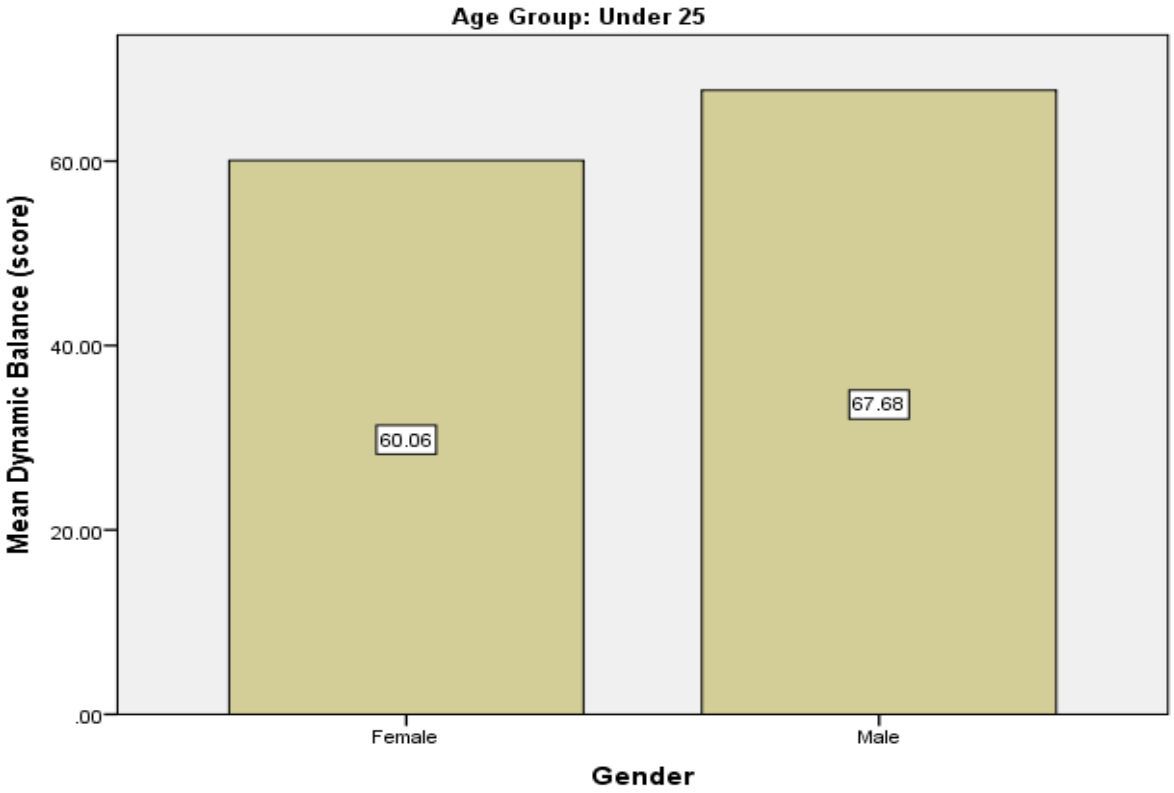

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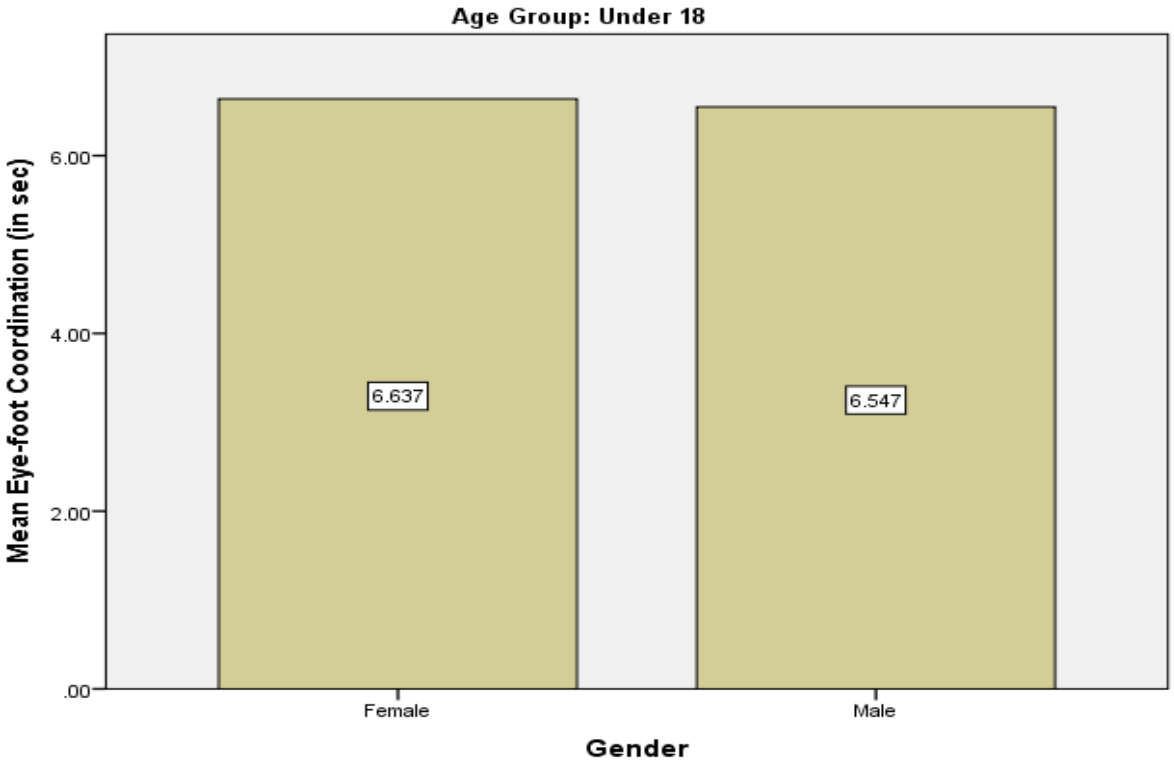

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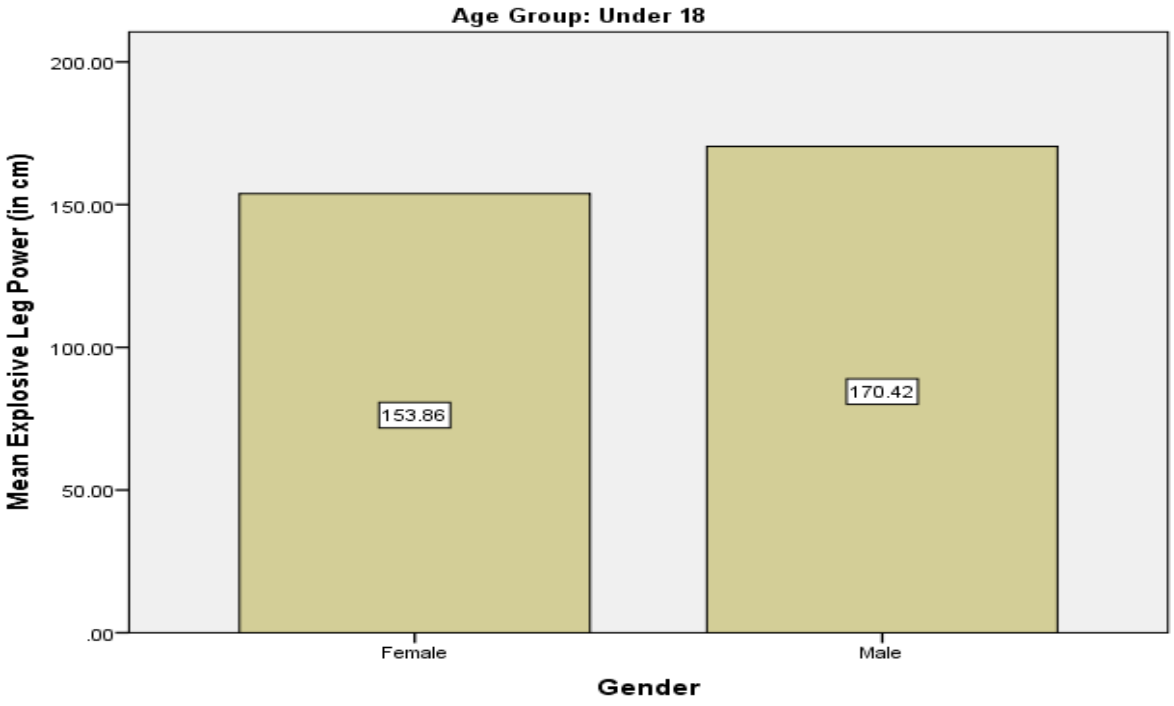

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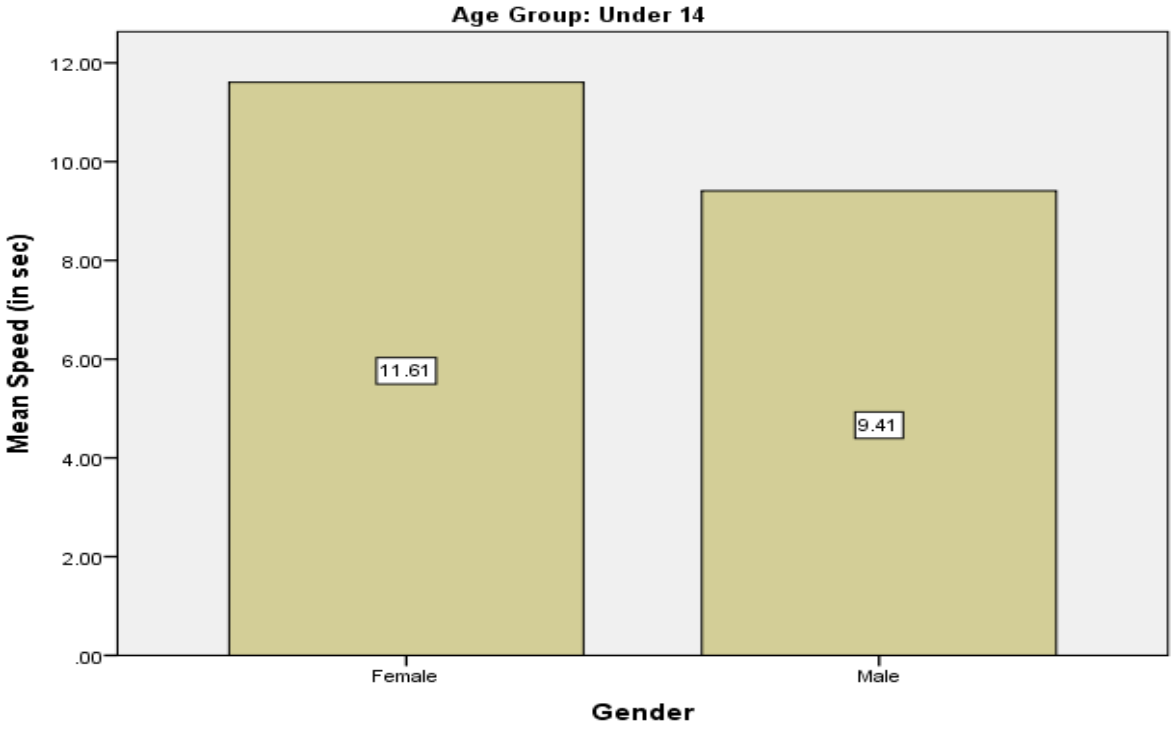

