



**JIMMA UNIVERSITY**  
**COLLEGE OF NATURAL SCIENCE**  
**DEPARTMENT OF SPORT SCIENCE**

**EFFECTS OF CORE STRENGTH TRAINING ON SELECTED SKILL RELATED  
FITNESS COMPONENTS OF DIGOTSION TOWN MALE U-17 YEARS SOCCER  
PLAYERS , NORTH WESTERN ETHIOPIA**

**BY**  
**DESIE WALE WONDALE**

**A RESEARCH SUBMITTED TO DEPARTMENT OF SPORT SCIENCE, COLLEGE  
OF NATURAL SCIENCE, JIMMA UNIVERSITY IN PARTIAL FULFILMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN  
FOOTBALL COACHING SPECIALIZATION**

***JUNE, 2019***  
***JIMMA, ETHIOPIA***

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***JUNE, 2019  
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**JIMMA UNIVERSITY**

**RESEARCH AND POST-GRADUATE PROGRAM DIRECTORATE**

As research advisors we hereby certify that we have read and evaluated this thesis entitled **“Effects of core strength training on selected skill related fitness components of Digotsion town male U-17 soccer players, North Western Ethiopia.”** We recommend that it can be submitted as fulfilling the thesis requirements.

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## **Declaration**

I hereby declare that this thesis is my original work and has not been presented for a degree in any other university. It has been submitted in partial fulfilment of the requirements for the degree of Master of Science in football coaching specialization in Jimma University. And that all sources of materials used for the thesis have been duly acknowledged.

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This thesis has been submitted for examination with my approval as a university advisor.

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## **Dedication**

This thesis is dedicated to God Almighty, my Saviour and protector. To my parents, Mr. Wale Wondale and Achameyelesh Abi, and younger brother Nakachew Wale, and my sisters Birkie Wale and Zemenay Wale, for their constant physical, emotional, and financial support throughout my educational career and life. And also dedicated to my main advisor Mr. Hirko Taye (assist. professor) for his approach and priceless guidance in my educational life and preparation of this dissertation in Jimma University.

## **Biographical Sketch**

The author, Desie Wale Wondale, was born in January 31, 1991 G.C in Gojjam Province, Amhara Region, North Western Ethiopia. He started his Elementary and Secondary School education at Yeidwuha Primary and Senior Secondary school. And he attended his preparatory education at Belay Zeleke preparatory school. Then, he joined at Bahir Dar University, sport science academy in 2010 G.C and graduated with a Bachelor of Degree in sport science (B.Sc) in 2012 G.C.

The author began practiced his career by teaching Health and physical Education in Awabel Woreda of secondary school since 2012 G.C. After one year of work experience, he changed his work place to Liyew Asress General Secondary and Higher Preparatory School which is found in Bibugn Woreda , Digotsion Town. After two years of service, he joined Debre Markos University, Department of Sport Science for learning pedagogy of teaching health and physical education subject and graduated a PGDT (Post Graduate in Diploma Teaching) license in 2015 G.C. After four years of service, he joined Jimma University, Department of Sport Science for perusing his master of science in football coaching specialization in 2016.

And the author has seven years of work experience. During the past seven years he made a miracle memories and developed tangible professionalism. And he carried out different action researches for school and education improvement. Parallel to his major work teaching, he has worked in coaching profession by a coach of U-13, U-15, and U-17 soccer projects and also a coach of a club in zonal and regional competition championships and collected so many licenses related to teaching and coaching professions. He has a registered national a short and long term training licenses such as first level coaching of football, second level referee license in football, Computer skill Training license, and first aid license from Bahir Dar University...and soon.

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## **Acronyms**

A.D	Anno domini
B.C	Before Christ
CAF	Confederation of African Football
E.C	Ethiopian Calendar
EFF	Ethiopian Football Federation
FIFA	Federation International De Football Association
G.C	Gregorian Calendar
SPSS	Software Package for Social Science
UEFA	Union of European Football Association

## **Abbreviations**

H0	Null Hypothesis
H1	Alternative Hypothesis
IAT	Illinois Agility Test
PoT	Post-test
PT	Pre-test
SLJT	Standing Long Jump Test
ST1	Speed Test for 20m dash
ST2	Speed Test for 30m dash
TT	T-test for agility
U-17	A person with the age of 15 and 16 years old
VJT	Vertical Jump Test

## **Abstract**

*The objective of this study was to examine the effects of core strength training on power, speed and agility on U-17 soccer trainees. 20 male soccer players who was the only soccer U-17 project team at Digotsion town were purposively selected and voluntarily participated in this study. Subjects were divided randomly into two groups, experimental group (EG: n=10) and control group (CG: n=10). 10 subjects in experimental group (age = 15.9 years, body mass = 49.6 kg, height = 1.65 meter) and 10 subjects in control group (age = 15.9 years, body mass = 48.7 kg, and height = 1.66 meter. This research was an experimental (pre-test, post-test) design. The parameters selected for the study were speed, power, and agility tests. Before the core strength training, pre-test results of the Experimental and Control Group of power tests (Vertical Jump Test and Standing Long Jump Test), speed tests (20m dash and 30m dash), and agility tests (Illinois agility test and T-test) were recorded. The subjects in the experimental group also took 40 minute core strength training twice a week and then continued the normal training program with the control group in other training days. After six weeks, post-test measurements on the same parameters were taken and results of the two groups were recorded. To analyse the parameters, means, standard deviations, and paired samples test were computed. The difference between the tests were analyzed statistically, with paired sample “t” test at  $P < 0.05$ . Consequently it was observed that core strength training implemented on junior level players brought about significant improvements between pr-test and post-test results of power, in vertical jump test and standing long jump test results were increased by a Post-test-Pre-test of mean difference 1.600 cm and 2.600 cm respectively. The Speed tests in 20m dash and 30m dash results were decreased by a Post-test-Pre-test of mean difference .05600 second and .06000 second respectively. And agility tests in Illinois agility test and T-test were decreased by a Post-Pre-test of mean difference .14900 second and .34900 second respectively. According to the results of this study, core strength trainings which were applied additionally to soccer trainings can contribute positively to the development of players' power, speed and agility skills. Future researches with a longitudinal design are needed to further examine the impact of core strength training on power, speed and agility in soccer players. And Studies should be conducted in the same area on different samples in terms of age and gender.*

**Key words:** (power, agility, core strength, soccer players, speed)

# CHAPTER ONE

## 1. INTRODUCTION

This chapter deals with about the background of the study, statement of the problem, research hypotheses, general and specific objectives of the study, significance of the study, delimitation of the study, limitation of the study, operational definition, and organization of the study.

### 1.1 Background of the Study

Soccer is the most popular sport in the world. From the Andes to Greenland, people just can't seem to resist kicking a leather ball around or watching others doing the same. There are around 265 million football players and 5 million referees worldwide. In fact, if soccer players made up a nation, it would be the fourth most populous on the planet. You could almost say that soccer is a universal language. If you found yourself in a strange country with no knowledge of the local tongue, you would still be able to strike up a conversation by using a few hand gestures accompanied by the names of some prominent players. Place one hand at chest level while saying "Pele," then raise it with the word "Maradona" and you'll quickly start making friends (Goldbatt and David, 2011). And it is obvious that this football legend gets their popularity through hard working since their childhood. Football, formally known as Association Football, having begun in England in 1848, it is now being played in more than 210 countries throughout the world and more than 150 countries being registered with Federation International de Football Association, the international governing body, which was itself established in 1904. Football has become one of the most widely played sports in the world Inklaar, (1994); Tumilty, D, (1993) and Nabhendra Singh (2010). It is characterized by short sprints, rapid acceleration or deceleration, turning, jumping, kicking, and tackling, Bangsbo, J and L.Michalsik (2002); Wisloff, U., J. Helgerud and J. Hoff (1998). Football is popular because of the fact it is a simple game requiring very few equipment and infrastructure. The game consists of two equal periods of 45 minutes, with a fifteen minutes break between. Eleven players from each team will be on the field.

According to the Ethio Football (1999:7) suggestion, there are no clearly written documents that notice the beginning of football in Ethiopia. On the other hand, the journal indicates that some foreigners were playing the game as early as 1880. Ethiopia, unlike the rest of Africa where football was imposed with colonial rule, the history of football in Ethiopia is different.



It was the victory of Emperor Menelik II (r. 1889-1913) against the Italian invaders at Adwa in 1896 that brought football into Ethiopia. The defeat of the Italians convinced the rest of Europe to acknowledge Ethiopia's independence and send emissaries to seek favors from the Emperor. It was these European diplomats and their dependents who introduced football into Ethiopia. In Ethiopia Football was introduced by foreigner who resided in Addis Ababa in 1924 G.C (1916 E.C). These communities were Americans, Indians, Greeks and Italians; they formed community and held tournaments at "Jan Hoy Meda". Football is the most popular sport in Ethiopia. Although not one of the leading football nations in Africa, Ethiopia has produced some outstanding teams at both club and international level as well as some talented individual players. Football in Ethiopia came under the control of the Ethiopia Football Federation (EFF) when that organization was founded in 1943. The EFF affiliated to FIFA, in 1953 and to the CAF in 1957. League football was in existence before the formation of the EFF with regional leagues contested during the 1938/39 and 1939/40 seasons in the provinces of Harar, Amhara, and Sidamo as part of the Italian occupation ([www.ethiopiafootball.com](http://www.ethiopiafootball.com))

Soccer is such a fantastic game because not only is it magic to watch, but it consists of such a large physiological demand on the human body. Muscular strength, muscular endurance, cardiovascular endurance, speed, quickness, agility, power, flexibility... The list goes on and on. When soccer is broken down, the game is played by players performing at various speeds and intensities; walking, jogging, and sprinting. The majority of play is in intervals and the activity does not last for long periods of time (e.g. chasing a loose ball, making a run into space etc...). This is the most important factor to consider when doing soccer conditioning. There definitely is a need for aerobic conditioning as well, due to the fact that the intervals mentioned are repeated at various intensities and durations over the course of a 90 minute match. However, because of the nature of the sport, anaerobic conditioning should take up the majority of the cardiovascular conditioning. As a result now a day's our country, Ethiopia also gives recognition for youth football program as a founding stage for the replacements and developments of elite athletes in the future. But so as to gain the full cumulative effects of youth football training program or to gain an improvement in performance, training shall meet certain criteria. And they should be equipped with the basic and advanced technical, tactical, physical, and psychological demands of modern football. Within this standing truth developing well-structured youth football development program is primarily mandatory (Asrat Abate, 2014).

Durandt, (2009) Stated that soccer players require a moderate to high levels of aerobic and anaerobic power, good agility, speed and a variety of technical and tactical skills to bolster the likelihood of their success in the sport and to meet the physical demands of play as well as training components. And now a day coaches give variety of aerobics, strength and power trainings which involve large muscle group specially lower and upper extremities so as to meet the physical demands of soccer players. Additionally, Afyon, (2014) stated soccer as a team sport of intense tackle so strong central body area decrease injury, improves explosive power, improve higher rate of anaerobic energy and technical movements with and without the ball. additionally in the same investigation he, stated in his research conducted on the effects of 12 weeks of core strength training on motor capabilities of 16 years old soccer player, a significant effect was observed in standing long jump, shuttle, push up, speed plank and vertical jump, which are almost an indicators and assessment tools of strength, anaerobic power, and speed of a soccer player. Even if different researchers examined that this core strength training helps for improving and strengthening core muscles for better performance, effective motor capabilities, endurance and strength of abdominal muscles and reduce back injuries, its contribution towards skill related fitness components including anaerobic power, speed and agility was investigated merely with scientific researches. And due to lack of investigation of the effects of core strength training on the above listed fitness components especially with local youth soccer players, the investigator carried out experiments and identifies the effects of core strength training on power, speed and agility on male U-17 soccer players.

