A COMPARATIVE STUDY OF TRAINING EFFECT ON SELECTED BODY COMPOSITION MOTOR PERFORMANCE SOCCER SKILL AND PLAYING ABILITY AMONG THREE DIFFERENT AGE GROUPS OF MALE SOCCERS

BY

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The Thesis is dedicated

To

those working tirelessly for the betterment

of Health, fitness, sports training

and

social Adjustment of the people

And

To the Members of my beloved family.

DECLARATION

I do hereby declare that the research work entitled “A COMPARATIVE STUDY OF TRAINING EFFECT ON SELECTED BODY COMPOSITION MOTOR PERFORMANCE SOCCER SKILL AND PLAYING ABILITY AMONG THREE DIFFERENT AGE GROUPS OF MALE SOCCERS” is an original work done by me under the supervision of Dr. ASISH PAUL Associate Professor, Jadavpur University which was approved by the research committee.

To the best of my knowledge, this thesis is not substantially the same as those, which have already been submitted for a degree or other academic qualification at any other universities.

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"A COMPARATIVE STUDY OF TRAINING EFFECT ON SELECTED BODY COMPOSITION MOTOR PERFORMANCE SOCCER SKILL AND PLAYING ABILITY AMONG THREE DIFFERENT AGE GROUPS OF MALE SOCCERS "

Submitted by me for the award of the Degree of Doctor of Philosophy in arts at Jadavpur University is based upon my work carried out under the Supervision of Dr. Asish Paul, Associate Professor, Dept. of Physical Education, Jadavpur University and that neither this thesis nor any part of it has been submitted before for any degree or diploma anywhere.

Countersigned by the

Supervisor: Candidates:

Dated : Dated:

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INTRODUCTION

In this chapter the general introduction, statement of the problem, objectives of the study, delimitations, limitations, hypothesis, definition and explanation of terms and significance of the present study have been described.

1.1 General Introduction

1.1.1 General history and development of soccer

Games and Sports as a part of human education have always existed in the human society. Before the dawn of civilization and culture, physical exercise was the important aspect of human existence. In the primitive societies, the "necessity for survival" motivated man to keep himself more physically fit and strong enough in comparison with stronger forces for nature.[35] Soccer is a game which calls for strenuous, continuous thrilling action and therefore, appeals to the youth the world over. The skills involved in the game are simple, natural and yet are highly stimulating and satisfying to anyone who participates in the game. The skills include kicking, running, jumping, throwing, dodging and so on.[33]Sport is a many sided social phenomenon which under social condition has general cultural, ideological, aesthetic, pedagogical and economic significance. Hence, the reasons of an all-measuring attention to sport in a society become understandable.[12]

Soccer as it is seen today has undergone a tremendous improvement since its birth of all the events in human history. The one to attract the largest audience was neither a great political occasion nor a special celebration of some complex achievement in the art or science, but the simple ball game a soccer match. If we examine it more carefully we would soon realize, that each soccer match is a symbolic event of some complexity. One of the greatest strengths of the game is its simplicity. At its crudest form all it needs is a ball and an open space with something to act as a goal post. No other sport is so easily available and so immediately inspiring.[13]

Football games have the main goal, namely to win the game by scoring as many goals as possible to the opponent's goal and trying to maintain the goal so as not to concede the ball from the opponent's attack. Soccer is a highly demanding game in which the participants are subjected to numerous actions that require overall strength and power production, speed, agility, balance, stability, flexibility, and the adequate level of endurance. Football sport has undergone many changes and developments from a simple form to become a popular soccer game that is liked and loved by the public.[102]

Association football, commonly known as football soccer, is a team sport played between two teams of 11 players each. It is widely considered to be the most popular sport in the world. Football is a ball game played on a rectangular grass or artificial turf field, with a goal at each of the short ends. The objective of the game is to score by maneuvering the ball in to the opposing goal. In general play, the goalkeeper is the only player allowed to use the in hands or arms to propel the ball; the rest of the team usually use their feet to kick the ball into position, while they may also occasionally use their torso or head to intercept a ball in midair. The team that scores the most goals by the end of the match wins. If the score is tied at the end of the game, either a draw is declared or the game goes in to extra time and or a penalty shootout, depending on the format of the competition. Soccer (also known as football) is the world's most popular form of sport, being played in every nation without exception. Football may be played competitively or for fun, as a career, a means of keeping fit or simply a recreational pursuit.[48,51]

Soccer has a rich history though it was formalized as we know it today by the establishment of the Football Association in 1863. The game soon spread to continental European countries and later to South America and the other continents. The world's governing body, Federation International de Football Association (FIFA), was set up in 1904.[51]

Football was introduced in India by the British. Being a simple and inexpensive game, it became popular among the masses. India took part in the Olympic Games held in 1948 in England. India played in the Semi- Final in the 1956 in Olympics. India had, in fact, already made her marks as the greatest power in Asia by winning the title at the first Asian Games held in Delhi in 1951.[21]

Soccer is often called the “Universal Game”. What hockey is to India, soccer is to the rest of the world. It is difficult to determine how many millions of people play the game, but it is estimated that the number of fans may reach over 800 millions in many parts of the world, crowds of 1,00,000 or more at a single match are not uncommon. In Brazil, a stadium built solely for Soccer games Seats 2,00,000 spectators. The game is played in more than 180 nations and enjoys a long history.[12]

The true origin of the game of soccer is shrouded in mystery. Many countries claim that this game has been played in their countries from very ancient times in same for another. There is evidence that football game was played in both Babylon and Egypt. But we know very well how it began in the late nineteenth century. The various English public schools, all playing their own different codes, eventually formulated a unified set of rules, splitting with the handling devotees who went on to for rugby. But speculation on the origin of the game can be protracted indefinitely. The modern game was modified in England following the formation of the football Association, where 1863 Laws of the game created the foundations for the way of sport is played today. Football is governed internationally by the Federation, namely International de football Association (International Federation of Association Football), which is commonly known by the acronym FIFA. The most widely viewed and famous in the world, boasts, an audience twice that of the Summer Olympics.[28]

When Edward II was the king, Football was popular in London, but unpopular with merchants, whose windows were broken, and with parents of some who were hurt, playing the game. It was primitive, rough and almost a brutal game and in1314 things were so bad, that Edward II forbade its being played. Tremendous popularity among the people kept the game alive and it survived the edicts of a series of kings and queens and remained the favorite sport of both the people and soldiers of England. From the beginning of the 17th century several new types of football games were played which were not as rough as the original game and these developed into rugby and at about1870 association football which is also known as soccer came into picture.[28]

Soccer, the most attractive and popular game in the world is certainly not a sort of fashionable sport which come today and gone tomorrow. It has been played in some form or the other for centuries “TUSCHU”, a game similar to soccer was played in china as far back as the 3rd and 4th century B.C. Modern soccer, however, has evolved

from England; where one of the earliest references to the game was a royal proclamation, beginning the game in the city of London in 1314. The game was standardized in 1863. With the formation of football association and the present concept of eleven players to a team was arrived at in1870.[38]

The modern game of football emerged in England, in its primitive form it had undoubtedly been played for centuries. The game began in England in the 12th century but Edward III is banned it in 1324. His successor Edward III in 1349, Richard II in 1389 and Hennry IV in 1401, as also, the Scottish rulers forbade people from playing football. The monarchs could not stop the interest of people and started taking a lenient view and football became popular at least in the public schools. Here were no definite rules of the same, each team played with its own.[21]

1.1.2 Techniques

Modern Soccer is a vigorous Fast game requiring accelerating sprint, rough tackling's, power in kicking and endurance to sustain skillful play for 90 minutes.[164]

The techniques that must be mastered in football included: (1) ball-kicking technique (passing),(2) ball technique (controlling),(3) dribbling technique,(4) heading technique,(5) ball recognition and mastery techniques using instinct or feeling (ball feeling), (6) technique of kicking the ball towards goal (shooting),(7) the technique of deceit with the ball (feinting), (8) guard technique (goal keeping).So, soccer is a game that is done by kicking a ball by a player, with a goal and aiming to put the ball into the opponent's goal. To play Football well, each player must master some basic techniques in playing Soccer, such as herding, feeding, controlling the ball (stopping), shooting, heading, grabbing the ball and goalkeeping techniques. Football dribbling can be done with the back of the inner leg, dribbling with the back of the foot and dribbling with the inner back of the foot. Basic techniques or skills in soccer games: (a) passing (kicking ball technique), (b) stopping (the technique of stopping and controlling the ball), (c) dribbling (a dribbling technique). A soccer player is required to have a good mastery of basic techniques because this is the main requirement to become a qualified and highly skilled player in soccer games. Passing is part of the kicking technique. In football, passing is the most widely used technique. A player who does not master the passing technique well, the player will not be a good player, and a good team is a team that all

players master the ball passing technique well. Based on usability or function, there are several kinds of kicks, including (a) giving feedback to friends (passing), (b) to shoot the ball towards the opponent's goal, to make a winning goal, (c) to clear or sweep the ball to the area direct forward defense, usually done by defender, (d) to do various kicks. An important aspect of improving the ability is to conduct coaching and training, especially in improving football achievement.[102]

The shoot into the goal is one of the technical skills required to score during the competition and is related to the technique of kicking and improves the likelihood of scoring and winning a match when performed with a proper kick technique. The opponent has more chance to shoot more in the goal, and the team has the opportunity to score more goals and win the match.[104]

Soccer players perform activities in which different energy systems are used such as dribbling, intervention by sliding, head shoots and tackles during the games.[150]

1.1.3 Anthropometry and Body Composition characteristics of Soccer

Anthropometric and body composition (BC) indicators are important factors affecting the specific attributes of today's soccer players.[111] Together with motor coordination and physical performance measures, they have been shown to discriminate between successful and less successful youth players.[82] Generally, soccer players who are taller, heavier, more muscular, and have more active mass and less fat mass may have major advantages, especially during growth and maturation. Continuous long-term monitoring of anthropometric parameters and BC should be performed. Moreover, it is necessary to consider sensitive periods for the development of physical abilities during ontogenesis and optimize training processes and eating habits accordingly. Biological variability in anthropometric and morphological parameters appears during ontogenesis.[107,110] The variability in anthropometric indicators and BC parameters during this period can be used to identify an elite player at an adolescent age.[119] It has been reported that soccer players with increased body size dimensions have improved speed, power, and strength performance, especially during the pubertal years.[73] Conversely, several longitudinal observation studies of adolescent soccer players have shown high consistency in anthropometric measures, sprint speed, explosive leg power, Isokinetic strength, and maximal aerobic speed among players,[71,79] and in motor

performance among players at different positions, with the exception of goalkeepers.[72] Anthropometric and morphological markers are also related to morphological asymmetries, as observed in athletes participating in asymmetric sport disciplines like tennis associated with asymmetrical changes in soft tissues.[81] When unilateral load (or a preferred limb) is involved in sport-specific movement, the limb becomes preferred by neural-motor patterns, resulting in different kinds of morphological and strength asymmetries.[114]

1.1.4 Motor fitness

Motor fitness is a more limited phase of physical fitness. Motor fitness may be defined as a readiness or preparedness for performance with special regard for big muscle activity without undue fatigue. It concerns the capacity to move the body efficiently with force over a reasonable range of time. Motor fitness does not assess the factors of physical fitness directly but does reflect them to a degree. Motor fitness is gauged by performance and this performance is based on a composite of many factors. These factors are - strength, endurance, speed, power, agility, flexibility, balance etc. Motor performance is very much related with to body composition. Difference in performance between male and female can be partially explained by the greater percentage of fat contained in the female body. Physically active people possess considerably less total body fat than their active contemporaries.[20]

Soccer players needs a very high level of fitness to play and avoid injuries, reveals that the soccer game is extremely challenging and players has to perform variety of skills during the play and needs speed, strength, agility, quickness and etc. mentions that the plyometric movement, in which a muscle is loaded and then contracted in rapid sequence, use the strength, and innervations of muscles and surroundings tissue to jump higher and run faster, depending on the desired training goals.[69,116]

The development of the soccer game systems causes the game to be played faster and more energy is spent. Therefore, this change has made the features required in athletes more comprehensive. In the selection of the player, considering the relationship of the candidate with the ball, it should not be enough, but it must have the characteristics of speed and explosive power.[106]

Although speed includes genetic characteristics, it is closely related with strength. The versatile strength plays a major role in increasing speed. As the increase in speed is related to acceleration, this can be achieved by increasing the driving forces. [41,46]

In soccer, speed should be considered in two ways, symmetrical speed is great importance especially for wingers, but soccer needs both symmetric and asymmetric speed due to its feature. It is possible to talk about a strong anaerobic capacity for an athlete with a symmetrical speed, but for an athlete with an asymmetrical speed, both the anaerobic power and the superiority of the quickness and change of direction abilities occur.[2]

Muscular power, often referred to as explosive power, is a combination of speed and strength an important in vigorous performance because it determines how hard a person can hit, jump and push etc. There are various means and method to increase power by increasing strength without sacrificing speed, by increasing speed of movement without sacrificing strength and by increasing both can be stressed by applying strong force through rapid motion. [125]

Agility is the ability to change the direction of body or its parts rapidly" is dependent on strength, reaction time, speed of movement and muscular coordination. Quick start and stops and quick changes in direction are fundamental to good performance in Football. [125]

Running speed is not only an athletic event itself, but it is an important factor in almost all court and field games it can result the difference in whether a performer is able to gain an advantage over his/her opponent. It is determined by the length and frequency (speed) of strides and mostly dependent upon speed of muscular and neuromuscular coordination.[125]

Soccer players must combine speed, strength, agility, power, and endurance as basic qualities before the individual skills inherent to the playing of soccer can be utilized. The understanding of the physical and the mental demands of the sport will enable a more scientific approach to the training of soccer players than has been prevalent heretofore.[39]

Soccer is the most natural and popular game throughout the world. It is a unique sport where the leg eye combination which is the most difficult one is used for play. Here a player has to keep his balance on one foot, watch his opponents and play with his own leg without any extra equipment like a racket, bat or stick. The most important variables for measuring performance in soccer are physical condition, technical skills and tactical performance.[143]

1.1.5 Soccer skill

Soccer at the professional level of play is arguably the world's leading team sport, performed by men and women, children and adults with different level of expertise. The relative age effect is a focus of discussion in youth soccer.[113] In many youth sports, size in itself may be a significant factor affecting success at young age levels where strength, speed and power are often at a premium, in turn bringing successful players to the attention of coaches and trainers. Those successful at young ages, in turn, may have an enhanced opportunity for special attention for example, selection for select teams, better coaching and soon. Soccer is a long-term development and late specialization sport. [159] US Soccer uses player development structure, giving broad direction to soccer environments while impacting the development of youth players. These are divided in three part bellow:

a) Zone one (U-6 to U-12) has a technical emphasis that is accomplished by focusing on player development versus match outcome. The intent is for coaches, administrators and parents of the players to spotlight the process of playing the game, rather than the score. The measurement of success in Zone one is the players' improvement of ball skills, understanding of the rules of the game, playing fairly and learning general game principles.

b) Zone two (U-14 to U-17) emphasis on the club culture and daily training atmosphere. There must be more training sessions and fewer matches so the players can learn the details of tactics, team formations and game strategies. Matches should be fewer in number and of an appropriate level of competition.

c) Zone three ($U\text{-}17^{+}$) takes the player toward professional player development. This development will occur in college, semi-pro and professional and youth national teams. This is the age to focus on the outcome of the match as well as the quality of performance.[95]

Prior to a player being expected to learn ball skills the child must first be in control of the body. This growth in athleticism is a long-term evolution. It is imperative for children to acquire a base of general balance, coordination and agility before soccer skills.[9] Essentially, the foundation of movement education must be laid during childhood. This requirement is of primary importance to the youngest players, making ball skills secondary in importance. For some important reason, we shall express about that why should be taught techniques before 14 years old. For giving correct explanation about this question, we have to consider important components of training and leaning process in soccer players under 14 years old. Furthermore, their skills and game understanding became more sophisticated [37].

Nevertheless, scientists are unsure of the precise effects that growth and development have on performance and whether it is influenced by sustained periods of sport-specific training. Intuitively, a combination of growth and training would be expected to optimize performance but there are limited data on this aspect of youth soccer. In order to perform at the highest level, players have to spend many hours in deliberate, purposeful practice with the specific intention of improving performance.[113]

Although practice on its own does not guarantee success, there is no substitute for earnest endeavor in the pursuit of excellence. Some players may be more genetically predisposed to benefit from practice effects, but no players have reached the elite level without a significant commitment to the process of refining and developing their soccer skills. It has seen that those who are recruited by Premier League Academies in England at 16 years of age typically started playing the game at 6 years of age and over the next 10years devoted an average of 15 hours per week, 700 hours per year (over 7,000 hours in total) to practice activities related to soccer. It is likely that at least 10,000 hours of practice are required before these players are ready for their debut in the first team. The academy players also considered practice, along with the motivation to succeed, to be the most important factors in becoming an elite player, whereas, in contrast, less skilled players considered skill and teamwork to be the key factors underpinning success.[135]

Sport skills require specific motor patterns and a child should be exposed to a wide range of movement experiences early in life. Balance, center of gravity, length

of limbs, body mass, and gross and fine motor control all play a part in a child's ability to move effectively. Within the same age group, some are shorter or taller than others, some have better balance, and others fall down quite often. As a result, we cannot pass false judgment on a child whose development is a little slower than the rest of the team. .[136,122]

Activities should be designed in which players are provided the opportunity to practice a wide range of loco motor movements (running, skipping, hoping, galloping, leaping, etc.), no loco motor movements (bending, pulling, twisting, pushing, etc.) and other movement components such as balance, change of direction, strength, and cardiovascular endurance. Although, most young children from ages 5to8 like to run, jump, roll, climb, skip, fall down and shout while involved in play. All this makes a strong case for them to play soccer. This behavior should be considered when adults set up a playing environment. Activities should fit the developmental levels of the children. Avoid the opposite approach of having the children fit the activities. If an activity does not fit the needs of the child, the child will show either frustration if it is too difficult or boredom if it is too easy. .[136,122]

Finally we should mention, soccer is natural for young children because soccer players experience body awareness and they use various body parts. How they use balance, agility, coordination, vision and social interaction can determine how they develop physical and social skills. As players get older, their development (i.e. psychomotor, cognitive and psychosocial) levels mature. This growth allows coaches to create more complexities in the training environment. For example, under-6 players must each have a ball; under-8players should use one ball in pairs; under-10 can share one ball among four players and one ball for eight players is appropriate for under-12.[136,122]

1.1.6 Playing ability

Soccer has been played for a very long time. The game is unique because primarily feet are used to play the game. This requires far more skill and coordination than most other sports where hands are used. Soccer is not only the most played sport in the world but also the most watched. Again this is due to the excitement and high skill levels of football. The game is always open and any team can regain possession

and attack at any stage. Soccer has had many opponents in its history, mainly coaches and journalists of other sports who have become jealous of footballs popularity. However football continues to grow and dominate the sporting landscape. [43]

The game of football is full of challenges and counter-challenges between the contesting teams. Many unforeseen situations evolve during the game. Preplanned moves do, of course, occur but each situation calls for a new approach. As a consequence, players, the most important factor of football are influence by the stress of competiveness in each conflicting situation. Performance of a team depends on the talents of the individual players and the understanding between the teammates and above all the attitude of players towards the interest of the team. Opinion on coaching and methods of play may differ, but there should be not much difference about the qualities of a successful player. Good football mainly depends on the quality of players.[43]

1.1.7 Training

Effective training requires a structured approach to plan the variation in training load albeit across relatively short time periods in soccer. The recognition of a number of key principles when planning facilitates the adaptive process. As the improvement in performance is a direct result of the quantity and quality of work completed, a gradual increase in the training load is required to underpin an increase in the body's capacity to do work. The progression of load is obtained through subtle changes in factors such as volume (the total quantity of the activity performed), intensity (the qualitative component of the exercise) and the frequency (the number of sessions in a period of time-balance between exercise and recovery) of training.[6]

The approach to such progressions in training should ideally be individualized as each athlete will be unique in their current ability and their potential to improve. Such individualization is frequently ignored in team sports such as soccer where the training prescription is often focused on the group. Specificity is widely identified as a choice of drill may be dependent on the philosophy of the manager as much as the conditioning staff of particular interest in the development of a global method of training is the utilization of small-sided games (SSG) as a means of training physical and technical parameters. In using SSG, coaches have the opportunity to maximize their

contact time with players, increase the efficiency of training, and subsequently reduce the total training time because of their multifunctional nature.[78]

Training helps to develop the strength, endurance as well as skills, and become more effective when given to young players.[67,68,103,139,154] Sports training is a scientifically based and pedagogically organized process which through planned and systematic, effect on performance ability and performance readiness aim at sports perfection and performance improvement as well as at the contest in sports competition. A review of literature on soccer conditioning method showed that, there are many different schools of thought on the subject and variety of methods for achieving fitness. Soccer demand stamina, players have to keep going for whole match, frequently sprinting both with and without the ball. The physiologist calls the ability to keep going at a moderate pace as Aerobic exercise. The player's replaces any oxygen used does as he or she working on a pay-as-you to bases.[55]

New training methods are arising all the time. Every coach needs to make use of these modern trends, relating them, of course, to the existing possibilities to the circumstances and conditions in which he works. New training methods should never be applied uncritically, and care should be taken to introduce them gradually, however effective they may appear to be. In the course of several years of training a process of adaptability develops within the players, with in their system.

To play to his fullest ability, a player must be prepared both mentally and physically to give his best effort throughout the match. This is as true of the professionals playing ninety minutes, as it is of school boys playing short duration matches. To be able to perform like this, a player must develop his fitness through intensive training. A fit player (technically and tactically) can delay the onset of fatigue during a match training session and will therefore, perform better.[19]

Training is an essential part of preparing for sports competition. If training for soccer is to be effective it must be related to the demands of the game. Fitness for the sport assumes that the player is capable of meeting these demands; otherwise he or she may not be able to cope with the physiological stress of match-play. In this instance the player has to raise fitness levels or risk not being selected.[156]

The knowledge of any field of endeavor does not remain stagnant. Perhaps, next to the fields of medicine and space exploration, maximum research is being done in the field of sports. The game of football has not been excluded from this effort. Techniques and tactics of the game of Football have changed over the years and newer methods of motor fitness development have been evolved. All these developments have resulted in a change in the opinions and interpretations of the game as they are highly influenced by the philosophies of the coaches and success of their teams. All these changes probably are the clues to make the game of football more competitive and attractive. [169]

Now-a-days coaches plan their practice session as per the need of the players and the team. There are many strategies and practices for developing effective training programmes. Even the handling of the practice session, especially with respect to the playing condition of the team also varies depending upon the philosophy of the coaches.[169]

Regular exercise helps to increase the overall quality of life. Playing sports acts as a beautiful blend of recreation and physical activity. It is a combination of both enjoyment and exercise.[165]

The field of physical education and sports is an international discipline. They develop international understanding and universal brotherhood in the present politically conflicting lives. Sports movements are considered as one of the major adhesive forces for developing world peace. It may also as one of the effective means in solidifying national integration and developing national character. Sports has become the media of international relationship between the countries. [23]

Sports performance is the sum of numerous factors which can vary from individual to individual. A few centimeters and fraction of seconds decide the record performances, victories or defeats in tough international competitions. It is very important to identify and fully mobilize each individual potential. [23]

The increase of popularity and importance are not only due to the fact that performance sports are glamorous and spectacular to watch. Sports perform multifarious functions for the human society in modern age. In fact it entered a new horizon of sporting culture, leading to the emergence of sports sciences as the back

bone of the performance sports. This brought into the sharp focus of the training system as the means of development of sports performance. Scientific knowledge has revolutionized the standard of performance in sports disciplines. Now the coaches are striving to get optimum performance with minimum expenditure of energy and time, the players and athletes are trained on scientific guidelines.[23]

In India there is no system in place to identify and train children at a tender age. There are no infrastructure in place for promoting football. In Europe, football clubs got nurseries for nurturing talent. Here, even big clubs have no such facilities. Tournaments for children in the country are not organized in a proper manner. Many of the participants fudge their age. There are no stringent rules to stop these kinds of practices. Absence of people with proper knowledge of Soccer at the helm organizations is also a cause for the decline of the game in the country.[166]

Plyometric training involves a repeated series of exercise work bouts intercepted with rest / relief periods. Moreover, due to the discontinuous nature of this form of training the exercise intensity and the total amount of works performed can be greater than that of continuous training. Plyometric training protocol is very beneficial in enhancing speed, anaerobic endurance, and aerobic endurance. Furthermore, the plyometric training prescription may be modified in terms of intensity, and duration of the exercise interval and the number of repetitions, blocks of sets per workout. Resistance training appropriate program and perfect design training is essential to maximize the benefits associated with resistance training.[105] Plyometric exercises exploits the stretch shortening cycle shown to enhance the performance of the concentric phase of movement[86] and increases power out-put.[57,130] Muscular strength is an important variable of health related fitness and the amount of force that a muscle can exert and it is vital fitness component in performing motor skills.[54] Resistance training program planned mostly to improve muscular strength and endurance through increased workload demand and includes variety of body weight exercises, free and machine weights, elastic tubing/stretch bands, and hydraulic machines.[153] Resistance training is valuable for all athletes and significant for enhancing performance. Athlete's upper body strength is dynamic and part of the training protocol for the following sports i.e., cricketers, basketball players, boxers, baseball players, wrestlers, judo players, etc.[61] Comparable gains of maximal strength is testified with traditional strength

training and plyometric training, moreover, concluding approach appears to induce greater gains in muscle power.[116] Resistance training improves athletic performance in various sports and maintains quality of life. Moreover, maximum range of motion is required in resistance training since muscle over load happens only at the specific joint angles where the muscles worked.[66] Resistance training benefits as the driving force for a healthy life and is the key reason for improving athletic performance in various sports.[66] Resistance training improves quality of life.[85]Resistance training is an imperative component of exercise protocol with the main aim to improve physical fitness for health or athletic performance.[85] Plyometric training provides significant training stimulus and has shown evidence to improve explosive actions in athletes.[98] This was stated by one of the scholars that coaches, strength, and conditioning professionals should devote additional time for plyometric training in elite male handball players during the season to improve physical performance.[93] Resistance training program plays an important role for improving muscle strength and hypertrophy.[88]

Twelve weeks program duration with three sessions and reveals that arm strength increases due to resistance training programme.[8] In earlier study it was investigated and finds improvements in muscle strength and endurance after resistance training in healthy male-college students.[96] Progressive associations been stated between strength, power and enhanced quality of life and lower risk related to fractures, reduced morbidity, and mortality,[61,152] reveals in his study that the influence of different intensity of resistance training had shown improved performance among the participants with regard to the selected fitness variables i.e. strength, anaerobic power and explosive power.

In this regard, several studies examined the relationship between measures of training load, anthropometry, body composition, and/or physical fitness in elite adult soccer players over the course of a soccer season.[115] Findings from these studies indicate significant variations in body composition and physical fitness according to the demands of the respective training period. Further, significant associations were reported between individual match playing time and changes in physical fitness.[149]

Moreover, there is currently no scientific data published on day-to-day

training variations, anthropometrics, body composition, and physical fitness at distinct time points over the course of a soccer season in (female) elite young soccer. Thus, a prospective cohort study was designed (i) to describe and evaluate variations in training volume and types, anthropometrics, body composition, and physical fitness over the course of an entire soccer season (e.g., preparation, competition, and transition period) and (ii) to compute respective associations in female elite young soccer players. In accordance with the relevant literature. [123,149] It has hypothesized that (i) soccer training (and/or growth/maturation) contribute to variations in body composition and physical fitness during the soccer season according to the demands of the respective training period and (ii) the volume of different training types/individual match playing time is significantly associated with relative changes in the respective components of body composition and physical fitness in female young soccer players.

The annual training cycle of female elite young soccer players significantly varied in terms of volume and type according to the respective training period. This is in accordance with [128] who highlighted the training principle of periodization for physical preparation during the season. For instance, it has found that weekly training volume decreased from the preparation to the subsequent competition periods. This is in accordance with a previous study [123] who examined pre- and in-season training volumes and intensities in 44 professional Australian football players' aged 23±3 years. The authors reported that absolute training volume was significantly higher during the pre-season compared to in-season. Further, training volume relative to period duration significantly decreased from11to13h/week to 9–10h/week from the first to the second round of the season .In this regard,[101] observed that young athletes who participate in more hours of sports per week than number of age in years show an increase the risk of sustaining overuse injuries compared to athletes with lower training volumes.Thus, the reduction in training volume may decrease the risk of injurie during the competition periods.