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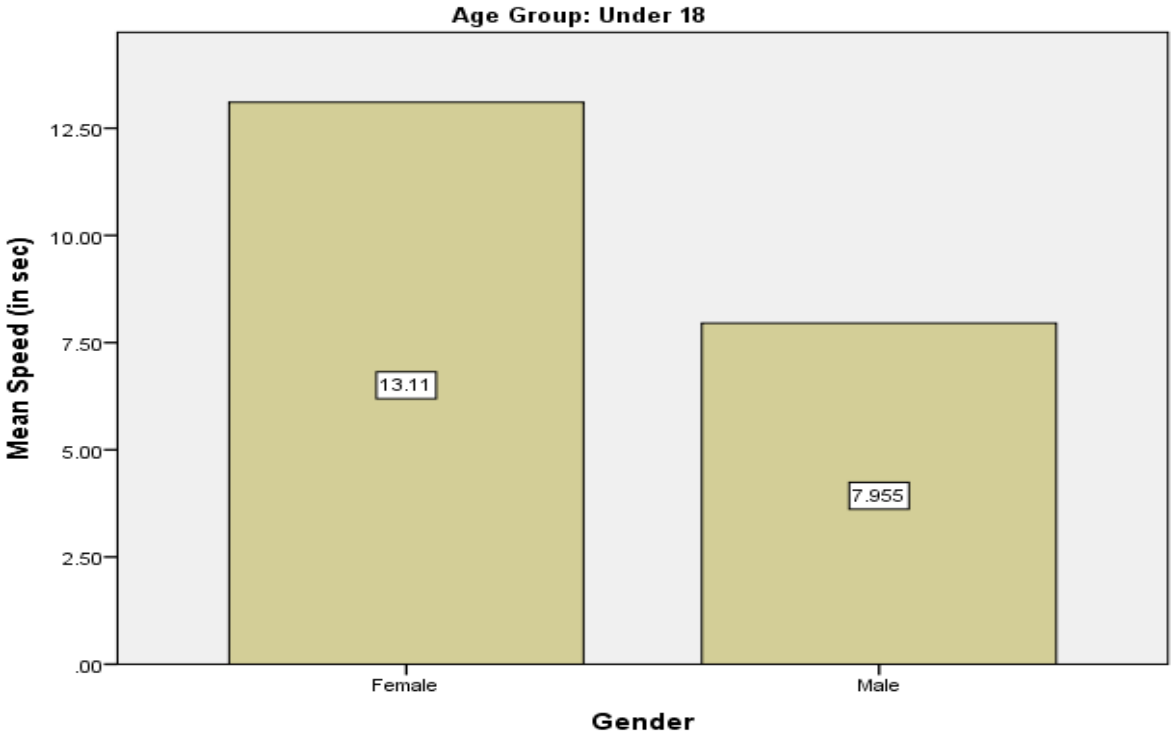

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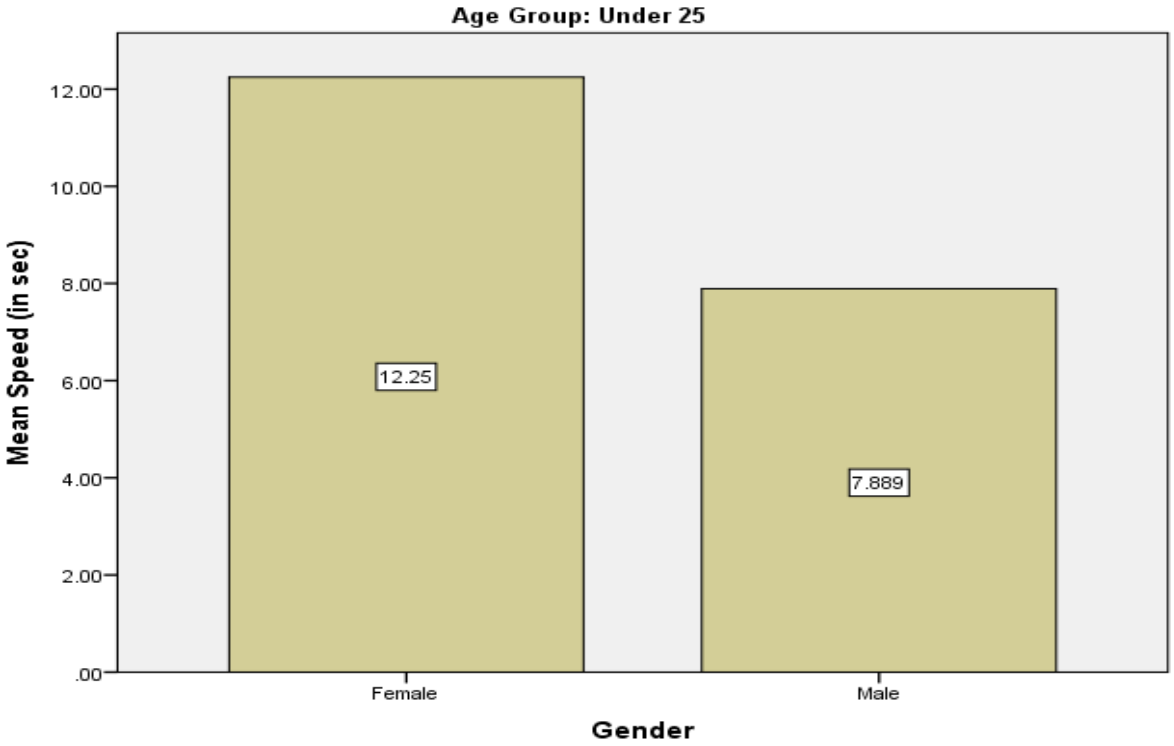
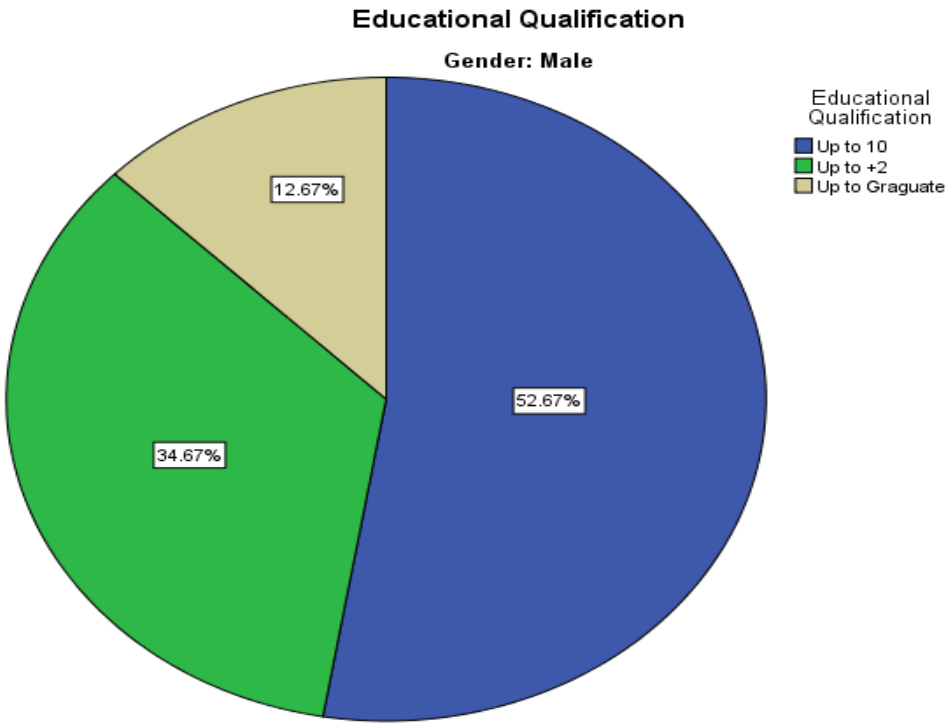

Age Group: Under 25
Mean Speed (in sec)
12.00
10.00
8.00
6.00
4.00
2.00
.00
12.25
7.889
Female
Male
Gender