## **1.2 Statement of the Problem**

Soccer is the most popular sport game in the world, played practically in every nation at different levels. Football may be played competitively or for fun, as a career, a means of keeping fit or simply a recreational pursuit Reilly, (1996). As Niessen, (2014) Football is a sport of intermittent nature that requires multiple and constant changes of direction running intensity, accelerations, and types of movements (running forwards, backwards, lateral movements, jumps, tackle, etc.). The specificity of training principle in sports science states that the most effective training is the one that resembles the demands of a sport/game as close as possible. Therefore, a broad understanding of the physical demands of football is essential for developing sport-specific conditioning programs for youth football players.

As Shinkle *et al*, (2012) definition, the core is considered a box with the abdominals and gluteal in back the diaphragms the roof, oblique's, as the side and the pelvic girdle and hip

girdle musculature serving as the bottom. The abs (the abdominal muscles) are only a small fraction of your core muscles. Core is a complex series of muscles that includes your entire trunk region. It involves everything except your arms and legs. It is involved in almost every movement of the human body. Core strength is the ability of the musculature to produce force through contractile forces through intra abdominal pressure. A cool core exercise brings in other muscle groups into play and helps on the flexibility of the calves. And core training as the training of abdominal and lumbar region. He added that strengthening core muscle is not only necessary for sportive performance but also provide a correct posture. A strong core is an invaluable asset. A strong, stable core will better help a soccer player: maintain stability on the plant foot when shooting a ball, keep their balance when faking left or right against a defender, shoot without placing stress on the low back, move the hip extensors (during the back-swing) and hip flexors and quadriceps (during the follow-through motion) on powerful shots, play with good posture so they can run at high speeds and change direction quicker, breathe more efficiently, which helps with recovering after high bouts of intense movement. And will allow a transfer of force from the lower body to the upper body with the minimal dissipation of energy in the torso. And if power is created but not transferred or no strong core muscle, performance may be affected negatively (Afyon , 2014). Similarly the benefits of this core training which is given for the sake of developing core muscles strength helps to improve sporting performance, improving musculoskeletal systems ranging from maintaining low back pain and prevent knee ligament injury is studied by (Nesser *et al.*, 2012).

Many sport organizations, sport journals and sport science professionals agreed that designing a well-planned grass root and youth football training program is a founding stage of the replacement and developments of tomorrow's elites. But it's obvious that their agreement can only be true if and only if there is an application of scientific soccer training which is supported by progressive assessments of player's performance, fitness qualities as well as training methodologies. Even if coaches who work on the grass root level give lots of aerobic, strength and other soccer related skill trainings to their trainees and knows little about the real impacts of their training on health related fitness components, they still lacks of assessing the skill related fitness components in relation to the type of exercise they prescribed. Now in Ethiopia from time to time football clubs have displayed encouraging enlargement and expansion in numbers through the country. In Amhara Region, North Western Ethiopia, there were different leagues and projects which trained and competed regularly. And from East Gojjam zone, four male soccer teams were participated in Amhara league. And also in this zone there were many soccer projects trainees with different age

category. From out of these projects Digotsion male soccer project was the only male U-17 project team that organized and funded by Bibugn District Sport office which sited in Digotsion town. Fortunately, the researcher had worked in coaching parallel to his major teaching profession. So he had the chance to know about the limitations and strength of the soccer team training periods either included or not. Even though, there has a good beginning of scientific professional training. And the researcher has not observed that their trainings have not consists of core strength trainings on the selected site and age group of soccer players. From this standing point of view and due to lack of investigation related with our country youth soccer training and players performance assessments, the researcher carried out on some selected skill related fitness components with tests and examine the effects of core strength training on soccer players. And the purpose of this study was to see whether increasing core strength training would have an effect on power, speed and agility on male U-17 soccer players.

### **1.3 Research Hypothesis**

**1. H0:** Core strength training would not be show a significance difference on power in U-17 soccer players.

**H1:** Core strength training would be show a significance difference on power in U-17 soccer players.

**2. H0:** Core strength training would not be show a significance difference on speed in U-17 soccer players.

**H1:** Core strength training would be show a significance difference on speed in U-17 soccer players.

**3. H0:** Core strength training would not be show a significance difference on agility in U-17 soccer players.

**H1:** Core strength training would not be show a significance difference on agility in U-17 soccer players.

### **1.4 Objectives of the Study**

#### **1.4.1 General objective**

To examine the effect of core strength training on selected skill related fitness components on male U-17 soccer players.

#### **1.4.2 Specific objectives**

- To measure the effect of core strength training on power in U-17 Soccer players.

- To assess the effect of core strength training on speed in U-17 Soccer players.
- To evaluate the effect of core strength training on agility in U-17 soccer players.

### **1.5 Significance of the Study**

The main significance of this study was to assess the effects of core strength training on power, speed and agility in soccer players. The researcher hopes that the findings of the study will contribute:

- To give insight for investigators, players, coaches, clubs, coaching staffs and sport administrators in addressing and evaluating the effects of core strength training on the selected skill related fitness components.
- The study may suggest to the coaches to prepare their training schedule as needed.
- It may use for further study as secondary source.
- It may help and initiate for other researchers to undertake similar studies at different levels.

### **1.6 Delimitation of the Study**

In order to make the study more clear, specific, accurate and manageable, this study mainly focused on the effects of core strength training on selected skill related fitness components on soccer players. And this study was delimited to the following parameters:

- Area – The study was conducted at Digotsion Town, Amhara Region
- Age – 15 to 16.
- Sex – Only male players were selected.
- Numbers of subject – by purposive sampling, 20 players were the sample of the study.
- The study was delimited only on power, speed and agility of skill fitness components.
- For power only standing long jump test and vertical jump test have selected.
- For measuring speed only 20m dash and 30m dash tests have selected for this study.
- For measuring Agility only Illinois agility test and T-Test have selected for this study.

### **1.7. Limitations of the Study**

As the researcher was a private student and investigator, he had not found any fund and sponsorship of money or any other related materials. Because of these factors the limitations of this study were as follows:

- Shortage of money, references, time constraints and less amount of personnel.
- The study could not control the underlying variables such as injuries, sickness or tiredness.

- The effort at the subjects in performing the tests was uncontrollable which might influence the results at the study.
- Daily routine, dietary habits, socio-economic condition, physical and the social environments were considered as the limitation of the study.
- The results may only apply to male U-17 soccer players and could not be generalized to all soccer team projects in the region or country.
- Only descriptive statistics and paired sample t-test results were analyzed and presented in the study.

### **1.8 Definition of terms**

The following terms are operationally defined for the purpose of this investigation:

**Agility:** refers to a “rapid whole body movement with change of velocity or direction in response to a stimulus” Sheppard and Young (2005).

**Core:** musculature surrounding the lumbo-pelvic region that attaches the upper and lower extremities (Karageans, Steven J. (2004).

**Core exercise:** is any exercise that involves the use of your abdominal and back muscles in coordinated fashion(Kisner, *et al.*, 2007).

**Core strength:** “the ability of the musculature to produce force through contractile forces through intra abdominal pressure” (Faries & Greenwood, 2007).

**Players:** equivalent for soccer project trainees at Digotsion town with U-17 age category.

**Power:** function of amount of work performed per unit of time (Pacific Lutheran University)

**Soccer:** another name of the football game(US Soccer Model 2012)

**Speed:** refers to a person’s ability to move fast ([www.topenedsport.com](http://www.topenedsport.com))

**Strength training:** a type physical exercise specializing in the use of resistance to induce muscular contraction (Shaw, *et al.*, 2014).

### **1.9 Organization of the Study**

This study is organized under five chapters. The first chapter highlights the paper; and why to study. Chapter two reviews related literature to distinguish previously discovered areas to cover the ground for what is to be obtained in this study. Chapter three deals how to make the research, the targets to shot upon, and how the data to be analyzed. Chapter four analyzes data of different sources and nature to achieve the objective of the study. The final chapter is to summarize, conclude, and forward suggestion and recommendations based on what is obtained in chapter four.

## **CHAPTER TWO**

### **2. REVIEW OF RELATED LITERATURE**

This review of pertinent literature is organized to include the findings of past researchers and how various scholars have look at the effect of core strength training on speed and agility on soccer players will examine; the history of world football , the history of African football, the history of football in Ethiopia, general characteristics of the U-17 age group, core(anatomy), the core muscles, physiology of the core, core strength vs. stability, physiological demands of soccer, strength training, strength training for soccer players, core strength training, principles of core strength training, core and soccer, skill related fitness components, and the selected skill related fitness tests( power tests of SLJT and VJT, speed tests of 20m and 30m dash and agility tests of Illinois agility and T-Test)

#### **2.1 The History of World Football**

No one really knows where and how football began but many writers have tried to relate its history with their own countries by mentioning certain evidences. For thousands of years it had been played in different ways. It is said to be the oldest among sport activities. Evidence proves that even it was in existence before the birth of Christ. The roots of soccer are grounded in antiquity. Some believe that soccer's origins can be traced to the ancient (2500 B.C) Chinese game of tsu-chu, or kickball. The Egyptians (2000 B.C), Japanese (600 B.C), Ancient Greeks, and Romans have also been intimately linked with the evolution and spread of the game. The Roman legions under Emperor Claudius (A.D 43) are credited with carrying the game to Britain, Where it was integrated in to the local games and evolved, grew, and developed from the middle ages through the industrial revolution. The modern form of soccer gained its renowned shape and identity in October 1863, in London's, where the first Football Association (English Football Association) was established and the laws of the game were formulated. EFA organized knock –out competition in 1871 & 1872. The laws served to separate association “assoc” Football (Soccer) and Rugby. The kick-in was replaced by the thrown (1863), Offside (1866), corner kick (1872), and referees (1874) were added, as were the whistle (1878), the penalty kick (1891), and various numbers of substitutions. At the beginning of the modern Olympic program in 1896 all clubs of European nations and most countries of Latin America had football. Contemporary soccer is truly an international game, with the Federation International De Football Association (FIFA), established in Paris on May 21, 1904, by a French man Robert Gyron, representing approximately 170 nations.

Soccer was introduced to the Olympic Games in Paris in 1900, and the inaugural world cup was played in 1930 in Montevideo, where the Uruguayan hosts defeated Argentina. In the first half of 1950's, Union of European Football Association (UEFA) and the African Federation were formed to provide International competitions at regional level. The world Football cup held every four years organized by FIFA is still the most organized competition that drew the attention of all people old and young in the modern world.