Further, our statistical analyses indicated that the training types were specific for the different training periods. More specifically, endurance and resistance training volumes were particularly high during the preparation periods

(i.e., PP1, PP2) while sprint and tactical training volumes were particularly high during the competition periods (i.e., CP1, CP2). Moreover, sport-specific training volumes(i.e., technical training, tactical training, matches) were significantly higher compared to non-specific training volumes, but particularly during the competition period (64-68%vs.32-36%).This is in accordance with the literature[89,157] and indicates higher sport-specific training volumes during the competition periods to better prepare for the upcoming demands of the competition period.

1.1.8 Factors of Physical Fitness

Aspects such as experience, body composition, endurance, balance between anaerobic and aerobic power, among other factors, are of primary importance in development and evaluation of elite players.[128] An understanding of growth and maturation is important for any aspiring youth soccer coach.[77] From conception through to physical maturity, growth represents the dominant biological process of the first 20 years of life. Trainers and coaches should be aware of the individual characteristics of the adolescent growth spurt and the training load should also be individualized at this time.[91] Growth itself has a particular definition and although sometimes used interchangeably with development, growth is represented by an increase in size or quantity. For some reasons which are considering below, technical training should be taught before 14 years old.

After 14 years of age the rate of increase in weight slows. The maximum rate of weight gain of 20-25kg for boys occurs between 12 and 16 years of age whilst about 10kg is gained between 16 and 20 years of age. Some researchers have shown that increasing of weight can reduce the agility and speed in children.[92] Connection between physical and technical performance has been proved by some studies.[83,77]

Skeletal Improvement

Skeletal weight increases in parallel with height and weight growth curves from about 15percent of total weight in childhood.[91]

Flexibility

The flexibility scores of children are stable between 5 and 11 years and then increase dramatically to age14 after which values level off. These changes relate to anatomical changes in leg and trunk length through adolescence. Flexibility is important factor to learn techniques in soccer players. After14years old flexibility will be decreased and in the process of learning is effective.

It is clear that during growth and development, soccer performance improved as players grew stronger, faster and had more endurance.[91,92] Soccer is an aerobic-anaerobic activity with alternating phases of high loads such as sprinting, rapid changes of direction, jumping and sudden stopping, and, according to the criteria of structural complexity, it can be classified as a polistructural and complex sport activity.[151] Three important factors affecting performance in soccer are; each of the technical, tactical, and conditional aspects (motor and functional abilities: speed, explosive power, coordination, agility, precision and flexibility) can play a role in different proportions depending on the characteristics of the encountered. Conditional performance from these items is proportionally greater than 50%.[63,134]

The fact that today's soccer is played faster than the old one and the physical power never lose its importance in this pace and remains as one of the most important pieces of soccer reveals how important the training of players is in this direction. An international soccer player performs about 1350 activities containing 220 high-speed running during a game.[122] For this reason, the success in sports or the availability of the athlete as a whole depends entirely on the fitness and coordination abilities of the athlete, such as physical structure, technical, tactical.[117]

Soccer is the game requiring high level of fitness. It is one of those rare games which demands not only speed but agility, strength, power, and endurance along with skill. Training is essentially a preparation of the individual athlete so that he can with stand competition stress when he encounters and perform to maximum effectiveness. The soccer training process is partly designed to improve the capacities of individual players to ensure a capability to cope with the loads that competitive match play

involves. A high level of physical demand is required for match play, which involves kicking, short sprinting, throwing, catching, trapping etc. The activities of the game include short sprinting as well as casual recovery movements. As the players have to cover a big area in the ground during attack and defense therefore, the game demands for aerobic as well as anaerobic fitness.[134,42]

The role of fitness in football and its contribution in acquiring skills of football has been well emphasized. Different methods and means for developing various components have been well explained. The Load Dynamic process (manipulation of intensity and volume of load) has been described in clear terms. The degree to which players can translate techniques and tactics effectively during a game situation reflects true measure of an individual ability to play the game. Answers to technical problems, in receiving, dribbling, distribution of ball, proper movement and timings of run and mobility in elevating space and lot more information about the team formation and systems are special feature of the book. In modern concept of coaching, match observation and analysis are indispensable. The coaches are advised to read these chapters with great care.[59]

Several health- and skill-related components of physical fitness are essential prerequisites for successful performance in (youth) soccer. In fact, earlier studies identified that higher levels of aerobic endurance,[75,94,117]speed,[108,124] agility/change-of-direction speed,[108]strength and power are important determinants of superior soccer performance.[158] Several authors observed changes in these physical fitness components over a soccer season.[109, 114, 122]

Similarly, a study showed significant improvements over the season in terms of performances in the Y-balance test, the shuttle run test, the DJ performance index and in kicking velocity (6-28%). This somewhat unexpected finding could partly be explained by the specificity of the training types. Of note, the greatest performance changes occur if training follows the principle of training specificity.[65] From a practical point of view, it appears beneficial to include specific means (e.g., resistance training) in the future that focus on the development of leg muscle strength/power, sprint and change-of-direction performances. For instance, a number of studies,[87,129,133,144,146,162] already examined the effects of different resistance training programs (e.g., plyometric training) in young soccer

athletes and found significant improvements in strength, power, linear and/or change-of-direction speed following training. Another possible explanation for the observed inconsistent performance gains over the season could be that body mass status (i.e., body mass index) was inappropriate. In fact,[126] argued that physical fitness is related to the body mass index of female soccer players. It appears that the training stimuli during the competition periods provided sufficient overload for performance enhancements. Further, more in-depths analyses revealed that physical fitness changes occurred during the first round of the season only. This might indicate either less effective training stimuli or less optimal physical and/or psychological conditioning (e.g., imbalance between stress and recovery) during the second round of season,[127] found moderate to large decrements in perceptions of well-being (e.g., motivation, sleep quality, appetite, fatigue) and several physical fitness tests (e.g., 30 m sprint) in English elite young soccer players aged 17±1 years as the soccer season progressed.

Only a few studies examined associations between variations in seasonal training data, match playing time, and changes in anthropometry, body composition, and/ or physical fitness.[76,109,100,146] As one possible explanation, suggested that a non-linear relationship (e.g., U-shaped curve) between the dose of (i.e., workload) and response to training (i.e., changes in physical fitness) may have contributed to the inconsistent findings reported in the literature.[100]

Soccer players can and must work at improving their strength and power to play more effectively.[17]

The distance a particular player cover is greatly influenced by his specific function in a team, for some positions require more running than others. To play his fullest ability, a player must be prepared both physically and mentally to give his best efforts throughout the game.[18]

It enables than to maintain optimum space and tempo during competition. Technical skill and tactical efficiency in long duration events are greatly affected by their endurance to enable them alert and active during competition, thus avoiding possible injuries and serving as bases for tactical behavior.[24]

Speed, endurance, strength, in fact, even elasticity can be gauged with an absolute unit of measurement, but the establishment of the degree of skill is rather subjective.

Generally we say a sportsman is skilled who is capable of finding the most suitable movement or solution for a given situation, who can carry out necessary movement proficiently, economically and accurately.

Special skill, therefore, presupposes the quick perception of stimuli, rapidity of thought and action making the most economical use of all the methods of play and abilities at the players command first of all technique and tactics, and beyond those the various physical and mental capabilities.[1]

The sports science is still in its state of infancy and in the near future more sports science disciplines are likely to emerge. Some of these disciplines have already emerged, e.g., sports statistics, sports bio-chemistry, sports neurophysiology, sports cybernetics etc.[25]

Richard Schmidt, a motor learning and motor development expert, developed a schema theory (1975, 2000), which suggests that children up to age 14 should experience a wide range of movement in early life to aid in solving future movement challenges. It has been reported that "When people practice a number of specific throwing distances, they learn something that allows them to generalize this experience to the performance of many throwing distances".[148]

For the success of today's soccer, there is a great need for the speed and explosive strength of soccer players. The fact that the athlete is able to run faster than the ball and/or the ball without the ball eliminates the skill difference between the opponent and his superiority with his opponent. An athlete who can jump faster and higher than his opponent will get a significant advantage for the success of the movement. Although the physical inadequacy of the player may appear as an obstacle in the air shoots, it can move to advantageous position by acting with a superior speed and explosive strength before the opponent. [121,60,97]

Sporting achievements are the indicators of the volume of use full expenditures of the athlete's efforts for self-improvement, the measure of his success on this road.

The sporting achievements are conditioned by many factors reflecting man's success in perfecting his abilities and are one of the indicators of the development of culture of a society. As such, they are of considerable value both for a personality and a society.[136]

Soccer is a game of physical and mental challenges. One must execute skilled movements under generalized conditions of restricted space, limited time, physical and mental fatigue, and opposing players. One must be able to run several miles during a game, mostly at sprint like speed and respond quickly to a variety of rapidly changing situations during play. One needs a thorough understanding of individual, group and team tactics. One's ability to meet all these challenges determines how well One's performed on the soccer field.[32]

The average distance of soccer players during the match is 114m back, this distance is 803m, 668m, and this distance is 1066m.[155,64,74,137]Both before and after the half-repeated sprint tests to soccer players. It was observed that the sprint performances of the players showed a significant decrease compared to the first half before the second half ($p<0.05$).[122]In their sprint tests, a significant difference in sprint performance of athletes ($p<0.001$)with the number of repetitions have been determined that the sprint times increased.[163] Sprint performances decreased after the first half and at the end of the second half and after the periods of increased play intensity ($p<0.05$).[106]

During soccer games, many actions affect the result of games. These actions are characterized by intermittent and multi-directional movements, as well as the movements of changing intensity and time. Reilly and Ball (1984) [138] stated that each game typically involves about 1000 changes of activity by each individual in the course of play, and each change requires abrupt acceleration or deceleration of the body or an alteration in the direction of motion. Though India could not make a big mark at World level soccer excepting winning Asian Games once and participation in Olympics, the game is found to be so popular throughout the country and is being played at different age- levels, Schools, Colleges, Universities, Industrial Clubs, Defense Units, Public Sector Clubs, Professional Clubs etc. The Soccer in India is promoted by All India Football Federation, Association of Indian Universities, and School Games Federation of India etc. The competitions for sub-juniors, juniors and seniors in male and female sections are being organized by the All-India Football Federation. The competitions for

school level players of both boys and girls in various age groups are being organized by the School Games Federation of India and competitions for college and university male and female players are being conducted by Association of Indian Universities. Besides these competitions, the competitions are also being conducted by Public Sector undertakings and tournaments are also conducted by clubs. Indian Football teams are participating regularly Asian competitions and in other international tournaments. Coaches are trained in scientific lines by National Institute of Sports, Patiala and Indian coaches are also attending seminars and international courses regularly. Even Foreign coaches are hired for training Indian National Football teams and also to train Indian coaches. Despite all these efforts, the standard of Indian Football is not high enough to be compared with other Asian counterparts even, leaving aside elite Nations from European and South American continents. The reasons for such a condition are many. No scientific method is being followed to select the talents at various levels of competitions. No systematic scientific training is being carried out for young and talented players with long term planning. Sufficient number of rained coaches is not available with all clubs and as such the teams are not being trained with scientific planning. The Competition Season for Football is not clearly defined and fixed by the Agencies, which are promoting this sport game in India and this causes problems for the teams to be trained on scientific lines with proper training plans of different seasons. [138]

Research findings indicate that performance in Soccer is dependent on anthropometric parameters such as height, weight, leg length, body mass, physical fitness parameters such as strength, speed, explosive strength of lower extremities, speed endurance, endurance, flexibility and agility and psychological parameters such self-confidence, anxiety etc.

School, college, University level, and open Soccer players will be graduated into professional level club players and hence right type of talents are to be selected and trained at different level itself for raising the standard of Indian Soccer. In order to develop the standard of Soccer it is felt necessary to conduct a research study to identify the performance determining parameters of Soccer players playing in different positions so that right type of talents can be selected and scientific training can be given to develop the fitness and essential soccer skills with them. Hence under these

circumstances the present researcher has opted such area of research and has framed his title and designed the process of study.

1.2 Statement of the Problem

In the present study, the scholar wanted to investigate new scientific approach for boosting up performance of Football players. Therefore, he took up this comparative effect on body composition, motor performance, soccer skill and playing ability level, among categorized soccer's from different age groups participated in Hooghly district school leavel games .

According to the circumstances the problem was stated as **"A Comparative Study of Training Effect on Selected Body Composition Motor Performance Soccer Skill and Playing Ability among Three Different Age Groups of Male Soccers."**

1.3 Objectives of the study

1. To observe the effect of soccer training programmes on height and compare them among the three different age groups.
2. To observe the effect of soccer training Programme on weight and compare them among the three different age groups.
3. To observe the effect of training Programme on body fat % and compare them among the three different age groups.
4. To observe the effect of training Programme on strength and compare them among the three different age groups.
5. To observe the effect of training Programme on power and compare them among the three different age groups.
6. To observe the effect of training Programme on agility and compare them among the three different age groups.
7. To observe the effect of training Programme on speed and compare them among the three different age groups.

8. To observe the effect of training Programme on endurance and compare them among the three different age groups.

9. To observe the effect of training Programme on kicking power of right and left foot and compare them among the three different age groups.

10. To observe the effect of training Programme on Throw in power and compare them among the three different age groups.

11. To observe the effect of training Programme on shooting accuracy and compare them among the three different age groups.

12. To observe the effect of training Programme on dribbling ability and compare them among the three different age groups.

13. To observe the effect of training Programme on over all soccer playing ability and compare them among the three different age groups.

14. To find out the percentage of development of said different variables of three different age group and to find out that which group has the maximum development.

1.4 Delimitations of the study

The present study was delimited to the following conditions:

1. Only the male subjects were selected for the study.

2. The subjects of present study were 60 boys of three different age groups.

3. The study was delimited to the students residing in the district of Hooghly of West Bengal.

4. For body composition only fat percentage was considered.

5. For motor performance only five selected tests were considered.

6. For soccer skill some limited skills were considered.

1.5 Limitations of the study

The findings of the study were understood by considering the following limitations.

1. Small number of sample size was may be one of the limitations of the study.
2. Individual differences among the subjects and other factors such as life style, dietary habits and socio economic condition were not taken into consideration.
3. Insufficient sophisticated testing equipment and sophisticated equipment for exercises were also the limitations for the present study.
4. Only from the districts of Hooghly among 23 district of West Bengal the subject were considered.
5. The motivation, interest and the different psychological factors as the influential factor to perform best during test were beyond the control of the researcher.

1.6 Hypothesis of the study

The researcher after studied the review of the related literature formulated the null hypothesises for the present research study.

H_{01}: No significant differences will occur due to training on anthropometric measures among the three age groups soccer players of 14 yrs, 17yrs., and 19yrs.

H_{02}: No significant differences will occur due to the training on body fat % among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player.

H_{03}: No significant differences will occur due to training on motor performances among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player.

H_{04}: No significant differences will occur due to training on soccer skills among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player.

H_{05}: No significant differences will occur due to training on soccer playing ability among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player.

1.7 Significance of the study

Modern soccer is very fast by its nature and demands high level of motor fitness, skill and tactical ability and physiological potentiality. In present era each nation is varying with others to produce top class players to win the prizes and laurals in the international competitions and therefore considerable research is devoted to discover the relative factors which are expected to be the predictive potentialities achieving high level of performance in soccer as pre-requisite factors of top class soccer performance. Importance should be given on various performance variables, body composition and physiological characteristics. Besides all type of pre-requisite factors of top performance of soccer the need of selection of appropriate soccer training and its proper administration is very much important.

Catch them young and coach them right is the important slogan of sports training. Thereby soccer players should be selected at an early age and should be imparted correct type of soccer training and coaching along with the proper loading and adaptation which may assure notable improvement in soccer performance in India. The result of this study may highlight the importance of specific soccer training programme under taken in this study for developing soccer performance.

The result of this study is likely to add the knowledge of essentialities of performance variables, I.e. body composition and soccer skill in developing soccer proficiency. The result of this study also may highlight the importance of high level of soccer oriented motor fitness in acquiring top soccer performance centering upon relative soccer skill, technique and tactical abilities .

1.8 Definition and Explanation of Terms

Soccer

Soccer is a football game, played under teams of 11 players on a side and using a round football. The designation “Soccer” is derived from association football to distinguish from American football, Canadian football, Rugby and several other sports in the historical development of the game. It is now played under the overall supervision at the federation international de football association. It is popularly known as football in India. In soccer training, the fitness training with ball, exercising of dynamic skill

and deep pass play were adopted. Soccer is a game in which the ball is propelled towards the goal by skillful advancing and controlling it with feet, body and head.

Soccer is a game in which there are eleven players a side one of whom shall be a goal keeper, the ball is round and is to be kicked through the goal posts under the crossbar no handling of the ball is allowed except by goal keeper.[26,5]

Body Composition

In body composition total body weight, body fat percentage and lean body weight or mass were studied.[5]

Dribbling

In soccer, a dribble is one of the most difficult ball skills to master and one of the most useful attacking moves. In typical game play, players attempt to propel the ball toward their opponents' goal through individual control of the ball, such as by dribbling (running with the ball close to their feet). Dribbling refers to the maneuvering of a ball around a defender through short skillful taps or kicks with either the legs. The purpose of such an action is to bring the ball past a defender legally and to create opportunities to score.[26]

Passing

Passing the ball is a key part of soccer. The purpose of passing is to keep possession of the ball by maneuvering it on the ground between different players and to advance it up the playing field.[26]

Kicking

Kicking is the conscious passing or placing of the ball with some part of the foot.[26]

Shooting

Shooting is an essential part of offensive players to achieve the target. The main objective in football is to score goal. So shooting skill is required to drive the ball towards the target.[26]

Playing Ability

In the present study playing ability refers to the ability of the players to play soccer game and could be assessed by the judges or subjective rating.[26]

Muscular endurance

Are the ability or capacity of a muscle or muscle group to perform repeated contractions against a resistance or load or to sustain contraction for an extended period of time with less discomfort and more rapid recovery.[31]

Training

Training is a pedagogical process, based on scientific principles, aiming at preparing Sports men for higher performance in sports competition.[45]

Intensity

The relative effort required to complete individual set or an entire workout. Intensity is a function of resistance used in each resistance training.[67]

Repetition

A repetition is one complete movement of an exercise. It normally consists of two phases: concentric muscles action or lifting of the resistance and the eccentric muscles action or lowering of the resistance.[167]

Set

This is a group of repetitions performed continuously without stopping while a set can be made up any number of repetitions.[167]

Skill

Is the ability to use the right muscles with the exact force necessary to perform the desired movement in the correct sequence and timing.[27]

Performance

The ability to perform. [49]

Football

A game, involving two teams of 11 players taking up position in their respective half with the aim of passing the ball between two horizontal bars & under the uprights placed on either side of the field, simultaneously trying to prevent the opponent from scoring goals. All football players of the both the team (Excluding goal keeper) during play should not deliberately handle the football with their hands or arm. Football players may use their feet to move the football around with the football around with in the football field, Players may use any part of the bodies during play excluding their hands and arms. Within the time duration of play, all players are free to play the ball in any direction and move throughout the pitch, through that ball should not receive in an offside position while football matches.[16]

Agility

Agility can be defined as the accuracy and speed with which an individual integrates his body parts in various ways.[10]

Balance

Balance is the ability to maintain equilibrium while stationary or moving.[11]

Co-ordination

Coordination is the ability to execute movement smoothly and efficiently.[11]

Power

Power is the function of force and velocity and it can be defined as the rate of performing work. When express by the formula Power = force × Velocity or work done/ time taken.[3]

Power is the capacity of the individual to bring into maximum muscular contraction at faster rate of speed. [3]

Explosive power

The capacity of the leg to release maximum muscular force in the shortest times as in executing a vertical jump.[4]

Flexibility

Flexibility is defined as the ability to perform movement with greater range of motion or large amplitude.[53]

Muscular endurance

The ability of a muscle to repeat identical movements or pressure or to maintain certain degree of tension over a period of time.[31]

Muscular endurance is the ability of a muscle to work against a moderate resistance for long period of time.[29]

Muscular strength

Strength system is the greatest force the neuro-muscular system is capable of exerting in a single maximum voluntary contraction. It denotes performance in those events where great resistance has to overcome.[14]

Speed

Speed is defined as the ability to move the entire body rapidly from one place to another.[30]

Chapter II

REVIEW OF RELATED LITERATURES

CHAPTER – II

REVIEW OF RELATED LITERATURES

A serious and scholarly attempt has been made by the research scholar to go through the literature related to study. The relevant studies of specific important are cited below.

Lohman *et al.*, (1975) [178] conducted a study on relationship of total body density, total body potassium, skin fold measurement and AAHPER Youth Fitness Tool. Performances were determined on 49 pubescent boys, 8 to 11 years of age. It was concluded that not only these variation body composition should be considered when interpreting result of AAPHER test.

Slaughter *et al.*, (1977) [179] studied the Somatotype and Body Composition of physical performance in 7 to 12 years old boys. In this study to objective method of measuring somatotype Sheldon Trunk Index method and Heath carter anthropometric method were used. It was concluded that somatotype was not related to physical performance. However, Ponderal Index correlated better with performance score, whereas Somatotype components have a lower correlation with running and jumping variables than body composition or body size variables.

Micheal J. Votto, (1977) [180] studied Somatotype and physical performance characteristics of major colleges football players. 23 players representing the offensive regulars of the 1975 north Caroline national Championship football team were evaluated on physiological, motor fitness and somatotype measures during sprint training on the football team were Age 22.1 years, height 75.5 inches, weight 238.4 lb., present body fat (skin fold) 72.7 percent and anaerobic power. The relative somatotype inter position comparison shows the football players markedly classified endo mesomorphic with observable inter position differences. Analysis of variance for related measure showed significantly greater anaerobic power in offensive backs, while selected flexibility measured showed the offensive lines men to be most flexible.

Latheef O. amusa, **(1979)**[181] selected 46 subjects, who were well conditioned soccer players having at least 2 years playing experience on the college level. They were tested for running speed, power, agility, Vo_2 max, strength, anaerobic capacity and flexibility. In addition, 11 anthropometric measurement consisting of skin folds and body diameters were taken. The soccer playing ability served as the criterion and was measured by the rating of 3 experienced soccer coaches based on selected soccer skill and strategies.Analysis of date was by zero order correlation and multiple regression analysis resulting in the following conclusion; age (experienced) is the best single predictor of playing ability, VO_{2max} and running speed are considered important factors in soccer performance. Flexibility, agility, lactate concentration and lag power are not considered as valid indicators of playing ability.

Cassel and Mc. Garry (1979) [182] compared the motor ability and physical characteristics of collegiate soccer playing by position of play. In motor ability differences (p.05) were found in leg power and in this respect the fullback were found to be more powerful than forward. In respect of soccer ability, the half-backs were to be more skillful than goalkeepers; and in speed forwards and fullback much faster than goalkeepers. No differences were evident in the ability of agility, upper body strength and endurance.

D.k. Kansal *et al.*, (1980) [183] studied the physique and body composition of the intervarsity soccer players of zonal champion and runners up team of the north zone. They concluded that the defence line players were significantly taller and heavier than forward line players. Forward line players had narrow hips and broader femur bicondylardiameter accompanied by better developed thighs and calves in comparison to the defensive players. The forward line players had also slightly lesser percentage of body fats and more of lean body mass.

Morrow *et al.*, (1980)[184] in the study of anthropometric strength and performance data were evaluated for 49 American discus, hammer, javelin throwers and shot putters who participated in pre-Olympic training camp. Comparison between participants indicates significant differences on the anthropometric and strength variable but were alike in terms of motor performance variables.

Ozkan (1984)[185] conducted a study of 77 male high school soccer players between ages of 15-18 years old. The purpose of the study was to investigate the physical and physiological and motor skill characteristics of the players. A secondary purpose was to compare the experimental variables between playing position, age group, and playing qualities. The test items consisted of age, height, weight, percentage of body fat, resting heart rate, 1.5 mile run, 50 yard sprint, vertical jump, agility, trunk extension and flexion, ball control, wall volley and obstacle dribble skill test. The statistical analysis reveals an average height and weight of 174.92 cm and 64.74 kg for entire group. Average resting heart rate and body fat were 70.7 bt/m and 10.38 percent respectively. The other results were excellent in 1.5 mile, fair on the 50 yard sprint and vertical jump. In agility similar level as college below average in trunk extension and flexion and in three soccer skill tests, the players scored 85th - 100th percentile.

Laverne W. Baacke, (1984) [186] reported utilized data of 87 male students of high school to determine the relationship of anthropometric and physical performance measure to perform the running, hop-step and jump. He concluded that all variables as measured in a body showed significant relationship with criterion beyond the 0.05 level of confidence.

Finn off *et al*., (2002) [187] conducted a study on a valid and reliable method of measuring the kicking accuracy of soccer players which is an important component of soccer performance. They constructed a plywood target measuring 243.5 cm wide X 122 cm high carbon paper applied to the surface of the target allowed measurement by 2 meters from bull's eye to 10 ball marks left by kicks. Intra class correlation coefficients with 95% confidence intervals were used to determine the intra and integrators reliability of the measurement to each mark. Mean and median distances from bull's eye to ball mark were 89.9 cm and 97.9 cm respectively (Range 25.7 to 150.75 cm). The interclass correlation coefficients for intra and integrators reliability were 0.99. The root mean square error of measurement indicated that accuracy of measurement was within 0.15 cm. These results suggest that own method of assessing kicking accuracy is a valid and reliable foot for analyzing performance. Because this tool closely replicates kicking into a soccer goal, we feel that is also has validity. To our knowledge no other tool or measure (e.g. number of shots on goal or number of

goals per game) has comparable validity and reliability. This method can be used as a training tool and further investigation of kicking accuracy.

Miller *et al.*, (2002) [188] studied to assess Performance data for 261 NCAA Division IA collegiate football players were analyzed to determine if player position, body weight, body fat, and training time were correlated with changes in performance in the following events: power clean (PC), bench press (BP), squat (SQ), vertical jump (VJ), 40-yd dash (40yd), and 20-yd shuttle (20yd). Individual positions were combined into the following groups: (A) wide receivers, defensive backs, and running backs, (B) linebackers, kickers, tight ends, quarterbacks, and specialists, and (C) linemen. Increases in body weight were positively correlated with increases in BP and PC performance for all groups. Increases in body fat were negatively correlated with performance in the PC and VJ for all groups. For group C, increases in body fat were also negatively correlated with performance in the 40yd and 20yd. Group and training time exhibited no linear relationship with performance in any of the tested events. No linear relationships were observed between the independent variables and performance in the SQ. When individual training data were analyzed longitudinally, a nonlinear increase in performance in the PC, BP, and SQ was observed as training time increased, with the greatest rate of change occurring between the first and second semesters of training.

Ostojic (2003) [189] studied the effects of training and competition on body fat content and sprint performance in elite professional soccer players. Thirty professional male soccer players (1st National league) participated in the study. Anthropometric measurements were collected at the start of the first conditioning period, at the start of season, in the midseason, end-season and at the start of the second conditioning period. Body composition was assessed by skinfold measurement. Estimated body fat percentage at the end of the season was significantly lower than levels at the start of the first conditioning period, mid-season, second conditioning period and at the start of the season (9.6±2.5% vs. 11.5±2.1, 10.2±2.9, 12.6±3.3 and 10.9±2.4% respectively; $p < 0.05$). The main finding of the present study was that body fat content of professional soccer players significantly dropped during the conditioning and competitive periods and increased during the off-season.

Polman *et al.*, (2004) [190] studied to compare the efficacy of three physical conditioning programmes provided over a 12 week period (24 h in total) on selected anthropometric and physical fitness parameters in female soccer players. Two of the groups received physical conditioning training in accordance with speed, agility and quickness (SAQ); one group used specialized resistance and speed development SAQ equipment (equipment group; n=12), while the other group used traditional soccer coaching equipment (non-equipment group; n=12). A third group received their regular fitness sessions (active control group; n= 12). All three interventions decreased the participants' body mass index (73.7%) and fat percentage (71.7%), and increased their flexibility (+ 14.7%) and maximal aerobic capacity ($VO_{2\ max}$) (+ 18.4%). The participants in the equipment and non-equipment conditioning groups showed significantly greater benefits from their training programme than those in the active control group by performing significantly better on the sprint to fatigue (711.6% for both the equipment and non-equipment groups versus 76.2% for the active control group), 25 m sprint (74.4% vs. 70.7%), left (74.5% vs. 71.0%) and right (74.0% vs. 71.4%) side agility, and vertical (+ 18.5% vs. +4.8%) and horizontal (+7.7% vs. + 1.6%) power tests. Some of these differences in improvements in physical fitness between the equipment and noequipment conditioning groups on the one hand and the active control group on the other hand were probably due to the specificity of the training programmes. It was concluded that SAQ training principles appear to be effective in the physical conditioning of female soccer players. Moreover, these principles can be implemented during whole team training sessions without the need for specialized SAQ equipment. Finally, more research is required to establish the relationship between physical fitness and soccer performance as well as the principles underlying the improvements seen through the implementation of SAQ training programmes.