Appendix- 3

Figure: 66



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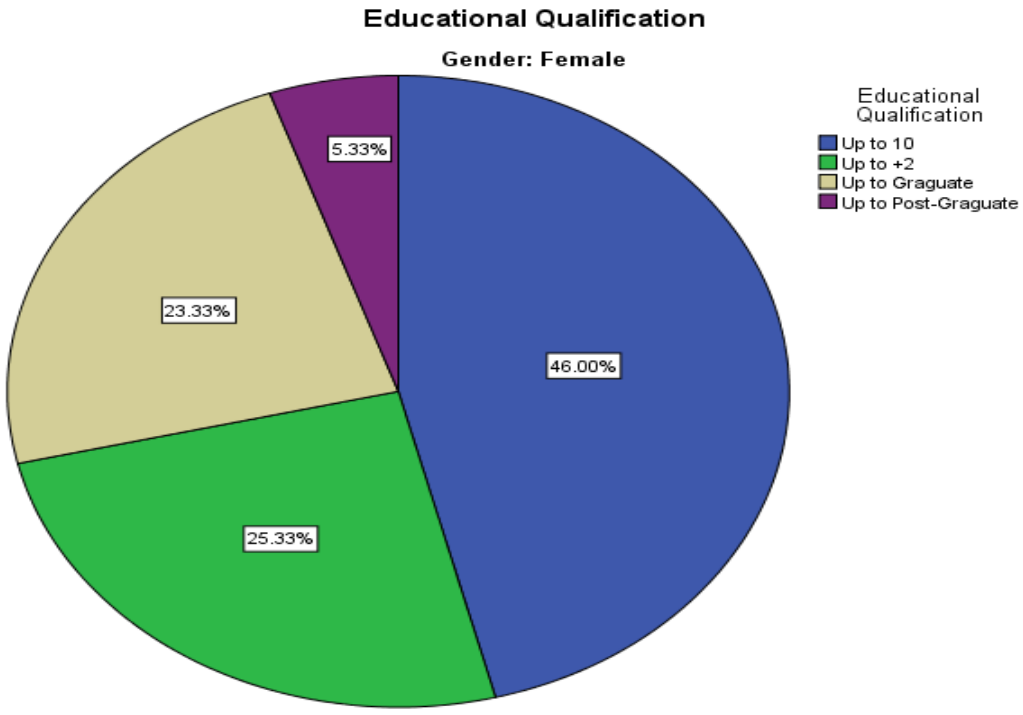

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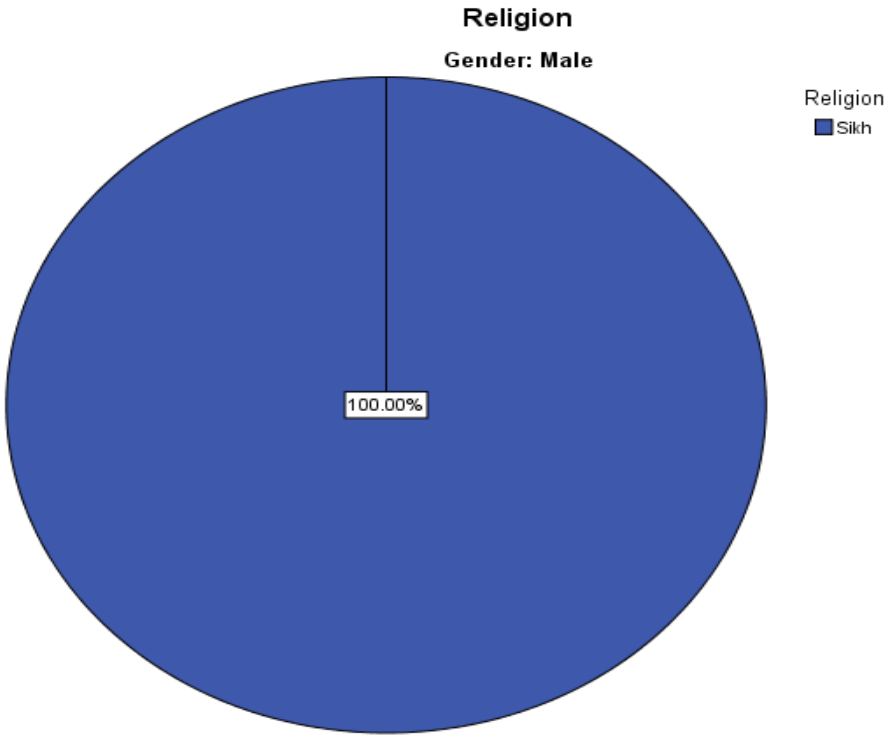

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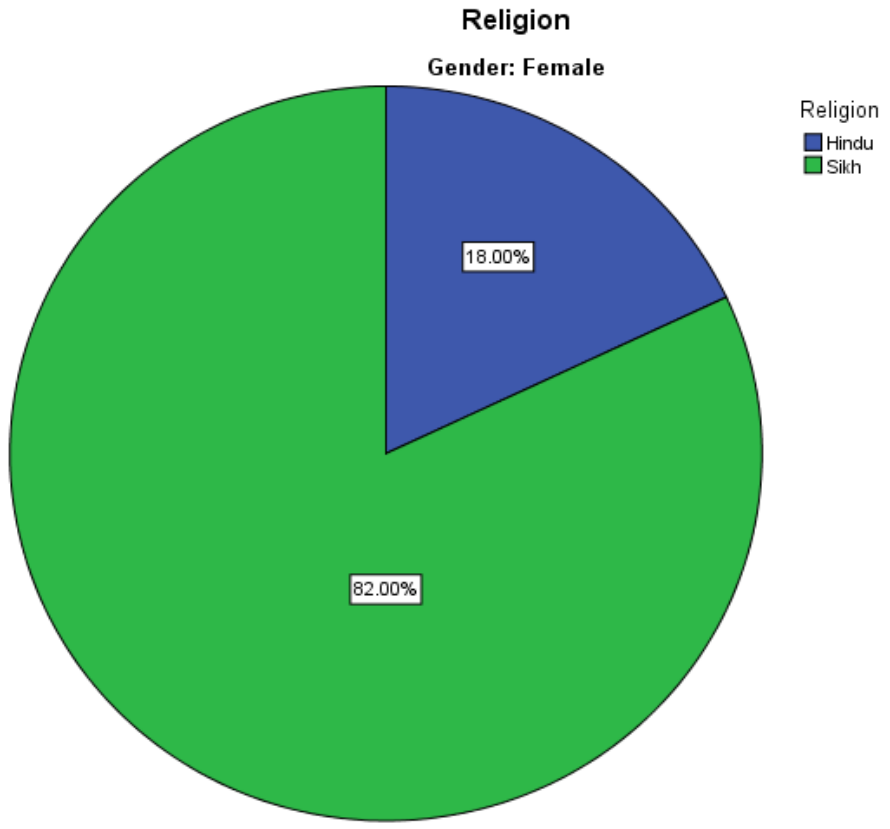

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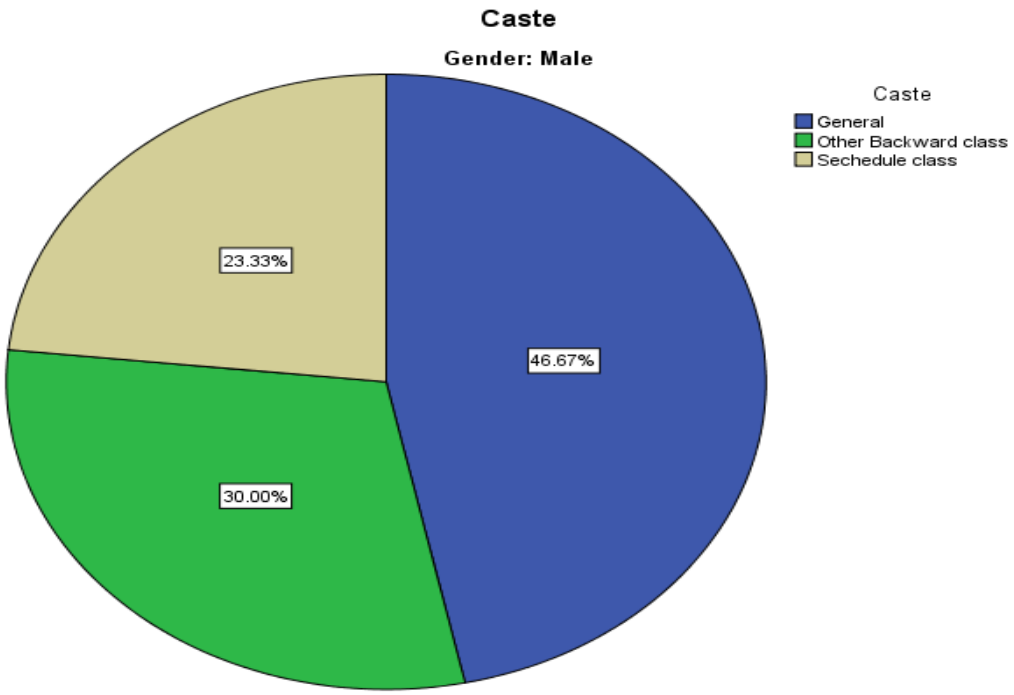

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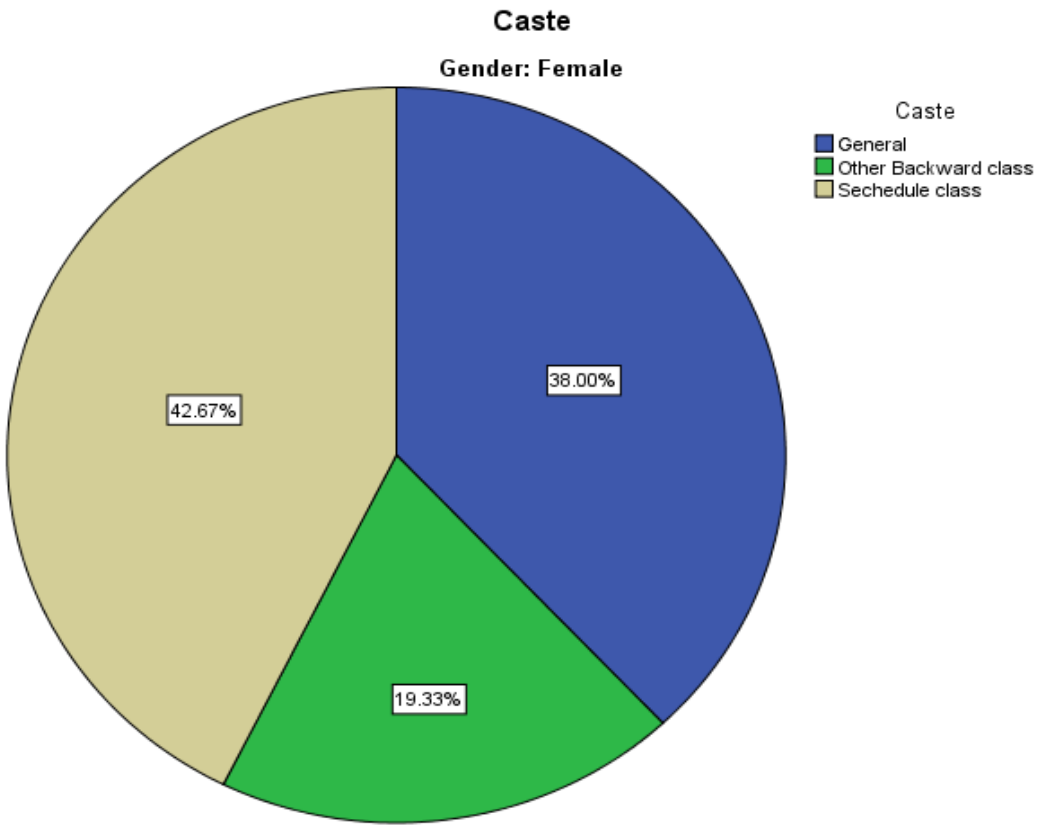