## **2.2. The History of African Football**

Football in Africa is followed passionately from Morocco on down to South Africa. You'll know when an important football match is being played in Africa because the country you are visiting will literally come to a standstill. Everywhere you go in Africa you'll see young boys kicking around a football. Sometimes the ball will be made of plastic bags with string wrapped around it, sometimes it will be made of crumpled up paper. As long as it can be kicked, there will be a game. Although Football has a long history in the African continent, it is impossible to tell where and when it started, Ethiopian, Egypt and the Sudan were the first to establish the African Football Federation. The Confederation of African Football (CAF, is the administrative and controlling body for African association football. CAF represents the national football associations of Africa, runs continental, national, and club competitions, and controls the prize money, regulations and media rights to those competitions. CAF is one of the biggest of six continental confederations of FIFA. Although it is just three years younger than the UEFA, CAF still has a long way to go in order to improve the quality of the national and local competitions. CAF has been given 5 slots out of the 32 available since the 1998 FIFA world cup in France. The top 5 African teams are: Nigeria (The Super Eagles), Cameroon (The Indomitable Lions), Senegal (The Lions of Taranga), Egypt (The Pharaohs) and Morocco (Lions of Atlas). Nigeria and Cameroon have a long standing football rivalry similar to that of Brazil and Argentina.

## **2.3 The history of Football in Ethiopia**

According to the Ethio Football (1999:7) suggestion, there are no clearly written documents that notice the beginning of football in Ethiopia. On the other hand, the journal indicates that some foreigners were playing the game as early as 1880. Ethiopia, unlike the rest of Africa where football was imposed with colonial rule, the history of football in Ethiopia is different. It was the victory of Emperor Menelik II (r. 1889-1913) against the Italian invaders at Adwa in 1896 that brought football into Ethiopia. The defeat of the Italians convinced the rest of Europe to acknowledge Ethiopia's independence and send emissaries to seek favors from the



Emperor. It was these European diplomats and their dependents who introduced football into Ethiopia. The first football game was held between these foreigners in Addis Ababa in 1924. Though there were indications that football clubs existed at the Teferi Mekonnen School as early as 1927, the participants remained foreigners such as Armenians and Greeks, who had been granted refugee status by Ethiopia. In one of the "international" football games held in Addis Ababa in 1935, the Ethiopian team, primarily comprised of European refugees and asylum seekers, beat the French team (members of the French Navy from Djibouti) 3-1. Yervant Abraham, an Armenian, scored all three goals. In that same year an Ethiopian football club, St. George was established with Yideneqachew Tessema, as one of the founding members, who is regarded as the father of Ethiopian football.

During the Italian occupation of Ethiopia (1936-1941), in accordance with the Fascist racial policy, Ethiopians were barred from playing football with Europeans. A separate sport office for the natives, "Sport Office for the Indigenous," was set up and the already established Ethiopian football clubs were renamed: St. George became *Littorio Wube*, Qebana team became *Villa Italia*, Sidist Killo renamed *Piazza Roma* and Gulele named *Consolata*. The irony was that on the immediate aftermath of the Italian defeat, a football match was held between an all-Ethiopian team, expatriate teams and an Italian football team, *Fortitudo*, in Addis Ababa in 1942. The Ethiopian team St. George faced the Italians. The latter was defeated at the football field as well. Soon after, Ethiopia established the Ethiopian Football Federation in 1943. The budget for the Federation was a mere \$127.00. Since then, the Federation hosted the "Ethiopian Cup," which was contested between football clubs of the Ethiopian armed forces, known as Army, the British Military Mission (BMME), football clubs of Italian stragglers who stayed in Ethiopia after the war, *Polisportiva*, St. George and the Imperial Body Guard football club, Body Guard. The BMME and *Polisportiva* won the 1945 and 1947 Ethiopian Cup finals respectively, while Army dominated the remainder of the 1940s and 1950s ([www.ethiosports.com](http://www.ethiosports.com)). Given British racist attitude towards Ethiopians and the not so long colonial aspirations of the Italians, these matches must have been arenas where Ethiopian patriotism and nationalism was expressed vis-à-vis colonialism and racism. With the establishment of the African Nations Cup in 1957, which included Ethiopia, Egypt and the newly independent Sudan, Ethiopian football attained additional momentum. In the 1962 African Nations Cup that was held in Addis Ababa, Ethiopia won beating Egypt 4-2. Since then, though Ethiopia had never won an African Nations Cup, football evolved into one of the most popular pastimes in Ethiopia. Wherever there is an educational establishment such as a university, college or even a high school, there were football clubs were formed;

even at Ethiopian military bases, there were football clubs that represented the military. In this regard, the Imperial Ethiopian Armed Forces and Ministry of Education and Fine Arts played a dominant and pioneering role in the development of football in Ethiopia. Parallel with this, one has to note that these were also "modern" institutions through which Western ideas seeped through into much of Africa. Even today, the African armed forces and educational establishments remain relatively modern and well-organized institutions; and in this regard, Ethiopia is not an exception.

In a country where freedom of speech and association is curtailed or does not even exist, football matches provided venues for expressions of discontent. This was particularly true during the era of the *Derg*. The latter, despite its claim of popular support and Marxist rhetoric, the populace, besides other things, regarded the *Derg* as a soldiers' party or government. Hence, the public associated many of the football clubs that were drawn from and represented the army and police such as Omedla, Mechal, and Ermejachen as affiliates of the *Derg*. Thus, almost all football matches between one of the civilian clubs and the army/police in the Addis Ababa stadium became symbols of struggle between the civilians and the military, opponents and supporters of the *Derg*. There were times when the defeat of one of the aforementioned football clubs by the civilians such as Buna or St. George would result in army-police violence against the civilian spectators. If one of the army-police teams won the game, then taxi drivers would exhibit their dissatisfaction and protest by refusing their service to the soldiers/police officers while serving only civilians. Civilian-military confrontation at the football stadium was not uncommon in Addis Ababa in particular and in Ethiopia in general during the imperial era. For instance, in 1965 there were several disturbances and fistfights that involved civilians and the military-police teams (Mekuria, Mechal, Omedla). They were readmitted to the football match in 1975, a year after the seizure of power by the *Derg*. What makes the civil-military confrontations of the 1970s and 1980s unique was its politicization. Though in most cases, the annual football matches between teams of the provinces and from within the provinces became venues for loyalties that transcended ethnic and religious differences, it also began mirroring ethno-nationalist aspirations. This was so, especially after the rise of secessionist movements in Eritrea in the 1960s. A football match between one of the Eritrean clubs such as the Red Sea or Eritrea Shoe and one of the non-Eritrean clubs, most often Ethiopian Navy or one of the clubs of the Second Division Army stationed in Eritrea, became highly political. In such occasions, the audience in the Asmara stadium was roughly divided between supporters of Eritrean secessionism and Ethiopian nationalism, while the football field became the battlefield for

competing nationalisms. If the Eritrean clubs scored a goal, the stadium was electrified with Tigregna beats which is always accompanied with a drum and a claps. Supporters of the army or navy, who were mainly drawn from civilian government employees, members of the armed forces and some Eritreans, would chant, (*Amaressa*), a well-known battle cry of the Ethiopian army. Despite this, any football match between the Ethiopian national team and another country, whether the national team wins or not, the public supports the team. The Addis Ababa stadium (sometimes the federation also uses the Diredawa stadium) was usually transformed into an arena where one celebrates and observes the depth and bounds of Ethiopian nationalism. Singing patriotic songs, waving the Ethiopian tri-colors, or wearing a bonnet with the tri-colors and coming to the stadium adorned with Ethiopian cultural dresses were and are some of the symbols of expressions of nationalism ([www.ethiosports.com](http://www.ethiosports.com)).

#### **2.4 General Characteristics of the U-17 Age Group**

Teenagers are group of individuals who are full of life, enthusiasm, energy and the feeling that they can do anything. They feel as if they can conquer that world- what's more is that they feel they are ready to. They are impressionable where physical appearance is concerned and can be easily misguided by advertising and the emphasis our society places on physical appearance. With this age bracket, we need to open to answering questions and keep the line of communication open. They are concerned about body image and exhibit small range in size and maturity among peers. They tend to have realistic view of limits to which their body can be tested. They reach for intimacy, tend to romanticize and make commitments. They desire respect, want adult leadership roles and can commit to follow through. They are beginning to accept and enjoy their own uniqueness but still seek approval from groups. They look for confidence of other in their decisions and can see self from view point of others. They take fewer risks, can initiate and carry out their own tasks in out the supervision of others. They are mastering abstract thinking, enjoy demonstrating acquired knowledge and will patience with meaningless activity. They provide experiences around body image, etiquette, grooming and avoid comments that criticize or compare statue, size or shape at all costs. Individuals in this age may have declining interest in past activities, but offering them an opportunity to be a leader, tapping into their energy, skills and knowledge will allow you to build a leader in them, but also keep them interested in positive programs that have and will grow their development ([www.msue.msu.edu](http://www.msue.msu.edu)). A stage of constructing the self-concept and may have a lengthened attention span. They able to better understand moral principles and strong identification with admired adults. They are very sensitive to praise and recognition; feelings are easily hurt and fear of ridicule and being unpopular. Their friends set

the general rules of behaviour and strong need to conform exists. Dress and behave like their peers in order to belong. Experiences physical changes - very concerned with their appearance and very self-conscious about their physical changes, Often a rapid weight gain at the beginning of adolescence poses an enormous appetite (US soccer model 2012).

## **2.5 Core (anatomy)**

In common parlance, the core of the body is broadly considered to be the torso. Functional movements are highly dependent on this part of the body, and lack of core muscular development can result in a predisposition to injury. The major muscles of the core reside in the area of the belly and the mid and lower back (not the shoulders), and peripherally include the hips, the shoulders and the neck. The core is used to stabilize the thorax and the pelvis during dynamic movement and it also provides internal pressure to expel substances (vomit, feces, carbon-laden air, etc.). Typically, the core is associated with the body's center of gravity, which is over the region of the second sacral vertebrae groups and stability is associated with isometric or static strength. In addition, it is the lumbar spine that is primarily responsible for posture and stability thus providing the strength needed for the stability especially utilized in dynamic sports. The core is traditionally assumed to originate most full-body functional movement, including most sports. In addition, the core determines to a large part a person's posture. In all, the human anatomy is built to take force upon the bones and direct autonomic force, through various joints, in the desired direction. The core muscles align the spine, ribs, and pelvis of a person to resist a specific force, whether static or dynamic. The nature of dynamic movement must take into account our skeletal structure (as a lever) in addition to the force of external resistance, and consequently incorporates a vastly different complex of muscles and joints versus a static position. Because of this functional design, during dynamic movement there is more dependence on core musculature than just skeletal rigidity as in a static situation. This is because the purpose of movement is not to resist a static, unchanging resistance, but to resist a force that changes its plane of motion. By incorporating movement, the bones of the body must absorb the resistance in a fluid manner, and thus tendons, ligaments, muscles, and innervations take on different responsibilities include postural reactions to changes in speed (quickness of a contraction), motion (reaction time of a contraction) and power (amount of resistance resisted in a period of time (Karageans, Steven J. (2004).