Morenoa *et al.*, (2004)[191] studied to assess body composition by anthropometry in school-age children playing football (soccer) and to compare the results with those of a reference group. They studied 239 children aged 9.0 to 14.9 years who played this sport in a local league and compared them with a reference population of 453 children in the same age range. They measured weight, height, four skinfold thicknesses, and two circumferences; and we calculated body mass index, total body fat percentage, fat free mass, arm fat percentage, and arm muscle area.

Body mass index do not showed any significant difference between football (soccer) and reference groups in any age category. The percentage of total body fat was significantly lower in the football (soccer) group than in the reference group at 9, 11, 12, and 14 years. In studies aiming to assess the effect of physical activity on body composition, it will be necessary to measure, not only body mass index, but other measures of the body fat compartment. Football (soccer) can be proposed as a physical activity practice aiming to prevent or treat obesity and its comorbidities.

Dupont *et al*., (2004) [192] conducted a study to investigate the effects of in-season, high-intensity interval training on professional male soccer players' running performances. Twenty-two subjects participated in 2 consecutive training periods of 10 weeks. The first period was considered a control period and was compared with a period where 2 high-intensity interval training exercises were included in the usual training program. Intermittent runs consisted of 12-15 runs lasting 15 seconds at 120% of maximal aerobic speed alternated with 15 seconds of rest. Sprint repetitions consisted of 12-15 all-out 40-m runs alternated with 30 seconds of rest. Results from the high-intensity interval training have shown that maximal aerobic speed was improved (+8.1 +/-3.1%; $p < 0.001$) and that the time of the 40-m sprint was decreased (-3 .5+/- 1.5%; $p < 0.001$), whereas no change in either parameters were observed during the control period. This study shows that improvements in physical qualities can be made during the in-season period.

Sisodiya and Sekhawat (2005) [193] were conducted a study on the effect of specific training procedure on selected skill performance of Basketball players. The purpose of this study was to find the effect of specific training procedure on selected skill performance of Basketball players. 30 male students of SAI hostel Jodhpur act as a subjects of this study. The necessary data were collected by administering various skill tests which included the testy items namely field goal speed test, dribble basketball throw for accuracy. Subjects were divided into three equal groups i.e. Experimental Group- I, Experimental Group- II and Control Group respectively. Training schedule was set up for four days a week which included the use of various specific training procedures on selected skills. Analysis of variance was applied for analyzing the data obtained from the present study and significant improvement was seen in performance of the subjects after the use of specific training procedure for

practicing different skills of Basketball. The value of posttest of field goal speed test, dribble test and basketball throw for accuracy for Experimental Group-I (F Cal =60.65), (F Cal= 60.48) and (F Cal= 12.14) was found highly significant than the table value (4.41) at 0.05 level of confidence.

Little and Williams, (2006) [194] conducted a study on suitability of soccer training drills for endurance training. The purpose of this study was to investigate inter-subject variability and intra-subject reliability in exercise intensity during soccer drills. It was hypothesized that soccer drills that involve the highest exercise intensities would demonstrate the lowest inter-subject variability and the highest intra-subject reliability. Heart rates of 23 professional soccer players were recorded during a range of soccer training drills. The drills consisted of 2 vs. 2 to 8 vs. 8 normal scoring games and 2 further possession games. Heart rate responses were examined for variability, reliability, and suitability for soccer endurance training. Coefficients of variation across players were less than 3% for all drills. Paired t-tests showed no significant differences in heart rate on repetition of the drills and 95% ratio limits of agreement were 1.8-3.8%. There were no significant correlations between exercise intensity and the statistical measures of variability and reliability. Several drills produced exercise intensities suitable for soccer endurance training with mean heart rate responses ranging from 87-91% maxHR. Soccer drills such as those used in the present study appear to be an adequate substitute for physical training without the ball and thus provide simultaneous skill and fitness training. The increase in training time spent developing technical ability and/or a reduction in total training time required may be useful for soccer teams. This study suggests that certain soccer drills produce exerctse intensities suitable for physical conditioning. However, it remains debatable whether soccer drills can provide sufficiently unified exercise intensity among different players and on repetition of a drill, because movement patterns cannot be externally controlled during soccer drills.

Gregson W. and Wriglcy R., (2007) [195] conducted a study on the effects of a l0 week plyometric training intervention on 10 m sprint and vertical jump performance in elite junior professional soccer players. The ability to produce explosive lower body power is an important determinant of performance in soccer. Plyometric training represents an effective method for the development of muscular

strength and power. Little information, however, currently exists on the volume of plyometric training needed to induce improvements in performance. To examine the effect of one weekly structured plyometric training session over a 10 week in-season training period on l0 m sprint and vertical jump (VJ) performance in elite junior professional soccer players. For this study twelve soccer players completed a 10m sprint [Limits of agreement (LOA) 0.01 ± 0.09 s) and VJ (LOA 0.7 ± 2.1 em) test on two occasions, 10 weeks apart. Six players were randomly allocated to an experimental (Exp) or control (Cont) group. Over the l 0 week period the Exp group completed one plyometric session per week in addition to normal training whilst the Cont group completed normal training only. The study was concluded that one plyometric training per week over a 10 week in-season training period leads to significant improvements in 1Om sprint time in elite junior soccer players. This training stimulus may act as an efficient training stimulus during the in-season period •when training time is limited.

Williams and Owen, (2007) [196] studied on the impact of player numbers on the physiological responses to small sided games to examine the physiological demands imposed on players during small-sided training games (SSG). In this study the impact of changing both the number of players and the size of the training area on heart rate responses was investigated. To calculate the findings average heart rate was calculated during small sided games via short-range radio telemetry for nine professional players. Recording intervals were set at 5 s. Player numbers increased from I vs. I to 5 vs. 5 which corresponded with an increase in pitch sizes from 15 x 20 meters to 25 x 30 meters. On a 15 x 20 m pitch mean HR in a 1 v 1 and 2 v 2 was significantly higher than in a 3 v 3. The mean HR on a 20 x 25m pitch for 2 v 2 was significantly greater than for 3 v 3 and 4 v 4. On a 25 x 30m pitch mean HR for both 3 v 3 and 4 v 4 was significantly higher than 5 v 5. The study was concluded that the games with higher numbers of players were not associated with sufficient physiological response to promote development of player's aerobic fitness. The l v 1 SSG and SSG in 15 x 20 m pitches imposed the highest physiological response. As player numbers increased, physiological stress decreased.

Meylan and Malatesta, (2009) [197] studied to determine the influence of short-term plyometric training within regular soccer practice on explosive actions of

early pubertal soccer players during the in-season. In soccer, explosive actions such as jumping, sprinting, and changes of direction are essential to optimal performance not only in adults, but also in children's games. Fourteen children (13.3 ± 0.6 years) were selected as the training group (TG) and 11 children (13.1 ± 0.6 years) were defined as the control group (CG). All children were playing in the same league and trained twice per week for 90 minutes with the same soccer drills. The TG followed an 8-week plyometric program (i.e., jumping, hurdling, bouncing, skipping, and footwork) implemented as a substitute for some soccer drills to obtain the same session duration as CG. At baseline and after training, explosive actions were assessed with the following 6 tests: 10 meter sprint, agility test, vertical jump tests (squat jump [SJ], countermovement jump [CMJ], contact test [CT] and multiple 5 bounds test [MBS]). Plyometric training was associated with significant decreases in 10m sprint time (- 2.1 %) and agility test time (-9.6%) and significant increases in jump height for the CMJ (+7.9%) and CT (+10.9%). No significant changes in explosive actions after the 8-week period were recorded for the CG. The current study demonstrated that a plyometric program within regular soccer practice improved explosive actions of young players compared to conventional soccer training only. Therefore, the short-term plyometric program had a beneficial impact on explosive actions, such as sprinting, change of direction, and jumping, which are important determinants of match-winning actions in soccer performance.

Katis and Kellis, (2009) [198] studied on the effects of small-sided games on physical conditioning and performance in young soccer players. Thirty-four amateur young soccer players participated in the study. A minimum of five years of training experience, a training status of at least two training sessions plus a game per week and no history of injury in the last six months were the main criteria for participating in the study. Subject and parental informed written consent was received and the University Ethics Committee approved the protocol. The subjects were randomly assigned to three groups. Group 1 performed only the three-aside game situation. Group 2 performed only the six-a-side game situation while Group 3 served as controls. Testing of each group was performed on separate occasions. The number of technical actions during the game was examined using video recordings. Field tests were performed in a random order before (pre) the games, in the middle (after the 5th bout) and after (post) the games. The control group performed only the field tests

without a game intervention. The three-a-side and six-a-side games were conducted with two goalkeepers and free touches. A necessary requirement for scoring goals was that all players should be in the opponent's half Differences between the three-a-side and the six-a-side games in passing, dribbling, heading, shooting, tackling and goal scoring values were examined using independent two-tailed Student's t-tests. A two-way analysis of variance (ANOVA) with repeated measures was applied to examine the differences in HR values between the ten bouts of each game protocol. A two-way mixed-model ANOVA design was applied to examine the differences in each field test score between the three groups of subjects (three-a-side group, six-a-side group, controls) performed before, in the middle and after each small sided game. The present study indicated that soccer players display high intensity levels when participating in small-sided games. As a result, a reduction in field test scores was observed. Three-a-side games affected sprint and agility performance. In contrast, six-a-side games had less effect on physical performance in field tests and it is suggest that the use of three-a-side games for improving fitness and technique in young soccer players may be more appropriate.

Buchhet *et al*., (2009) [199] conducted a study to compare the effect of strength/speed Vs repeated sprints training on repeated sprints ability in young elite soccer players. For that 14 elite male adolescents were assigned to either complex or repeated sprints training groups. During 10 weeks; consisted in 4 to 6 series of 4 to 6 exercises (e.g. counter movement jumps, depth and plyometric jumps, agility drills, standing starts and shuttle sprints), each repetition interspersed with at least 45 second of passive recovery. Repeated sprint training consisted of 2-3 sets of 5-6Xl5.20 m shuttle sprints. The groups performed either repeated sprints or complex training once a week and maintained similar external training programs. Before and after training, performance was assessed by a counter movement jump, a hopping test and best and mean times on a repeated shuttle sprint ability test. After training except for 10m all performance were significantly improved in both groups. Relative changes in 30m were similar for both groups. Complex training tended to induce greater improvements in counter movement jump and hop height compared with repeated sprints. In contrast repeated sprints training induced greater improvement in repeated sprints ability best and tended to enhance more repeated sprints ability mean compared with complex training. The study was concluded that both complex and

repeated sprints training regimens represent effective means to increase physical performance in young elite soccer players. Nevertheless, changes in performance are likely training regimen specific with repeated sprint training being more effective at improving running performance and complex training more effective at improving jumping ability.

Alveset *et al*., (2010) [200] conducted a study on Short-term effects of complex and contrast training in soccer players' vertical jump, sprint, and agility abilities. The purpose of this study was to analyze the short-term effects of complex and contrast training (CCT) on vertical jump (squat and countermovement jump), sprint (5 and 15 m), and agility (505 Agility Test) abilities in soccer players. Twenty-three young elite Portuguese soccer players (age 17.4 ± 0.6 years) were divided into 2 experimental groups (G 1, n = 9, and G2, n = 8) and 1 control group (G3, n = 6). Groups G l and G2 have done their regular soccer training along with a 6-week strength training program of CCT, with 1 and 2 training sessions·wk -1 , respectively. G3 has been kept to their regular soccer training program. Each training session from the CCT program, was organized in 3 stations in which a general exercise, a multiform exercise, and a specific exercise were performed. The load was increased by 5% from I repetition maximum each 2 weeks. Obtained results allowed identifying (a) a reduction in sprint times over 5 and 15 m (9.2 and 6.2% for G l and 7.0 and 3.1%, for G2;$p < 0.05$) and (2) increase on squat and j ump (12.6% for G l and 9.6% for G 2; $p < 0.05$). The results suggested that the CCT induced the performance increase in 5m and 15 m sprint and in squat jump. Vertical jump and sprint performances after CCT program were not influenced by the number of CCT sessions per week (1 or 2 sessions·wk - 1). From the obtained results, it was suggested that the CCT is an adequate training strategy to develop soccer players' muscle power and speed.

Mannaet *et al*., (2010) [201] conducted a study to find out the effect of training on selected physiological and biochemical variables of Indian soccer players of different age groups. A total of 120 soccer players volunteered for the study, were divided (n=30) into 4 groups: (i) under 16 years (U 16), (ii) under 19 years (U 19), (iii) under 23 years (U23), (iv) senior (SR). The training sessions were divided into 2 phases (a) Preparatory Phase (PP, 8 weeks) and (b) Competitive Phase (CP, 4 weeks). The training program consisted of aerobic, anaerobic and skill development, and were

completed 4 hrs./day; 5 days/week. Selected physiological and biochemical variables were measured at zero level (baseline data, BD) and at the end of PP and CP. However, no significant change was found in body mass and maximal heart rate of the players after the training.

Wong *et al*., (2010) [202] studied to examine the effects of on-field combined strength and power training (CSPT) on physical performance among U -14 young soccer players. Players were assigned to experimental (EG, n = 28) and control groups (CG, n = 23). Both groups underwent preseason soccer training for 12 weeks. Experimental Group performed CSPT a week, which consisted of strength and power exercises that trained the major muscles of the core, upper, and lower body. CSPT significantly ($p < 0.05$) improved vertical jump height, ball shooting speed, 10 m and 30 m sprint times, Yo-Yo intermittent endurance run (YYIER), and reduced submaximal running cost (RC). CSPT had moderate effect on vertical jump, ball-shooting, 30 m sprint, and YYIER, small effect on 10 m sprint, RC, and maximal oxygen uptake. YYIER had significant ($p < 0.05$) correlations with 10 m ($r = -0.47$) and 30 m ($r = - 0.43$) sprint times, ball-shooting speed ($r = 0.51$), and vertical jump ($r = 0.34$). The CSPT can be performed together with soccer training with no concomitant interference on aerobic capacity and with improved explosive performances. In addition, it is suggested that CSPT be performed during the preseason period rather than in-season to avoid insufficient recovery/rest or over training.

Segoviaet *et al*., (2010) [203] conducted a study to assess the effect of 4 months of training on the training executed by 2 under-19 teams from the first Spanish division on aerobic power, strength, and acceleration capacity. Two under-19 soccer teams that competed in the same league were evaluated on 2 occasions. The first evaluation (E1) was done at the beginning of the competitive period, and the second evaluation (E2) was done 16 weeks later, coinciding with the end of the first half of the regular season. The following were evaluated: lower-body strength through jump height with countermovement with and without load, speed of the Smith machine bar movement in a progressive load test of full squats (FSL), acceleration capacity in 10m, 20m, and 30 m (T10, T20, T30, T10-20, T10-30, T20-30), and maximal aerobic speed (MAS). Team a executed complementary strength training, and training loads

were determined with regard to the speed with which each player moved the bar in FSL. Between the evaluations, the training sessions of each team were recorded to assess their influence on the changes in E2. Team A significantly improved its MAS ($p < 0.01$) and its application of strength in the CMho ($p < 0.05$) and FS20.30.40 ($p < 0.0$ 1), while significantly worsening their acceleration capacity in all the splits ($p < 0.01$). Team B slightly worsened its MAS and significantly improved its application of strength in the CMJ20 ($p < 0.01$) and FS50-60 ($p < 0.05$). Its acceleration capacity improved insignificantly except for in the 20m to 30m interval/T20_30 ($p < 0.05$). The present study demonstrates that the use of loads as a function of the speed of movement, without the need to determine maximum repetitions is a methodology that is adequate for the improvement of the application of strength in under-19 soccer players.

Buchheit *et al.*, (2010) [204] studied on improving repeatedsprint ability in young elite soccer players: repeated shuttle sprints vs.explosive strength training to compare the effects of explosive strength (ExpS) vs. repeated shuttle sprint (RS) training on repeated sprint ability (RSA) in young elite soccer players, 15 elite male adolescents (14.5 ± 0.5years) performed, in addition to their soccer training program, RS (n = 7) or ExpS (n = 8) training once a week for a total of 10 weeks. RS trainingconsisted of 2-3 sets of 5-6 x 15- to 20-m repeated shuttle sprintsinterspersed with 14 seconds of passive or 23 seconds of active recovery; ExpS training consisted of 4-6 series of 4-6 exercises (e.g.,maximal unilateral countermovement jumps (CMJs), calf and squatplyometric jumps, and short sprints). Before and after training,performance was assessed by 10 and 3 0 m (10 and 30 m) sprint times, best(RSAbest) and mean (RSAmean) times on a repeated shuttle sprint abilitytest, a CMJ, and a hopping (Hop) test. After training, except for 10 m (p =0.22), allperformances were significantly improved in both groups (all p's<0.05). Relative changes in 30 m (- 2.1 ± 2.0%) were similar for both groups (p = 0.45). RS training induced greater improvement in RSAbcst (- 2.90 ± 2.1 vs. - 0.08 ± 3.3%, p = 0.04) and tended to enhance RSAmeanmore (-2.61 ± 2.8 vs. - 0.75 ± *2.5%*, p= 0.10, effect size [ES] = 0.70) than ExpS. In contrast, ExpS tended to induce greater improvements in CMJ (14.8± 7.7 vs. 6.8 ± *3.7%*, p= 0.02) and Hop height (27.5 ± 19.2 vs. 13.5± 13.2%, p = 0.08, ES = 0.9) compared with RS. Improvements in therepeated shuttle sprint test were only observed after RS training, whereasCMJ height was only

increased after ExpS. Because RS and ExpS were equally efficient at enhancing maximal sprinting speed, RS training induced improvements in RSA were likely more related to progresses inthe ability to change direction.

Gioftsidou *et al.*, (2011)[205] investigated the effects of a soccer training session on the balance ability of the young soccer players. Participants were twenty-six young soccer players. Standard testing balance boards and Biodex Stability System were used to assess balance ability before (pre training) and immediately after (post training) the completion of a soccer training session. Also, Isokinetic knee joint moment measurements (60°/sec and 180°/sec) were carried out pre- and post-soccer training. The results revealed that no differences ($p>0.05$) were found in balance ability and knee joint moment production between pre- and post-soccer training. Result is in contrast to the notion of a link between fatigue induced by a soccer training session or game and injury caused by impaired balance.

Clemente *et al.*, (2012)[206] examined the specificity of collective sports training has evolved to adapt according to ecology stimuli inherent to the sport. In this sense, the coaches have adopted exercises based on the game, designated by small-sided games. In football practice this type of exercises triggers very receptivity on the part of coaches. In this sense, this paper analyzes the relevance of this type of exercise and as may be appropriate depending on the specific needs of the players. Task constraints as field dimensions, number of players for exercises or objectives of the task showed effects on physiological and technical variables of the players. Consequently this article will examine through a literature review, the effects related to the task constraints in order to emphasize the massive relevance of small sided soccer games.

Kelly *et al.*, (2013)[207] developed a high-intensity soccer specific training (SST) drill that was not only based on the demands of match-play but also would reduce the variability in the physiological response to training compared with other specific drills. To evaluate this approach to training, the SST drill was compared with a “traditional” aerobic interval training (AIT) protocol and a small-sided games (SSG) drill. These results indicate that the SST stimulates a more uniform physiological response than other currently adopted specific endurance training protocols used in

soccer. This would suggest that it provides a valid alternative to the current approaches used for the aerobic training of players.

Campos *et al.*, (2013) [208] investigated the effects of three weeks of training with intensity monitored on the aerobic capacity of professional soccer players. Fourteen players, members of a first division Brazilian Championship team in 2010, aged 22.78 ± 3.06 years were evaluated pre and post three weeks of training. The anaerobic threshold intensity LAN was determined by bi-segmented method, for this four sub maximal efforts of 800 meters with intensities 10, 12, 14 and 16 km/h were applied. There were no significant differences between conditions before and after training, indicating that three weeks of training are insufficient to generate positive changes in soccer players.

Clemente & Rocha, (2013)[209] examined Soccer, for their characteristics, falls into the category of collective sports games. Regardless of other characteristics, is the opposition between the elements of two teams clash in the relationship and cooperation between team-mates, occurring in a random environment, that reflect the essence of the game. The organization of sports training and education should be a useful element for improving the performance of a particular person, group of subjects or learning context of a specific task. It is the responsibility of the coach, have multidisciplinary competences that enable to manipulate a set of elements that promote the development of tactical knowledge and decision making of the players, enabling a real increase in the capacity of players to the game matters: technical/tactical efficiency of the team. Thus, a coach's perspective, the proper handling of ecological elements of training may address the players' attention to relevant sources of information, acting in order to use the information that will achieve the objectives. This paper discusses briefly the importance that the tactic should have in each intervention of the soccer coach during planning the training or teaching.

Knight *et al.*, (2015)[210] examined soccer-specific training (SST) drills are used to develop physiological adaptations, technical and tactical skills, and provide coaches with greater control of external training load. Despite widespread use, there has been little analysis of SST drills. This study quantified the effect of manipulating player numbers on the physiological demands of an SST drill. Results showed

variables such as total running distance (TD), mean percentage of maximum heart rate, RPE, and [BLA] were greater for the 8-player SST drill. The 10-player drill also had a 22% greater TD and 21% higher average speed compared to the 12-player drill, which tended to have a lower activity profile. The 8-player SST drill could be used to develop aerobic capacity and repeat-sprint ability (RSA) because of a higher activity profile. The 10- and 12-player drills would be suited for RSA and sprint acceleration enhancement.

Gunnar, & Svein, (2015) [211] investigated the effects of short burst speed and change-of -direction exercises on sprint and agility performance in youth female soccer players 15.5 (± 0.7) years. One training group (n=10) followed an eight week, once per week training program consisting of short-burst sprinting exercises in addition to two normal soccer training, while a control group (n=9) followed three traditional soccer training session. The results demonstrate that a training program of short burst high speed exercises improve linear sprint and agility performance in youth female soccer players, beyond the gain of traditional soccer training consisting of small-sided games.

Baro, (2015) [212] determined the effect of training in small size playfield and regular official size playfield in the selected soccer skill performance of soccer players. To find out the pre and post training performance and significance differences among the groups the collected data were analyzed statistically through t-test, Analysis of Variance (ANOVA) and Analysis of Co-variance (ANCOVA). The level of significance was observed at 0.05 level of confidence. Insignificant difference was found in the pre-test means of three selected groups as the obtained F-value of 0.072 is less than that of tabulated F-value of 3.144 for the d.f. of 2/63 at 0.05 level and significant difference was found in the post-test means and adjusted means of three selected groups as the F-Value 12.70 and 62.59 are quite higher than the tabulated F-value of 3.144 and 3.146 respectively at 0.05 level of confidence.

Condessa *et al*., (2015) [213] compared the exercise intensity of four specific soccer training sessions (friendly and training match, tactical and technical workouts). Ten professional soccer players were recruited. A treadmill progressive interval test was performed to determine the players' VO_2 max, maximal heart rate (HR max), HR-VO2 curve, and the heart rate corresponding to blood lactate concentrations of 2

and 4 mm 0l/L. The friendly match presented the highest percentage of time performed in the high intensity zone.

Di Giminiani, & Visca, (2017) [214] investigated the explosive strength and endurance adaptations in young elite soccer players who underwent a supervised training program for a period of two years. These results highlight that, in long-term training, the monitoring of the adaptive responses in relation to the training load may provide a guideline to optimize the trainability of some performance variables in young elite soccer players (13–15 years). In the present study, we cannot exclude the influence of growth and maturation on some performance variables; therefore, the monitored adaptive responses should be considered as the possible results of an interaction between the applied training load and maturation.

Dragijsky *et al*., (2017) [215] investigated changes in the linear running speed (LRS) for 30 m, change of direction speed (CODS), and endurance in young elite Czech soccer players. These results show the impact of soccer season time period on young soccer player performance and may further serve as a basis for comparison with similar research conducted by peers. These results may aid sports practice for clinicians, conditioning coaches, soccer coaches and physiotherapeutic coaches.

Summary of the Review:

From 1975 to 2017, many researches have been conducted in the field of Soccer and its related issues. Here in this study the present researcher gathered some of them. Different studies have been done considering the body density, different skin fold measurements, Youth Fitness Tool, Somatotype and Body Composition with comparison and relations among them. Studies have been conducted with the variables as running speed, power, agility, strength, anaerobic capacity and flexibility etc.

For soccer performance, one of the important criteria is age i.e., maturity, playing ability, $VO_{2\ max}$ and running speed were established. Whereas the flexibility, agility, lactate concentration and leg power were contradictory indicators of playing ability found in those studies. Most studies on different comparison between motor ability and physical characteristics of college level soccer player with their position have been done. It has found that different relations also with the position and the

different fitness component as agility, upper body strength and endurance. Different anthropometric relations also have been established. Different researchers also tried to found out the different characteristics, as the physical, physiological and motor skills of the soccer players. Soccer skill as the kicking accuracy was determined as an important component of soccer performance.

On the professional soccer players, the effects of training and competition on body fat content and sprint performance were determining factors. The importance of training time was analyzed to determine if player position, body weight, body fat were correlated with changes in performance. Studies also occurred to compare the efficacy of different physical conditioning programmes for several weeks with selected anthropometric and physical fitness parameters in case of female soccer players.

Age group specific study has done to assess body composition by anthropometry in school-age children playing soccer and to compare the results with those of a reference group. The effects of in-season, high-intensity interval training on professional male soccer players' running performances also got some specific importance.

Some studies shows that improvements in physical qualities can be made during the in-season period and has found the positive effects of specific training procedure on selected skill performance. Soccer training drills has been found very effective for endurance training and the effects of ten weeks plyometric training intervention is positive on 10 meter sprint and vertical jump performance in elite junior professional soccer players.

Some studies have found that the positive impact of player numbers on the physiological responses to small sided games and which also affect the physical conditioning and performance in young soccer players. Short-term complex and contrast training in soccer players' influences the vertical jump, sprint, and agility abilities. There is the effect of training on selected physiological and biochemical variables of Indian soccer players of different age groups. On-field combined strength and power training (CSPT) improve the physical performance among U -14 young soccer players. Four months training executed by two under-19 teams develops the aerobic power, strength, and acceleration capacity.

The strength training shows that the repeated shuttle sprints and explosive strength are mutually dependent on each other in case of young elite soccer players. Positive influence of soccer training has established on the balance ability of the young soccer players.

Research studies on effects of training with intensity monitored on the aerobic capacity of professional soccer players. Some study examined the effect of soccer-specific training drills to develop physiological adaptations, technical and tactical skills. Short burst speed and change-of -direction exercises also introduced to develop the sprint and agility performance for the youth female soccer players of around sixteen years. The training considering the size of the playing field was also introduced to determine the selected soccer skill performance of soccer players. Researches also took place to find out the effect of different intensity exercise of four specific soccer training sessions, which are friendly and training match, tactical and technical workouts. Two year training programme also underwent to investigate the explosive strength and endurance adaptations in young elite soccer players.

So, from the above discussion about the studies which have already done provides some information that there are definite effects of different types of training with varied intensity and protocol on different variables of soccer performances. But there is no such age specific study about the effect of soccer training on such variables. There is also information about the effect of different types of training on physical and anthropometric variables. The present researcher was very eager to search very age specific training effect. As there is a very specific Soccer training module provided by FIFA, but for which age group it is most suitable, there was no information in FIFA websites and as well as in his study of related literature. Hence the present researcher with due discussion with his guide try to open that area of specific age group training and tried to compare the effect of same type of training on three different age group of U-14 yrs., U-17 yrs., and U-19 yrs.

Chapter III

METHODOLOGY

CHAPTER- III

METHODOLOGY

3.1 General Introduction

The procedural method with specific operation directed towards conclusions has been planned and performed in this chapter of methodology.

After establishing the hypothesis in relation to the objectives, the next step is to develop the procedural method in the instructional model. This indicates that specific operations based on the hypothesis that will accomplish the desired objectives, must be planned and performed. Hypothesis based on the best information available should be used to direct the procedure. This chapter of methodology deals with the sampling procedure, criterion measures, the design, tools and the procedure for data collection have been described.