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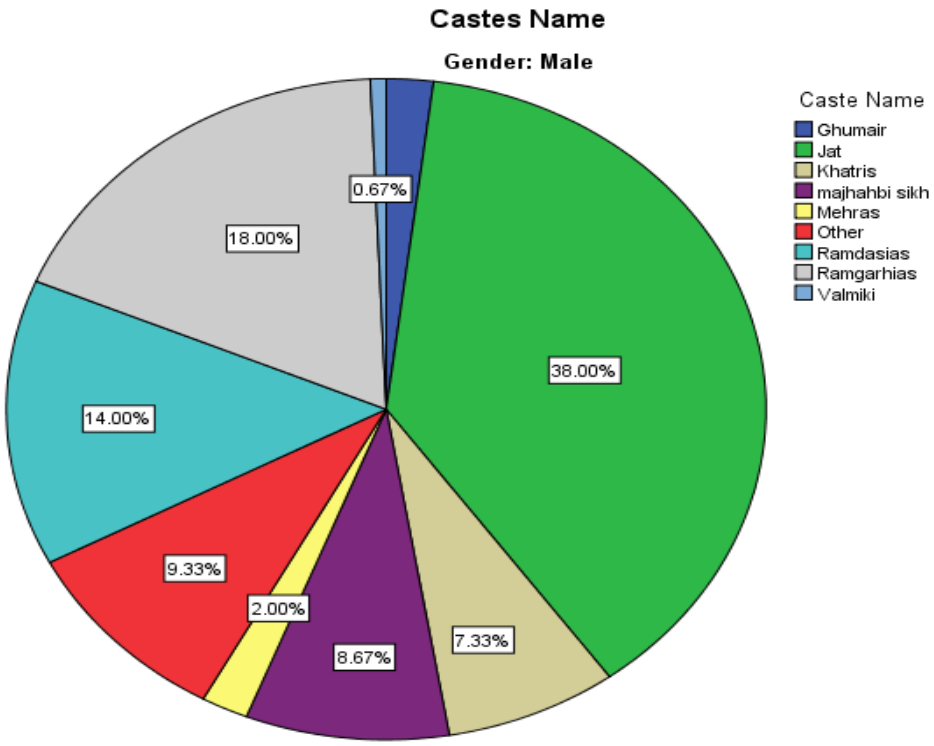

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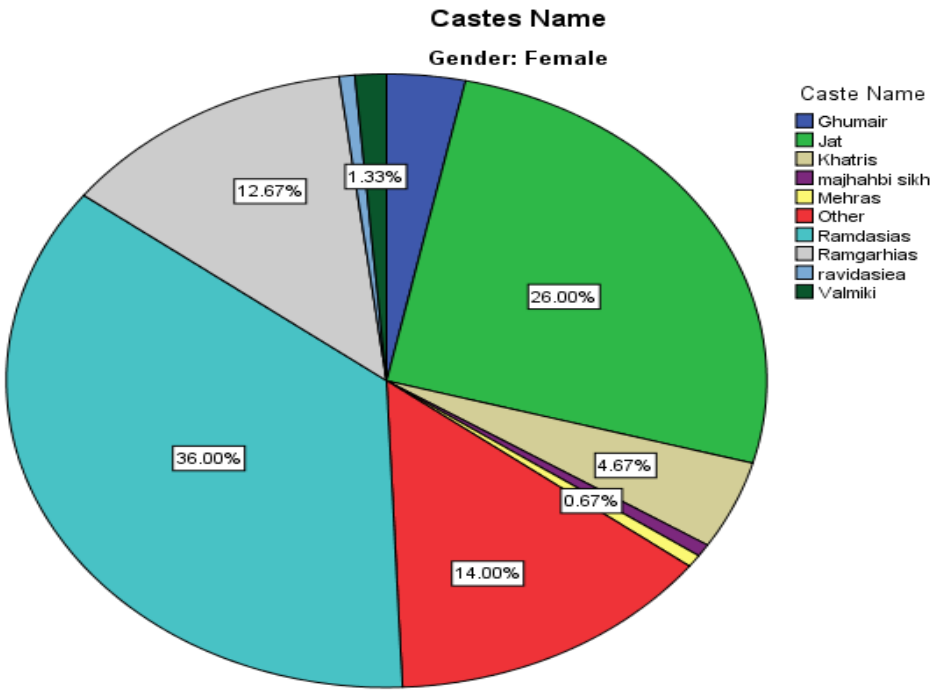

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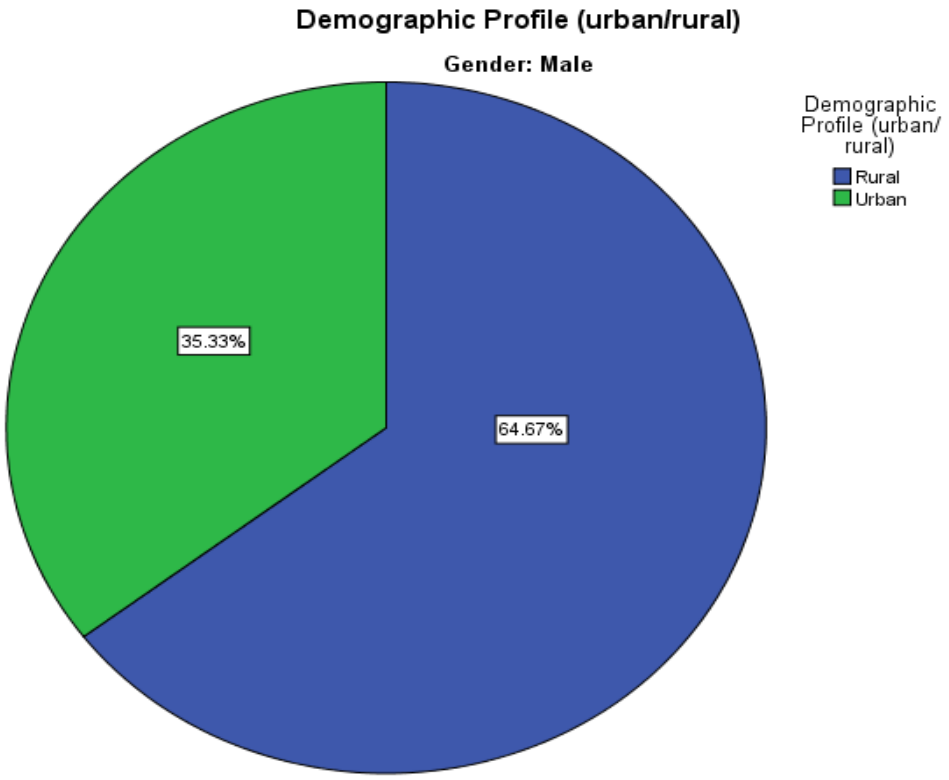

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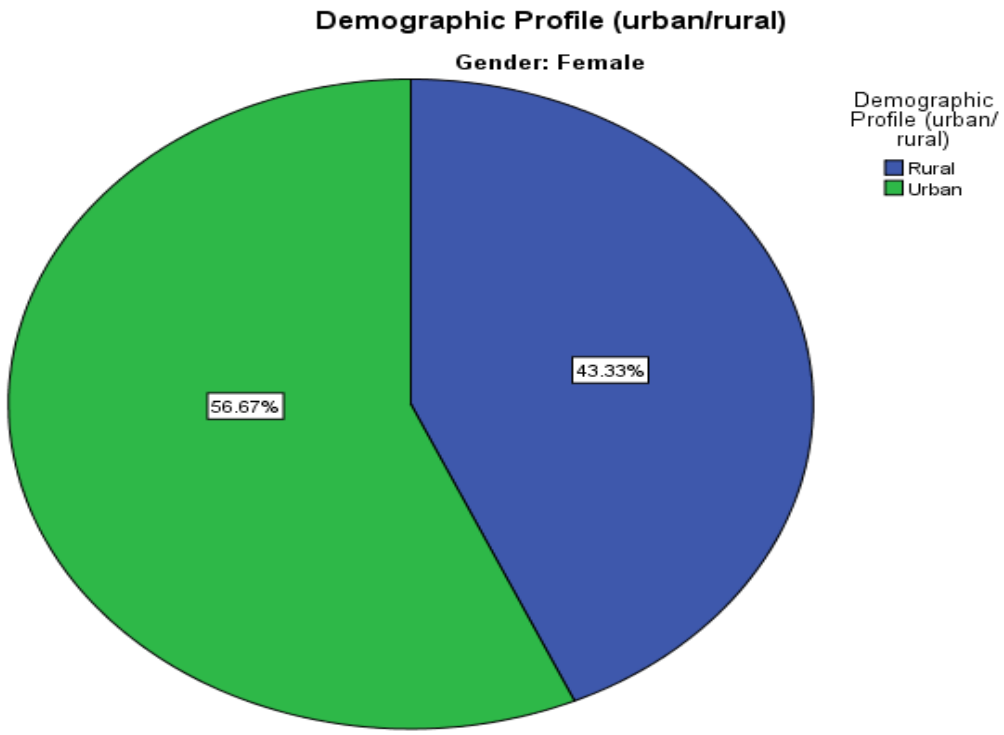