## **2.6 The core muscles**

Core muscles are important for a soccer player as they serve a base for endurance, posture, strength, power, coordination, and reducing likelihood of injury. ... Whether it's for fighting off an opposing player, or making that powerful kick to score, your core muscle play an important role. Core muscles are one of the most active muscle groups in the body. Major muscles included are the pelvic floor muscles, transverses abdominis, multifidus, internal and external oblique's, rectus abdominis, erector spinae (sacrospinalis) especially the longissimus thoracis, and the diaphragm. The lumbar muscles, quadratus Lumborum (deep portion), deep rotators, as well as cervical muscles, rectus capitis anterior and lateralis, longus colli may also be considered members of the core group. Minor core muscles include the latissimus dorsi, gluteus maximus, and trapezius. Core muscles are also involved in the Valsalva maneuver, where the thorax tightens while the breath is held to assist, often involuntarily, in activities such as lifting, pushing, excretion and birthing. Whether you are walking, making dinner, jogging or playing golf you are engaging your core muscles. Because you use core muscles for so many activities, it is important to keep them strong and flexible. Many people equate the core with their abdominal muscles. But your core is much more than that! According to a sports medicine book "The Role of Core Stability in Athletic Function" the core is described as a muscular box with 29 pairs of muscles. Generally, light to moderate exercise is safe for healthy adults. If you engage in regular activity, odds are good you can undertake the workouts without difficulty. But it's best to talk to a doctor first if you have pain in your joints or back, have had surgery or have a chronic or unstable health condition. Core exercises are an important part of a well-rounded fitness program. Aside from occasional sit ups and push ups, however, core exercises are often neglected. Core exercises train the muscles in your pelvis, lower back, hips and abdomen to work in harmony. This leads to better balance and stability, whether on the playing field or in daily activities. In fact, most sports and other physical activities depend on stable core muscles. Any exercise that involves the use of your abdominal and back muscles in coordinated fashion counts as a core exercise. For example, using free weights in a manner that involves maintaining a stable trunk can train and strengthen several of your muscles, including your core muscles (Kisner, *et al.*, 2007).

## **2.7 Physiology of the Core**

The core consists of the musculature surrounding the lumbopelvic region. These muscles are either directly or indirectly attached to the spinal column and connect the upper and lower extremities (Vleeming, Pool-Goudzwaard, Stoeckart, Van Wingerdenm, & Snijders, 1995).

Panjabi (1992) stated that core stability is controlled by the passive spinal column, active spinal muscles, and the neural and feedback subsystem. The neural and feedback subsystem includes proprioceptors in the tendons, ligaments, muscles, and the nervous system. These three interdependent systems combine to allow movements enabling the dynamic activities seen in daily living. This idea can also be applied to sport. Most athletic movements begin with the core musculature and then continue to the limbs. Several muscles (latissimus dorsi, pectoralis major, hamstrings, quadriceps, and iliopsoas) attach to the core and are directly involved in throwing, kicking, and running. Stabilizing muscles (upper and lower trapezius, hip rotators, glutei) also attach to the core (Kibler, Press, & Sciascia, 2006). Not only has the lumbopelvic region shown to be involved in core rotation and load transfer from the lower body, but also in core stability (Bliss & Teeple, 2005; Vleeming et al., 1995).

## **2.8 Core Strength vs. Stability**

Currently, many studies do not distinguish between core strength and stability despite the clear differences. Researchers have defined core stability as, “the ability to control the position and motion of the trunk over the pelvis to allow optimum production, transfer and control of force and motion to the terminal segment in integrated athletic activities” (Kibler, Press, & Sciascia, 2006). Core exercises improve your balance and stability. Core stability refers to a person's ability to stabilize their core. Stability, in this context, should be considered as an ability to control the position and movement of the core. Thus, if a person has greater core stability, they have a greater level of control over the position and movement of this area of their body. Meanwhile, core strength is defined as, “the ability of the musculature to produce force through contractile forces through intra abdominal pressure” (Faries & Greenwood, 2007). Elite level athletes must be able to produce powerful movements while maintaining core stability in dynamic environments. Core exercises are an important part of a well-rounded fitness program. Core exercises train the muscles in your pelvis, lower back, hips and abdomen to work in harmony. This leads to better balance and stability, whether on the playing field or in daily activities. In fact, most sports and other physical activities depend on stable core muscles. Any exercise that involves the use of your abdominal and back muscles in coordinated fashion counts as a core exercise. For example, using free weights in a manner that involves maintaining a stable trunk can train and strengthen several of your muscles, including your core muscles. The body's core is frequently involved in aiding other movements of the body, such as the limbs, and it is considered that by improving core stability a person's ability to perform these other movements may also be improved i.e. core stability training may help improve someone's

running ability. The body's core region is sometimes referred to as the torso or the trunk, although there are some differences in the muscles identified as constituting them. The major muscles involved in core stability include the pelvic floor muscles, transversus abdominis, multifidus, internal and external obliques, rectus abdominis, erector spinae (sacrospinalis) especially the longissimus thoracis, and the diaphragm. The minor muscles involved include the latissimus dorsi, gluteus maximus, and trapezius. Notably, breathing, including the action of the diaphragm, can significantly influence the posture and movement of the core; this is especially apparent in regard to extreme ranges of inhalation and exhalation. On this basis, how a person is breathing may influence their ability to control their core.

## **2.9 Physiological Demands of Soccer**

The physiological demands of soccer are complex. This complexity is partly a consequence of the nature of the exercise pattern. The requirement for frequent changes in both the speed of movement (e.g., walking, jogging, high intensity running, and sprinting) and direction makes the activity profile intermittent. The intermittent exercise associated with soccer necessitates contributions from both the aerobic and the anaerobic energy systems. Training programs for players will therefore need to include activities and exercise prescriptions that stress these systems. Players also need to possess muscles that are both strong and flexible. These attributes are important for the successful completion of the technical actions (e.g., passing, shooting, etc.) which ultimately determine the outcome of the match. Effective ways to develop both strength and range of movement, especially in the lower limbs, also needs to be systematically planned and performed in training. The need to include a number of components of fitness into the training programs of soccer players would indicate that the exercise prescription should be multi-dimensional. The inclusion of specific training plans for the development of a number of energy systems as well as specific muscle exercises would lead to a need for multiple types of physical training sessions. The completion of a large number of such training sessions is problematic in a sport such as soccer for various reasons. The need to include training that is focused on the development of technical skills and sessions that impact on the tactical requirements of soccer prevents the completion of numerous physical training sessions. Technical and tactical sessions are frequently the priority in the training plan and will therefore often take precedent overall other training activities. The large number of competitive fixtures, as well as the need for frequent travel, further limits the time that is available to undertake physical training in the competitive season. These restrictions promote the need for a more global approach to the training of

players by devising sessions that promote the simultaneous development of physical, technical, tactical, and mental qualities (Morgans *et al.*, 2014).

As Niessen, (2014) Football is a sport of intermittent nature that requires multiple and constant changes of direction running intensity, accelerations, and types of movements (running forwards, backwards, lateral movements, jumps, tackle, etc.). The specificity of training principle in sports science states that the most effective training is the one that resembles the demands of a sport/game as close as possible. Therefore, a broad understanding of the physical demands of football is essential for developing sport-specific conditioning programs for youth football players.

### **2.10 Strength training**

Strength training is a type of physical exercise specializing in the use of resistance to induce muscular contraction which builds the strength, anaerobic endurance, and size of skeletal muscles. When properly performed, strength training can provide significant functional benefits and improvement in overall health and well-being, including increased bone, muscle, tendon, and ligament strength and toughness, improved joint function, reduced potential for injury increased bone density, increased metabolism, increased fitness and improved cardiac function. Training commonly uses the technique of progressively increasing the force output of the muscle through incremental weight increases and uses a variety of exercises and types of equipment to target specific muscle groups. Strength training is primarily an anaerobic activity, although some proponents have adapted it to provide the benefits of aerobic exercise through circuit training. Sports where strength training is central are bodybuilding, weightlifting, power lifting, strongman, Highland games, shot put, discus throw, and javelin throw. Many other sports use strength training as part of their training regimen, notably tennis, American football, wrestling, track and field, rowing, lacrosse, basketball, pole dancing, hockey, professional wrestling, rugby union, rugby league, and soccer. Strength training for other sports and physical activities is becoming increasingly popular (Shaw *et al.*, 2014)

### **2.11 Strength Training for Soccer Players**

In sports training, and especially with soccer training, the conventional wisdom is that strength training and conditioning for young athletes is a big no-no. There are a lot of parents who are nervous about strength training for their kids. They might believe that they are too young, or there is no need for total body strength. Or that it will “stunt their growth”. What’s more is, young athletes can also be reluctant to start strength training. They think “strength



training”, and they picture body builders. The stereotype of body builders, and others who do strength training, is big, bulky, and slow, all qualities you want to avoid as a soccer player and as a teenager. Strength and conditioning is essential to give a young athlete every possible advantage on the field and to reach their full potential (they will reach their full height regardless). The reality is, unless you are training hard for it, no one is going to bulk up like a body builder. Strength training and conditioning when it comes to soccer, means power, speed, and overall athleticism. There has been a great deal of research showing that proper strength training and conditioning greatly reduces the chances of being injured while playing soccer. This applies to injuries such as torn muscles or ligaments and potentially life-threatening ones like concussions. Some studies have shown that the rate of injuries is almost 50% less for those athletes who have undergone strength training. (www.wikipedia.com)

### **2.12 Core Strength Training**

All powerful movements originate from the center of the body out, and never from the limbs alone. Before any powerful, rapid muscle contractions can occur in the limbs, the spine must be solid and stable and the more stable the core, the most powerful the extremities can contract. Training the muscles of the core also corrects postural imbalances that can lead to injuries. The biggest benefit of core training is to develop functional fitness that is essential to both daily living and regular activities. Core strengthening exercises are most effective when the torso works as a solid unit and both front and back muscles contract at the same time, multi joint movements are performed and stabilization of the spine is monitored (Akuthota *et al.*, 2008). People seem to think core training is synonymous with abdominal training, which explains why various websites, blogs, infomercials, and trainers use the phrase to attract misinformed readers desperate for a six-pack. In truth, the core is much more than a six-pack, and it needs to be treated as such. And it’s time to destroy misconceptions about core training and restore its true meaning (Akuthota *et al.*, 2008).

### **2.13 Principles of Core Strength Training**

A core strength exercise program should be done in stages with gradual progression. It should start with restoration of normal muscle length and mobility to correct any existing muscle imbalances. Adequate muscle length and flexibility are necessary for proper joint function and efficiency of movement. Muscle imbalances can occur where agonist muscles become dominant and short while antagonists would become inhibited and weak. One example of a muscle imbalance pattern includes tightness and over-activity of the primary Hip flexor,

which in turn causes reciprocal inhibition of the primary hip extensor (gluteus Maximus). Further up the kinetic chain, this particular muscle imbalance leads to increased lumbar extension, with excessive force on the posterior elements of the spine. In addition, postural muscles have a tendency to become tight due to constant activity in order to fight the forces of gravity. Then, activation of the deep core musculature should be taught through lumbo-pelvic stability exercises. When this has been mastered, more advanced lumbo-pelvic stability exercises on the physioball can be added. Finally, there should be transitioning to the standing position ([www.bodybuilding.com](http://www.bodybuilding.com)).