3.2 Selection of Subjects

This is a study falling under the category of Experimental research in the field of physical education. In this comparative study, the researcher made an attempt to evaluate and designed to investigate the effect of a training program on selected body composition, motor performance, skill and soccer playing ability among three different age groups of male soccer players. Sixty (N-60) District level male soccer players, regularly playing competitive soccer volunteered for the present study.

The subjects of the present study were from three different age groups - (i) Pre-adolescence (under- 14) years, (ii) Adolescence (under-17) years and (iii) Adult (under-19) years. Total 60 numbers of boys were volunteered themselves as the subjects of this study. They were from Mozepur Bharati Vidyamandir (H.S) of Hooghly District. Each age group was comprised of 20 volunteers and they were selected randomly from a population of 25 of each age group.

3.3 Design of the Study

Three groups of subjects were depending upon their age. The first group was Pre-adolescence group, second group was adolescence and third group was adult group.

Sampling having completed, personal data like name, age, height, weight, was taken for each subject age-wise. Measurement for selected body composition variables and tests for motor performance parameters and soccer skill test were conducted in the same day. For collecting data the researcher took the assistance from some researcher, scholars of the Department of physical Education of the Jadavpur University. On the next day the soccer playing ability were measured through competitive soccer match under the supervision of 4 qualified soccer coach of national Institute of sports (NIS). After 12 week specific training the post data were taken in the same manner with the same assistance and supervisors.

3.4 Selection of Variables

The selection of body composition, motor performance variables and soccer skill and playing ability were done by using the following criteria:

1. Through review of all the available scientific literature pertaining to the body composition, motor performance variables and soccer skill and playing ability which seemed to be related and likely to contribute to better soccer performance.

2. Series of discussions were held with the supervisor of the scholar and experts regarding the selection variables related to the soccer performance

3. Feasibilities in terms of availability of instruments and measuring techniques and acceptability of the test items were discussed with the supervisor and experts.

Based on the above mentioned criteria, the following anthropometric measures, body composition performance, motor performance variables, soccer skill and playing ability were selected.

3.5 Orientation of Subjects

Before collection of data, the subjects were oriented about the purpose of the study. For the collection of data, the investigator explained the purpose of training programme to the subjects and their part in the study. The investigator explained the procedures of test on selected criterion variables and gave instructions about the points and procedures to be followed by the subjects for measuring. Three sessions were spent to familiarize the subjects with the techniques used to execute the training. It was useful to them while performing the training correctly. The subjects were verbally motivated to attend the training session regularly. Further subjects were specially instructed to avoid any special training programme till the end of the experimental period. The subjects of all the groups were motivated adequately to perform their maximum during the training and testing periods.

3.6 Criterion Measured

Following five aspects were considered as criteria for the study.

1. Collecting Personal data
2. Anthropometric measure
3. Body composition
4. Motor performance
5. Soccer skill
6. Soccer playing ability

Anthropometrical measures

Sl	variables	Instruments	Unit
1	Height	Stadiometer	In metres
2	Weight	Weighing Machine	In kilograms

Body Composition Variables

Sl	variables	Instruments	Unit
1	Percentage of Body Fat	Skinfold calliper	percentage

Motor performance variables

Sl	Variables	Test items	Unit
1	Shoulder Strength	6 lbs medicine ball put	meter
2	Leg Explosive Strength	Standing Broad Jump	centimetres
3	Agility	Zig Zag run	second
4	Speed	50mts. run	second
5	Endurance	600 yds. run	seconds

Performance Variables

Sl	variables	Test items	Unit
1	Kicking for Distance – Right Foot	Warner's Soccer Skill Test	in meter
2	Kicking for Distance – Left Foot	Warner's Soccer Skill Test	in meter
3	Throw-ins for Distance	Warner's Soccer Skill Test	in meter
4	Shooting for Accuracy	Warner's Soccer Skill Test	In numbers
5	Dribbling ability	Warner's Soccer Skill Test	In second

Playing Ability Variables

1	Soccer Playing Ability	Judges rating	In Numbers

Age was a point of reference in this study. For body composition criterion fat% were determined from selected skinfold measurements. For motor performance criterion tests were conducted for speed, strength, agility, power and endurance. Warner soccer skill test were conducted to measure soccer skills and 5 point rating scale considering soccer skill, physical fitness, tactical ability, positioning sense and game temperament were measured in competitive match situation for soccer playing ability.

For the present study different instruments and tools used for collected data and their measurements were listed below.

i)Plastic cones (9/9 inches base with 12 inches height), ii) stop watch, iii) line dust iv) starting clapper, v) medicine ball, vi) wooden scale, vii) mat, viii) white board, ix)

marker pen, x) table and chair, xi) measuring tape, xii) football, xiii) Harpenden skin fold calliper, xiv) Stadiometer, xv) weighing machine .

3.7 Reliability of Data

Reliability of the test depends upon various factors, such as instruments reliability, reliability of data and also reliability & competency of testers.

3.8 Reliability of Instruments

The instruments used in this study was stop watch, medicine ball, marking tape and Harpenden skin fold calliper were manufactured by reputed concerns and are being widely used for similar measuring purposes. Thus the instruments used in the present study for the same measurement purpose were deemed as reliable enough as guaranteed by the manufacturer.

3.9 Tester's Reliability

For collecting data the help of the physical education professionals were taken. They were also given a short orientation/practice well before the data was collected. Finally tester's (4 persons) reliability was confirmed by computing co-efficient of co-relation by test re-test method considering 5 subjects only and the coefficient became 0.91 - 0.95. Thus it could be assumed that the testers were competent and reliable enough for the said purpose.

3.10 Reliability and Validity of the Tests

Before conducting the actual test a pilot study was conducted with six subjects. In the pilot study tests and measurements of all the criteria mentioned above were conducted once by the researcher he and retests of the variables were conducted by a research scholar of the department. The test-retest, coefficient correlation was found highly significant (0.89-0.96). The tests selected for the study were all taken from the standard text books and there by validity of the test were established.

3.11 Procedure for Administering the Test

The test were conducted in the playground of the Mozepur Bharati Vidyamandir (H.S), Hooghly District and the Duttapur playground. The following test / measurements were administered.

1. Collecting personal data
2. Anthropometric Measure
3. Body Composition
4. Measurement of motor performance components.
5. Measurement of soccer skills
6. Measurement of soccer playing ability

3.11.1. Collecting Personal Data

AGE: The researcher had collected the data of birth of the subjects from the school record and age was calculated accordingly in years and months.

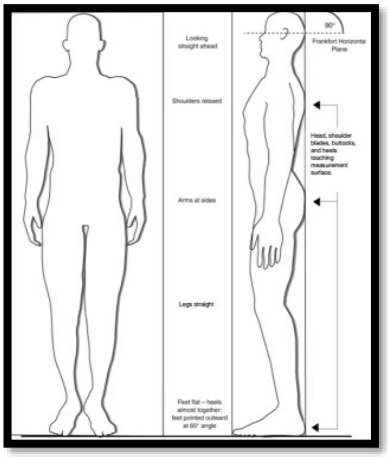

Fig. No. 1A

Fig. No. 1B

Fig. No. 1A & 1B : Measurement of Height

Height

Purpose **:** To measure the height of the subject

Equipments: Stadiometer, scale, piece of chalk, pencil and score sheet.

Procedure: The subject stood on the stadiometer with barefoot. At the time of measuring

The heels were on the platform without elevating it. The scale was brought down firmly in contact with vertex. A mark was made with chalk piece on the side of scale in the stadiometer after that the subject stepped away from the stadiometer stand board.

Scoring: The vertical distance from the stadiometer stand board to chalk piece mark was measured. The measurement was taken to the nearest one centimetre.

Weight

Purpose : To measure weight of the subject

Equipments: Weighing machine, pencil and score sheet were used.

Procedure: The subject stood on the weighing machine with barefoot and with ideal clothes. At the time of measuring the heels were on the weighing scale without elevating it, and the body was erect in position after the stop of the scale vibration the reading was taken and the subjects stepped away from the weighing machine.

Scoring: The reading was taken nearest to the one kilogram

Fig. No. 2 Measurement of Weight

3.11.2. Skinfold Measurement for Body Composition

All the skin fold measurements were taken with the help of a Harpenden skin fold caliper. Some of the skin folds were taken exactly at the level from where the

circumferences were taken. For every measurement, a fold of skin and sub-cutaneous tissue was picked up firmly between thumb and fore- finger at the left hand, about one centimetre above the mark made for the purpose and pulled away from the underlying muscle. The edges of the plates of caliper were then applied one centimetre below the fingers of the left hand and allowed to free the caliper edges to use full pressure before taking the thickness of the fold. The subject is relaxed at the time when skin fold was taken.

The skinfold measurement consists of biceps, triceps, subscapular, suprailliac, abdominal and thigh skinfolds. All the measurement recorded in mm and taken from the right side of the subjects by the researcher himself. Skinfold was picked up at about one cm above the marked level, jaws of the skinfold caliper was applied at the marked level and value was noted after two seconds.

Triceps skinfold:

Equipment: Harpenden skin fold caliper of standard pressure of 10gm/mm2.

Procedure: This skin fold was taken on the back of the arm at the level marked on the skin for the arm circumference and directly in line with the point of the elbow at the same level as that for the biceps skin fold. The reading is recorded with the help of Harpenden calliper. Triceps skinfold was measured over the triceps muscles parallel to the long axis of arm with arm at size of the body mid-way between the acromion and the elbow.

Fig. No. 3 Measurement of Triceps Skinfold

Subscapular skinfold :

Equipment: Harpenden skin fold caliper.

Procedure: This skinfold was taken just at the lower angle of the scapula in a diagonal direction obliquely downward and outward at 45^0. The subject is asked to stand in the normal position. Subscapular skinfold was measured at the inferior angle of the scapula running downward and outward in the directions of the ribs.

Fig. No. 4 Measurement of Subscapular Skinfold

Suprailliac skinfold :

Equipment: Harpenden skin fold caliper.

Procedure: It is taken one centimeter above the superior margin of iliac crest. Picked up the skin vertically and placed the caliper one centimeter below of the picked up point. The reading is noted down in between the unit of 0.1 mm. Suprailliac skinfold was measured about one cm. above and two cm. Medial to anterior superior illiac spine.

Fig. No. 5 Measurement of Suprailliac Skinfold

Abominal skinfold : Abominal skinfold was measured at the level of the umbilicus about 5cm lateral to it.

Fig. No. 6: Measurement of Abominal Skinfold

Thigh skinfold: The thigh skinfold was measured in the middle of the mid-inguinal point and proximal line of the patella when the knee was bent at right angle. The skinfold was picked over the anterior aspect of the thigh and fold was pointing downward.

Fig. No. 7 Measurement of Thigh Skinfold

3.11.3 Body Composition

Body composition is an important factor contributing to higher level of physical performance, in the activities where the fatal body weight must be moved. A substantial amount body fat not only serves as deal weight, but it also reveals that the relative ability to supply oxygen to the working muscle, thus cutting down on cardiovascular endurance.

Most scientific method of assessment of body composition is whole body 40 k count using 4 Iiscientillation counter. But the physical educators are restricted to use that equipment in the field of survey due to inadequacy of finance. Though evidences of different studies (Behnke and wilmore, 1974; Cureton et al., 1975; Damon and Goldman 1964; Durin and Rahaman, 1967; Durin and Wonersley, 1974; katch and michael, 1968, 1969; Katch and Mc Ardle, 1973, 1975; Sidhu and Mokha, 1968; Wilmore and Behnke, 1970) and support the use of skinfold measurement in the prediction of body density, lean body mass, percentage of body fat and total fat in kg. Durin and Goldman (1964) showed that the skinfold was best suited to predict density and fat relative to hydrostatic method, among commonly used method such as surface area.[170]

Body Density

Purpose: To assess the body density of the subjects

Required instrument : skinfold calliper

Procedure : After assessment of the skinfold of triceps, abdomen, suprailliac and thigh the body density was computed by the following formula given by Jackson, Pollock and word (1980).

$$B.D = 1.096095 - 0.0006952(x) + 0.0000011(x)^2 - 0.0000714(x_2)$$

Where X = sum of triceps, abdomen, suprailliac and thigh skinfolds in mm.

(X_2) = age in years

Score : score was recorded in gm/ cc [171]

Percentage Body Fat

Purpose : To assess the percentage of body fat in proportion of body weight of the subject.

Required instrument : Skinfold caliper

Procedure : After assessment of body density percentage of body fat was estimated by

% of fat = 100 (4.570/ B.D. – 4.142)

Scoring : score was recorded on percentage.[172]

Lean Body Mass

Purpose : To assess the fat free body weight of the subjects.

Required Instruments : Weighting machinne and skinfold caliper.

Procedure : After assessment of the required skinfolds lean body mass was computed by lohman et al. (1975) equation.

L.B.M. = .87 (weight) -.36 (triceps skinfold) - .40 (subsoapular skinfold) + 3.71

Where, weight in kg and skinfold in mm. were the units.[173]

3.11.4 Measurement of Motor Performance

The motor performance of the subjects were measured by using Barrow's motor performance test consisted of three sub tests, namely, (i) standing broad jump, (ii) Zig Zag run, (iii) 6 lbs medicine ball put and (iv) 50mts. Run and (v) 600 yds run for endurance test. Speed and endurance were conducted according to verduci (1980). All the items were explained and demonstrated before testing began. The purpose of the tests was also made known to the subjects.

Standing Broad Jump

Purpose : To measure power primarily and agility speed and strength secondarily.

Equipment : one measuring steel tape and jumping pit.

Fig. No. 8 Measurement of Standing Broad Jump

Procedure : The subject was asked to take position behind the take-off mark on the ground with his feet parallel. He took a preliminary movement by bending his knee and swinging his arms and jumped outward as far as possible. Three trials were given in succession.

Scoring : The final score was the distance of the best jump measured to the nearest centimetres. [174]

Zigzag Run

Purpose : To measure agility primarily and speed secondarily.

Equipment : Stop watch, 5 poles, space for Zigzag course which is a rectangular field of 16ft x 10ft size with the poles placed at the concerns and middle point of the field.

Procedure : The event was explained and demonstrated. The subject began at the start and followed the prescribed course for three complete laps. The watch was stopped when the subject finished his run at the end the third. The subjects were instructed that the standing start was allowed. On the command go, the subject runs

the prescribed course in a figure of eight fashion. They were advised not to grasp the poles or not to misplace them anyway. They were directed to complete three circuits of the course and continue to run past the finish mark.

Scoring : The final score was the elapsed time to the nearest tenth of a second which was required to run the prescribed course – three times.[174]

Fig. No. 9: Measurement of Zigzag Run

Six Pound Medicine Ball Put

Purpose: To measure arm and shoulder girdle strength primarily, and power, agility arm and shoulder girdle co-ordination speed and balance secondarily.

Equipment: A space in the field approximately 90 ft x 25 ft. A restraining line was clearly marked with a second line 15 ft to the rear. The throw was made from between these lines. A measuring steel tape was used.

Procedure: the event was explained and demonstrated. The subject stood between the restraining lines and put the ball straight down the course. They took three trials in succession.

Scoring: The final scores was the distance of the best put measured to the nearest meter.[174]

Fig. No. 10 Measurement of Six Pound Medicine Ball Put

Measurement of speed - 50 mtr. run:

Purpose : The purpose of this test was to measure the speed of the subject

Equipment : Starting liner, 50 meter straight line, two stop watches, whistles, and clapper.

Procedure : The subjects were divided into two groups and were motivated to run by explaining the purpose of the test. They came in two and assembled behind the starting line. At the starting signal by a clapper, they ran as fast as possible and finished 50 meter distance.

Scoring : The time taken to cover 50 meter in the nearest tenth of second was taken as score of speed.[174]

Fig. No. 11 Measurement of speed - 50 mtr. Dash

Measurement of endurance - 600 yds run

Purpose : To measure endurance of the subject.

Equipments : A track, or an area within a football field, or a square 50 yards on each side of a playground, stop watch, clapper, whistle.

Procedure : Students used a standing start. At the signal, "ready? go!" the students ran for 600 yard distance covered. Three students ran at a time. The timer merely calls out the time as the pupils cross the finish line. Walking was permitted but the object was to cover the distance within shortest possible time.

Scoring : Recorded in minutes and seconds. [174]

Fig. No. 12 Measurement of endurance -600 yds run

3.11.5 Measurement of Soccer Skill

For Football Skill five tests were conducted. Out of these five, three tests adopted from Warner's Soccer Skill Test and two from Batty (1980). These two test refereed by Eric G. Batty "Coaching Modern Soccer Attack", though he had not conducted these tests but he suggested that these are too much necessary for measuring football ability and S. Saha conducted these tests for his thesis and he had done a pilot study for Reliability and Validity [174,175]

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Kicking for Distance – Right and left Foot

Purpose : To measure Kicking ability for Distance with a degree of Accuracy using the Right Foot & Left foot.

Equipment : Soccer Balls and Field properly marked, Measuring Tape (100 mts.)

Field Marking : 25 yards restraining line was drawn with the perpendicular two straight line not less than 80 yards. The two lines were marked from the distance of 25 yeards to each 5 yards intervals up to maximum distance Parallel to the restraining line.

Fig. No. 13 A **Fig. No. 13 B**

Fig. No. 13 A & B Kicking for Distance – Right and left Foot

Procedure: The subjects ran to kick a stationery ball. The ball must stay within a lane that the 25 yards wide. The Distance in the air is measured. Three trials were given. The subjects took a running start and kick this ball first with Right Foot and then with Left Foot as far as possible down this marked off lane. It was measured at the first bounce. Out of three trials the best performance was counted. Teammates helped to retrieve and spot the balls.

Scoring : Measure the distance between the restraining line and first bounce of the kicked ball on ground. Record the best of three measured to the nearest yard.

Throw-ins for Distance in meter

Purpose : To measure Throwing ability

Equipments: Football and Steel Tape.

Procedure: The subjects were standing on the side lines and Thrown-in from correct Throwing position. The assistants made the spot where the ball first touched the ground. Distance measured through a Steel Tape. In between two chances the best one was recorded.

Fig. No. 14 Throw-ins for Distance in meter

Dribbling for Time

Purpose **:** To measure ability to Control the Ball with the Feet.

Equipments: Five objects, soccer ball, stop watch.

Procedure: The subject instructed to dribbles the soccer ball in and out among the objects and timed for the course of the trip. The distance between the two successive object was 15 (fifteen) feet and from starting line to the first object is also fifteen feet. On the signal ready "go" dribble the ball to the right and left of the objects, around the end zone and back to the same manner and cross the starting line. Three trials were timed and the best one was recorded.

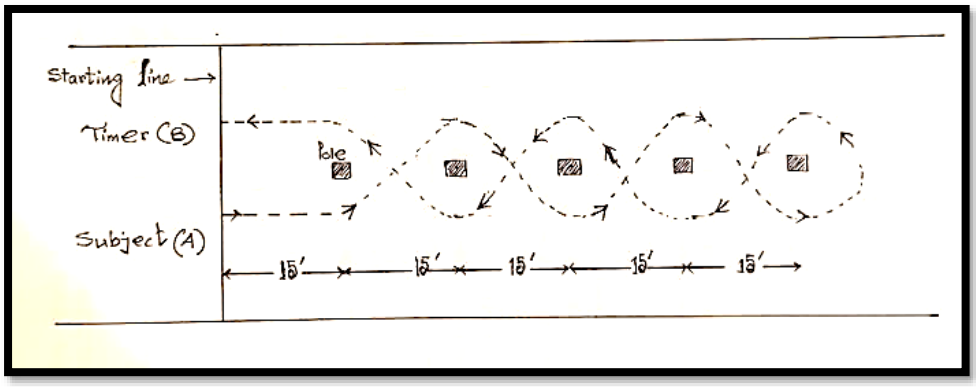


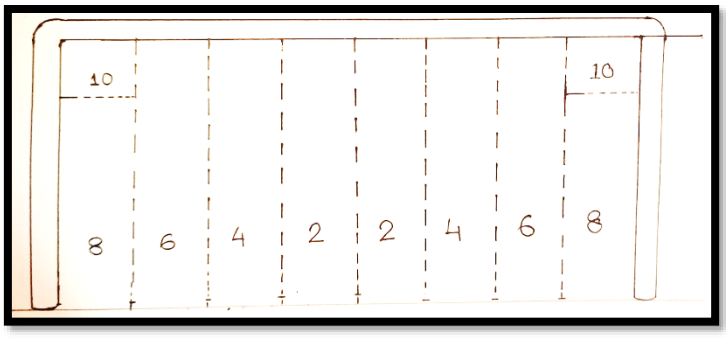
Fig. No. 15 Dribbling for Time

Shooting for Accuracy

Purpose : To measure Accuracy.

Equipments: Football, Goal Posts and Cross bar, being divided into separate zones.

Procedure: The ball kept in the penalty spot. Three chances were given to each subject and the space in between goal posts were divided into six and earned score according to complicacy. The points scored from three chances were recorded by the scholar.



3.11.6 Measurement of Soccer Playing Ability (performance rating)

Purpose : To measure soccer playing ability of the subject.

Procedure : Soccer playing ability of each Soccer player was judged by four qualified experts observing five Soccer playing ability related components (out of ten marks for each components) namely Skill, Physical Fitness, Tactical ability, Positioning sense and Game Temperament, in game situation for a week.

Fig. No. 16 A

Fig. No. 16 B

Fig. No. 16 A, B & C Measurement of Soccer Playing Ability (performance rating)

Fig. No. 16 C

Scoring: The average out of fifty marks given by each four qualified experts was considered as the score of Soccer playing ability of each Soccer player which was recorded in number. The average of the four experts' ratings was taken as a score for playing ability.

3.12 Training Programme

During the training period all the three groups underwent their respective training programmes in addition to their regular course of study as per their curriculum. The duration of training programmes was limited to twelve weeks with three days per week. Further, all the participants were instructed neither to change their life style nor to change their dietary intake for the entire duration of the training. A week consists of three days and each day has one sessions. Each training session consist of one and half hour to two and half hours approximately which included warming up and limbering down. All the subjects involved in this study were carefully monitored throughout the training programme to be away from injuries.

They were questioned about their health status throughout the training programmes. None of them reported any injuries.

3.13 Administration of Training Programmes

A twelve week training programme, three days per week i.e. on Mondays, Wednesdays and Fridays was undertaken in this study. At the time of the experimental period a training schedule prepared by the researcher with the help of supervisor and soccer experts was applied to the experimental groups and the training programme was supervised by the investigator with the help of three qualified experts and three assistants who were previously trained and instructed for the same.

The training programme was composed of soccer related body composition, motor fitness, soccer skill in dynamic situation and game practice as playing ability.

In the first two weeks of training session 10 minutes time for warming-up,30 minutes time for motor fitness training, 40 minutes time for soccer skills training 5 minutes rest and the 10 minutes time for cooling down were affixed. In between each phase 5minutes time was affixed for changing over and thus in the first two weeks total 100 minutes time was worked out.

5 minutes to10 minute's duration of time was enhanced or reduce as per requirement for each of the training items. I.e. physical fitness, soccer skill and playing ability in every after two weeks till the end of training programme. 10 minutes warming up and 10 minutes cool down programme was exercised continuously throughout the program .Last two week (I,e 11^{th} and 12th week)155 minutes time was worked out. Stimulus of intensity, density, duration, frequency and volume of load were adjusted according to the ability of the subject. The principle of 'worthwhile load' was fully utilized. The following table clearly depicted the time schedule of the training program.

Table no.1 : TOTAL TIME TABLE FOR SOCCER TRAINING(WEEK WISE)

DURATION (in min.)	WARMING UP & PHYSICAL TRAINING		REST	SKILL & TECHNIQUE	REST	GAME SITUATION	COOLING DOWN	TOTAL DURATION
1st & 2nd weeks	10 minute	30 minute	5 minute	40 minute	5 minute	……	10 minute	100 minute
3rd & 4th weeks	10 minute	40 minute	5 minute	40 minute	5 minute	……..	10 minute	110 minute
5th&6th weeks	10 minute	40 minute	5 minute	45 minute	5 minute	15 minute	10 minute	130 minute
7 th & 8 th weeks	10 minute	30 minute	5 minute	50 minute	5 minute	25 minute	10 minute	135 minute
9th & 10th weeks	10 minute	30 minute	5 minute	40 minute	5 minute	40 minute	10 minute	140 minute
11th &12 th weeks	10 minute	35 minute	5 minute	40 minute	5 minute	50 minute	10 minute	155 minute

Table no.2 : DETAIL SPECIFIC TRAINING PROGRAMME

DURATION	WARMING UP & PHYSICAL TRAINING		REST	SKILL & TECHNIQUE		REST	GAME SITUATION	COOLING DOWN
	10 min	30/35/40 min	5min	40 /45/50 min		5 min	10/25/40/50 min	10 min
1st & 2nd WEEKS (Total Time 100 minutes)	Loosening exercise, jogging, dyanamic stretching exercise.	Resistance exercise, weight training, speed training, co-ordination &balance.	Rest	Ball Passing & Receiving , Trapping, Heading, Turning with Ball, Dribbling, Shooting, Kicking	Practice various movement with and with out ball.	Rest	--	Shoulder stretch, Torso strtch, Neck stretch, Quadriceps stretch, Hamstring stretch, Bridge posture.
3rd & 4th WEEKS (Total Time 110 minutes)	Loosening exercise, jogging, dyanamic stretching exercise,Striding , light free hand exercise.	Slow continuous running Endurance development.	Rest	Ball passing ,Receiving,Heading, With ball zig -zag run,With ball turning,Shooting ,Ball control	Practice various movement with and with out ball.	Rest	--	Shoulder stretch,Torso strtch,Neck stretch,Quadriceps stretch,Hamstring stretch,Bridge posture.
5th & 6th WEEKS (Total Time 130 minutes)	Loosening exercise, jogging, dyanamic stretching exercise,Striding , light free hand exercise.	Basic motor skill development.Endurance training.	Rest	Running with ball, Dribbling,Ball control & turning, 1 vs 1 attacking.High drive kick to pass the ball to the partner .	Practice various movement with and with out ball.	Rest	Technical movement apply as best as possible in game like situation	Shoulder stretch,Torso strtch,Neck stretch,Quadriceps stretch,Hamstring stretch,Bridge posture.Childs pose,Recycling twist.
7th & 8 th WEEKS (Total Time 135minutes)	Slow jogging and dynamic stretching, Gradually incressing speed of running with long stride.	Perception & awareness balance ,Short sprint recovery.	Rest	Receiving to turn passing &receiving. Heading in running codition with partner.	Practice various movement with and with out ball.	Rest	Technical movement apply as best as possible in game like situation & cooling down	Shoulder stretch,Torso strtch,Neck stretch,Quadriceps stretch, Hamstring stretch, Bridgeposture.Childspose ,Recycling twist.
9th & 10th WEEKS (Total Time 140minutes)	Slow jogging and dynamic stretching, long stride run,Free hand exercise.	Speed and agility ,General strength,explosive strength development.	Rest	Aerial control, Heading, crossing & finishing,Aerial ball control & heading. Receiving the ball with chest,thigh,foot, and full instep running codition with partner.	Practice various movement with and with out ball.	Rest	Technical movement apply as best as possible in game like situation	Shoulder stretch, Torso strtch, Neck stretch, Quadricepsstretch, Hamstring stretch, Bridgeposture.Childspose, Recycling twist.
11th & 12th WEEKS (Total Time 155minutes)	Loosening exercise,slow jogging, dynamic stretching,free hand exercise.	Perception and awareness reaction &acceleration.	Rest	Passing and receiving ball control &shooting, Receving to turn and shooting,over head back volley in dynamic condition with parner.	Practice various movement with and with out ball.	Rest	Technical movement apply as best as possible in game like situation .	Shoulder stretch,Torso strtch, Neck stretch,Quadriceps stretch, Hamstring stretch, Bridge posture. Childspose, Recycling twist.