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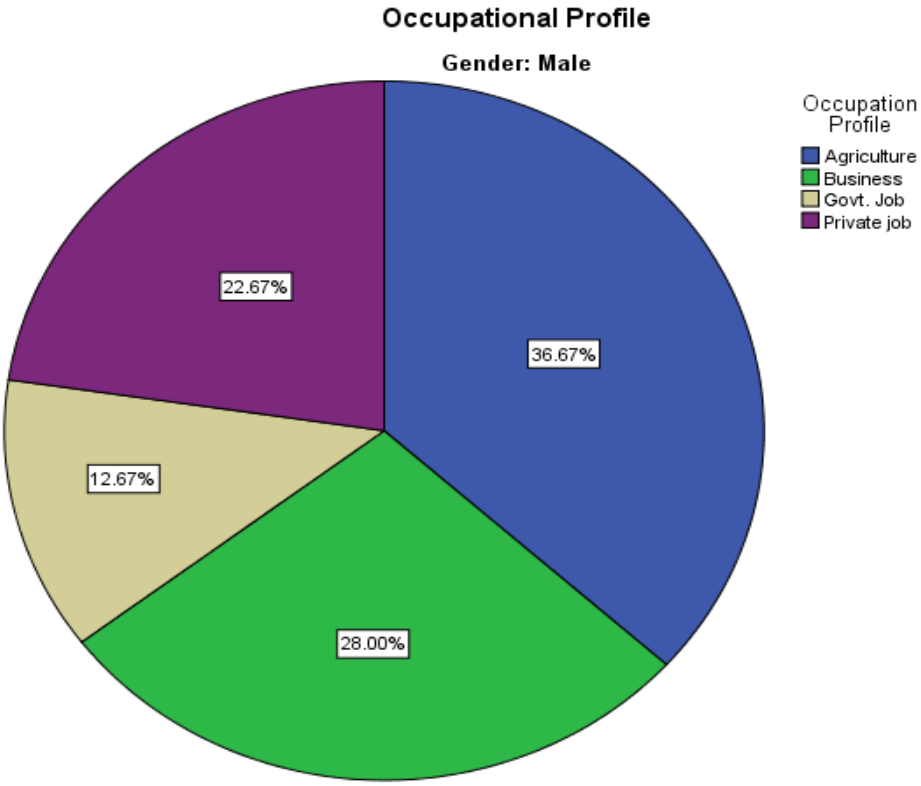

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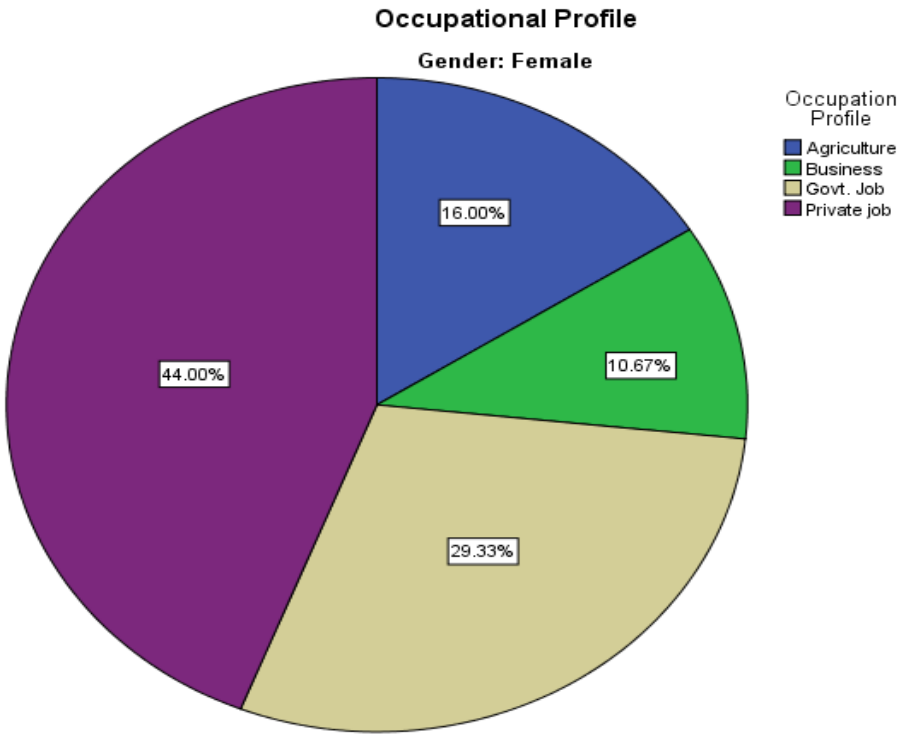

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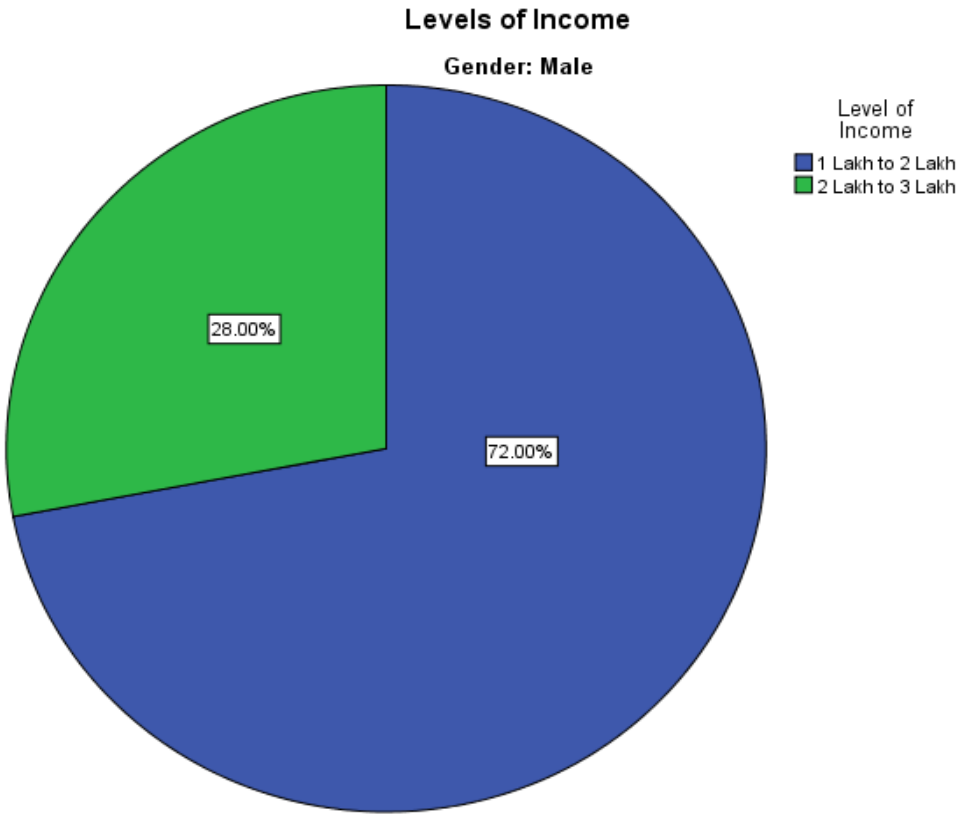

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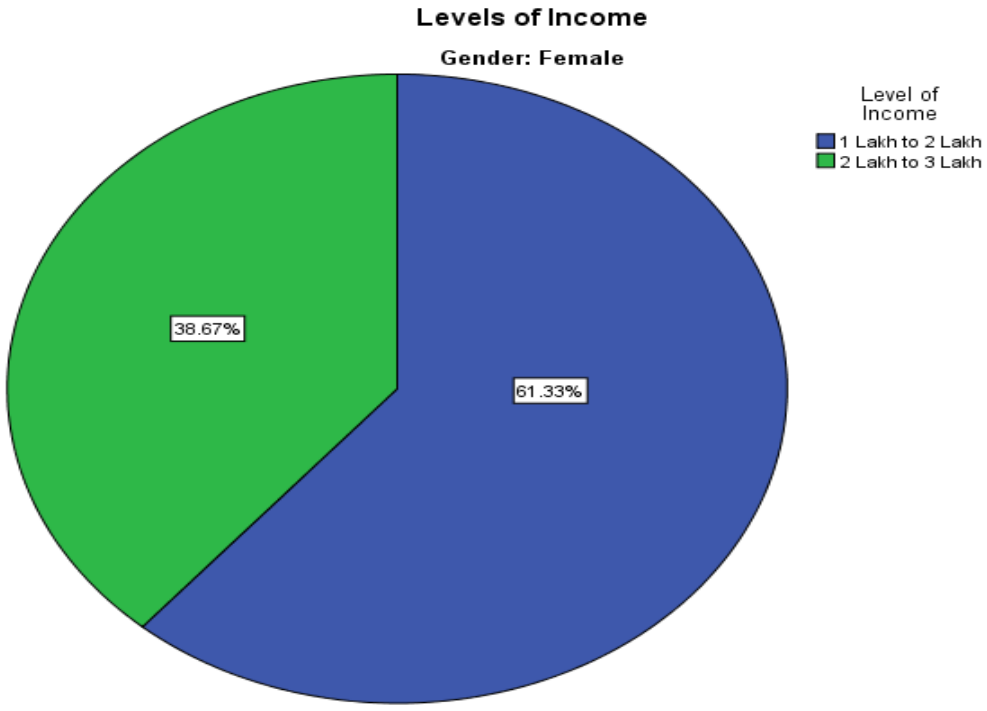
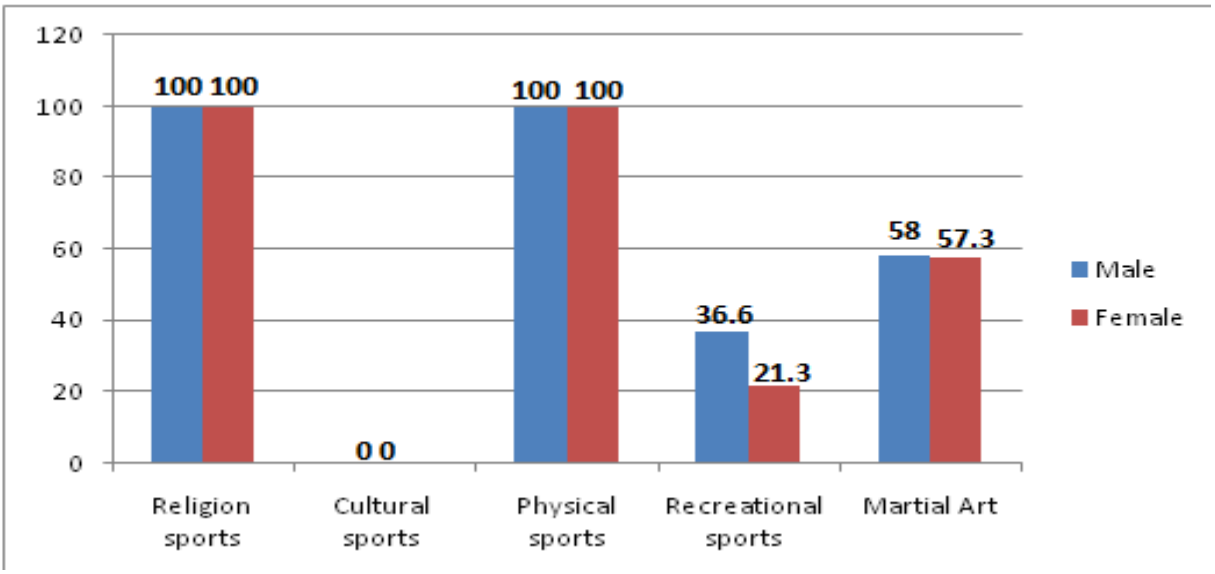