#### **2.14 Core and Soccer**

The core seems to play an important role in soccer. The core stabilizes through every agile movement, every kick, and every landing. Sprinting and kicking are known to be related to core strength, for example, the glutei stabilize the trunk and allow for powerful forward movements of the leg (Putnam, 1993). Therefore, the core stabilizes during every shot and pass. Investigators Niewolna and Zwierko (2015) looked at soccer players and untrained subjects to see the effects of unexpected perturbations on core stability. They found that soccer players required less time than recreationally active people to activate the various core muscles and less postural sway in response to a change in surface stability. This suggests that these muscles are important and incorporated in soccer (Borghuis, Lemmick, & Hof, 2011). The kicking motion also requires core rotation to generate torque. Researchers demonstrated that maximum foot velocity in kicking is more highly related to hip flexor muscle activation than knee extension (Zattara, & Bouisset, 1988). The hip flexor muscles directly attach to the core musculature, suggesting core strength and power in this area produce a faster movement in the distal limbs.

#### **2.15 Skill-Related Fitness Components**

Concept of physical fitness is as old as humankind. Throughout the history of mankind physical fitness has been considered an essential element of everyday life. The ancient people were mainly dependent upon their individual strength, vigor and vitality for physical survival. This involved mastery of some basic skill like strength, speed, endurance, agility for running, jumping, climbing and other skills employed in hunting for their livings. Physical fitness is a broad term used to describe the physiology of the body as it relates to health. It is the ability to perform daily activities, and encompasses a wide range of abilities willingly and actively. Physical fitness includes not only components of sports but those of health as well. Each sport and activity requires a specific set of skills, and so being fit for a sport requires a

specific skill set. Being fit for one sport does not necessarily make you fit for another. Basically physical fitness is classified in to two. Health related which contribute for the overall health improvements of an individual, and skill related components demanded highly for performance improvements of a particular athlete who participate in a specific sport.

Skill-related physical fitness: -consists of those components of physical fitness that have a relationship with enhanced performance in sports and motor skills. The components are commonly defined as agility, balance, coordination, power, speed and reaction time. Prior to the last 40 years the distinction between health-related and skill-related physical fitness was not typically made.

Agility: - is the ability to quickly change body position and make directional changes in body movement. A text book of PE for you define agility is the —ability to rapidly and accurately change the direction of the entire body in space 3. (1999, page 53) Wayne A. Payne and Dale B. Bahn define Agility is the ability to move quickly with frequent direction position, enhance your performance in a in variety of activities. (1989, page 71). This is the combination of speed and coordination. It allows you to efficiently change direction and body position at speed. The simple definition of agility is the ability to move quickly and easily, but this definition doesn't necessarily paint an obvious picture as to how it relates to sport. A more clear definition is that agility is the ability to move quickly and easily *change direction*. Basketball players, for instance, are incredibly agile—they don't simply run up and down the court, they have to move in every direction, jumping, sliding, and back pedalling in quick response to the movement of the ball and other players. Their bodies have to be trained to respond and change course at the drop of a hat. Agility drills commonly involve exercises that develop foot speed and direction change. For instance, ladder drills require quick and specific foot placement while crossing an agility ladder. Cone drills are another common approach. Simply set cones up in a "T" or star shape, then sprint, slide, backpedal, or change direction depending on which cone you're approaching.

Balance: - is the maintenance of equilibrium while stationary or while moving. Balance itself refers to your ability to adjust your body position to remain upright. It deals with proprioception, or knowing where your body is in space, and being able to make adjustments to your body position as your center of gravity changes during movement. For instance, every time you take a step, your body has to adjust to its constantly-shifting center of gravity in order to keep you from toppling over. In physical activity settings, balance is required for running, changing direction, landing a jump, and staying upright after you get jostled by an

opponent. There are few sports where balance doesn't play an important role, and there are lots of activities where balance is required for enhanced performance and safety. For instance, trail runners benefit from balance training because it can help prevent them from rolling an ankle or taking a nasty fall after tripping over a root or slipping on a muddy path. Balance can further be broken down into static balance, which is maintaining equilibrium while not moving, and dynamic balance, which is maintaining control of the body while moving without succumbing to gravity or momentum. Balance is important in sports such as dance, gymnastics, ice hockey, figure skating and other sports requiring extreme control (<http://scorecardresearch.com>).

Coordination: - is the ability to use the sense and body parts in order to perform motor tasks smoothly and accurately. But according to John et al (1996 page 97) defined as - coordination involves putting the relevant motor programs in the right order and effectively using the neuron muscular system to produce smoothly an efficient movement. Hence, coordination is the ability to integrate sensor and motor systems to produce efficient movement. Think of all the sports and activities that benefit from well-honed hand-eye (or foot-eye) coordination. Badminton, golf, soccer, basketball, football, racquetball, archery, softball, and ultimate Frisbee are just a few of the many examples that require you to be able to see an external object and respond precisely with your hands and feet to meet a pre-determined objective. In some cases, that means hitting a golf ball off a tee and in other cases that means catching a fly ball.

Power:-is the ability to transfer energy swiftly in to force. And also it is an explosive strength, is the ability to effectively integrate strength and speed to produce maximum muscular force at a maximum speed. It is the rate at which energy is expended or work is done. Then J.shorkey(1997 page 145) define power —work divide by time, or the rate of doing work if one can perform the same work better than the other with in the same time interval, then we have got a better power. In essence, it's how fast you can generate a maximal force. In sports, "power athletes" are those who exert brute strength in short, all-out efforts. Olympic weightlifters, football players, and "power gymnasts" are all clear examples. But that doesn't mean athletes in other sports, like basketball, volleyball, and tennis, don't benefit from developing greater power. For instance, jumping to get a rebound requires leg power while forcefully spiking volleyball requires a combination of upper- and lower-body power. To improve your power, you need to perform exercises that combine resistance work with speed.

For instance, plyometric box jumps develop lower-body power because they require you to explosively lift your own body weight into the air in order to land on the box.

**Speed:** - is the ability to perform a movement quickly. It is the time takes us to respond to a stimulus. John etal (1996 page 96) also state that —Speed is basically how fast you can move partial your body or the whole of your body, and is measured in meters per second. Therefore, speed is the rate of movement and often refers to the ability to move rapidly and it is an important factor in all explosive sports and activities that require sudden changes in space. Most sports and activities require some form of speed. Speed is not always about how quickly you can move your whole body from a to b, it also relates to body parts. For example, when playing golf, the speed of your arms and upper body in creating the swing are vital in driving the ball over a long distance.

**Reaction time-** refers to how quickly you can respond to an external stimulus. It is the ability to perform movements and actions of the body or body-part at a particular moment to produce to best effect. This is the time between a stimulus being perceive and the first movement made in response to it. It also depends on how long you take to process the information and this can be improved with practice. Think about a tennis match for a moment—the best competitors react almost instantaneously when the ball comes off their opponent's racquet, sprinting toward the location where they expect the ball to bounce. Reaction time hinges heavily on your mind-body connection. Your eyes see a stimulus, your mind interprets the stimulus, and your body reacts in accordance with the interpretation it's given.

## **2.16 The Selected skill related fitness tests**

The difference between the five health-related components of fitness and the six skill-related components of fitness boils down to the specificity of training and performance. In other words, while everyone benefits from cardiovascular endurance, not everyone needs to train for speed. To put it another way, your 85-year-old grandma can benefit from daily walks that help keep her heart in shape, but she probably doesn't need to worry about developing the speed necessary to run a five-minute mile. If you're already meeting the ACSM's guidelines for physical activity, and you want to do more to train for a specific fitness-related event or goal, you need to consider the six skill-related fitness components. These components, sometimes referred to as sport-related fitness components, include power, speed, agility, hand-eye coordination, balance, and reaction time. For this study the selected skill related

fitness components are power, speed and agility. Power is a measure that combines speed and strength. In essence, it's how fast you can generate a maximal force. In sports, "power athletes" are those who exert brute strength in short, all-out efforts. Olympic weightlifters, football players, and "power gymnasts" are all clear examples. The definition of "speed," then, is incredibly variable, and training will differ based on the sport you're training for. Speed is the ability to move the total body quickly from one point to another. The simple definition of agility is the ability to move quickly and easily, but this definition doesn't necessarily paint an obvious picture as to how it relates to sport. A more clear definition is that agility is the ability to move quickly and easily *change direction* (www.teachpe.com)

## **2.16.1 Power tests**

### **2.16.1.1 Vertical jump test**

The purpose of this test is to measure the leg muscle power of subjects. The athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach height. The athlete then stands away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. And jump height is usually recorded as distance score Getchell (1979).

#### **Procedures and analysis**



*Figure 1; picture of Vertical jump test*

### **2.16.1.2 Standing Long Jump Test (Broad Jump)**

The standing long jump, also called the broad jump, is a common and easy to administer test of explosive leg power. The standing long jump was also once an event at the Olympic Games, and the purpose of this test is to measure the explosive power of the legs Getchell (1979). The athlete stands behind a line marked on the ground with feet slightly apart. A two

foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The subject attempts to jump as far as possible, landing on both feet without falling backwards. Three attempts are allowed. And the measurement is taken from the take-off line to the nearest point of contact on the landing (back of the heels). Record the longest distance jumped, the best of three attempts.

#### **Procedure and analysis**



*Figure 2; picture of Standing Long Jump Test (Broad Jump)*

### **2.16.2 Speed Tests**

#### **2.16.2.1 20 meter and 30 meter dash sprint tests**

The purpose of this test is to determine acceleration, maximum running speed and speed endurance, depending on the distance run. The test involves running a single maximum sprint over a set distance, with time recorded. After a standardized warm up, the test is conducted over a certain distance, such as 10, 20, 30, 40 and/or 50 meters or yards, depending on the sport and what you are trying to measure. The starting position should be standardized, starting from a stationary position with a foot behind the starting line, with no rocking movements. If you have the equipment (e.g. timing gates), you can measure the time to run each split distances (e.g. 5, 10, 20m) during the same run, and then acceleration and peak velocity can also be determined. It is usual to give the athletes an adequate warm-up and practice first, and some encouragement to continue running hard past the finish line.

#### **Procedure and analysis**



*Figure 3; picture of 20 meter and 30 meter dash sprint tests*

## 2.16.3 Agility tests

### 2.16.3.1 Illinois Agility Test

Agility is an important component of many team sports, though it is not always tested, and is often difficult to interpret results. Durandt, (2009) the Illinois Agility Test is a commonly used test of agility in sports, and as such there are many norms available. The purpose of these is to test running agility of soccer trainees. And the length of the course is 10 meters and the width (distance between the start and finish points) is 5 meters. Four cones are used to mark the start, finish and the two turning points. Another four cones are placed down the center an equal distance apart. Each cone in the center is spaced 3.3 meters apart. Subjects should lie on their front (head to the start line) and hands by their shoulders. On the 'Go' command the stopwatch is started, and the athlete gets up as quickly as possible and runs around the course in the direction indicated, without knocking the cones over, to the finish line, at which the timing is stopped.