Table no. 3 : TRAINING SCHEDULE

ALLOTMENT OF TIME FOR EACH PART OF THE TRAINING PROGRAMMED

Week	Warming Up	Motor Fitness	Intensity	Density	Skill Dynamic	Intensity	Density	Team Game	Cooling Down	Total Time
1st &2nd	10 min	30 min	optimum	2 min	30min+ 10 min	optimum	5 min	-	10 min	100 min
3rd &4th	10 min	40 min	moderate	2 min	30min+ 10 min	moderate	5 min	-	10min	110min
5th& 6th	10 min	40 min	high	2 min	30min+ 15 min	moderate	5 min	15 min optimum	10 min	130 min
7th &8th	10 min	30 min	high	2 min	30min+ 20 min	high	5 min	25min moderate	10 min	1min135
9th&10th	10 min	30 min	moderate	2 min	30min+ 10 min	high	5 min	40 min high	10min	140 min
11th&12th	10 min	35 min	moderate	2 min	30min+ 10 min	high	5 min	50 min high	10min	155 min

3.14 Experimental Design

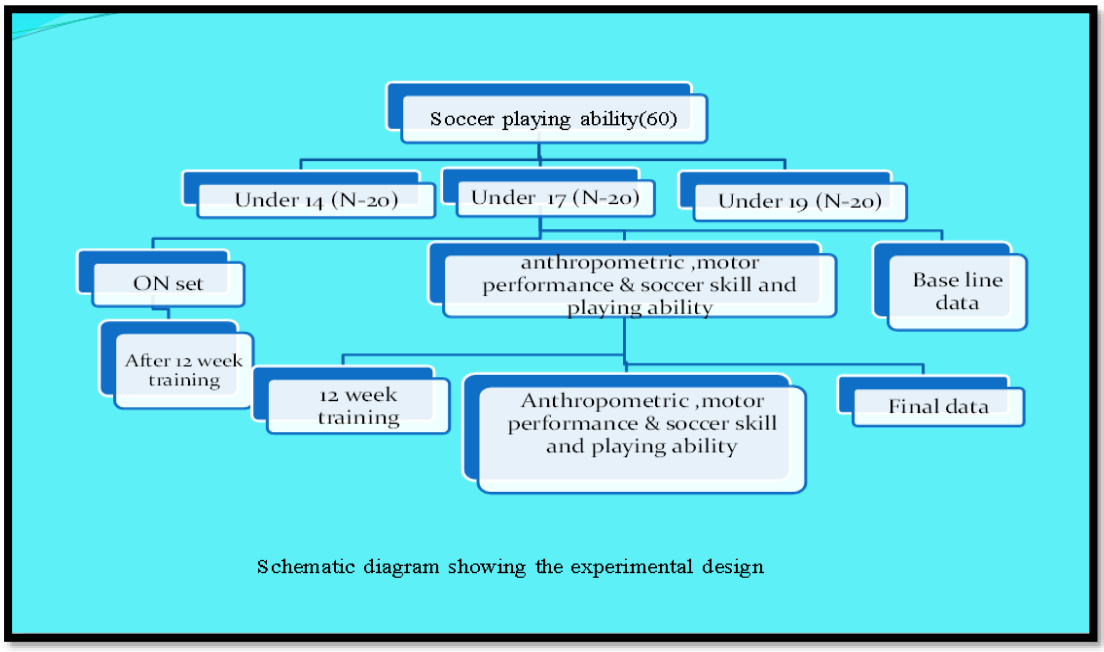


Fig. No. 17 A. Diagram of the experimental design

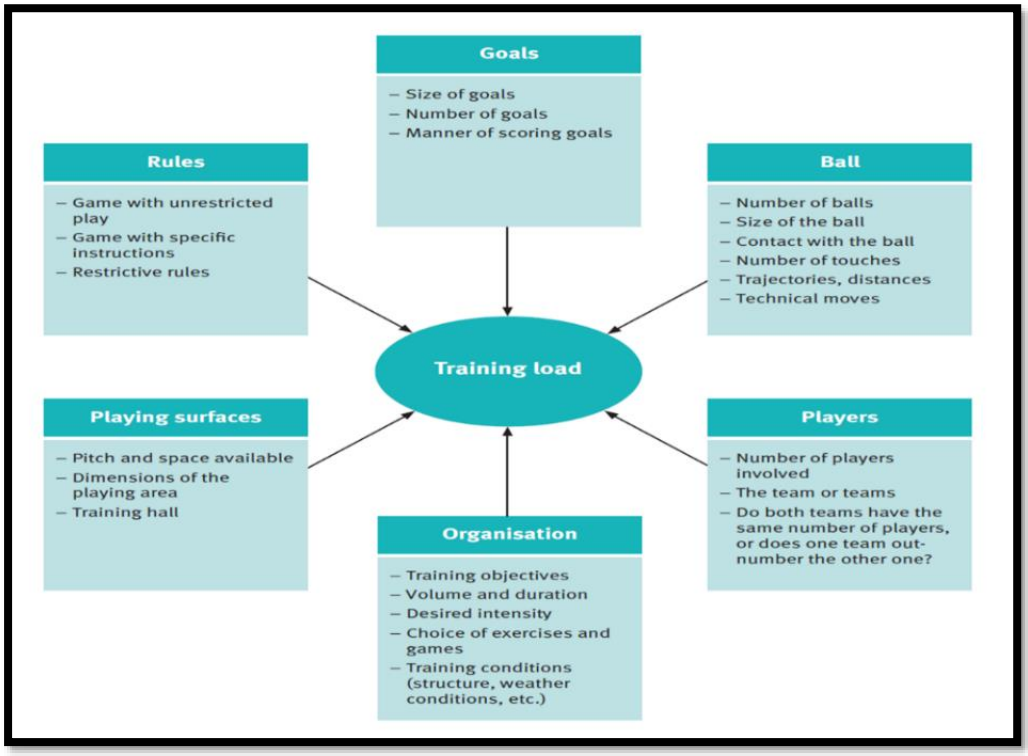


Fig. No. 17 B. Different factors influencing training load

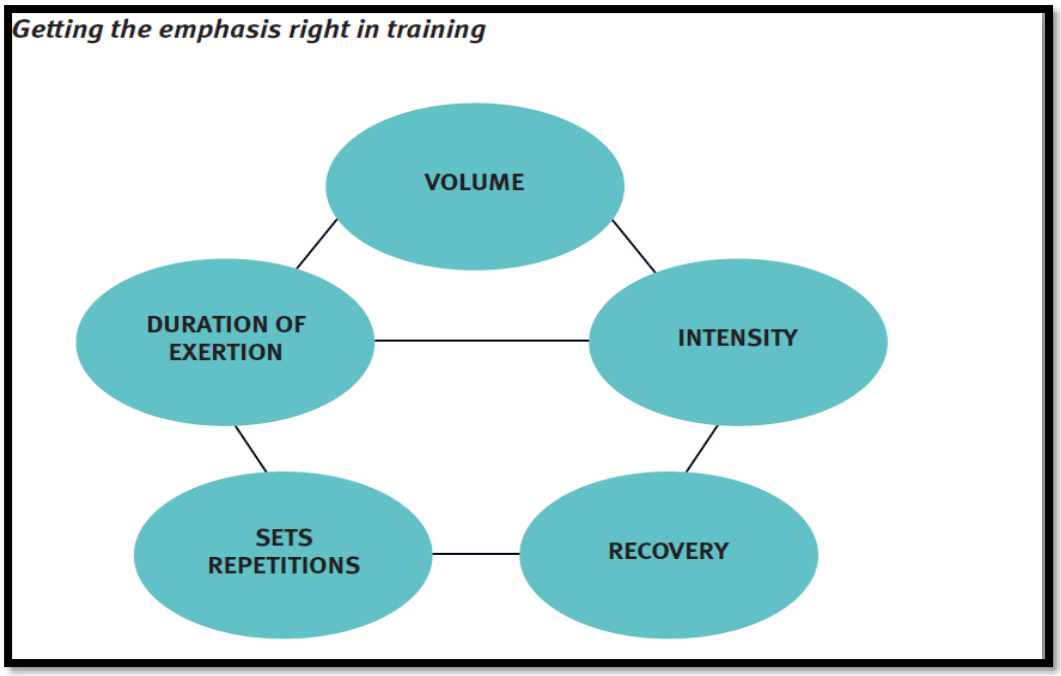


Fig. No. 17 C. Different factors of load

3.15 Statistical Procedure

For the analysis of collected data following statistical treatments were given**:-**

1) Mean of each measured criteria were calculated. The mean was calculated as the measures of central tendency.

2) Statistical significance of the difference between mean values of different criteria for different variable was tested by analysis of covariance (ANCOVA) i.e. by 'F' ratio.

3) For the purpose of studying significant difference between means, the level of significance was set at 0.05 level of confidence which, in the opinion of the investigator was deemed to be adequate.

4) Percentage of performance development was calculated.

5) Regression Analysis was done.

Chapter IV

RESULT AND DISCUSSION

4.1 The Data

4.2 Presentation and Analysis of Data

4.3 Co-Variance of Anthropometric Variables

4.4 Discussion of Findings

4.5 Motor Fitness

4.6 Soccer Skill Test

4.7 Soccer Playing Ability

4.8 Discussions

4.9 Testing of Hypothesis

CHAPTER – IV

RESULTS AND DISCUSSION

Results of statistical calculation, analysis and interpretation of the collected data in the light of the existing knowledge and testing of hypothesis, which has formulated in the beginning of this thesis, have been presented in this chapter.

4.1 The Data

The main objectives of the present thesis was to compare the effect of soccer training programme on selected anthropometric variables, motor fitness variables, Soccer skills and soccer playing ability of three age group of male soccer's players of 14, 17 and 19 years.

4.2 Presentation and Analysis of Data

Normality of Data: Normality of Data is tested through Shapiro-Wilk Test.

Table no. 4: The value of the Shapiro-Wilk Test of different variables of three groups

variables	Group	Shapiro-Wilk			
		pre		post	
		Statistic	Sig.	Statistic	Sig.
Weight	U14	.969	**.738**	.962	**.582**
	U17	.953	**.418**	.955	**.441**
	U19	.961	**.569**	.982	**.962**
Height	U14	.952	**.398**		
	U17	.954	**.432**		
	U19	.966	**.670**		
Triceps	U14	.929	**.145**	.900	.042
	U17	.924	**.119**	.965	**.655**
	U19	.881	.018	.845	.004
Sub-scapula	U14	.903	.047	.932	**.165**
	U17	.952	**.406**	.958	**.510**
	U19	.950	**.367**	.859	.008
Suprailliac	U14	.892	.029	.908	**.059**
	U17	.890	.027	.825	.002
	U19	.937	**.209**	.897	.036
Calf	U14	.856	.007	.890	.027
	U17	.932	**.166**	.943	**.274**
	U19	.912	**.069**	.903	.046

Mid-thigh	U14	.875	.014	.926	**.127**
	U17	.911	**.068**	.923	**.114**
	U19	.866	.010	.885	.022
Abdomen	U14	.818	.002	.839	.003
	U17	.863	.009	.900	.042
	U19	.936	**.206**	.912	**.069**
Medicine ball put	U14	.959	**.527**	.956	**.468**
	U17	.910	**.063**	.916	**.083**
	U19	.976	**.869**	.959	**.524**
Standing Broad Jump	U14	.849	.005	.953	**.415**
	U17	.807	.001	.965	**.644**
	U19	.944	**.281**	.915	**.079**
Zigzag run	U14	.973	**.819**	.949	**.345**
	U17	.940	**.239**	.943	**.275**
	U19	.913	**.072**	.922	**.109**
50 mtr. run	U14	.879	.017	.920	**.098**
	U17	.909	**.062**	.937	**.208**
	U19	.840	.004	.940	**.237**
600 yards. run	U14	.858	.007	.843	.004
	U17	.952	**.394**	.870	.012
	U19	.938	**.221**	.947	**.319**
Soccer playing ability	U14	.943	**.268**	.954	**.424**
	U17	.955	**.443**	.954	**.433**
	U19	.920	**.098**	.958	**.497**
Right foot kick	U14	.909	**.061**	.922	**.106**
	U17	.940	**.235**	.903	.047
	U19	.953	**.420**	.948	**.332**
Left foot kick	U14	.874	**.014**	.889	.026
	U17	.939	**.232**	.932	**.170**
	U19	.968	**.708**	.934	**.185**
Throw-in for distance	U14	.962	**.591**	.958	**.499**
	U17	.952	**.406**	.935	**.191**
	U19	.929	**.150**	.950	**.366**
Shooting accuracy	U14	.840	.004	.879	.017
	U17	.931	**.164**	.911	**.067**
	U19	.896	.034	.914	**.075**
Dribbling ability	U14	.900	.041	.900	.041
	U17	.949	**.358**	.971	**.771**
	U19	.442	.000	.952	**.395**

df 20

The value of the **Shapiro-Wilk Test** is greater than 0.05 indicates that the data is normal. If it is below 0.05, the data significantly deviate from a normal distribution. The Shapiro-Wilk test for normality is available when using the distribution platform to examine a continuous variable.

The null hypothesis for this test is that the data are normally distributed. The Prob < W value listed in the output is the p-value. If the chosen alpha level is 0.05 and the p-value is less than 0.05, then the null hypothesis that the data are normally distributed is rejected. If the p-value is greater than 0.05, then the null hypothesis is not rejected.

The normality tests are supplementary to the graphical assessment of normality. The main tests for the assessment of normality are Kolmogorov-Smirnov (K-S) test, Lilliefors corrected K-S test, Shapiro-Wilk test, Anderson-Darling test, Cramer-von Mises test, D'Agostino skewness test, Anscombe-Glynn kurtosis test, D'Agostino-Pearson omnibus test, and the Jarque-Bera test. Among these, K-S and Shapiro- Wilk tests are much used test and the K-S and Shapiro-Wilk tests can be conducted in the SPSS Explore procedure. [216]

Table no. 5: The value of the Levene statistic of different variables

		PRE		POST	
		Levene Statistic	Sig.	Levene Statistic	Sig.
Weight	Based on Mean	.945	.395	.816	.447
Height	Based on Mean	.176	.839		
Triceps	Based on Mean	6.864	.002	8.611	.001
Subscapula	Based on Mean	.429	.653	.092	.912
Suprailliac	Based on Mean	.697	.502	2.390	.101
Calf	Based on Mean	13.622	.000	16.405	.000
Midthigh	Based on Mean	8.733	.000	7.881	.001
Abdomen	Based on Mean	4.631	.014	3.090	.053
Medicine ball put	Based on Mean	1.159	.321	1.088	.344
Standing Broad Jump	Based on Mean	23.467	.000	4.302	.018
Zigzag run	Based on Mean	1.093	.342	2.043	.139
50 mtr. run	Based on Mean	4.717	.013	4.816	.012
600 yrds. run	Based on Mean	10.353	.000	12.975	.000
Soccer Playing ability	Based on Mean	1.850	.167	.673	.514
Right foot kick	Based on Mean	1.676	.196	1.820	.171
Left foot kick	Based on Mean	3.087	.053	4.421	.016
Throw-in for distance	Based on Mean	3.353	.042	3.152	.050
Shooting accuracy	Based on Mean	.210	.812	1.560	.219
Dribbling ability	Based on Mean	1.507	.230	9.080	.000

df 1- 02, df 2- 57

The data homogeneity test was carried out using Leven's test with SPSS 16.0 at the 0.05 significance level. Data significance value is greater than 0.05 (sig > 0.05), which means the sample data tested is homogeneous.

For one example the homogeneity test results show the results of the sig test data homogeneity of soccer passing accuracy through penalty shootout is 0.812(pre) and 0.219(post), both of which is > 0.05, so the tested data is homogeneous.

After the data is declared normal and homogeneous through the normality test and data homogeneity, then the researcher performs a hypothesis test using the GLM (Two-way ANOVA) test. From the results of testing, the data obtained are table 2.

From the result of **Levene's Test** for Equality of Variances, we can reject the null hypothesis that there is no difference in the variances between the groups and accept the alternative hypothesis that there is a statistically **significant** difference in the variances between groups.

Levene’s test is built into most statistical software. The result from the test is reported as a p-value, which we can compare to your alpha level for the test. If the p-value is larger than the alpha level, then you can say that the null hypothesis stands — that the variances are equal; if the p-value is smaller than the alpha level, then the implication is that the variances are unequal.

Table no. 6: The mean and S.D. of different variables and comparison (t-test) between pre and post-test means of 14yrs. age group soccers.

14 yrs.		Mean ± Std. Deviation		p value
		Pre	Post	
01	Weight (Kg.)	30.45±4.72	29.75±4.82	.55
02	Height (mtr.)	1.43± .08	1.44± .09	.53
03	Triceps (mm)	6.18±1.28	5.59±1.12	.00
04	Sub scapula (mm)	5.15 ± .91	4.80 ±.85	.04
05	Suprailliac (mm)	5.46± 1.46	4.88 ±1.00	.02
06	Calf (mm)	7.62 ±1.58	7.11±1.32	.01
07	Midthigh (mm)	7.94±1.57	7.44±1.41	.10
08	Abdomen (mm)	6.13±1.44	5.85±1.36	.00
09	Medicine ball put (mtr.)	5.69±.84	6.40±.82	.00
10	Standing Broad Jump (cm.)	167.55± 15.28	202.30±7.50	.00
11	Zigzag run (sec.)	24.47± 1.30	22.34 ± 1.38	.00
12	50 mtr. run (sec.)	8.98±.38	7.89 ±.30	.00
13	600 yrds. run (sec.)	255.65± 36.57	148.35±24.72	.00
14	Soccer Playing ability (no.)	5.84±.66	6.74 ±.45	.00
15	Right foot kick (mtr.)	16.37±4.51	18.43±4.51	.00
16	Left foot kick (mtr.)	12.38±4.05	15.32 ± 3.56	.00
17	Throw-in for distance (mtr.)	10.18 ± 2.43	11.54 ± 2.66	.00
18	Shooting accuracy (no.)	3.42± .94	4.18± .62	.00
19	Dribbling ability (sec)	18.86± 3.34	17.31± 3.42	.00
20	Total	61.20± 7.34	66.78± 7.01	.00

Table no. 7: The mean and S.D. of different variables and comparison (t-test) between pre and post-test means of 17yrs. age group soccers.

17 yrs.		Mean ± Std. Deviation		P value
		pre	post	
01	Weight (Kg.)	46.10 ± 6.82	45.85 ± 6.33	.44
02	Height (mtr.)	1.61± .09	1.63±.08	.59
03	Triceps (mm)	5.40 ± .66	4.9775±.65	.00
04	Sub scapula (mm)	6.41 ±.78	5.70±.78	.00
05	Suprailliac (mm)	6.04 ±1.46	5.36±1.32	.00
06	Calf (mm)	6.86 ±1.14	6.53± 1.08	.00
07	Midthigh (mm)	7.00 ±.97	6.44±.72	.002
08	Abdomen (mm)	7.24 ±1.37	6.69± 1.53	.005
09	Medicine ball put (mtr.)	6.84 ±1.25	8.23± 1.17	.00
10	Standing Broad Jump (cm.)	159.00 ±28.24	208.45±17.59	.00
11	Zigzag run (sec.)	25.44 ±1.30	24.45± 1.39	.00
12	50 mtr. run (sec.)	8.53 ±.44	7.60±.46	.00
13	600 yrds. run (sec.)	171.50 ±19.06	105.38±12.88	.00
14	Soccer Playing ability (no.)	5.64 ±.76	6.62±.58	.00
15	Right foot kick (mtr.)	34.80 ±7.04	37.04± 7.59	.00
16	Left foot kick (mtr.)	27.22 ±8.15	28.98±7.90	.00
17	Throw-in for distance (mtr.)	16.22 ±2.56	17.56± 2.58	.00
18	Shooting accuracy (no.)	3.88 ± .85	4.33±.48	.014
19	Dribbling ability (sec)	14.96 ± 1.29	13.81±1.54	.00
20	Total	97.08±15.01	101.73±15.30	.00

Table no. 8: The mean and S.D. of different variables and comparison (t-test) between pre and post-test means of 19yrs. age group soccers.

19 yrs.		Mean	Std. Deviation	P value
		pre	post	
01	Weight (Kg.)	53.35±6.47	54.40±6.58	.014
02	Height (mtr.)	1.66±.08	1.68±.07	.48
03	Triceps (mm)	5.88±1.76	5.51±1.78	.002
04	Sub scapula (mm)	6.74±.89	6.38±1.01	.00
05	Suprailliac (mm)	6.21±1.77	5.87±1.73	.001
06	Calf (mm)	8.60±3.59	7.64±3.12	.005
07	Midthigh (mm)	7.41±3.09	6.80±2.57	.003
08	Abdomen (mm)	8.45±2.40	7.67±2.33	.00
09	Medicine ball put (mtr.)	9.70±1.25	10.88±1.32	.00
10	Standing Broad Jump (cm.)	199.10±6.74	247.50±11.66	.00
11	Zigzag run (sec.)	22.56±.84	21.47±.76	.00
12	50 mtr. run (sec.)	7.05±.22	6.33±.29	.00
13	600 yrds. run (sec.)	157.07±21.76	99.17±6.62	.00
14	Soccer Playing ability (no.)	5.69±.92	6.91±.53	.00
15	Right foot kick (mtr.)	36.80±6.10	39.34±5.99	.00
16	Left foot kick (mtr.)	29.98±6.05	31.15±6.29	.16
17	Throw-in for distance (mtr.)	18.04±3.54	19.14±3.67	.001
18	Shooting accuracy (no.)	3.65±.78	4.08±.72	.03
19	Dribbling ability (sec)	15.70±5.92	13.44±1.06	.11
20	Total	104.17±16.05	07.16±12.68	.14

4.3 Co-Variance of Anthropometric Variables

The Mean value and Analysis of Co-variance of the obtained data about weight, height and body fat % of three groups of football players have been presented in the following tables.

Table-9: Mean, standard deviation, adjusted mean and p value of different variables

Variables	Test	14 yrs.		17 yrs.		19 yrs.	
		Mean ± S. D.	p value	Mean ± S. D.	p value	Mean ± S. D.	p value
Weight (Kg.)	pre	30.45±4.72		46.10±6.82		53.35±6.47	
	post	29.75±4.82	.55	45.85±6.34	.44	54.40±6.58	**.014**
	adj. post	40.51		43.51		45.98	
Height (Mtr.)	pre	1.44±0.08		1.61±0.09		1.66±0.08	
	post	1.44±0.08	.53	1.61±0.08	.59	1.67±0.08	.48
	adj. post	1.54		1.58		1.59	
Fat %	pre	9.55±1.38		9.45±0.98		10.11±2.45	
	Post	8.98±1.09	.47	8.80±0.85	.42	9.48±2.30	.46
	adj. post	9.11		9.02		9.13	

In table-9 the pre, post and adjusted post mean values and the respective p values of weight, height and body fat % of the three groups of football players were presented. In case of weight the mean value of the 14 yrs. group pre-test was 30.45kg, post-test was 29.75kg. &adjusted post-test was 40.51kg and p value .55. The mean value of the 17 yrs. group pre-test was 46.10kg, post-test was 45.85kg. & adjusted post-test was 43.51kg and p value .44. The mean value of the 19 yrs. group pre-test was 53.35kg, post-test was 54.40kg. & adjusted post-test was 45.98 kg and p value .014. Only for the 19 yrs. group a significant difference has occurred. In case of height the mean value of the 14 yrs. group pre-test was 1.44 meter post-test was 1.44 mtr. & adjusted post-test was 1.54 mtr. and p value .53. The mean value of the 17 yrs. group pre-test was 1.61 mtr., post-test was 1.61mtr. & adjusted post-test was 1.58 mtr.

and p value .59. The mean value of the 19 yrs. group pre-test was 1.66 mtr. , post-test was 1.67 mtr. & adjusted post-test was 1.59 mtr. and p value .48. There were no significant differences have occurred in any of the group. In case of body fat % the mean value of the 14 yrs. group pre-test was 9.55, post-test was 8.98 & adjusted post-test was 9.11 and p value .47. The mean value of the 17 yrs. group pre-test was 9.45, post-test was 8.80 &adjusted post-test was 9.02 and p value .42. The mean value of the 19 yrs. group pre-test was 10.11, post-test was 9.48 & adjusted post-test was 9.13 and p value .46. There were also no significant changes occurred in any of the said groups.

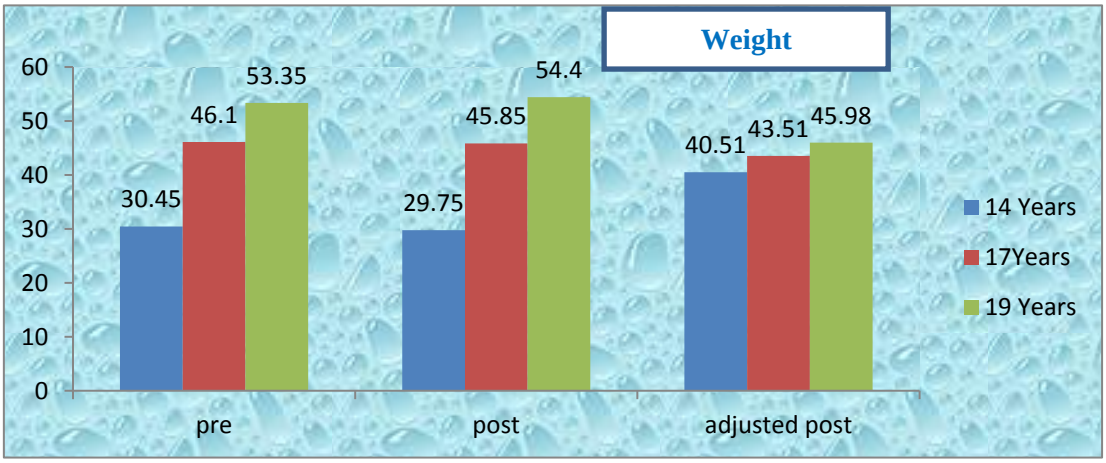


Fig. No. 18: The graphical representation of Mean of weight in pre, post and adjusted post test

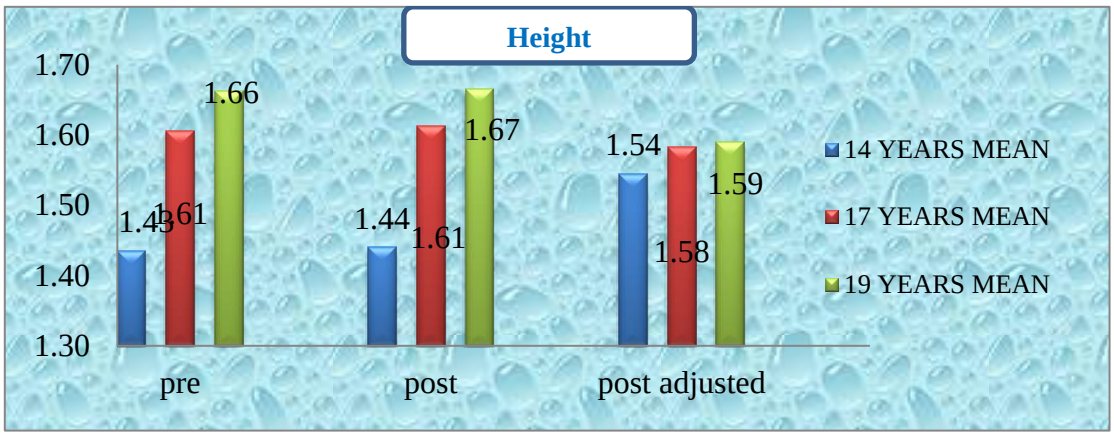


Fig. No. 19: The graphical representation of Mean of height in pre, post and adjusted post test

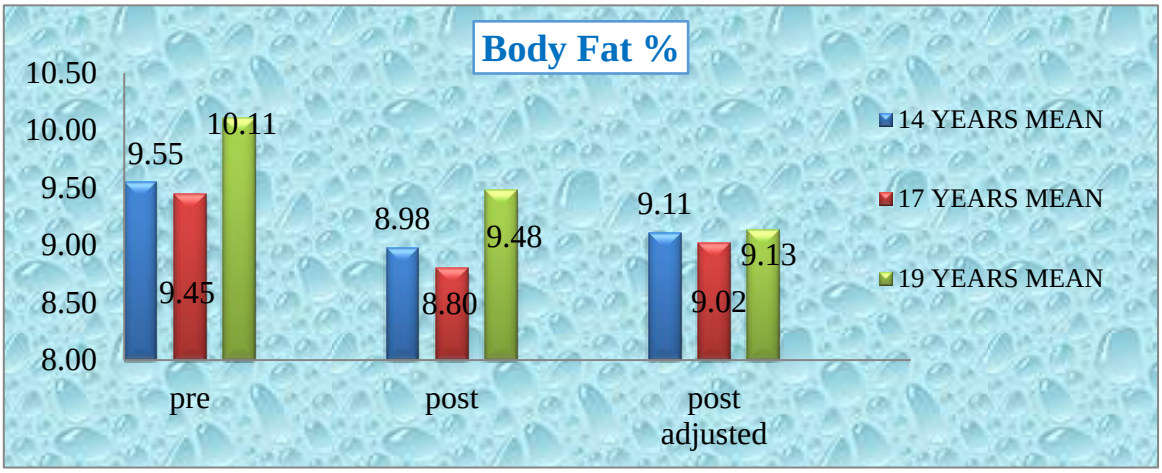


Fig. No. 20: The graphical representation of Mean of body fat %in pre, post and adjusted post-test

Table-10: Analysis of Co variance of different variables

Variables	Test	Variance	Sum of Squares	Mean Squares	'F' Value
Weight	Pre	Among, within	5479.30, 2101	2739.65, 36.86	74.32
	Post	Among, within	6266.23, 2027.10	3133.12, 35.56	88.10
	Adjusted post	Among, within	88.38, 553.38	44.19, 9.88	4.47
Height	Pre	Among, within	0.56, 0	0.28, 0.01	42.55
	Post	Among, within	0.55, 0.37	0.28, 0.01	42.29
	Adjusted post	Among, within	0.01, 0.14	0.00, 0.00	1.93
Body fat %	Pre	Among, within	5.01,168	2.50, 2.95	0.85
	Post	Among, within	4.94, 137.13	2.47, 2.41	1.03
	Adjusted post	Among, within	0.14, 11.56	0.07, 0.21	0.33

***Significant at 0.05 level of confidence**

F.05 (2, 57) = 3.15 A = among means variance

F.05 (2, 56) = 3.15 W = within group variance

Considering weight, the calculated F Value of the pre-test and post-test were 74.32 and 88.10 and were both greater than the table value $F_{0.05}$ (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the weight of all the three groups are not equally

affected. The F value of adjusted post-test was 4.47, which was also greater than the table value and signifies the unequal effect only due to the soccer training. Considering height the calculated 'F' ratio of the pre-test and post-test were 42.55 and 42.29 and were both greater than the table value $F_{0.05}$ (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the height of all the three groups are not equally affected. The F value of adjusted post-test was 1.93, which was less than the table value and not signifies any change due to the soccer training. Considering Body fat % the calculated 'F' ratio of the pre-test and post-test were 0.85 and 1.03 and were both less than the table value $F_{0.05}$ (2, 56/57) = 3.15 and it is concluded that regarding the body fat %, all the three groups are not affected at al due to the soccer training. The F value of adjusted post-test was 0.33, which was also less than the table value and not indicating any significant change due to the soccer training.