Figure: 80

Socio-Cultural perception of Gatka among Gatka Players



List of Publications

1. Nanak Parkash Patrika (Punjabi), Gatka: Virasat ate Sarirak Pakh. Page 244-248
2. Vigyan De Nakash (Punjabi), Gatka: Ik Khed. Page 114-118
3. Journal Punjab Academy of Sciences, Evaluation of Health Related Fitness Components of Gatka (A Sikh Marshal Art) Player s in different Age Groups. Page 81-84

A STUDY OF FITNESS AND SOCIO-CULTURAL ASPECTS OF GATKA: A SIKH MARTIAL ART

A

THESIS

Presented to the faculty of Medicine of the

Punjabi University, Patiala

In partial fulfilment of the Requirement

For the Degree of

DOCTOR OF PHILOSOPHY

IN

SPORTS SCIENCE

By

MANINDER JEET SINGH

DEPARTMENT OF SPORTS SCIENCE

PUNJABI UNIVERSITY, PATIALA

2017

Chapter 5

SUMMARY

Human body has been designed naturally in such a way that it has abundant of movements and movement patterns which enabled to perform in any condition. In the ancient time human has performed these movements for hunting, defence, offence, run, climb, escaping from any hazards of threat etc. Evidences have been there in the literature which has proved that in certain specific skills through repetitively physical activity which help the humans to perform with peak abilities. The skilled pattern to use human body movements for any conditions of combat (favourable or unfavourable or threat) has been treated as a particular tradition of specific human population. Human body movements have been demonstrated differently on different occasions. The present study entitled "A Study of Fitness and Socio-Cultural Aspects of Gatka: A Sikh martial Art" primarily aimed at examining various aspects and dynamics of fitness among the Gatka players. The study was further an attempt to investigate the impact of socio-cultural background such as demography, caste, social status religions affiliations, economic class, level of literacy etc. To evaluate the all aspects of fitness this study has been designed in such a way that it would curtain all-embracing patterns which will help to justify the contribution of Gatka as an art, as a physical activity as a way activity and as a way of life. Furthermore, the study was comprehensive and distinguished attempt which evaluated the impact of socio-religious and socio-economic as well local castes factors on the changing patterns of the fitness levels among males as well as females. In regard to the origin and social acceptance of Gatka as a martial art in India in general and in Punjab in particular, the study had revealed that Gatka had been considered as a typical indigenous form of martial art. It has not been adopted or borrowed by Indians from any other society or territory and it was neither introduced in the region by any alien person or community. In context of Punjabi community while borrowing it from any other Indian community but it has completed the process of evolution in Punjab to be established as a martial art of Sikhs. The political, social and demographic conditions of people in Punjab compelled them to be trained and properly equipped to face, counter and defeat the enemies entering India through Punjab.

As for as the physical and motor fitness perspective of Gatka were concerned, the study explains that physical and motor fitness components among Gatka players have been found significant in comparison to the normal population, not pursuing Gatka or any other formal physical activity. It had established that this martial art has the visible vigorous potential to improve the physical and motor fitness levels of the performers. If performed with accurate training and regularly, it would increase the components of physical and motor fitness and any peak level.

The data of present study had been divided of age wise variable among males, and males performers belonging to the age group of under-14 year have been found as underweight (16.96±3.38). Noticeably, the age groups of under-18 year (20.19±2.35) and under-25 (22.96±2.49) year have been found as maintaining an appropriate body mass index. In regard to percent body fat, a part of body composition, it has been found that all three above mentioned age groups of males players possessed appropriate percent body fat and it was not measured as less or more than the prescribed norms and standards. However, there were dissimilarities among these three age groups in regard to percent body fat (under-14 year (5.50±1.52), under-18 year (5.84±1.64) under-25 year (6.45±1.07). The cardiovascular endurance in the age group of under-25 year (2.35±.248) has been found as significant while in the under-14 year (2.54±.230) age group it has been found as non significant. The component of flexibility was found at least significant in the age group of under-25 year (6.14±5.60) and significant flexibility was found in the age group of under-14 year (9.48±3.06) and under-18 year (10.54±4.49). Muscular endurance and muscular strength of arms and shoulders were found as significant in the under-14 year (3.74±1.92) age group. The age group of under-25 year (5.70±2.95) also contains significant muscular endurance and muscular strength of arms and shoulders. Muscular strength and muscular endurance of abdominal part of the body was most significant in the age group of under-18 year (26.48±5.43) age group while under-14 year (21.14±6.37) age group has been found as least significant. The overall agility score has been found as significant among male players of Gatka (under-14 year (12.34±.552), under-18 year (11.51±.724) under-25 year (11.33±.687)). In regards to dynamic balance, the performance of males has been found as satisfactory. Even significant the data indicates (under-14 year (61.10±12.02), under-18 year (68.50±12.12) under-25 year (67.68±12.69)). The results of the eye-foot coordination test confirmed that male performers of Gatka were significantly weak in this aspect

(under-14 year (7.23±1.55), under-18 year (6.54±.693) under-25 year (6.67±1.03)). The explosive leg power of males was found as significantly appropriate (under-14 year (138.36±9.06), under-18 year (170.42±16.90) under-25 year (182.52±13.29)). The speed of male players was measured as below the established norms of fitness (under-14 year (9.40±.812), under-18 year (7.95±1.01) under-25 year (7.88±.718)).

In regard to the females in the test of body mass index majority of females have been found over-weight under-14 year (16.66±2.86), under-18 year (23.66±6.01) under-25 year (24.70±5.75). The percent body fat has been overall as below the prescribed norms under-14 year (8.0±1.01), under-18 year (10.00±2.34) under-25 year (11.87±2.19). Cardio-vascular endurance of females has been found as average under-14 year (2.58±.220), under-18 year (2.33±.225) under-25 year (2.44±.22). The flexibility, dynamic balance, eye-foot coordination and explosive leg power has been found as above the average and hence significant good under-14 year (9.93±2.81), under-18 year (13.91±4.55) under-25 year (15.23±4.98), under-14 year (59.88±13.28), under-18 year (69.46±12.57) under-25 year (60.06±14.65), under-14 year (7.31±1.46), under-18 year (6.63±.602) under-25 year (7.14±1.22) and under-14 year (136.64±7.02), under-18 year (153.86±20.02) under-25 year (142.86±15.19). The muscular endurance and muscular strength of arms shoulder under-14 year (3.08±1.89), under-18 year (3.50±1.65) under-25 year (2.88±1.91) and abdominal under-14 year (17.96±4.87), under-18 year (18.62±5.90) under-25 year (17.84±4.80) have been found as poor. Moreover the agility under-14 year (13.41±1.14), under-18 year (12.62±1.319) under-25 year (12.49±1.28) and speed under-14 year (11.60±2.46), under-18 year (13.10±1.08) under-25 year (12.24±1.82) have been measured as poor among female players of Gatka.

The data of Gatka players has provided a clear status at health and fitness parameters of male and female players in all age groups i.e. under-14 years, under-18years, and under-25years respectively. The results of certain health and fitness parameters BMI, % body fat, cardiovascular endurance, flexibility, coordination, balance etc have been found better in female players whereas the parameters of strength, muscular endurance, cardiovascular endurance, power, agility and speed were found better among the male players. Although the performance of both gender players varied with the age and training too but fundamentally the player were not equipped with the adequate coaching facilities and lack of tactical techniques.

As for as the justification of fitness among Gatka players was concerned, it has been observed that particular groups, due to their differences of gender and age are comparatively better generally in the fitness aspects and particularly in one or other components of fitness, but the overall level of fitness among the Gatka players was significantly lower in proportion to the norms of fitness for a professional or amateur players at other sports. The main reason for the minimal or dissatisfactory levels of fitness among them can be attributed as physical, social, economic and professional. Physically, the Gatka players have not been prepared themselves and compatible to the measurement of fitness. They were not practice to adopt their fitness related physical component to remain adequately fit. Socially, most of the Gatka players belong to those families where there persistent dietary and fatigue trends of fitness. Economically, majorly belonging to the economically marginalised families, the Gatka players were not in positions to expend appropriately on their diet, fitness supplements, and professional training required for fitness. From the perspective of professional training, the Gatka players, due to their unawareness about that martial art of Gatka and marginalised economic conditions were not able to here or get associated with the professional trainers and coaches of Gatka. Therefore these findings partially the second hypothesis composed in the study that Gatka players were better in physical fitness and relatively better in motor fitness in their competitions. This martial art, due to the disinterest of the society and unwillingness of the governments had not availed any reasonably good infrastructure mostly in the traditional Akharas, play ground of schools as well as colleges and community places by the traditionally and pastorally trained masters, in spite of separate arenas and professional trainers and coaches. It was sturdily required that community should promote the martial art of Gatka among the new generations as a recreational sport, a physical-fitness and motor-fitness activity and a defence technique as a martial art. The organisations associated with the task the promotion of traditional sports, martial arts and fitness among youth come forward to promote Gatka as an indigenous martial and a sports activity.