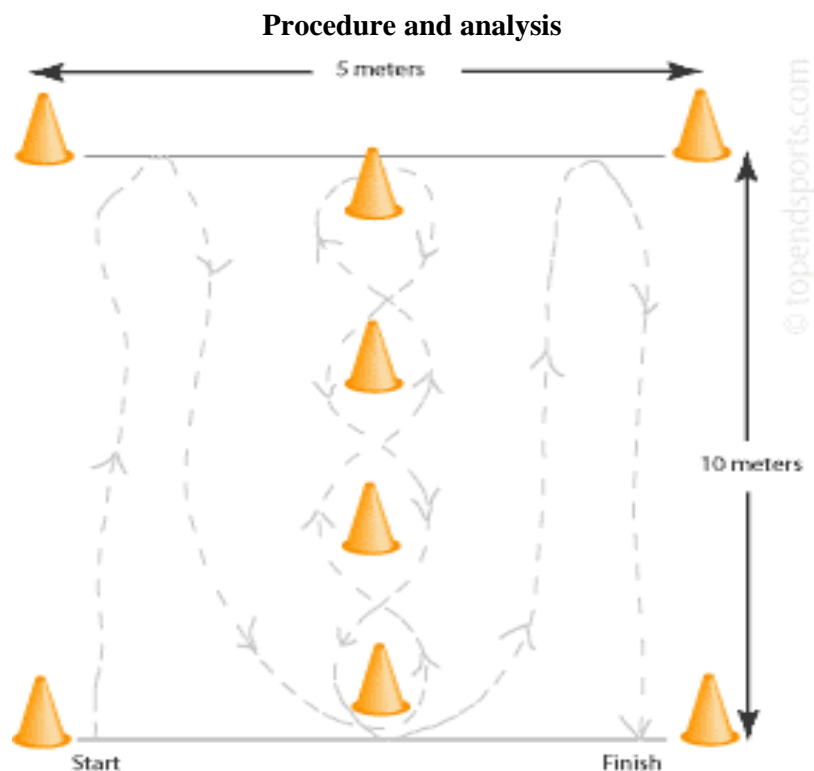


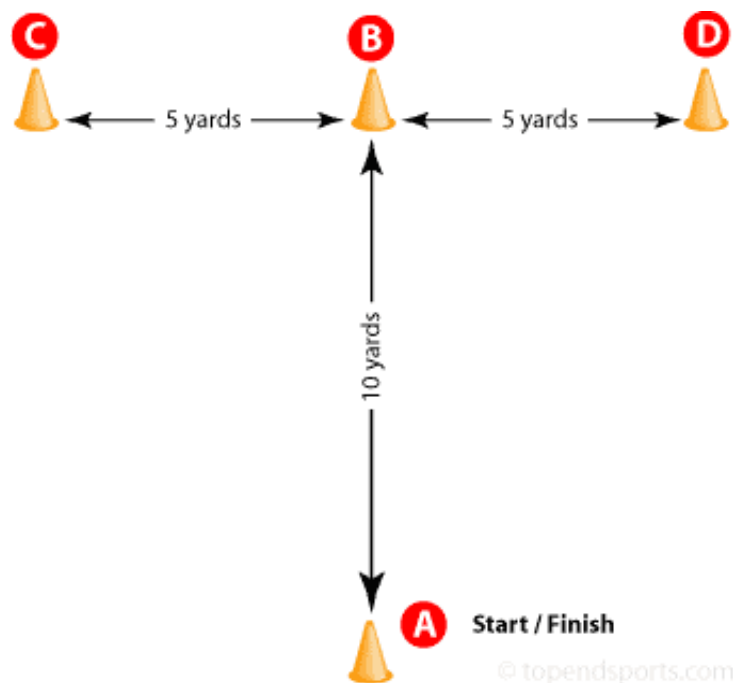
Figure 4; Diagram of Illinois Agility Test



### 2.16.3.2 Agility T-Test

The purpose of this test is to test agility of athletes, and includes forward, lateral, and backward running. It is conducted by Set out four cones (5 yards = 4.57 m, 10 yards = 9.14 m). The subject starts at cone A. On the command of the timer, the subject sprints to cone B and touches the base of the cone with their right hand. They then turn left and shuffle sideways to cone C, and also touch its base, this time with their left hand. Then shuffling sideways to the right to cone D and touching the base with the right hand. They then shuffle back to cone B touch with the left hand, and run backwards to cone A. The stopwatch is stopped as they pass cone A.

#### Procedure and analysis



*Figure 5; Diagram of Agility T-Test*

## CHAPTER THREE

### 3. MATERIALS AND METHODS

In this section description of the study area, study design, population of the study, sample and sampling techniques, experimental materials, source of data, data collection instruments, data collection procedures, methods of data analysis, and protocol and ethical consideration will be briefly discussed.

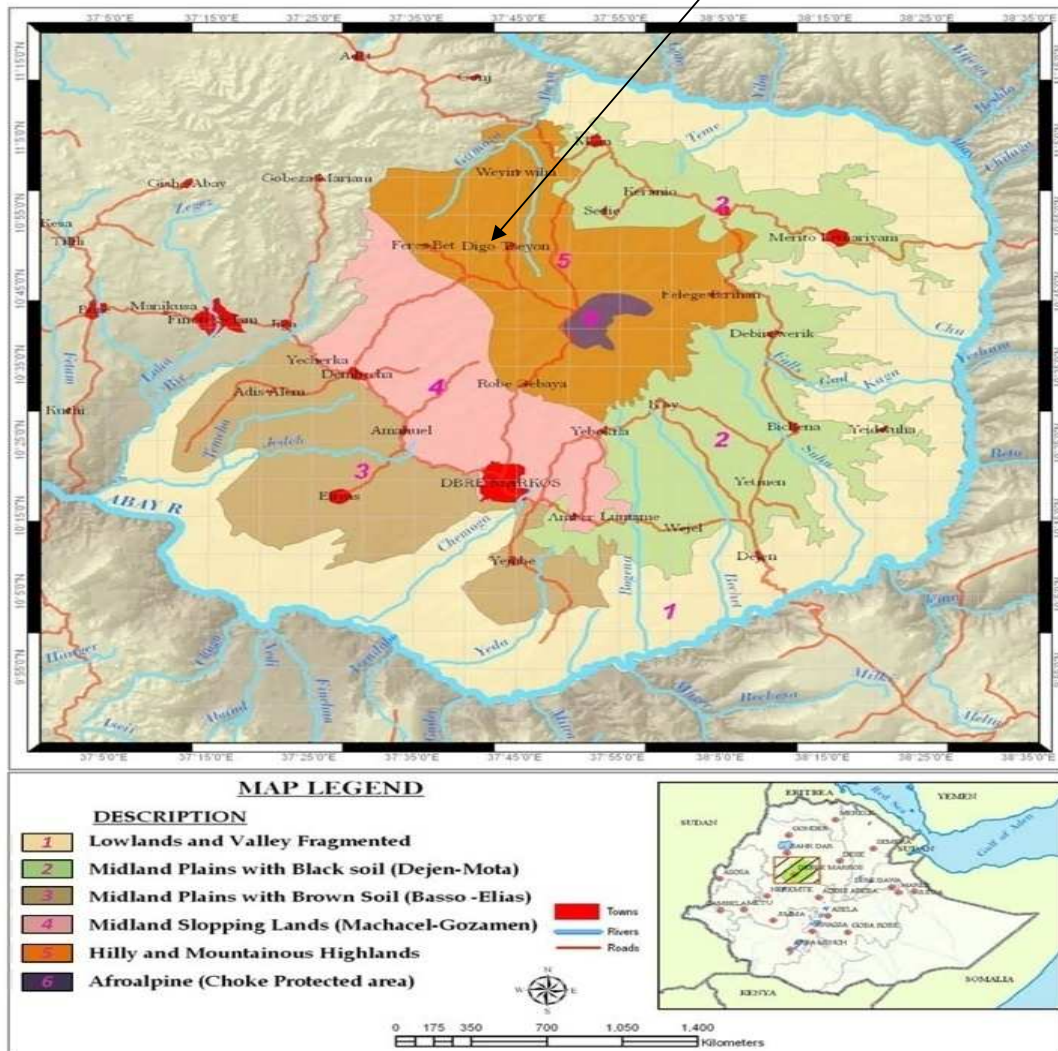
#### 3.1 Study Area

This research was conducted at Digo Tsion town, capital of Bibugn woreda in East Gojjam Zone, Amhara regional state and the period of the study was for six consecutive week starting from March to May 2019. East Gojjam Zone is found in Amhara regional state. Debre Markos is the center of East Gojjam Zone, which is 299 Km distance away from the capital city of Ethiopia. And the East Gojjam Zone has four city administrations and 18 woredas. Bibugn (Amharic: ቤቡኝ) is one of the woredas in the Amhara Region of Ethiopia. Part of the Misraq Gojjam Zone, Bibugn is bordered on the south by Sinan, on the west by the Mirab Gojjam Zone degadamot woreda, on the northwest by Goncha, and on the east by Hulet Ej Enese. Towns in Bibugn include Digo Tsion, Weyin Wuha and Wabirr. Digo tsion(ድጎጥዕን) is the center of Bibugn wereda. Due to geographical proximity and availability of trainees' the researcher carried out this research on one of East Gojjam zone on the selected woreda Bibugn and its capital city is Digotson which is located at latitude of 11<sup>0</sup>00' 0.00'' North and longitude of 37<sup>0</sup> 34' 59.99'' East. It located about 81km far from the capital city of east Gojjam zone, Debre Markos. And it far distance about 741km from Jimma Town. There are over 15 kebelles in bibugn wereda: among those debiresina is one of a kebele that found in the north part. The highest point in this woreda as well as in the Misraq Gojjam Zone is Mount Choqa (also known as Mount Birhan), a part of the Choqa Mountains, with an elevation of 4154 meters above sea level. In October 2009, zonal officials announced that construction of 47-km road connecting Digua Tsion with Motta, with a budget of over 147 million Birr had begun, with completion expected by September 2010. The construction completed in 2005 E.C that connected Bibugne with Motta and Bahirdar towns. The construction road creates good opportunities for travelers from Debremarkos to Motta town in a short way.

Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), this woreda has a total population of 82,002, an increase of -1.48% over the 1994

census, of whom 40,190 are men and 41,812 women; 6,241 or 7.61% are urban inhabitants. With an area of 399.79 square kilometers, Bibugn has a population density of 205.11, which is greater than the Zone average of 153.8 persons per square kilometer. A total of 18,548 households were counted in this woreda, resulting in an average of 4.42 persons to a household, and 17,959 housing units. The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 99.13% reporting that as their religion. (www.wikipedia.com/bibugnworeda)

*Digotsion Town*



*Figure 6; Map of the Study Site (Source: www.ethiomappingagency.com)*

### **3.2. Study Design**

The aim of the study was to evaluate the effects of core strength training on power, speed and agility in U-17 soccer players. The basic design of this study was an experimental (pre-test, post-test) design specified an experimental and a control group. 20 soccer players with age of 15-16 years were selected from Digotsion soccer project. Each subject was assigned to one of two groups either an experimental or a control group. Pre-test of power tests (vertical jump test and standing long jump test), speed tests (20m and 30m dash), and agility tests (Illinois agility test and T-test) were administered for the subjects. The subjects in the experimental group also took 40 minute core strength training for two days (Tuesday and Thursday) per week for six consecutive weeks. The core strength training consisted of different kind of core strength exercises such as side bend, reverse plank with leg raise, bicycle kicks, modified sit-ups, russian twist, leg and hip raiser, alternative crunch, oblique, single plank, superman, reverse crunches, hip raiser, bird-dogthe, body saw, flutter kick, bicycle crunches , push up to side plank, single leg stabilizers, cooling down and stretching activities. And also the experimental group continued the normal training program with the control group in other training days. After six weeks, post-test measurements on the same parameters were taken.