In order to find out upon which group the effect of soccer training was maximum, pairwise comparison analysis of adjusted means of post-test data was carried out.

Table 11: Adjusted mean scores and their differences of different variables during post testing in different groups

variables	group 1 (14 years)	group 2 (17 years)	group 3 (19 years)	Critical Difference
weight	40.51	43.51	45.98	0.44
differences	3.0*	2.47*		
height	1.54	1.58	1.59	0.01
differences	0.04*	0.01*		
Fat %	9.11	9.02	9.13	0.06
differences	0.09*	0.11*		

***at 0.05 level of significance**

Table 11 shows that in case of weight the soccer training programme was not equally effective and the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum

changes occur in case of U-19 boys and resulted into weight gain. In case of Height there were no effective changes occur among the three groups as the differences between three groups were marginally significant. Likewise in case of body fat % the same results occurred. As the critical difference (CD) of body fat % is less than the difference of the means of the adjusted post test of body fat % then it can be declared that in each case there were unequal effective changes occurred and maximum changes took places for the U 19 group of boys.

4.4 Discussion of Findings

The researcher has conceptualize this study with a purpose to find out the changes occurred in case of weight, height and body fat % due to Soccer training programme and compare them among three groups.

The above mention results showed the significant changes due to soccer training only occur in case of weight of U 19 players(p=.014), but in the other age groups no significant changes occur. In case of body fat % and height there were no significant changes occur in either of three groups. In U 14 and U 17 there were weight loss (mean weight reduced from 30.45 kg. to 29.75 and 46.10 kg. to 45.85 respectively) but in case of U 19 there was weight gain (mean weight increase from 53.35 kg. to 54.40 kg.). From the ANCOVA also it is clear that maximum changes occur in case of weight for the U 19 group. Although there was no weight gain planning included in the soccer training but this change may occur due to the maturity of the U 19 group. Besides scheduled exercise there were theory classes about health, nutrition, diet, rest etc. As the players of this group are quite matured then they followed the suggestions regarding the procedure weight gain and its importance. Amusa indicated that age (experienced) is the best single predictor of playing ability and running speed are considered important factors in soccer performance.[168]

The results showed maximum reduction of body fat % was took place in case of U 19 boys due to the effects of soccer training. All the three experimental group were under selected soccer training programme, comprises with Warm up, Physical Training, Skill and Technique, Game Situation, Cooling Down. They were participated in the training program thrice in a week and enjoyed the training. Physical activity is necessary for motor development. The main intension was to

develop the soccer playing ability and thus the development of motor fitness was very important and a result the body fat % also changed along with the body weight. In case of U 19 player the body weight significantly increased but the fat % reduced, which indicate the ultimate increase of muscle mass.

Morenoa, Leona et al. (2004) studied that the percentage of total body fat was significantly lower in the football (soccer) group than in the reference group at 9, 11, 12, and 14 years. In studies aiming to assess the effect of physical activity on body composition, it will be necessary to measure, not only body mass index, but other measures of the body fat compartment. Football (soccer) can be proposed as a physical activity practice aiming to prevent or treat obesity and its comorbidities.[176] Ostojic (2003) found that body fat content of professional soccer players significantly dropped during the conditioning and competitive periods and increased during the off-season.[177] Amusa indicated through 11 anthropometric measurements consisting of skin folds and body diameters and soccer playing ability and conclude lower fat % for good soccer player.[168]

Soccer training has specifically targeting to the development of soccer playing ability which depends upon different physical, physiological, psychological, technical and extraneous factors. Soccer training comprises with different such activities, which main focus is to develop these factors. Considering the individual characteristics the nature of exercises is different. In case of team practice if the participants are not under the control of the coaches' through-out the day like an academy it is quite difficult to focus on individual development. Here in this study there is no significant changes occur in case of weight, height and body fat percentage within the three groups except the weight in U 19 group. In comparison to other two age groups of 14 yrs. and 17 yrs. maximum changes occur in case of U 19 group.

4.5 Motor Fitness

Table-12: Mean, standard deviation, adjusted mean and p value of different variables.

Variables	Test	U-14 YEARS		U-17 YEARS		U-19 YEARS	
		Mean ± S.D	P Value	Mean ± S.D	P Value	Mean ± S.D	P Value
Medicine ball put (mtr.)	Pre	5.69 ± 0.84	.00	6.84 ± 1.25	.00	9.70 ± 1.25	.00
	Post	6.40 ± 0.82		8.23 ± 1.17		10.88 ± 1.40	
	Adj. Post	8.04		8.78		8.69	
Standing Broad Jump(cm.)	Pre	167.55 ± 15.28	.00	159.00 ± 28.25	.00	199.10 ± 6.73	.00
	Post	202.30 ± 7.50		208.45 ± 17.59		247 ± 11.66	
	Adj. Post	206.12		216.54		235.59	
Zigzag Run (sec.)	Pre	24.47 ± 1.30	.00	25.44 ± 1.30	.00	22.56 ± 0.84	.00
	Post	22.34 ± 1.38		24.45 ± 1.39		21.47 ± 0.77	
	Adj. Post	22.01		23.14		23.09	
50 MT Run (sec.)	Pre	8.98 ± 0.38	.00	8.53 ± 0.44	.00	7.05 ± 0.22	.00
	Post	7.89 ± 0.30		7.60 ± 0.46		6.3 ± 0.29	
	Adj. Post	7.29		7.34		7.19	
600Yds Run (sec.)	Pre	255.65 ± 36.57	.00	171.50 ± 19.06	.00	157.07 ±21.76	.00
	Post	148.35 ± 24.72		105.38 ± 12.88		99.17 ± 6.62	
	Adj. Post	132.52		111.41		108.96	

In table-12 the pre, post and adjusted post mean values and the respective p values of medicine ball put, standing broad Jump, zigzag run, 50 mtr. run & 600 yards run of the three groups of football players were presented. In case of medicine ball put the mean value of the 14 yrs. group pre-test was 05.69 mtr., post-test was 06.40 mtr. & adjusted post-test was 08.04 mtr. and p value 0.00. In case of medicine ball put the mean value of the 17 yrs. group pre-test was 06.84 mtr., post-test was 08.23 mtr. & adjusted post-test was 08.78 mtr. and p value 0.00. In case of Medicine ball put the mean value of the 19 yrs. group pre-test was 09.70 mtr., post-test was 10.88 mtr. & adjusted post-test was 08.69 mtr. and p value 0.00. In case of standing broad

jump the mean value of the 14 yrs. group pre-test was 167.55 cm. post-test was 202.30 cm. & adjusted post-test was 206.12 cm. and p value 0.00. In case of standing broad jump the mean value of the 17 yrs. group pre-test was 159.00 cm., post-test was 208.45 cm. & adjusted post-test was 216.54 cm. and p value 0.00. In case of standing Broad Jump the mean value of the 19 yrs. group pre-test was 199.10 cm., post-test was 247.00 cm. & adjusted post-test was 235.59 cm. and p value 0.00. In case of zigzag run the mean value of the 14 yrs. group pre-test was 24.47 sec., post-test was 22.34 sec. & adjusted post-test was 22.01sec. and p value 0.00. In case of zigzag run the mean value of the 17 yrs. group pre-test was 25.44 sec., post-test was 24.45 sec. &adjusted post-test was 23.14 sec. and p value 0.00. In case of zigzag run the mean value of the 19 yrs. group pre-test was 22.56 sec., post-test was 21.47 sec. & adjusted post-test was 23.09 sec. and p value 0.00. In case of 50 mtr. run the mean value of the 14 yrs. group pre-test was 08.98 sec., post-test was 07.89 sec. & adjusted post-test was 7.29 sec. and p value 0.00. In case of 50 mtr. run the mean value of the 17 yrs. group pre-test was 08.53 sec., post-test was 07.60 mtr. & adjusted post-test was 7.34 mtr. and p value .00. In case of 50 mtr. run the mean value of the 19 yrs. group pre-test was 07.05 sec., post-test was 06.30 sec. & adjusted post-test was 7.19 and p value 0.00. In case of 600 yds. run the mean value of the 14 yrs. group pre-test was 255.65 sec., post-test was 148.35 sec. & adjusted post-test was 132.52 sec. and p value 0.00. In case of 600 yds. run the mean value of the 17 yrs. group pre-test was 171.50 sec., post-test was 105.38 sec. & adjusted post-test was 111.41sec. and p value 0.00. In case of 600 yds. run the mean value of the 19 yrs. group pre-test was 157.07 sec., post-test was 99.17 sec. & adjusted post-test was 108.96 sec. and p value 0.00.

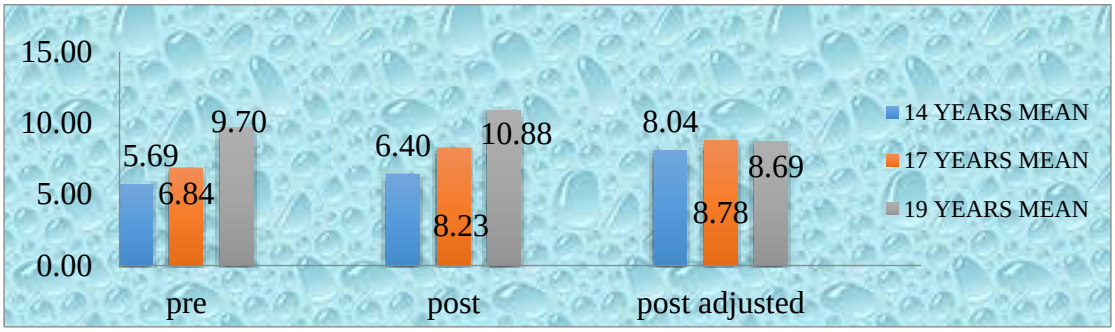


Fig. No. 21: The graphical representation of Mean of medicine ball puts in pre, post and adjusted post test

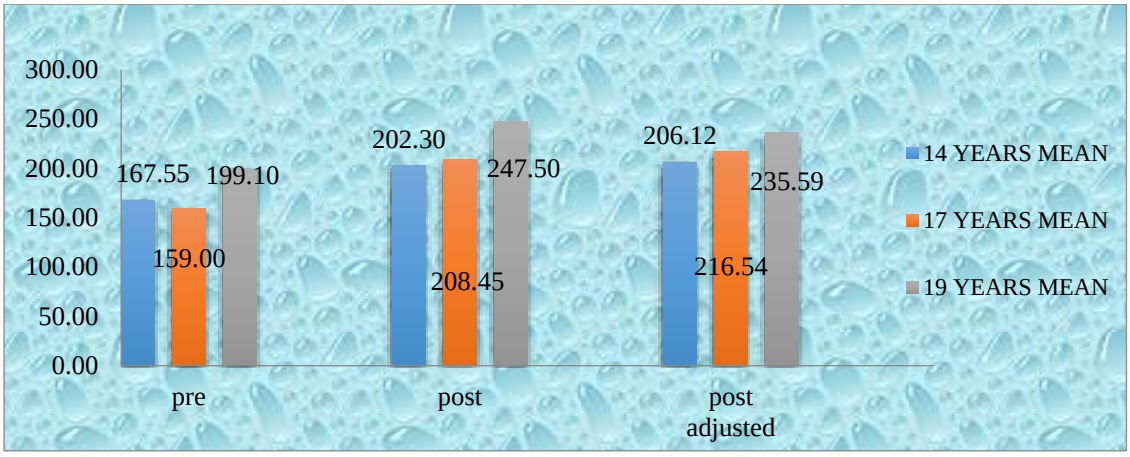


Fig. No. 22: The graphical representation of Mean of standing broad jump in pre, post and adjusted post test

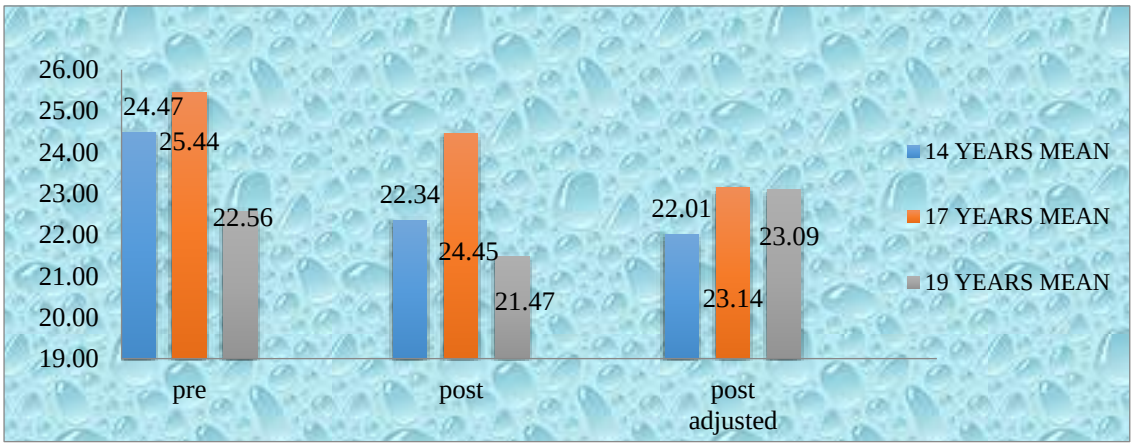


Fig. No. 23: The graphical representation of Mean of zigzag run in pre, post and adjusted post test

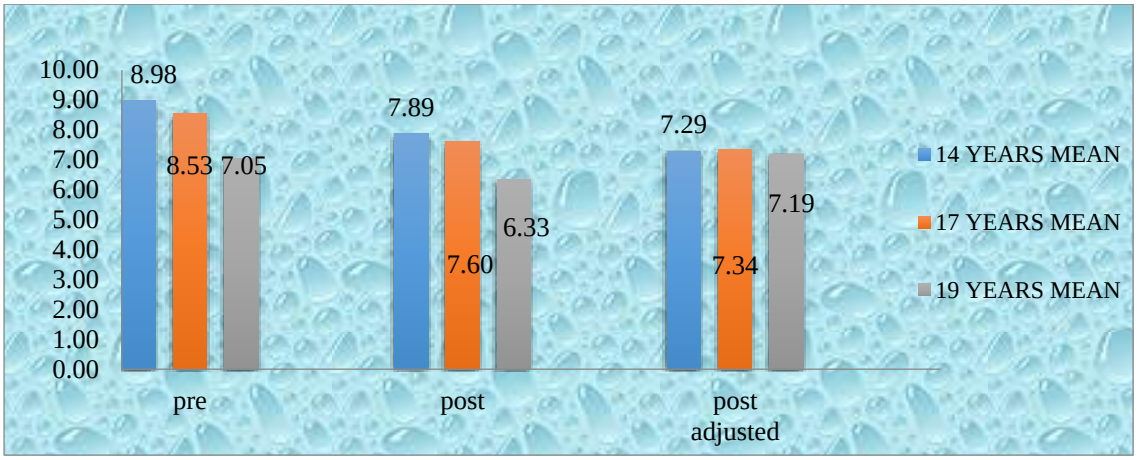


Fig. No. 24: The graphical representation of Mean of 50 mtr. run in pre, post and adjusted post test

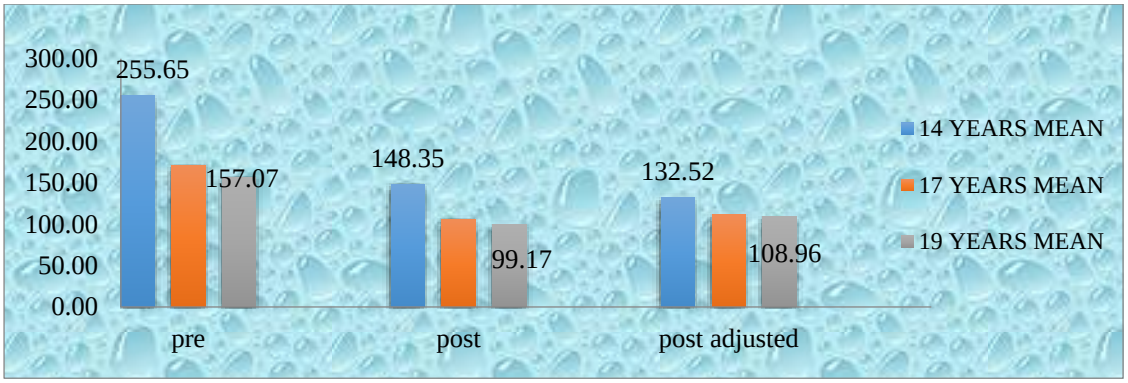


Fig. No. 25: The graphical representations of Mean of 600 yds. run in pre, post and adjusted post test

Table-13: Analysis of Co variance of different variables

* Significant at 0.05 level of confidence

Variables	Test	Variance	Sum of Squares	Mean Squares	'F' Value
Medicine ball put	Pre	Among, within	170.26 ,73	85.13,1.28	66.75
	Post	Among, within	203.34,72.23	101.67,1.27	80.24
	Adjusted post	Among, within	4.58,5.50	2.29,0.10	**23.34**
Standing board jump	Pre	Among, within	17843.43,20459	8921.72,358.93	24.86
	Post	Among, within	24038.43,9530.15	12019.22,167.20	71.89
	Adjusted post	Among, within	5943.03,4441.11	2971.51,79.31	37.47
Zigzag run	Pre	Among, within	85.98,78	42.99,1.36	31.52
	Post	Among, within	93.84,84.40	46.92,1.48	31.69
	Adjusted post	Among, within	16.12,4.07	8.06,0.07	110.83
50 mtr. run	Pre	Among, within	40.88,7	20.44,0.13	156.57
	Post	Among, within	27.43,7.33	13.71,0.13	106.69
	Adjusted post	Among, within	0.08,3.09	0.04,0.06	**0.74**
600 yds run	Pre	Among, within	113385.35,41313	56692.68,724.80	78.22
	Post	Among ,within	28691.78,15594.54	14345.89,273.59	52.44
	Adjusted post	Among, within	1801.16,273.59	900.58,228.67	**3.94**

F.05 (2, 57)= 3.15 A= among means variance

F.05 (2, 56)= 3.15 w= within group variance

Considering Medicine ball put, the calculated F Value of the pre-test and post-test were 66.75 and 80.24 and were both greater than the table value F0.05 (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the Medicine ball put of all the three groups are not equally affected. The F value of adjusted post-test was 23.34, which was also greater than the table value and signifies the unequal effect only due to the soccer training. Considering Standing Broad Jump the calculated 'F' ratio of the pre-test and post-test were 24.86 and 71.89 and were both greater than the table value F0.05 (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the Standing Broad Jump of all the three groups are not equally affected. The F value of adjusted post-test was 37.47, which was less than the table value and not signifies any change due to the soccer training. Considering Zigzag Run the calculated 'F' ratio of the pre-test and post-test were 31.52 and 31.69 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the Zigzag Run, all the three groups are not affected at al due to the soccer training. The F value of adjusted post-test was 110.83, which was also less than the table value and not indicating any significant change due to the soccer training. Considering 50mtr. Run the calculated 'F' ratio of the pre-test and post-test were 156.57 and 106.69 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the 50mtr. Run, all the three groups are not affected at al due to the soccer training. The F value of adjusted post-test was 0.74, which was also less than the table value and not indicating any significant change due to the soccer training. Considering 600yds Run the calculated 'F' ratio of the pre-test and post-test were 78.22 and 52.44 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the 600yds Run, all the three groups are not affected at all due to the soccer training. The F value of adjusted post-test was 03.94, which was also less than the table value and not indicating any significant change due to the soccer training.

In order to find out upon which group the effect of soccer training was maximum, pairwise comparison analysis of adjusted means of post test data would be carried out.

Table 14: Adjusted mean scores and their differences of different variables during post testing in different

Variables	group 1 (14 years)	group 2 (17 years)	group 3 (19 years)	Critical Difference
Medicine ball put	8.04	8.78	8.69	0.04
differences	0.74*		0.09*	
Standing broad jump	206.12	216.54	235.59	1.26
differences	10.42*		19.05*	
Zigzag run	22.01	23.14	23.09	0.04
differences	1.13*		0.05*	
50 mtr. run	7.29	7.34	7.19	0.03
differences	0.05*		0.15*	
600yds run	132.52	111.41	108.96	2.14
differences	21.11*		2.46*	

***at 0.05 level of significance**

Table - 14 shows that in case of Medicine ball put the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-17 boys and resulted into distance of Medicine ball put ability gain.

In case of Standing Broad Jump the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-19 boys and resulted into distance of Standing Broad Jump ability gain.

In case of Zigzag Run the soccer training programme were nearly equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes

occur in case of U-14 boys and resulted into lower time of Zigzag Running ability gain.

In case of 50mtr. Run the soccer training programme were nearly equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-19 boys and resulted into lower time of 50mtr. Running ability gain.

In case of 600yds run the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-19 boys and resulted into lower time of 600yds Running ability gain.

Alves, et al. (2010)[200] conducted a study on Short-term effects of complex and contrast training in soccer players' vertical jump, sprint, and agility abilities. The purpose of this study was to analyze the short-term effects of complex and contrast training (CCT) on vertical jump (squat and countermovement jump), sprint (5 and 15 m), and agility (505 Agility Test) abilities in soccer players. Twenty-three young elite Portuguese soccer players (age 17.4 ± 0.6 years) were divided into 2 experimental groups (G 1, n = 9, and G2, n = 8) and 1 control group (G3, n = 6). Groups G l and G2 have done their regular soccer training along with a 6-week strength training program of CCT, with 1 and 2 training sessions·wk -1 , respectively.[200] G3 has been kept to their regular soccer training program. Each training session from the CCT program, was organized in 3 stations in which a general exercise, a multiform exercise, and a specific exercise were performed. The load was increased by 5% from I repetition maximum each 2 weeks. Obtained results allowed identifying (a) a reduction in sprint times over 5 and 15 m (9.2 and 6.2% for G l and 7.0 and 3.1%, for G2;$p < 0.05$) and (2) increase on squat and j ump (12.6% for Gl and 9.6% for G2; $p < 0.05$). The results suggested that the CCT induced the performance increase in 5m and 15 m sprint and in squat jump. Vertical jump and sprint performances after CCT program were not influenced by the number of CCT sessions per week (1 or 2 sessions·wk - 1).[200]

From the obtained results, it was suggested that the CCT is an adequate training strategy to develop soccer players' muscle power and speed.

Segovia, Andres and Badillo, (2010)[202] conducted a study to assess the effect of 4 months of training on the training executed by 2 under-19 teams from the first Spanish division on aerobic power, strength, and acceleration capacity. Two under-19 soccer teams that competed in the same league were evaluated on 2 occasions. The first evaluation (E1) was done at the beginning of the competitive period, and the second evaluation (E2) was done 16 weeks later, coinciding with the end of the first half of the regular season. The following were evaluated: lower-body strength through jump height with countermovement with and without load, speed of the Smith machine bar movement in a progressive load test of full squats (FSL), acceleration capacity in 10m, 20m, and 30 m (T10, T20, T30, T10-20, T10-30, T20-30), and maximal aerobic speed (MAS).[202] Team A executed complementary strength training, and training loads were determined with regard to the speed with which each player moved the bar in FSL. Between the evaluations, the training sessions of each team were recorded to assess their influence on the changes in E2. Team A significantly improved its MAS ($p < 0.01$) and its application of strength in the CMho ($p < 0.05$) and FS20.30.40 ($p < 0.0$ 1), while significantly worsening their acceleration capacity in all the splits ($p < 0.01$). Team B slightly worsened its MAS and significantly improved its application of strength in the CMJ20 ($p < 0.01$) and FS50-60 ($p < 0.05$). Its acceleration capacity improved insignificantly except for in the 20m to 30m interval/T20_30 ($p < 0.05$).[202] The study demonstrates that the use of loads as a function of the speed of movement, without the need to determine maximum repetitions is a methodology that is adequate for the improvement of the application of strength in under-19 soccer players. Here also the present researcher found almost the same result with some variations of application of training.

Meylan and Malatesta (2009)[197] studied to determine the influence of short-term plyometric training within regular soccer practice on explosive actions of early pubertal soccer players during the in-season. In soccer, explosive actions such as jumping, sprinting, and changes of direction are essential to optimal performance not only in adults, but also in children's games. Fourteen children (13.3 ± 0.6 years) were selected as the training group (TG) and 11 children (13.1 ± 0.6 years) were defined as the control group (CG). All children were playing in the same league and trained

twice per week for 90 minutes with the same soccer drills. The TG followed an 8-week plyometric program (i.e., jumping, hurdling, bouncing, skipping, and footwork) implemented as a substitute for some soccer drills to obtain the same session duration as CG.[197] At baseline and after training, explosive actions were assessed with the following 6 tests: 10 meter sprint, agility test, vertical jump tests (squat jump [SJ], countermovement jump [CMJ], contact test [CT] and multiple 5 bounds test [MBS]). Plyometric training was associated with significant decreases in 10m sprint time (- 2.1 %) and agility test time (-9.6%) and significant increases in jump height for the CMJ (+7.9%) and CT (+10.9%). No significant changes in explosive actions after the 8-week period were recorded for the CG. The current study demonstrated that a plyometric program within regular soccer practice improved explosive actions of young players compared to conventional soccer training only. Therefore, the short-term plyometric program had a beneficial impact on explosive actions, such as sprinting, change of direction, and jumping, which are important determinants of match-winning actions in soccer performance. In this study also the present researcher has got positive result of such fitness variables.