All martial arts have been introduced as defensive training part and traditionally have been demonstrated as a regional or religious act of populations. To maintain the diversity of these movement arts further studies have to be done on their regional requirements and religious needs. Also as human body movements and medico-physiological aspects of training should be studied in detail which may ethically and aesthetically helped to establish the human body peak performances.

Chapter 6
CONCLUSION

The present study entitled "A Study of Fitness and Socio-Cultural Aspects of Gatka: A Sikh martial Art" primarily aims at examining various aspects and dynamics of the levels of fitness among the Gatka players. The study is further an attempt to investigate the impact of socio-cultural background such as demography, caste, social status religions affiliations, economic class, level of literacy etc. In the fitness of the Gatka players, the study was an all-embracing attempt to study the contribution of Gatka martial art as a physical activity changing the levels of fitness among people. Furthermore, the study was comprehensive and distinguished attempt evaluated the impact of socio-religions and socio-economic as well racial factors on the changing patterns of the fitness levels among males as well as females.

FINDINGS OF THE STUDY

In regard to the origin ride and social acceptance of Gatka as a martial art in India in general and in Punjab in particular, the study reveals that Gatka can be considered as a typical indigenous form of martial art. It has not been adopted or borrowed by Indians from any other society or territory and it was neither introduced in the region by any alien person or community. In context of Punjabi community while borrowing it from any other Indian community but it has completed the process of evolution in Punjab to be established as a martial art. The political, social and demographic conditions of people in Punjab compelled them to be trained and properly equipped to face, counter and defect the enemies. This unavoidable condition enthused people of the region to adopt the martial art of Gatka.

While narrating the religions roots of the martial art Gatka, the study divulges that though, there had been general trends persistent among all males of Punjabi communities to keep a bamboo or wooden stick or swords with then as a symbol of force and as an instrument of self defence, but in Sikh practices Gatka has been perceived and patronised as a formal activity of self defence. Sikh Gurus especially the sixth guru Hargobind formally patronised Gatka as a martial art and the tradition was adopted by the tenth guru Gobind Singh, who formally made sword an advanced instrument of Gatka as part of the religions code of the Sikh, to be carried forever. Consequently, the finding approve the first hypothesis constructed the beginning of

the research work that Gatka had been prevalent in Indian sub-continent, eminently in northern region, much prior to the advent of the Khalsa (Pure) and Nihangs (Baptised Sikh).

As for as the physical and motor fitness perspective of Gatka were concerned, the study explains that physical and motor fitness components among Gatka players have been found significant in comparison to the normal population, not pursuing Gatka or any other formal physical activity. It establishes that this martial art has the visible and vigorous potential to improve the physical and motor fitness levels of the performers. If performed with accurate training and regularly, it does increases the components of physical and motor fitness.

In the context of age wise variable among males, the performers belonging to the age group of under-14 have been found as underweight. Noticeably, the age groups of under-18 and under-25 have been found as maintaining an appropriate body mass index. In regard to percent body fat, a part of body composition, it has been found that all three abovementioned age groups of males possess appropriate percent body fat and it was not measured as less or more the prescribed norms. However, there were dissimilarities among these three age groups in regard to percent body fat. Further, the cardiovascular endurance in the age group of under-25 has been found as significant while in the under-14 age group it has been found as non significant. Flexibility was found at least significant in the age group of under-25 and significant flexibility was found in the age group of under-14 and under-18. Muscular endurance and muscular strength of arms and shoulders were found as significant in the under-14 age group. The age group of under-25 also contains significant muscular endurance and muscular strength of arms and shoulders. Muscular strength and muscular endurance of abdominal part of the body was most significant in the age group of under-18 age group while under-14 age group has been found as least significant. The overall agility has been found as significant among male players of Gatka. In regards to dynamic balance, the performance of males has been found as satisfactory. The results of the eye-foot coordination test confirmed that male performers of Gatka were significantly weak in this aspect. The explosive leg power of males was found as significantly appropriate. The speed of male players was measured as below the established norms of fitness.

In regard to the females in the test of body mass index majority of females have been as over-weight. The percent body fat has been overall as below the prescribed norms.

Cardio-vascular endurance of females has been found as average. The flexibility, dynamic balance eye-foot coordination and explosive leg power has been found as above the average and hence significant good. The muscular endurance and muscular strength of arms shoulder and abdominal have been found as poor. Moreover the agility and speed have been measured as poor among female players of Gatka.

In regard to the inquiry of the impact of socio religions, socio demographic, socio cultures and socio-economic conditions on the Gatka players, it has been found that male players are comparatively more fit than the females, the levels of fitness have been found as better in comparison to the urban players of Gatka. The players belonging to the economically marginalised classes have been found as less fit in various aspects, in comparison to the players belonging to the families with sufficient economic resources. More noticeably, the levels of fitness have been found as better among formally baptised Sikh players (males and females) in comparison to general players of Gatka. As far as impact of caste on the levels of fitness was concerned, the players (males as well females) belonging to Mazhabi Sikh, Ramdasiea Sikh and Jat Sikh was found as comparatively more fit than other castes.

As for as the verification of fitness among Gatka players is concerned, it has been observed that particular groups, due to their differences of gender and age are comparatively better generally from the fitness aspect and particularly in one or other phases of fitness, but the overall level of fitness among the Gatka players is significantly lower in proportion to the norms of fitness for a professional or amateur players. The main reason for the minimal or dissatisfactory levels of fitness among them can be attributed as physical, social, economic and professional. Physically, the Gatka players do not prepare themselves ad compatible to the measurement of fitness. They do not practice to adopt and meld their fitness related physical parts to remain adequately fit. Socially, most of the Gatka players belong to those families where there persistent dietary and fatigue trends of fitness. Economically, majorly belonging to the economically marginalised families, the Gatka players are not in positions to expend appropriately on their diet, fitness supplements, and professional training required for fitness. From the perspective of professional training, the Gatka players, due to their unawareness about that martial art of Gatka and marginalised economic conditions are not able to here or get associated with the professional trainers and coaches of Gatka. Therefore these findings partially the second hypothesis composed in the study that Gatka players are better in physical fitness and

relatively better in motor fitness in their competitions. This martial art, due to the disinterest of the society and unwillingness of the governments had not availed any reasonably good infrastructure mostly in the traditional Akharas, play ground of schools as well as colleges and community places by the traditionally and pastorally trained masters, in spite of separate arenas and professional trainers and coaches. Other conscious communities of the world, facilitated by the governments, have been very much able to provide international recognition to their traditional martial arts. But Gatka has been neglected by the community and orphaned by the state. As a result, this martial art which had trained and equipped the people of Punjabi, especially the Sikh masses to successfully challenge and defeat the invaders and plunders, is about to vanish its significance as well as identity. It is sturdily required that community should promote the martial art of Gatka among the new generations as a recreational sport, a physical-fitness and motor-fitness activity and a defence technique as a martial art. The organisations associated with the task the promotion of traditional sports, martial arts and fitness among youth come forward to promote Gatka as an indigenous martial and a sports activity.

ABSTRACT

In regard to the origin ride and social acceptance of Gatka as a martial art in India in general and in Punjab in particular, the study reveals that Gatka can be considered as a typical indigenous form of martial art. It has not been adopted or borrowed by Indians from any other society or territory and it was neither introduced in the region by any alien person or community. In context of Punjabi community while borrowing it from any other Indian community but it has completed the process of evolution in Punjab to be established as a martial art. The political, social and demographic conditions of people in Punjab compelled them to be trained and properly equipped to face, counter and defect the enemies. This unavoidable condition enthused people of the region to adopt the martial art of Gatka.

As for as the physical and motor fitness perspective of Gatka were concerned, the study explains that physical and motor fitness components among Gatka players have been found significant in comparison to the normal population, not pursuing Gatka or any other formal physical activity. It establishes that this martial art has the visible and vigorous potential to improve the physical and motor fitness levels of the performers. If performed with accurate training and regularly, it does increases the components of physical and motor fitness.

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found as significant among male players of Gatka. In regards to dynamic balance, the performance of males has been found as satisfactory. The results of the eye-foot coordination test confirmed that male performers of Gatka were significantly weak in this aspect. The explosive leg power of males was found as significantly appropriate. The speed of male players was measured as below the established norms of fitness.

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In regard to the inquiry of the impact of socio religions, socio demographic, socio cultures and socio-economic conditions on the Gatka players, it has been found that male players are comparatively more fit than the females, the levels of fitness have been found as better in comparison to the urban players of Gatka. The players belonging to the economically marginalised classes have been found as less fit in various aspects, in comparison to the players belonging to the families with sufficient economic resources. More noticeably, the levels of fitness have been found as better among formally baptised Sikh players (males and females) in comparison to general players of Gatka. As far as impact of caste on the levels of fitness was concerned, the players (males as well females) belonging to Mazhabi Sikh, Ramdasiea Sikh and Jat Sikh was found as comparatively more fit than other castes.