### **3.3. Population of the study**

The study population was Digotsion U-17 youth soccer project team. And the players were currently engaged on soccer training three times a week in Digotsion Town which organized and supported by Bibugn Woreda Sport Office. And all subjects were in good health and overall fitness.

### **3.4 sample and sampling techniques**

All 20 subjects were voluntarily participated in the study. The subjects were male aged U-17 years. The research design used in this study was purposive sampling. And among of 20 participants the researcher randomly selected the control group, n=10 and the experimental group, n=10 which a treatment was applied.

### **3.5. Equipment and Experimental Materials**

The following equipments and materials were used in this study; Weight scales (measured in kg), Stadiometer or wall mounted scale (measured in m), stop watch, 50 metre measuring tape, data collection recording sheets, paper, pen, whistle, gypsum and marking cones(x12).

### **3.6 Source of Data**

In order to gather sufficient information related to the problem under study, the researcher used primary as well as secondary data sources. The primary sources of data were collected from the pre designed skill related fitness field tests. And the secondary data's from various documents, journals, books, internet sources or web services and unpublished booklets which related to the study to strengthen the data obtained from primary sources.

### **3.7. Data collection Instruments**

Before a medical checkup, while they join in to the team, the researcher prepared a questionnaire for the identification of their current health status and translated in to Amharic ( 'አማርኛ' ) language for ease of understanding and get confirmation to involve actively in this study. By physical examination with the help of two Medical Doctors and two health officers' anthropometric measurements of the players were recorded. And by the field tests with the help of eight test assistant and one coach, the selected skill related fitness tests were implemented. These were, two power tests (Standing Long Jump Test (Broad Jump) and vertical jump test), two speed tests (20m Dash and 30m dash sprint tests), and two agility tests (Illinois Agility Test and T-Test).

#### **3.7.1 Power Tests**

##### ***3.7.1.1 Standing Long Jump Test (Broad Jump)***

The Standing long jump, also called the Broad Jump, is a common and easy to administer test of explosive leg power. The purpose is to measure the explosive power of the legs. - Equipment required: tape measure to measure distance jumped, non-slip floor for takeoff, and soft landing area preferred. The take off line should be clearly marked. The athlete stands behind a line marked on the ground with feet slightly apart. A two foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The subject attempts to jump as far as possible, landing on both feet without falling backwards. Three attempts are allowed. The measurement is taken from take-off line to the nearest point of contact on the landing (back of the heels). Record the longest distance jumped, the best of three attempts.

### ***3.7.1.2 Vertical Jump Test (Vertical Leap)***

This procedure describes the method used for directly measuring the vertical jump height jumped. There are also timing systems that measure the time of the jump and from that calculate the vertical jump height. Equipment required: measuring tape or marked wall, chalk for marking wall (or Vertec or jump mat). The athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach height. The athlete then stands away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. The jumping technique can or cannot use a countermovement. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded. The jump height is usually recorded as a distance score.

### **3.7.2 Speed Tests**

#### ***3.7.2.1. 20 Meter Dash sprint test***

The 20 Meter Dash is part of the SPARQ rating system for Basketball and Soccer. The aim of this test is to determine acceleration, and also a reliable indicator of speed, agility and quickness. Equipment required: measuring tape or marked track, stopwatch or timing gates, cone markers, flat and clear surface of at least 40 meters. The test involves running a single maximum sprint over 20 meters, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. Start from a stationary position, with one foot in front of the other. The front foot must be on or behind the starting line. This starting position should be held for 2 seconds prior to starting, and no rocking movements are allowed. The tester should provide hints to maximizing speed (such as keeping low, driving hard with the arms and legs) and encouraged to continue running hard past the finish line. Two trials are allowed, and the best time is recorded to the nearest 2 decimal places. The timing starts from the first movement (if using a stopwatch) or when the timing system is triggered, and finishes when the chest crosses the finish line and/or the finishing timing gate is triggered.

#### ***3.7.2.2. 30 Meter Dash sprint test***

The aim of this test is to determine acceleration and speed. equipment required: measuring tape or marked track, stopwatch or timing gates, cone markers, flat and clear surface of at least 50 meters. procedure: The test involves running a single maximum sprint over 30

meters, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. Start from a stationary position, with one foot in front of the other. The front foot must be on or behind the starting line. This starting position should be held for 2 seconds prior to starting, and no rocking movements are allowed. The tester should provide hints for maximizing speed (such as keeping low, driving hard with the arms and legs) and encouraged to continue running hard through the finish line. Two trials are allowed, and the best time is recorded to the nearest 2 decimal places. The timing starts from the first movement (if using a stopwatch) or when the timing system is triggered, and finishes when the chest crosses the finish line and/or the finishing timing gate is triggered.

### **3.7.3 Agility Tests**

#### ***3.7.3.1 Illinois Agility Test***

Agility is an important component of many team sports, though it is not always tested, and is often difficult to interpret results. The Illinois Agility Test (Getchell, 1979) is a commonly used test of agility in sports, and as such there are many norms available. And as the name it indicates the purpose of this test is to measure agility.

#### ***3.7.3.2 T-Test***

According to (Bourgase, 2012), T-Test is a test of agility, and includes forward, lateral, and backward running. The measuring tape, marking cones, stopwatch, timing gates (optional) was used to arrange the test. This test was administer by Setting out four cones (5 yards = 4.57 m, 10 yards = 9.14 m). The subject started at cone A. On the command of the timer, the subject sprinted to cone B and touched the base of the cone with their right hand. Then turned to left and shuffled sideways to cone C, and also touched its base, this time with their left hand. Then shuffled sideways to the right to cone D and touched the base with the right hand. They shuffled back to cone B touched with the left hand and run backwards to cone A. The stopwatch was stopped as they passed cone A. The trial did not count. The best time of three successful trials to the nearest 0.1 seconds was recorded as his score (www.topendsports.com)

### **3.8 Data Collection Procedures**

All athletes should get medical clearance before being allowed to involve in core trainings and field fitness assessment tests. Players need to be properly warmed up prior to conducting any test in order to avoid injuries and to improve the reliability of the tests results. On days with multiple tests, a general warm-up of jogging and dynamic stretching prior to the first test

should be adequate. However, if there is a long waiting period between tests, the athlete may need to repeat the warm-up procedure (Freeman , 2009).

After obtaining an informed consent with medical check up and completed a questionnaire regarded their current health status, all 20 male U- 17 soccer trainees' were participated in the study. Each subject was assigned to one of two groups. Random assignment was used for participants to the two groups, by writing and giving a code for experimental group EG1-EG10, and for control group CG1-CG10, and then a player took his chance and registered parallel to his name. The independent variable was administered to experimental group and not to the control group, and both groups were measured on the same dependent variable. Prior to data collection, field marking was done. All subjects were asked to go for warm-up. Familiarity of the tests were practiced for two days and also again core strength familiarity was made on the experimental group for two days, but for familiarity sessions no record of data was applied. When subjects were adapted and ready for the test, pre-test results of the power tests (vertical jump test and standing long jump test ), speed tests (20m and 30m dash), and agility tests (Illinois agility test and T-Test) were recorded by the researcher with the help of professional assistants. All test assistants should be adequately trained prior to testing, to ensure correct administration of the tests, and reduce error between testers. The subjects in the experimental group also took 40 minute core strength training twice a week and then continued the normal training program with the control group in other training days. After six weeks, post-test measurements on the same parameters were taken and results of the two groups were recorded. Each test was hold at the field of Digotsion Stadium near to Alemayehu Bezabih Elementary School which was the players' training venue.

The order in which the fitness tests performed can affect performance in subsequent tests. Blood pressure and resting heart rate tested first when the person was fully rested. There should be no physical activity prior to the measurements of body composition. This test should always take place first and directly after any health checks. Anthropometric measurements should taken prior to any warm up and include height and weight. Athletes wear sport shorts, t-shirt, and no shoes for these measurements. Height was recorded with a stadiometer to the nearest .5 cm. Weight was recorded to the nearest .10 kg on a balance scale. Power tests were performed first, followed by speed and agility. A thorough warm-up should precede any speed and power test. After this participants had completed three test sessions when it was conductive to their schedules. For each test, subjects were familiarizing at the end of the first testing session but no data was collected. The first session included



vertical jump test and standing long jump test. The second session of assessments included the 20m dash and 30m dash sprint tests. The third session included the Illinois agility test and T-test. The test order was the same for all athletes.

### **3.9 Methods of Data Analysis**

The data collected through skill related physical fitness components of power(vertical jump test and standing long jump test), speed(20m and 30m dash test) and agility tests(Illinois agility test and T-test) were presented as a group mean value and standard deviations. And the effects of core strength training on variables were analyzed in separate two pre coded groups; experiment group and control group twice, pre and post tests. And the difference between each test result was analyzed statically with descriptive statistics and paired samples “t”-test at  $p < 0.05$  through SPSS software version 20.

### **3.10 Protocol and Ethical Consideration**

This study dealt with the ethical issues related to the investigation. Information of subject's participation in this research was kept confidential. It protected the privacy of research participant and makes guaranty. Records pertaining to this research were coded secretly in numbers and put in a secured storage area. The findings were general for the study community and not reflected anything particular of individual. Participation of subjects in this study was purely a voluntary based activity and their right not to participate and can resign at any time of training session have been respected. Therefore the study was conducted all action based on the university rule, code of conduct and policies concerning research ethics. Therefore the study conducted all action based on the university rule, code of conduct and policies concerning research ethics. Ethical approval was obtained from institutional research ethics review committee (IRERC) of Jimma University. The protocol was approved by the university guidelines and written consent had been given and informed the concerned bodies.

## CHAPTER FOUR

### 4. RESULTS AND DISCUSSION

This chapter discussed the presentation, analysis and interpretation of the data collected on the field tests from the subjects. The purpose of this study was to investigate the effects core strength training on power, speed and agility of Digotsion town male U-17 soccer trainees. All 20 male soccer trainees were selected through purposive sampling method. And pre-tests of power tests (Vertical Jump Test and Standing Long Jump Test), speed tests (20m and 30m dash tests), and Agility tests (Illinois Agility Test and T-test) were given. And continued their soccer training which was given three times per a week, simultaneously half of them were randomly selected and took treatment for six week of core strength training. And at the end of six week core strength training similar post-tests were given for all 20 soccer trainees regardless of their groups so as to evaluate whether core strength training affects agility, power and speed of U-17 soccer trainees or not. The demographic, field experiment results and findings obtained after six week core strength training are presented below. And the abbreviations used in this research were as follows: Experimental Group (EG), Control Group(CG), Vertical Jump Test (VJT), Standing Long Jump Test (SLJT), 20 meter dash for speed test 1 (ST1), 30 meter dash for speed test 2 (ST2), and Illinois Agility Test (IAT) and T-test (TT).