4.6 Soccer Skill Test

Table no. 15: Mean, standard deviation, adjusted mean and p value of different variables

Variables	Test	U-14 YEARS		U-17 YEARS		U-19 YEARS	
		Mean ± S.D	P Value	Mean ± S.D	P Value	Mean ± S.D	P Value
Right foot kick (mtr.)	Pre	16.37 ± 4.51	.00	34.80 ± 7.04	.00	36.81 ± 6.10	00.
	Post	18.43± 4.51		37.05 ± 7.59		39.34 ± 5.99	
	Adj. Post	31.33		31.59		31.89	
Left foot kick (mtr.)	Pre	12.38 ± 4.05	.00	27.22± 8.15	..00	29.98 ± 6.05	.16
	Post	15.32 ± 3.56		28.99 ± 7.90		31.15 ± 6.29	
	Adj. Post	25.18		25.31		24.96	
Throw in for distance (mtr.)	Pre	10.18 ±2.43	.00	16.22 ± 2.56	.00	18.04 ± 3.54	.001
	Post	11.54 ± 2.66		17.56 ± 2.59		19.14± 3.67	
	Adj. Post	15.95		16.21		16.07	
Penalty kick for shooting accuracy (no.)	Pre	10.20 ± 2.80	.00	11.65 ± 2.56	.014	10.95 ± 2.33	.03
	Post	12.55 ± 1.85		13.00 ± 1.45		12.25± 2.17	
	Adj. Post	12.83		12.72		12.24	
Dribbling ability (sec.)	Pre	18.86 ± 3.34	.00	14.96 ± 1.29	.00	15.70 ± 5.92	.11
	Post	17.31 ± 3.42		13.81± 1.54		13.45 ± 1.06	
	Adj. Post	16.67		14.24		13.67	

In table-15 the pre, post and adjusted post mean values and the respective p values of right foot, left foot, throw in for accuracy, penalty kick for accuracy, dribbling for time of the three groups of football players were presented. In case of Right Foot the mean value of the 14 yrs. group pre-test was 16.37 mtr., post-test was 18.43mtr.& adjusted post-test was 31.33mtr. and p value 0.00. In case of Right foot the mean value of the 17 yrs. group pre-test was 34.80 mtr., post-test was 37.05mtr. & adjusted post-test was 31.59 mtr. and p value 0.00. In case of Right foot the mean value of the 19 yrs. group pre-test was 36.81mtr. Post-test was 39.34mtr. & adjusted post-test was 31.89mtr. and p value 0.00. In case of Left foot the mean value of the 14 yrs. group pre-test was 12.38 mtr. , post-test was 15.32 mtr. & adjusted post-test was

25.18 mtr. and p value 0.00. In case of Left Foot the mean value of the 17 yrs. group pre-test was 27.22 mtr., post-test was 28.99 mtr. & adjusted post-test was 25.31mtr. and p value 0.00. In case of Left foot the mean value of the 19 yrs. group pre-test was 29.98 mtr. , post-test was 31.15 mtr. & adjusted post-test was 24.96 mtr. and p value 0.16. In case of Throw in for distance the mean value of the 14 yrs. group pre-test was 10.18 mtr. , post-test was 11.54 mtr. & adjusted post-test was 15.95 mtr. and p value 0.00.

In case of Throw in for distance the mean value of the 17 yrs. group pre-test was 16.22 mtr., post-test was 17.56mtr. & adjusted post-test was 16.21mtr. and p value 0.00. In case of Throw in for distance the mean value of the 19 yrs. group pre-test was 18.04 mtr., post-test was 19.14 mtr. & adjusted post-test was 16.07 mtr. and p value 0.001. In case of Penalty Kick for Accuracy the mean value of the 14 yrs. group pre-test was 10.20, post-test was 12.55 & adjusted post-test was 12.83 and p value 0.00. In case of Penalty Kick for Accuracy the mean value of the 17 yrs. group pre-test was 11.65, post-test was 13.00 & adjusted post-test was 12.72 and p value 0.014. In case of Penalty Kick for Accuracy the mean value of the 19 yrs. group pre-test was 10.95, post-test was 12.25 & adjusted post-test was 12.24 and p value .03. In case of Dribbling for Time the mean value of the 14 yrs. group pre-test was 18.86 sec. , post-test was 17.31 sec. & adjusted post-test was 16.67 sec. and p value 0.00. In case of Dribbling for Time the mean value of the 17 yrs. group pre-test was 14.96 sec., post-test was 13.81 sec. & adjusted post-test was 14.24 sec. and p value 0.00.

In case of Dribbling for Time the mean value of the 19 yrs. group pre-test was 15.70 sec., post-test was 13.45 sec. & adjusted post-test was 13.67 sec. and p value 0.11.

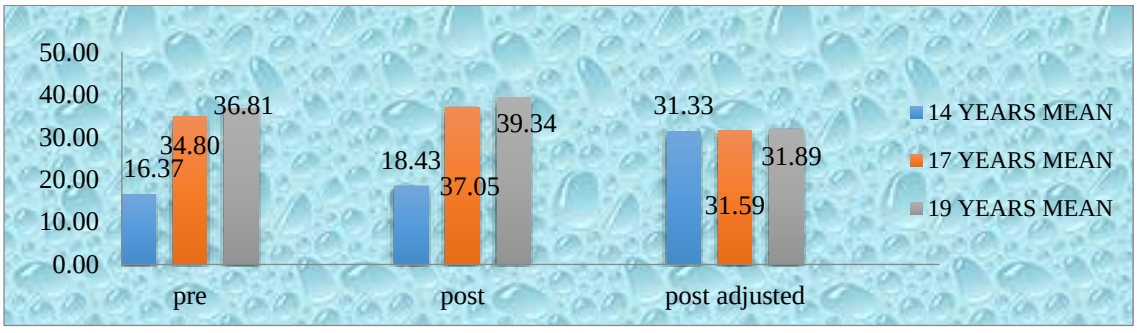


Fig. No. 26: The graphical representation of Mean of Right foot in pre, post and adjusted post test

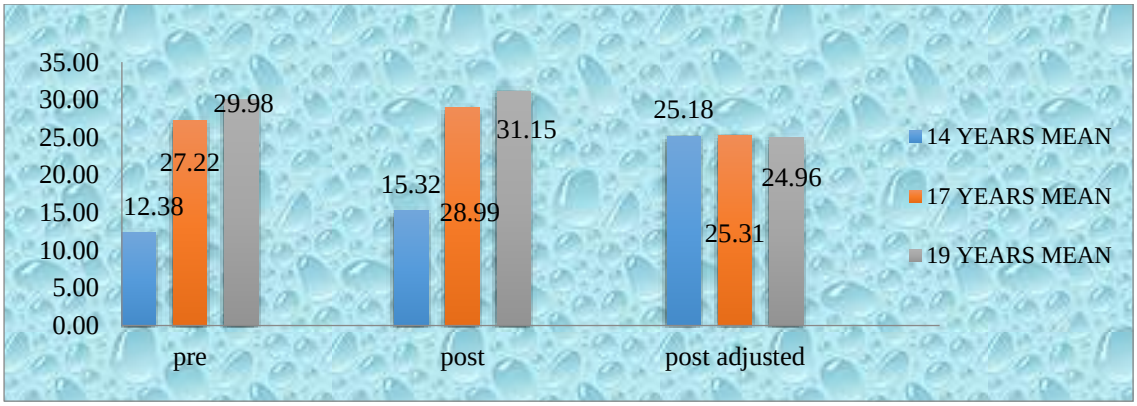


Fig. No. 27: The graphical representation of Mean of Left foot in pre, post and adjusted post test

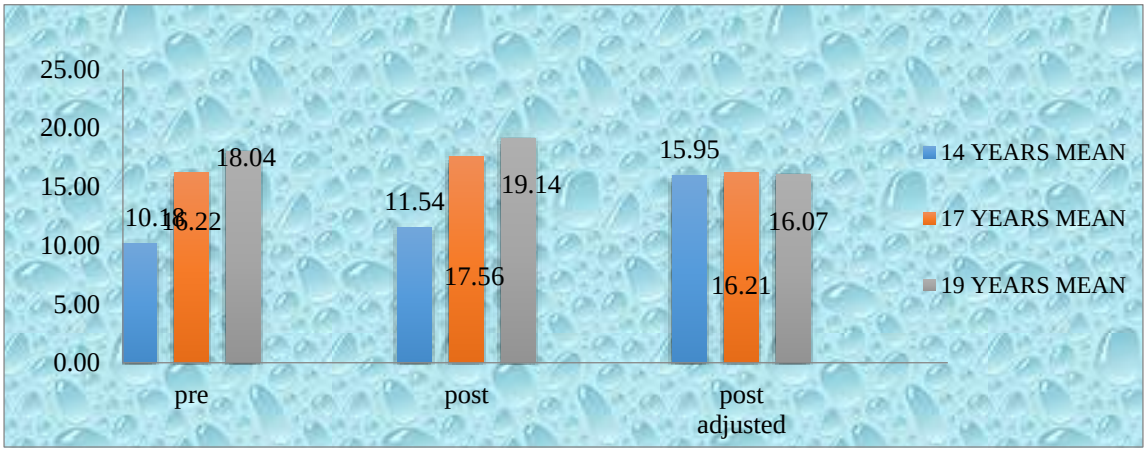


Fig. No. 28: The graphical representation of Mean of throw in for distance in pre, post and adjusted post test

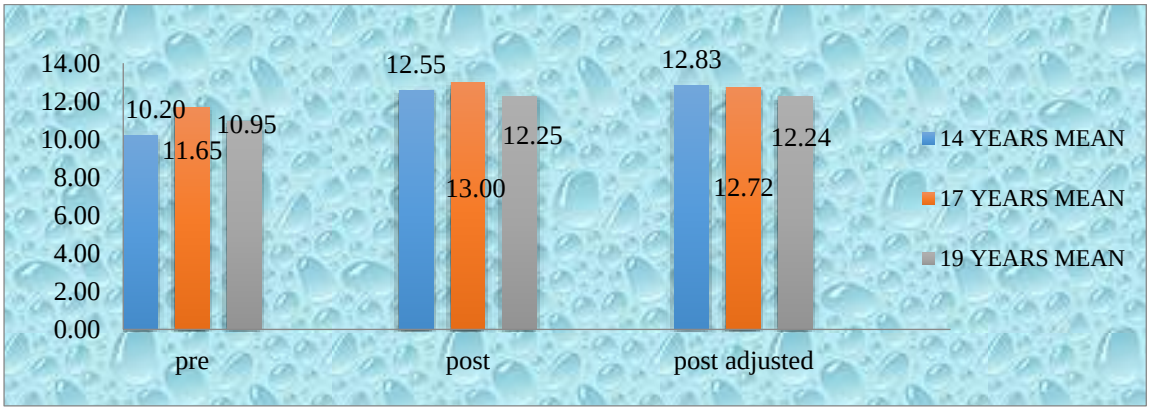


Fig. No. 29: The graphical representation of Mean of Penalty kick for accuracy in pre, post and adjusted post test

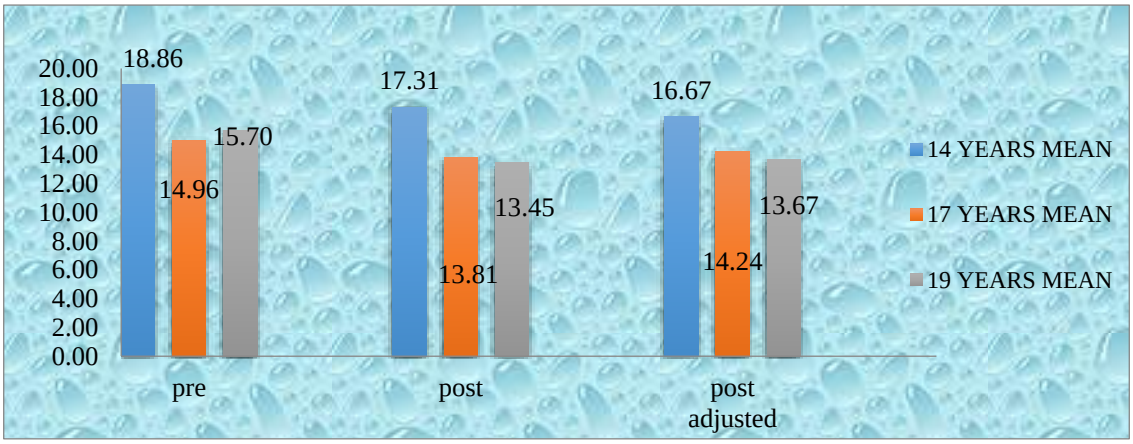


Fig. No. 30: The graphical representation of Mean of dribbling for time in pre, post and adjusted post-test.

Table- 16: Analysis of Co variance of different variables

Variables	Test	Variance	Sum of Squares	Mean Squares	'F' Value
Right foot kick	Pre	Among, within	5075.16, 2036	2537.58, 35.73	71.03
	Post	Among, within	5261.93, 2163.32	2630.97, 37.95	69.32
	Adjusted post	Among, within	1.36, 142.84	0.68, 2.55	**0.27**
Left foot kick	Pre	Among, within	3583.62, 2269	1791.81, 39.80	45.02
	Post	Among, within	2946.72, 2180.42	1473.36, 38.25	38.52
	Adjusted post	Among, within	1.22, 293.04	0.61, 5.23	0.12
Throw in for distance	Pre	Among, within	677.27, 474	338.64, 8.32	40.68
	Post	Among, within	643.02, 517.79	321.51, 9.08	35.39
	Adjusted post	Among, within	0.49, 88.46	0.25, 1.58	0.16
Penalty kick for shooting accuracy	Pre	Among, within	21.03, 377	10.52, 6.61	1.59
	Post	Among, within	5.70, 194.70	2.85, 3.42	0.83
	Adjusted post	Among, within	3.92, 138.85	1.96, 2.48	**0.79**
Dribbling ability	Pre	Among, within	171.56, 910	85.78, 15.96	5.38
	Post	Among ,within	182.45, 289.41	91.23, 5.08	17.97
	Adjusted post	Among, within	87.70, 221.29	43.85, 3.95	11.10

F.05 (2, 57) = 3.15
F.05 (2, 56) = 3.15

A= among means variance
W= within group variance

Considering Right Foot, the calculated F Value of the pre-test and post-test were 71.03 and 69.32 and were both greater than the table value F0.05 (2, 56/57) = 3.15,

hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the Right foot of all the three groups are not equally affected. The F value of adjusted post-test was 0.27, which was also greater than the table value and signifies the unequal effect only due to the soccer training. Considering Left foot the calculated 'F' ratio of the pre-test and post-test were 45.02 and 38.52 and were both greater than the table value F0.05 (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the Left Foot of all the three groups are not equally affected. The F value of adjusted post-test was 0.12, which was less than the table value and not signifies any change due to the soccer training. Considering Throw for distance the calculated 'F' ratio of the pre-test and post-test were 40.68 and 35.39 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the Left foot, all the three groups are not affected at al due to the soccer training. The F value of adjusted post-test was 0.12, which was also less than the table value and not indicating any significant change due to the soccer training. Considering Throw for distance the calculated 'F' ratio of the pre-test and post-test were 40.68 and 35.39 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the Throw for distance , all the three groups are not affected at al due to the soccer training. The F value of adjusted post-test was 0.16, which was also less than the table value and not indicating any significant change due to the soccer training. Considering Penalty Kick for Accuracy the calculated 'F' ratio of the pre-test and post-test were 01.59 and 0.83 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the Penalty Kick for Accuracy, all the three groups are not affected at all due to the soccer training. The F value of adjusted post-test was 0.79, which was also less than the table value and not indicating any significant change due to the soccer training. Considering Dribbling for time the calculated 'F' ratio of the pre-test and post-test were 05.38 and 17.97 and were both less than the table value F0.05 (2, 56/57) = 3.15 and it is concluded that regarding the Dribbling for time, all the three groups are not affected at all due to the soccer training. The F value of adjusted post-test was 11.10, which was also less than the table value and not indicating any significant change due to the soccer training.

In order to find out upon which group the effect of soccer training was maximum, pairwise comparison analysis of adjusted means of post test data would be carried out.

Table - 17: Adjusted mean scores and their differences of different variables during post testing in different groups

Variables	group 1 (14 years)	group 2 (17 years)	group 3 (19 years)	Critical Difference
Right foot kick	31.33	31.59	31.89	0.23
Differences	0.26*		0.30*	
Left foot kick	25.18	25.31	24.96	0.32
Differences	0.13*		0.35*	
Throw in for distance	15.95	16.21	16.07	0.18
Differences	0.26*		0.14*	
Penalty kick for shooting accuracy	12.83	12.72	12.24	0.22
Differences	0.11		0.44	
Dribbling ability	16.67	14.24	13.67	0.28
Differences	2.43*		0.57*	

Table - 17 shows that in case of right foot kick the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-19 boys and resulted into right foot kicking ability gain. In case of left foot kick the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-17 boys and resulted into left foot kicking ability gain.

In case of throw in ability the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test

mean and compare it with the critical difference it is clear that maximum changes occur in case of U-17 boys and resulted into throw in accuracy ability gain.

In case of Penalty kicking ability the soccer training programme were nearly equally effective as the differences were not significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-17 boys but that were not significant.

In case of dribbling ability the soccer training programme were not equally effective as the differences were significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-17 boys and resulted into lower time of dribbling ability.

4.7 Soccer Playing Ability

Table- 18: Mean, standard deviation, adjusted mean and p value of soccer playing ability

Variables	Test	U-14 YEARS		U-17 YEARS		U-19 YEARS	
		Mean ± S.D	P Value	Mean ± S.D	P Value	Mean ± S.D	P Value
Soccer playing ability	Pre	23.37 ± 2.64	.00	22.57 ± 3.02	.00	22.76 ± 3.68	.00.
	Post	26.96 ± 1.79		26.47 ± 2.33		27.64 ± 2.11	
	Adj. Post	26.18		26.57		27.68	

In table -18 the pre, post and adjusted post mean values and the respective p values of soccer playing ability of the three groups of football players were presented. In this case mean value of the 14 yrs. group pre-test was 23.37, post-test was 26.96. & adjusted post-test was 26.81 and p value .00. The mean value of the 17 yrs. group pre-test was 22.57, post-test was 26.47. & adjusted post-test was 26.57 and p value .00. The mean value of the 19 yrs. group pre-test was 22.76, post-test was 27.64. & adjusted post-test was 27.68 and p value .00.

Table no. 19: Analysis of Co variance of soccer playing ability

Variables	Test	Variance	Sum of Squares	Mean Squares	'F' Value
Soccer Playing Ability	Pre	Among, within	6.89 , 564	3.45,9.89	0.35
	Post	Among, within	13.81,248.72	6.90,4.36	1.58
	Adjusted post	Among, within	13.66,191.52	6.83,3.42	**2.00**

***Significant at 0.05 level of confidence**

F.05 (2, 57) = 3.15 **A = among means variance**

F.05 (2, 56) = 3.15 **W = within group variance**

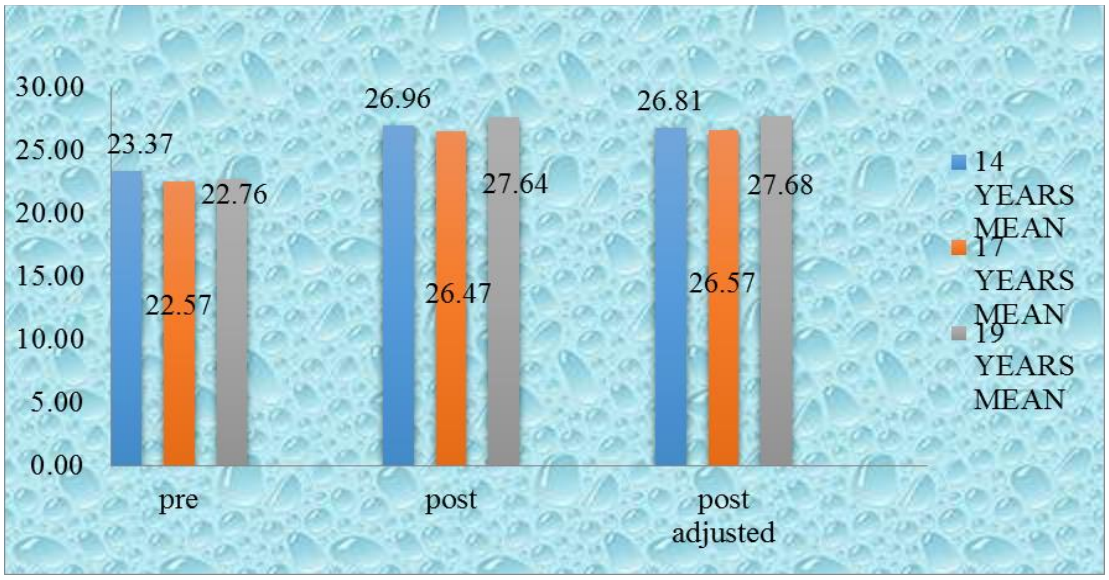


Fig. No. 31: The graphical representation of Mean of soccer playing ability in pre, post and adjusted post-test.

Considering Soccer playing ability, the calculated F value of the pre-test and post-test were 0.35 and 1.58 and were both less than the table value F0.05 (2, 56/57) = 3.15, hence not significant and it can be concluded that the three groups were heterogeneous before the intervention and after soccer training the playing ability of all the three groups were equally affected. The F value of adjusted post-test was 2.00, which was also less than the table value and signifies the equal effect due to the soccer training.

Table no. 20: Adjusted mean scores and their differences of different variables during post testing in different groups

Variables	GROUP 1 (14 years)	GROUP 2 (17 years)	GROUP 3 (19 years)	CD at 0.05 level
Soccer playing ability	26.81	26.57	27.68	0.26
differences	0.24		01.11	

In case of soccer playing ability the soccer training programme were equally effective as the differences were not significant. From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-19 boys but that were not significant.

Table no. 21: Development in percentage (%) of different Variable after training of different age group soccer players.

variables	Group	Mean Post	Mean Pre	% of improvement
Anthropometric				
Weight (kg.)	U14	29.750	30.450	2.30
	U17	45.850	46.100	0.54
	U19	**54.400**	**53.350**	**1.97 ***
Motor fitness components				
Power	U14	6.397	5.693	12.38 *
	U17	**8.234**	**6.843**	**20.33 ***
	U19	10.882	9.700	12.19 *
Leg Explosive strength	U14	202.300	167.550	20.74 *
	U17	**208.450**	**159.000**	**31.10 ***
	U19	247.500	199.100	24.31 *
Agility	**U14**	**22.335**	**24.471**	**8.73 ***
	U17	24.446	25.436	3.89 *
	U19	21.468	22.555	4.82 *
Speed	**U14**	**7.890**	**8.979**	**12.13 ***
	U17	7.598	8.533	10.96 *
	U19	6.332	7.048	10.16 *
Endurance	**U14**	**148.350**	**255.650**	**41.97 ***
	U17	105.377	171.500	38.56 *
	U19	99.171	157.069	36.86 *
Soccer Skill				
Right foot kicking ability	**U14**	**18.427**	**16.370**	**12.56 ***
	U17	37.045	34.800	6.45 *
	U19	39.340	36.805	6.89 *
Left foot kicking ability	**U14**	**15.320**	**12.380**	**23.75 ***
	U17	28.985	27.218	6.49 *
	U19	31.150	29.980	3.90 *
Accuracy of hand with explosive strength	**U14**	**11.540**	**10.177**	**13.40 ***
	U17	17.555	16.222	8.22 *
	U19	19.140	18.035	6.13 *
Shooting accuracy	**U14**	**4.184**	**3.417**	**22.45 ***
	U17	4.333	3.884	11.57 *
	U19	4.084	3.650	11.89 *
Dribbling ability	U14	17.315	18.859	8.19 *
	U17	13.813	14.960	7.67 *
	U19	**13.446**	**15.700**	**14.36 ***
Soccer Playing Ability				
Playing ability	U14	6.743	5.844	15.39 *
	U17	6.621	5.645	17.28 *
	U19	**6.912**	**5.693**	**21.41 ***

In the extreme right column the bold values showing the max. development among the three age groups.

Table no. 22: maximum percentage (%) of improvement of different age groups considering different variable after training.

Variables	% of Improvement rate	Age group
Weight	**1.97**	**U 19**
Arm strength	**20.33**	**U 17**
Leg explosive strength	**31.10**	**U 17**
Agility	**8.73**	**U 14**
Speed	**12.13**	**U 14**
Endurance	**41.97**	**U 14**
Kicking ability (Right)	**12.56**	**U 14**
Kicking ability (Left)	**23.75**	**U 14**
Throw in ability	**13.40**	**U 14**
Penalty taking ability	**22.45**	**U 14**
Dribbling ability	**14.36**	**U 19**
Soccer Playing ability	**21.41**	**U 19**

The above table is showing the % of improvement of the variables through training. It is clear that maximum development occurs in case of Agility, Speed, Endurance, Kicking ability (both for Right and left leg), Throw-in ability, shooting accuracy for the 14 yr. boys. For strength of arm and leg maximum development occurs for the 17yrs. boys and maximum development occurs in case of Weight, Dribbling ability and Soccer Playing ability for the student of 19 yrs.

Table no. 23: Multiple Regression analysis between dependent and independent Variables of pre-test data

Model	Unstandardized coefficients		t	P	Collinearity statistics	
	B	Std. er.			Tolerance	VIF
(Constant)	-1.405	4.286	-.328	.745		
Weight	.038	.030	1.250	.218	0.079	12.687
Height	-.049	2.209	-.022	.982	0.121	8.274
Arm strength	.055	.091	.608	.547	0.278	3.603
Leg explosive strength	.008	.006	1.285	.206	0.420	2.379
Agility	.044	.083	.532	.598	0.492	2.034
Speed	.129	.270	.477	.636	0.157	6.366
Endurance	.010	.003	2.985	.005	0.326	3.067
Kicking ability (Right)	.009	.023	.410	.684	0.152	6.598
Kicking ability (Left)	.007	.022	.344	.733	0.204	4.909
Throw in ability	-.013	.045	-.294	.770	0.236	4.237
Penalty taking ability	.117	.124	.947	.349	0.818	1.223
Dribbling ability	-.009	.028	-.312	.757	0.671	1.491
R = 0.60	R Square = 0.36		Adjusted R Sq. = 0.09		S.E. of the estimate = 0.75	
Durbin-Watson = 2.32			**F-stat = 1.304** ^{NS}			

The above table revealed the Multiple Regression Analysis between dependent and independent variables of pre-test data. Regression equation was found (df = 18, 41 F = 1.304, P < 0.05) not significant. The P value of F statistics was greater than 0.05 then the IV doesn't a good to explaining the variation in the DV. From the Table R, R^2, adjusted R^2, Durbin Watson test, VIF (Variance Inflation Factor) finds how weakly the model fits in the data. R was the correlation between observed and predicted values of DV. R of these variables regression was 0.60, which was not considered too close to positive 1 and values wasn't indicating stronger relationship. R^2 was the proportion of variation in the DV explained by the regression model. The values of R^2 of variables 0.36 it was too far to 1 which indicated that the model wasn't fit in this study. Also said that the model containing the variables can explain 36% variation of DV pre. Adjusted R^2 of variables was 0.09, which was more closely

reflecting the goodness of fit of the model in the study. The regression equation written as, the participant predicted –

Playing ability (pre) = {-1.405 + 0.04 (Weight) - 0.049 (Height) – 0.057 (Triceps) + 0.047 (Sub scapula) - 0.113 (Supra iliac) – 0.221 (Calf)* + 0.238 (Midthigh)* – 0.016 (Abdomen) – 0.055 (Medicine ball) + 0.008 (SBJ) + 0.044 (Zigzag) – 0.129 (M50) + 0.010 (Y600) * + 0.009 (Right) + 0.007 (Left) – 0.013 (Throw) – 0.117 (Penalty) – 0.009 (Dribble)}.