ਸੰਖੇਪ ਸਾਰ

ਗਤਕਾ ਇੱਕ ਖੇਲ ਇੱਕ ਸੱਭਿਆਚਾਰਕ ਵੰਨਗੀ ਅਤੇ ਅਜੋਕੇ ਸਮੇਂ ਵਿਚ ਇੱਕ ਖੇਡ ਕਲਾ ਦੇ ਮੁਕਾਬਲਿਆਂ ਦੇ ਰੂਪ ਵਿਚ ਪ੍ਰਚਲਿੱਤ ਹੋ ਰਹੀ ਹੈ। ਇਸੇ ਦੇ ਪ੍ਰਫੁਲਤਾ ਦੀ ਅਤੇ ਇਸ ਦੇ ਸਿਹਤ ਮੁਖੀ ਅਤੇ ਯੁੱਧ ਮੁਖੀ ਪਰੰਪਰਾਗਤ ਪੱਖਾਂ ਨੂੰ ਪੜਚੋਲਨ ਲਈ ਇਹ ਅਧਿਐਨ ਸ਼ੁਰੂ ਕੀਤਾ ਗਿਆ। ਇਸ ਵਿਚ ਗਤਕੇ ਦੇ ਸਿਹਤ ਅਤੇ ਤੰਦਰੁਸਤੀ ਪੱਖਾਂ ਨੂੰ ਸਮਾਜਿਕ ਅਤੇ ਸੱਭਿਆਚਾਰਕ ਪੱਖਾਂ ਨਾਲ ਜੋੜ ਕੇ ਦੇਖਣ ਦੀ ਕੋਸ਼ਿਸ਼ ਕੀਤੀ ਗਈ ਹੈ। ਇਸ ਨਜ਼ਰੀਏ ਨੂੰ ਪੜਚੋਲਣ ਲਈ ਸਿਹਤ ਤੇ ਤੰਦਰੁਸਤੀ ਦੇ ਕੁੱਝ ਮੁਲਾਂਕਣ ਅੰਗਾਂ ਨੂੰ ਵਿਧੀ-ਵੱਧ ਤਰੀਕੇ ਨਾਲ ਅਪਣਾਇਆ ਗਿਆ ਜਿਸ ਦੇ ਨਾਲ-ਨਾਲ ਗੱਤਕੇ ਦੇ ਸਮਾਜਿਕ ਸਭਿਆਚਾਰਕ ਪੱਖਾਂ ਨੂੰ ਉਘਾੜਨ ਲਈ ਘੋਖਣ ਦੀ ਵਿਧੀ ਰਾਹੀਂ ਨੂੰ ਪ੍ਰੈਟਿਕਲ ਪੱਖੋਂ ਅਪਣਾਇਆ ਗਿਆ ਅਤੇ ਜਿਸਦੀ ਮਦਦ ਨਾਲ 300 ਗਤਕਾ ਖਿਡਾਰੀਆਂ ਤੋਂ ਅੰਕੜੇ ਇਕੱਠੇ ਕੀਤੇ ਗਏ। ਇਸ ਤੋਂ ਬਿਨਾਂ ਲਗਭਗ 3100 ਖਿਡਾਰੀਆਂ ਤੋਂ ਵੱਖ-ਵੱਖ ਅਖਾੜਿਆਂ ਵਿਚ ਜਾ ਕੇ ਅੰਕੜੇ ਇਕੱਤਰ ਕੀਤੇ ਗਏ। ਸਿਹਤ ਅਤੇ ਤੰਦਰੁਸਤੀ ਦੇ ਪੱਖਾਂ ਤੋਂ ਮੁੰਡਿਆਂ ਅਤੇ ਕੁੜੀਆਂ ਦੇ ਅੰਕੜਿਆਂ ਨੇ ਵੱਖ-ਵੱਖ ਭਾਗਾਂ ਵਿਚ ਕੀਤੇ ਗਏ ਸਿਹਤ ਅਤੇ ਤੰਦਰੁਸਤੀ ਮੁਖੀ ਟੈਸਟਾਂ ਰਾਹੀਂ ਇਸ ਚੀਜ਼ ਨੂੰ ਸਥਾਪਿਤ ਕੀਤਾ ਕਿ ਮੁੰਡਿਆਂ ਅਤੇ ਕੁੜੀਆਂ ਵਿਚ ਵੱਖ-ਵੱਖ ਉਮਰ ਵਰਗਾਂ (8 ਤੋਂ 14 ਸਾਲ, 14 ਤੋਂ 18 ਸਾਲ, 18 ਤੋਂ 25 ਸਾਲ) ਅਨੁਸਾਰ ਕੀਤੇ ਜਾਂਦੇ ਪ੍ਰਦਰਸ਼ਨ ਵਿਚ ਮੁੰਡਿਆਂ ਦੇ ਪ੍ਰਦਰਸਨ ਵਿਚ ਉਮਰ ਵਰਗਾਂ ਅਨੁਸਾਰ ਵੱਖ-ਵੱਖ ਆਉਣਾ ਸੰਭਵ ਸੀ ਪਰੰਤੂ ਇਹ ਭਿੰਨਤਾ ਬਹੁਤ ਜ਼ਿਆਦਾ ਪਾਈ ਗਈ ਇਵੇਂ ਵੀ ਵੱਖ-ਵੱਖ ਉਮਰ ਵਰਗਾਂ (8 ਤੋਂ 14 ਸਾਲ, 14 ਤੋਂ 18 ਸਾਲ, 18 ਤੋਂ 25 ਸਾਲ) ਵਿਚ ਕੁੜੀਆਂ ਦੇ ਪ੍ਰਦਰਸ਼ਨ ਕਲਾ ਵਿਚ ਵੀ ਭਿੰਨਤਾ ਸੀ ਪਰੰਤੂ ਮੁੰਡਿਆਂ ਦੇ ਮੁਕਾਬਲੇ ਵਿਚ ਇਹ ਭਿੰਨਤਾ ਕੁੜੀਆਂ ਦੇ ਆਪਸੀ ਉਮਰ ਵਰਗਾਂ (8 ਤੋਂ 14 ਸਾਲ, 14 ਤੋਂ 18 ਸਾਲ, 18 ਤੋਂ 25 ਸਾਲ) ਵਿਚ ਘੱਟ ਸੀ, ਅਤੇ ਕੁੱਲ ਮਿਲਾ ਕੇ ਇਹ ਪ੍ਰਦਰਸ਼ਨ ਅੰਕੜਿਆਂ ਮੁਤਾਬਿਕ ਉਚ ਪੱਧਰ ਦਾ ਨਹੀਂ ਗਿਣਿਆ ਜਾ ਸਕਦਾ। ਸਮਾਜਿਕ ਸਭਿਆਚਾਰਕ ਪੱਖਾਂ ਤੋਂ ਇਕੱਤਰ ਕੀਤੇ ਗਏ ਅੰਕੜਿਆਂ ਮੁਤਾਬਿਕ ਇਹ ਤੱਥ ਸਾਹਮਣੇ ਆਏ ਹਨ ਕਿ ਗਰੀਬ ਪਰਿਵਾਰਾਂ ਦੇ ਬੱਚੇ ਜ਼ਿਆਦਾ ਗੱਤਕੇ ਖੇਡਦੇ ਹਨ ਇਹ ਗਰੀਬ ਪਰਿਵਾਰ ਜਾਤੀ ਤੌਰ `ਤੇ ਨੀਵੀਂ ਜਾਤੀ ਨਾਲ ਸੰਬੰਧ ਰੱਖਦੇ ਹਨ ਅਤੇ ਧਾਰਮਿਕ ਤੌਰ ਤੇ ਵੀ ਕੱਟੜ ਹਨ। ਅੰਕੜਿਆਂ ਮੁਤਾਬਿਕ ਇਹ ਤੱਥ ਵੀ ਸਾਹਮਣੇ ਆਏ ਹਨ ਕਿ ਜਿਹੜੇ ਖਿਡਾਰੀ ਉਚੀ ਜਾਤੀ ਨਾਲ ਸੰਬੰਧ ਰੱਖਦੇ ਹਨ, ਗੱਤਕਾ ਖੇਡਦੇ ਹਨ ਉਨ੍ਹਾਂ ਦੀ ਆਰਥਿਕ ਹਾਲਤ ਕੋਈ

ਬਹੁਤੀ ਵਧੀਆਂ ਨਹੀਂ ਸਗੋਂ ਕਈ ਖਿਡਾਰੀਆਂ ਦੀ ਆਰਥਿਕ ਹਾਲਤ ਨੀਵੀਂ ਜਾਤੀ ਵਾਲੇ ਖਿਡਾਰੀਆਂ ਤੋਂ ਵੀ ਮਾੜੀ ਹੈ।

ਅੰਤ ਵਿਚ ਇਸ ਅਧਿਐਨ ਵਿਚ ਇਹ ਸਿੱਟਾ ਨਿਕਲਿਆ ਹੈ ਕਿ ਗੱਤਕਾ ਖਿਡਾਰੀਆਂ ਦੀ ਸਿਹਤ ਅਤੇ ਤੰਦਰੁਸਤੀ ਉਪਰ ਉਨ੍ਹਾਂ ਦੇ ਸਭਿਆਚਾਰ ਅਤੇ ਸਮਾਜ ਦਾ ਪੂਰਾ ਪ੍ਰਭਾਵ ਹੈ। ਇਸ ਲਈ ਉਹ ਗੱਤਕੇ ਨੂੰ ਧਾਰਮਿਕ ਖੇਡ ਸਮਝਦੇ ਹੋਏ ਇਸ ਦੀ ਹਰ ਪੱਖ ਤੋਂ ਮਾਨਤਾ ਅਤੇ ਪਵਿੱਤਰਤਾ ਨੂੰ ਕਾਇਮ ਰੱਖਣ ਦੇ ਨਾਲ ਖੇਡਣਾ ਪਸੰਦ ਕਰਦੇ ਹਨ।

DECLARATION

I, **Maninder Jeet Singh** certify that the work embodied in this Ph. D. thesis is my own bonafide work carried out by me under the supervision of **Professor (Dr.) Paramvir Singh** from **2012** to **2017** at Department of sports science Punjabi University, Patiala. The matter embodied in this Ph. D. thesis has not been submitted for the award of any other degree/diploma.

I declare that I have faithfully acknowledged, given credit to and referred to the research workers wherever their works have been cited in the text and the body of the thesis. I further certify that I have not will fully lifted up some other's work, para, text, data, results, etc. reported in the journals, books, magazines, reports, dissertations, theses, etc., or available at web-sites and included them in this Ph. D. thesis and cited as my own work. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the University.

Maninderjeet Singh

Date: 3/5/2018...

Signature of the candidate

Place: Patiala

(Maninder Jeet Singh)

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Supervisor's signature,

Paramvir Singh

(Name & Designation)
(Dr.) Paramvir Singh
Professor
Department of Sports Science
Punjabi University, Patiala

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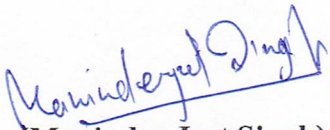

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