Table no. 24: Multiple Regression analysis between dependent and independent Variables of post test data

Model	Unstandardized coefficients		t	P	Collinearity statistics	
	B	Std. Err.			Tolerance	VIF
(Constant)	2.974	3.321	.895	.376		
Weight	-.017	.018	-.937	.354	.101	9.930
Height	2.437	1.257	1.939	.059	.178	5.622
Arm strength	.070	.071	.983	.331	.191	5.230
Leg explosive strength	-.005	.006	-.881	.383	.207	4.824
Agility	-.048	.056	-.851	.400	.467	2.140
Speed	-.054	.211	-.257	.798	.171	5.850
Endurance	.013	.004	3.182	.003	0.379	2.636
Kicking ability (Right)	-.019	.016	-1.201	.237	0.148	6.759
Kicking ability (Left)	.036	.016	2.229	.031	.198	5.050
Throw in ability	.023	.027	.847	.402	.308	3.242
Penalty taking ability	.048	.133	.364	.718	.676	1.480
Dribbling ability	-.010	.032	-.320	.751	.553	1.809
R = .583	**R Square = .340**		**Adjusted R Sq. = .050**		**S.E. of the estimate = .51416**	
Durbin – Watson = 2.167			**F-Stat = 1.173^{NS}**			

The above table revealed the Multiple Regression Analysis between dependent, i.e., the playing ability and other independent variables of post data. Regression equation was found (df = 18, 41 F = 1.173, P < 0.05) not significant. The P value of F statistics was greater than 0.05 then the IV doesn't a good to explaining the variation in the Dependent Variables (DV). From the Table R, R^2, adjusted R^2, Durbin Watson test, VIF (Variance Inflation Factor) finds how weakly the model fits in the data. R was the correlation between observed and predicted values of DV. R of these variables regression was 0.583, which was not considered too close to positive 1 and values wasn't indicating stronger relationship. R^2 was the proportion of variation in the DV explained by the regression model. The value of R^2 of variables is 0.34. It was too far to 1 which indicated that the model wasn't fit in this study. Also it can be said that the model containing the variables can explain 36% variation of DV post. Adjusted R^2 of variables was 0.05, which was more closely reflecting the goodness of fit of the model in the study. Then the regression equation written as, the participant predicted: –

DV post = {2.974 - .017 (Weight) +2.437(Height)* +.007(Triceps) + .105(Sub scapula) - 0.076(Supra illiac) – 0.030(Calf) + 0.053(Midthigh) + 0.028(Abdomen)+ 0.070(Medicine ball) -.005(SBJ) - 0.048 (Zigzag) – 0.054(M50) + 0.013 (Y600) * - 0.019 (Right) + 0.036(Left)* +0.023 (Throw) + 0.048(Penalty) – 0.01(Dribble)}.

4.8 Discussions

Gregson W. and Wriglcy R. (2007)[195] conducted a study on the effects of a l0 week plyometric training intervention on 10 m sprint and vertical jump performance in elite junior professional soccer players and found significant improvements in 10m sprint time in elite junior soccer players. Alves et al (2010)[200] conducted a study on Short-term effects of complex and contrast training in soccer players' vertical jump, sprint, and agility abilities and the results suggested that the training induced the performance increase in *5* and 15 m Sprint and in squat jump. Vertical jump and sprint performances were not influenced by the number of training sessions per week (1 or 2 sessions· wk. - 1). Ahmaidi et al. (2010)[204] stated that the improvements in the repeated shuttle sprint test were only observed after repeated shuttle sprint training. Segovia et al (2010)[203] stated the effect of 4 months of training on the

training and demonstrates that the use of loads as a function of the speed of movement, without the need to determine maximum repetitions is a methodology that is adequate for the improvement of the application of strength in under-19 soccer players. Berthoin et al (2004)[192] stated that the high-intensity interval training has shown the improvement of maximal aerobic speed and that the time of the 40-m sprint was decreased. Amusa (1979)[181] concluded that age (experienced) is the best single predictor of playing ability and running speed and are considered important factors in soccer performance. Flexibility, agility and leg power are not considered as valid indicators of playing ability. Katis and Kellis (2009)[198] indicated that soccer players display high intensity levels when participating in small-sided games. In contrast, six-a-side games had less effect on physical performance in field tests and it is suggest that the use of three-a-side games for improving fitness and technique in young soccer players may be more appropriate. Polman, et al (2004)[190] concluded that speed, agility and quickness training principles appear to be effective in the physical conditioning of female soccer players and established the relationship between physical fitness and soccer performance.

In this study the result provides us some mixed information. No such specific age group clearly developed all the influential variables through this specific training. For 19 yrs. age group the weight, dribbling quality and the soccer playing ability were improved maximum in comparison to the other two groups due to training. The soccer related two qualities depend largely on maturity. As this group is mature more than the other two groups, then naturally the adaptation of with ball training affected more the 19 yrs. group than the other two groups. The dribbling is largely depends on the decision making process,

4.9 Testing of Hypothesis:

The researcher after studied the review of the related literature formulated null hypothesises for the present research study which had described in the 1st chapter. Hypothesis testing is common in statistics as a method of making decisions using data. In other words, testing a hypothesis is trying to determine if your observation of some phenomenon is likely to have really occurred based on statistics.

According to the San Jose State University Statistics Department, hypothesis testing is one of the most important concepts in statistics because it is how you

decide if something really happened, or if certain treatments have positive effects, or if groups differ from each other or if one variable predicts another. In short, you want to proof if your data is statistically significant and unlikely to have occurred by chance alone. In essence then, a hypothesis test is a test of significance.[46]

H_{01}: The 1st null hypothesis was, there will be no significant differences due to training on anthropometric measures of the said three groups. Based on the result and discussion it was clear that except weight of 19 yrs. group we cannot reject the null hypothesis and hence not accepted the alternative hypothesis.

H_{02}: The 2nd null hypothesis stated that no significant differences will occur due to the training on body fat % among three age group viz. 14yrs, 17yrs., and 19yrs. soccer player. The result and discussion not rejected the null hypothesis and hence not accepted the alternative hypothesis.

H_{03}: The 3rd null hypothesis was that, there will be no significant differences due to training on motor performances among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player. Based on our result and discussion it was clear that we can reject the null hypothesis and accepted that there were significant changes occurred due to training.

H_{04}: The 4th null hypothesis was stated as, no significant differences will occur due to training on soccer skills among that said three age group soccer players. The result and discussion clearly signifies the rejection of the null hypothesis and acceptance of the alternative hypothesis except the left foot kick and dribbling ability of 19 yrs. boys.

H_{05}: The 5th and the last null hypothesis was, no significant differences will occur due to training on soccer playing ability among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player. Based on our result and discussion it was clear that it can reject the null hypothesis and accept the alternative hypothesis.

Chapter V

SUMMARY, CONCLUSSION AND RECOMMENDATION

CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary:

Soccer is one of the most ancient and popular sports in the world, almost all the nations play soccer both for enjoyment and competition. The spectators and players enjoy the game of soccer with a great amount of merriment. Football was introduced in India by the British. Being a simple and inexpensive game, it became popular among the masses. Association football, commonly known as football soccer, is a team sport played between two teams of 11 players each.

Modern Soccer included ball-kicking technique, ball control technique, dribbling technique, heading technique, ball recognition and mastery techniques, shooting technique, dribbling technique, goal keeping technique etc. A soccer player is required to have a good mastery of basic techniques because this is the main requirement to become a qualified and highly skilled player in soccer games. Soccer players perform activities in which different energy systems are used such as intervention by sliding, head shoots and tackles during the games.

Generally, soccer players who are taller, heavier, more muscular, and have more active mass and less fat mass may have major advantages, especially during growth and maturation. Continuous long-term monitoring of anthropometric parameters and BC should be performed. Moreover, it is necessary to consider sensitive periods for the development of physical abilities during ontogenesis and optimize training processes and eating habits accordingly. Soccer players needs a very high level of fitness to play and avoid injuries, reveals that the soccer game is extremely challenging and players has to perform variety of skills during the play and needs speed, strength, agility, quickness and etc. mentions that the plyometric movement, in which a muscle is loaded and then contracted in rapid sequence, use the strength, and innervations of muscles and surroundings tissue to jump higher and run faster, depending on the desired training goals.

Soccer players must combine speed, strength, agility, power, and endurance as basic qualities before the individual skills inherent to the playing of soccer can be utilized. The understanding of the physical and the mental demands of the sport will enable a more scientific approach to the training of soccer players than has been prevalent heretofore. In order to perform at the highest level, players have to spend many hours in deliberate, purposeful practice with the specific intention of improving performance.

The progression of training load is obtained through subtle changes in factors such as volume (the total quantity of the activity performed), intensity (the qualitative component of the exercise) and the frequency (the number of sessions in a period of time-balance between exercise and recovery) of training.

The approach to such progressions in training should ideally be individualized as each athlete will be unique in their current ability and their potential to improve. Such individualization is frequently ignored in team sports such as soccer where the training prescription is often focused on the group. Specificity is widely identified as a choice of drill may be dependent on the philosophy of the manager as much as the conditioning staff of particular interest in the development of a global method of training is the utilization of small-sided games (SSG) as a means of training physical and technical parameters. In using SSG, coaches have the opportunity to maximize their contact time with players, increase the efficiency of training, and subsequently reduce the total training time because of their multifunctional nature.[78]

In India there is no system in place to identify and train children at a tender age. There is no infrastructure in place for promoting football. In Europe, football clubs got nurseries for nurturing talent. Here, even big clubs have no such facilities. Tournaments for children in the country are not organized in a proper manner. Many of the participants fudge their age. There are no stringent rules to stop these kinds of practices. Absence of people with proper knowledge of Soccer at the helm organizations is also a cause for the decline of the game in the country.[166]

In this regard, several studies examined the relationship between measures of training load, anthropometry, body composition, and/or physical fitness in elite adult soccer players over the course of a soccer season.[85] Findings from these studies indicate significant variations in body composition and physical fitness according to

the demands of the respective training period. Further, significant associations were reported between individual match playing time and changes in physical fitness.[84]

Research findings indicate that performance is Soccer is dependent on anthropometric parameters such as height, weight, leg length, body mass, physical fitness parameters such as strength, speed, explosive strength of lower extremities, speed endurance, endurance, flexibility and agility and psychological parameters such self-confidence, anxiety etc. Research findings also indicate that players at different levels and in different playing positions also differed in these parameters. Advanced countries identify the talents giving due considerations to the performance determining factors and then develop the identified talents on scientific lines. No such efforts are being made in our country and hence low standard of soccer and hence we are not able to compete with our Asian counterparts even, leaving aside top South-American, European countries etc.

The present study, the scholar wanted to investigate new scientific approach for boosting up performance of Football players. Therefore, he took up this comparative study of body composition, motor performance, soccer skill and playing ability level, among categorized soccers from different age groups participated in Hooghly district school level games.

The purpose of the study was

1. To observe the effect of soccer training programme on height, weight, body fat %, strength, power, agility, speed, endurance and compare the effect among the three different age groups.

2. To observed effect of soccer training programme on kicking power of right and left foot, throw in power, shooting accuracy, dribbling ability and compare them among the three different age groups.

3. To observed effect of soccer training programmes on over all soccer playing ability and compares them among the three different age groups.

4. To find out the percentage of development of said different variables of three different age groups and to find out that which group has the maximum development.

The subjects of the present study were from three different age groups of under- 14 years, under-17 years and under-19 years. Each group comprises with 20 subjects. Sampling having completed, personal data like name, age, height, weight, was taken for each subject age-wise. Measurement for selected body composition variables and tests for motor performance parameters and soccer skill test were conducted in the same day. On the way next day the soccer playing ability were measured through competitive soccer match under the supervision of 4 qualified soccer coach of national Institute of sports (NIS). After 12 week way specific training the post data were taken in the same manner with the same assistance and supervisors. The five categories of variables were Anthropometric measure, Body composition, Motor performance, Soccer skill, and Soccer playing ability

Further statistical calculation shows the development of different variables which influence the soccer playing ability following 12 weeks of the soccer training programme.

5.2 Conclusions:

In the present study, the findings related to the soccer training effect on different influential factors of soccer playing ability such as different motor fitness components, soccer skill and soccer playing ability itself were discussed in detail in chapter-IV. Considering the analysis and interpretation based on the results the following conclusions have been drawn:

5.2.1 Anthropometric variables:

(i) Height:

It was observed that there was no change of height of the soccers occurred in case of three age groups following the 12 weeks soccer training.

(ii) Weight:

It was observed that there was significant increase in weight of the soccers of 19 yrs. group but in case of 14 and 17 yrs. group there were reduction of weight but that were not significant following 12 weeks soccer training.

(iii) Body Fat %:

It was observed that there was no significant change of body fat % of the soccers occurred in case of all the three age groups following the 12 weeks soccer training.

5.2.2 Motor fitness variables:

(i) Shoulder strength:

It was observed that there was significant development of shoulder strength of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 17 yrs. group

(ii) Leg explosive strength:

It was observed that there was significant development of leg explosive strength of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 17 yrs. group.

(iii) Agility:

It was observed that there was significant development of agility of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 14 yrs. group.

(iv) Speed:

It was observed that there was significant development of speed of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 14 yrs. group.

(v) Endurance:

It was observed that there was significant development of endurance of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 14 yrs. group.

5.2.3 Soccer Skill

(i) Right foot kicking ability:

It was observed that there was significant development of Right foot kicking ability of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 14 yrs. group.

(ii) Left foot kicking ability:

It was observed that there was significant development of Left foot kicking ability of the 14 yrs. and 17 yrs. group soccers occurred, but for 19 yrs. group there was no significant change following 12 weeks soccer training with maximum change of 14 yrs. group.

(iii) Throw in for distance:

It was observed that there was significant development of throwing ability for distance of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 14 yrs.

(iv) Shooting for accuracy:

It was observed that there was significant development of shooting accuracy of the soccers occurred in case of all the three groups following 12 weeks soccer training but maximum changes took place in case of 14 yrs.

(v) Dribbling ability:

It was observed that except 19 yrs. there was significant development of dribbling ability of the soccers occurred in case of the rest two groups following 12 weeks soccer training with maximum change of 19 yrs.

5.2.4 Soccer playing ability:

It was observed that there was significant development of soccer playing ability of the soccers occurred in case of all the three groups following 12 weeks soccer training with maximum change of 19 yrs.

5.3 Recommendations:

Considering the results, its interpretation and conclusions drawn accordingly the present researcher want to recommend some ways through which the further research may took place and the specific field may develop. The practical aspects of this study bearing immense importance for the development of the performance of soccer. The talent identification and nurturing requires some specific type of scientific module. From this present study one may get some specific idea about the effect of a specific type of module of soccer training. With this idea coach, physical education teacher, soccer trainer may apply their common sense, knowledge and innovation for further molding this module and apply them for training. Hence under this situation bearing the findings of the present study the following recommendations may be considered for further application:-

1. Mainly the soccer coaches may apply this specific training module to increase body weight, dribbling ability and soccer playing ability of 19 yrs. age soccers.

2. The soccer coaches may apply this model of training for the development arm strength and leg explosive strength of 17 yrs. age soccers.

3. The soccer coaches may apply this model of training for the development agility, speed, endurance, and football kicking ability for both the legs, ball throwing for distance and shooting accuracy of 14 yrs. age soccers.

4. This module they can use mainly for the 14 year age boys group with some modification of strength training and dribbling practice.

5. The Physical Education teachers may apply this soccer training protocol in their physical education classes of football with part by part and with some adjustable modification they can intervene also to train their students for the school team of different age group.

6. This protocol may consider by the district sports association, district school sports association, even the state association also.

Recommendation for Further Research:

i. A similar investigation may be conducted on young female students as globally female soccer became very popular.

ii. The study may be conducted with larger sample size.

iii. More groups of variables may be included such as physiological and psychological variables as these are another two performance characteristics in sports.

iv. Different other age groups may also be considered.

v. Socio economic considerations may be there as this factor influence a lot on the developmental process.

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APPENDICES

Appendices-1 : *Publication in Peer Review Journals.*

Appendices-2 : *Paper Presentation Certificate in the two-day International Webinar*

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Appendices-6 : *Certificate Course in Sports Coaching.*

Appendices-7 : *AIFF 'D' Certificate.*

Appendix-1

Publication in Peer Review Journals

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INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

COMPARATIVE INFLUENCE OF SOCCER TRAINING ON SELECTED VARIABLES AMONG SOCCER PLAYERS

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ABSTRACT

The most important variables for measuring performance in soccer are physical condition, technical skills and tactical performance. Physically active people possess considerably less total body fat than their active contemporaries. Body composition and anthropometric measures are the important factors among other important variables, which influences the soccer playing ability. Proper soccer training for specific age group improves these qualities. The purpose of the study was to compare the effect of 12 week soccer training on selected anthropometric measures and body fat % among three age group soccer player. Twenty district level male soccer players from each of the three age category of 14yrs., 17 yrs. and 19yrs. were considered as the trainee of the study. Significant (p=.014) weight gain took place only in case of 19yrs. group. The pre and post-test value in case of weight (F = 74.32 and 88.10) and height (F = 42.55 and 42.29) signifies the differences among the three groups but in case of body fat % (F = 0.85 and 1.03) there were no significant differences. The critical differences of weight, height and Fat % in ANCOVA were 0.44, 0.01 , 0.06 and the different adjusted post-test mean values clearly indicated the maximum changes in case of 19 yrs. boys. The conclusion may be drawn that maximum development occurred in case of the 19yrs. group soccer players due to the proposed soccer training.

Citation: ***Dinabandhu Adhikari, Arumay Jana and Dr. Asish Paul.*** **2020.** "Comparative influence of players"

INTRODUCTION

Soccer was introduced in India by the British. Being a simple and inexpensive game, it became popular among the masses (Dubey, 1999). Soccer is the game requiring high level of fitness. It is one of those rare games which demands not only speed but agility, strength, power, and endurance along with skill (Reilly, 1996). The levels of fitness depend on individual bodily characteristics. That is why anthropometric and body composition (BC) indicators are important factors affecting the specific attributes of today's soccer players (Mala, 2018) Research findings indicate that performance of Soccer is dependent on anthropometric parameters such as height, weight, leg length, body fat % etc (Jackson, 1980). Generally, soccer players who are taller and less fat mass may have major advantages, especially during growth and maturation (Leão, 2019). Continuous long-term monitoring of anthropometric parameters and body composition should be performed. Biological variability in anthropometric and morphological parameters appears during ontogenesis (Leão, 2019).

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It has been reported that soccer players with increased body size dimensions have improved speed, power, and strength performance, especially during the pubertal years (Carling, 2009). Conversely, several longitudinal observation studies of adolescent soccer players have shown high consistency in anthropometric measures (Buchheit, 2013; Deprez, 2015) Physically active people possess considerably less total body fat than their active contemporaries.(8) Aspects such as body composition is one of the important factor among other factors, which is primary important in development and evaluation of elite players (Ostojic, 2004). The variability in anthropometric indicators and body composition parameters during this period can be used to identify an elite player at an adolescent age (Milsom *et al.*, 2015). Now-a-days coaches plan their practice sessions as per the need of the players and the team (Dubey, 1999). The physiologist calls the ability to keep going at a moderate pace as aerobic exercise (William Thomson, 1982) Opinion on coaching and methods of play may differ, but there should be not much difference about the qualities of a successful player (Sahaa, 2008). Soccer training and maturation contributed to significant variations in anthropometry, body composition throughout the different training periods over the course of a soccer season in female elite young soccer players (Lesinski *et al.*, 2017).

Appendix-2

Paper Presentation Certificate in the two-day International Webinar

2020

2-Day International Webinar on

TRENDS OF DEVELOPMENT OF PHYSICAL EDUCATION AND EDUCATION IN 21ST CENTURY

organized by

DEPARTMENT OF PHYSICAL EDUCATION AND EDUCATION

Chandrapur College

Chandrapur, Purba Bardhaman, West Bengal, India

In Collaboration with

West Bengal Committee of the Institute of Physical Education

CERTIFICATE

This is to certify that DINABANDHU ADHIKARI, RESEARCH SCHOLAR, of PHYSICAL EDUCATION, JADAVPUR UNIVERSITY has participated as PAPER PRESENTER in the 2-day international webinar on TRENDS OF DEVELOPMENT OF PHYSICAL EDUCATION AND EDUCATION IN 21ST CENTURY was held on 25th and 26th July, 2020. And his/ her paper was entitled as, EFFECT OF 12 WEEK SOCCER TRAINING ON SELECTED ANTHROPOMETRIC MEASURES AND BODY FAT PERCENTAGE AMONG DIFFERENT AGE GROUPS SOCCER PLAYERS.

Dr Kartik Chandra Samanta
Principal
Chandrapur college
University of Burwuan

Prof. Samiran Mondal
Professor Department of Physical Education and Sports Science, Visva-Bharati University, Santintkatan & Secretary WEBCIPE

Dr Anup Mondal
Secretary
Webinar Organising Committee &
Asst. Prof. Dept. of Physical Education

Dr Awsesh Subba
Join Secretary
Webinar Organising Committee, & HOD
Asst. Prof. Dept. of Phvsical Education

Appendix-3

Paper Presentation Certificate in the National Seminar

National Webinar on Health and Fitness during Pandemic Covid-19 and Holistic Approaches to Athletics
September 02-03, 2020

Organised by
DEPARTMENT OF PHYSICAL EDUCATION, THE UNIVERSITY OF BURDWAN
GOLAPBAG, BURDWAN 713104, WEST BENGAL, INDIA

Certificate

This is to certify that Mr. Dinabandhu Adhikari, Asst. teacher in Physical Education of Mozepur Bharati Vidyamandir (H.S.), Duttapur, Hooghly participated in the National Webinar on "Health and Fitness during Pandemic Covid-19 and Holistic Approaches to Athletics" and presented a paper entitled "COMPARATIVE INFLUENCE OF SOCCER TRAINING ON SELECTED SOCCER SKILLS AMONG SOCCER PLAYERS".

Dr. Gopa Saha Roy
Convener of the Webinar
The University of Burdwan

Professor Arijit Ghoshal
Coordinator, UGC-SWAYAM
The University of Burdwan

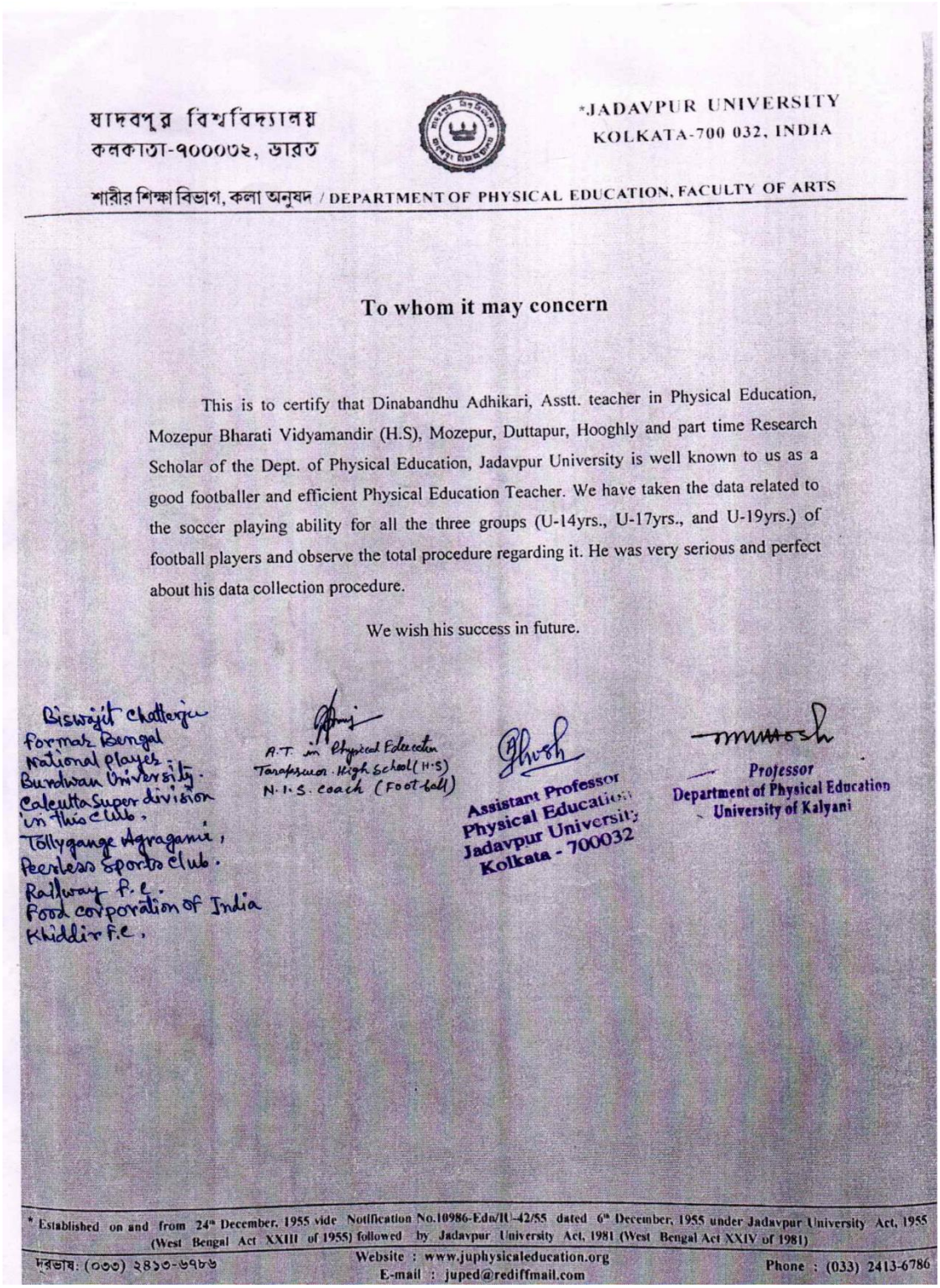
Professor Nimai Chandra Saha
Vice Chancellor
The University of Burdwan

SEPTEMBER 03, 2020; RAJBATI, BURDWNAN

NO.: BU/WEBINAR/PHEDN/2020/01/065

Appendix-4

Certificate from experts



যাদবপুর বিশ্ববিদ্যালয়
কলকাতা-৭০০০৩২, ভারত

*JADAVPUR UNIVERSITY
KOLKATA-700 032, INDIA

শারীর শিক্ষা বিভাগ, কলা অনুষদ / DEPARTMENT OF PHYSICAL EDUCATION, FACULTY OF ARTS

To whom it may concern

This is to certify that Dinabandhu Adhikari, Asstt. teacher in Physical Education, Mozepur Bharati Vidyamandir (H.S), Mozepur, Duttapur, Hooghly and part time Research Scholar of the Dept. of Physical Education, Jadavpur University is well known to us as a good footballer and efficient Physical Education Teacher. We have taken the data related to the soccer playing ability for all the three groups (U-14yrs., U-17yrs., and U-19yrs.) of football players and observe the total procedure regarding it. He was very serious and perfect about his data collection procedure.

We wish his success in future.

Biswajit Chatterjee
Former Bengal
National player
Burdwan University.
Calcutta Super division
in this club.
Tollygange Agragami,
Peerless sports club.
Railway F.C.
Food corporation of India
Khiddir F.C.

A.T. in Physical Education
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* Established on and from 24th December, 1955 vide Notification No.10986-Edn/IU-42/55 dated 6th December, 1955 under Jadavpur University Act, 1955 (West Bengal Act XXIII of 1955) followed by Jadavpur University Act, 1981 (West Bengal Act XXIV of 1981)

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Appendix-5

Picture Captured During Training Session

Appendix-6

Certificate Course in Sports Coaching

SPORTS AUTHORITY OF INDIA

NETAJI SUBHAS
NATIONAL INSTITUTE OF SPORTS
PATIALA

No. 7818

Six-Week

Certificate Course in Sports Coaching
Session May-June,2016

This is certified that Smt/Kum/Shri Dinabandhu Adhikari

Sponsored by/from NS. NIS. Patiala attended the

six-week Certificate Course in Football

held at Singhania University, Pacheri Bari, Jhunjhunu (Rajasthan)

from 16-05-2016 to 25-06-2016 under the Mass Sports Participation programme and passed

Examination in Grade A by obtaining 75 marks out of 100

Registrar
Singhania University
Pacheri Bari, Jhunjhunu
Rajasthan

S.S. ROY
Executive Director (A)
SAI NS NIS, PATIALA

Appendix-7

AIFF 'D' Certificate

AIFF

ALL INDIA FOOTBALL FEDERATION

'D' CERTIFICATE COURSE

Certificate of Participation

This is to Certify that Mr. / Mrs. .....Dinabandhu Adhikary.....
has participated in the AIFF 'D' Certificate Course Held at Keshab - Uma - Charitable Trust, Gangadharpur, B-Ed College Ground, Howrah from 14th March to 18th March 2018 .

The course has been conducted under the supervision of AFC instructor Ms. Kuntala Ghosh Dastidar.

K Ghosh Dastidar
Kuntala Ghosh Dastidar
Course - Instructor

Utpal Kumar Ganguli
Hony. Secretary
IFA (W.B.)

ALL INDIA FOOTBALL FEDERATION

FOOTBALL HOUSE, SECTOR-19, DWARKA
NEW DELHI-110 075

Date: 31st March, 2018

No. D/2018/WB/286

AIFF 'D' COACHING CERTIFICATE COURSE

This is to Certify that Mr./Ms. Dinabandhu Adhikari completed

the AIFF 'D' COACHING CERTIFICATE COURSE held at Howrah, West Bengal

from 13th March, 2018 to 18th March, 2018

SAVIO P. MEDEIRA
ACTING TECHNICAL DIRECTOR

KUSHAL DAS
GENERAL SECRETARY