#### 4.1 Demographic characteristics of the Subjects

**Table 1. General characteristics of the Subjects**

Subjects	N	Age(yrs)	Body mass(Kg)	Height (m)
		X± SD	X± SD	X± SD
Experimental Group	10	15.9± .316	49.6±4.3957	1.65±.03529
Control Group	10	15.9±.316	48.7±4.7741	1.66±.06237
Total	20			

Where X= Mean value, SD- Standard Deviation, N= number of players in a group, kg= kilogram, m= metre, yrs= years.

According to Table 1; Average age of the subjects; EG= 15.9 yrs; CG= 15.9 yrs.

Average body mass of the subjects; EG= 49.6 Kg; CG= 48.7 kg and

Height average of the subjects; EG=1.65m; CG= 1.66m.

## 4.2. Data Interpretation of Power Tests

**Table 2; Mean and Standard Deviation of Pre-test and Post-test results of Vertical Jump Test and Standing Long Jump Test of the Subjects**

Subjects	N	PT (X ,± SD)	PoT (X, ± SD)	ΔX (MD)	P value
VJT result of EG	10	37.20± 5.903	38.80±7.193	-1.600	.022
VJT result of CG	10	40.20± 5.391	40.20±5.574	.000	1.000
SLJT result of EG	10	210.50± 11.881	213.10±12.574	-2.600	.010
SLJT result of CG	10	207.20±14.551	206.20±15.433	1.000	.107

*EG= experimental group, CG= control group , N= number of players in a group, VJT=vertical jump test, SLJT= standing long jump test, PT=pre-test results before training, PoT=post-test results after six week, p= level of significance, ΔX= (MD) mean difference.*

As Table 2: shows that Pre-test and post- test VJT mean of EG was 37.20 and 38.80 respectively. And the CG; PT and PoT result of VJT mean was 40.20 and 40.20 respectively. So these data indicated that there is a significant difference and gradual improvement between Pre-test and post-test results on both groups. In which in case of the EG, VJT test result was significantly increased by a PoT - PT mean difference of 1.600 cm at P=.022, after six week of core strength training. And in case of the CG, VJT result was no significant change at mean difference of .000 cm at P=1.000. But in case of SLJT, a significant difference and gradual improvements was obtained only at the EG in which Pre-test and post-test result was 210.50 cm and 213.10 cm respectively. In which the SLJT result of this group was increased by a PoT - PT mean difference of 2.600cm at P= .010. But based on the pre given significance value in which the mean difference of pre and post SLJT result of the CG was 1.000 cm at P >.05. Since the only improvement was shown by the experimental group, the researcher accepted alternative hypothesis 1 and rejected the null one. And it is confirmed with the following findings.

Tarik. O, (2016) found in their research conducted on Relationship between core stability, dynamic balance and jumping performance in soccer players that core stability is associated with jump height in soccer players.

Heydar .S *et al*(2013) showed in their research conducted on the effect of six- week core stability exercises on performance of male athlete, 11-14 years old that significant increment was observed in Performance tests of (Standing Broad Jump, Vertical Jump, 9.1 m Sprint, Shuttle Run) and recommend the core stability exercises to improve general performance of athletes. Thus it is in conformity with the finding of this study.

### 4.3 Data Interpretation of Speed Tests

**Table 3; Mean and Standard Deviation of Pre-test and Post-test results of 20m dash (ST1) and 30m dash (ST2) tests of the Subjects**

Subjects	N	PT (X ,± SD)	PoT (X, ± SD)	ΔX (MD)	P value
ST1 of EG	10	3.3010±.17489	3.2450±.16622	.05600	.011
ST1 of CG	10	3.2880±.19921	3.3020 ±.18677	-.01400	.122
ST2 of EG	10	4.8940±.21706	4.8340±.22177	.06000	.002
ST2 of CG	10	4.8100±.41382	4.8170±.40172	-.00700	.523

*EG= experimental group, CG= control group , N= number of players in a group, ST1= speed test 1 (20 meter dash test), ST2= speed test 2 (30 meter dash test), PT=Pre-test results before training, PoT=Post-test results, p= level of significance, ΔX= (MD) mean difference.*

As Table 3: shows that Pre-test and post-test result of Speed test 1 (20m dash test ) mean of EG was 3.3010 and 3.2450 respectively. And the CG; Pre-test and Post-test mean was 3.2880 and 3.3020 respectively. And also pre-test and post-test ST2 results of the EG was 4.8940 and 4.8340 respectively. And also the CG was 4.8100 and 4.8170 respectively. Therefore these data indicated that there is a significant difference and gradual improvement between PoT - PT results of both the EG and CG. In which incase of the EG, duration of 20m dash speed test (ST1) was significantly less by a PoT - PT mean difference of .05600 second at P=.011 and duration of 30m dash speed test (ST2) was significantly decreased by a mean difference of .06000 second at P= .002 after six week of core strength training. And also in case of the CG, in which duration of 20m dash speed test (ST1) was significantly increased by a mean difference of .01400 at second P=.122 and duration of 30m dash speed test (ST2) was significantly increased by a mean difference of .00700 second at P=.523. As a result the investigator accepted alternative hypothesis 2 and rejected the null hypothesis for 20m dash speed test (p=.011) and 30m dash speed test (p= .002), the following researchers supported this study.

Thomas and William, (2009) found in their research conducted on a female volleyball team that 40 m sprint speed improved after core training: thus, it is in conformity with the finding of this study. Natalia Niewolna and Teresa Zwierko, (2015) found in their research conducted on the Effect of three months core stability and functional exercises on selected speed and strength parameters in expert female footballers, There was also a significant reduction in the time of 30 meter sprint at  $p < 0.05$ , Thus it is also in conformity with the finding of this study.

#### 4.4 Data Interpretation of Agility Tests

**Table 4; Mean and Standard Deviation of Pre-test and Post-test results of Illinois Agility Test and T-test of the Subjects**

Subjects	N	PT (X ,± SD)	PoT (X, ± SD)	ΔX (MD)	P value
IAT result of EG	10	17.0670±.41323	16.9180±.43667	.14900	.001
IAT result of CG	10	17.3650±.52741	17.3410±.48706	.02400	.421
TT result of EG	10	11.5840±.82874	11.2350±.82729	.34900	.007
TT result of CG	10	11.5850±1.09929	11.6630±1.14985	-.07800	.242

*EG= experimental group, CG= control group, IAT=Illinois agility test, TT= t-test of agility, X=mean value of each tests, ΔX= (MD) mean difference, PT=pr-test result, PoT= Post-test results after six weeks of training post-test results, p=significance level.*

As Table 4: shows that Pre-test and post- test IAT mean of EG was 17.0670 and 16.9180 respectively. And the CG; PT and PoT result of IAT mean was 17.3650 and 17.3410 respectively. And also PT and PoT t-test results of the EG was 11.5840 and 11.2350 respectively. A PT and PoT t-test result of the CG was 11.5850 and 11.6630 respectively. So these data indicated that there was a significant difference and gradual improvement between PT and PoT test results on both groups. In which incase of the EG, duration of Illinois agility test was significantly less by a mean difference of .14900 at P= .001 and duration of T-test was significantly decreased by a PoT- PT mean difference of .34900 at P=.007 after six week core strength training. And also in case of the CG, in which duration of Illinois agility test was significantly less by a mean difference of .02400 at P=.421 and duration of T-test was significantly increased by a mean difference of .07800 at P=.242. As a result the investigator accepted alternative hypothesis 3 on IAT (p= .001), on T-test (p=.242) and rejected the null hypothesis. And this findings supported by Afiyon. A, stated in his research done on 16 years old soccer players that 12 weeks core strength training has an explosive effect on player's motoric capabilities such as; standing long jump, shuttle run, speed, plank, and vertical jump which are some of an important parameters of soccer speed power and agility.

Generally, six week of core strength training has a significant improvement on power, speed and agility of U-17 experimental group than control group even six week of regular soccer training has its own positive effect on such skills too.

## CHAPTER FIVE

### 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary

The abs (the abdominal muscles) are only a small fraction of your core muscles. Core is a complex series of muscles that includes your entire trunk region. It involves everything except your arms and legs. It is involved in almost every movement of the human body. Core stability is the ability to control the position and motion of the trunk over pelvis and leg to allow optimum production, transfer and control of force and motion to the term segment in integrated kinetic chain activities. Core stability is the foundation of a well-rounded soccer player. The researcher aim was to testify the following research hypotheses and evaluate the effects of core strength training on power, speed and agility of U-17 soccer trainees.

**1. H0:** Core strength training would not be show a significance difference on power in U-17 soccer players.

**H1:** Core strength training would be show a significance difference on power in U-17 soccer players.

**2. H0:** Core strength training would not be show a significance difference on speed in U-17 soccer players.

**H1:** Core strength training would be show a significance difference on speed in U-17 soccer players.

**3. H0:** Core strength training would not be show a significance difference on agility in U-17 soccer players.

**H1:** Core strength training would not be show a significance difference on agility in U-17 soccer players.

After obtaining an informed consent with medical check up , the only soccer trainees project team in Digotsion town with age under 17 years which consists of 20 subjects were purposively selected and half of them were selected as experimental group and the remaining as control group for this study.

In the study, power tests were measured by vertical jump test (VJT) and standing long jump test (SLJT), speed tests were measured by 20 -meter dash Test and 30-meter dash Test , and agility tests were measured by the Illinois Agility Test (IAT) and the T-Test. And both groups took a pre-test of vertical jump test (VJT) and standing long jump test (SLJT) of power tests , 20m dash (ST1) and 30m dash (ST2) of peed tests, and Illinois agility test (IAT) and t- test

(TT) of agility tests. After taking the first plot tests, both groups continued their normal training program for three days a week for six weeks. The subjects in experimental group also took 40 minute tertian core strength training on two training days of the week and then continued the normal training program with the control group in other training days. After six weeks, post-test measurements on the same parameters were taken and results of the two groups were recorded. To analyze the selected skill-related physical fitness parameters of male football players, means, standard deviations, and paired samples test were computed. The difference between the tests were analyzed statistically, with paired sample “t” test at  $P < 0.05$ . Although power post-test scores showed reduction, speed and agility post-test scores of the control group showed an improvement compared to the pre-test scores, no significant difference was found between them ( $p > 0.05$ ). Consequently it was observed that core strength training implemented on junior level players brought about significant improvements between pr-test and post-test results of power, in which the VJT ( vertical jump test) and SLJT ( standing long jump test ) results were increased by a PoT- PT mean difference of 1.600 cm ( $P=.022$ ) and 2.600 cm ( $P= .010$ ) respectively. The Speed in which duration of 20m dash (ST1) and 30m dash speed test(ST2) result was decreased by a PoT- PT mean difference of .05600 second ( $P=.011$ ) and .06000 second ( $P= .002$ ) respectively. And agility, in which the duration to complete IAT (Illinois agility test) and TT (t test) was decreased by PoT- PT mean difference of .14900 second ( $P= .001$ ) and .34900 second ( $P=.007$ ) respectively. According to the results of this study, core core strength trainings which were applied additionally to soccer trainings can contribute positively to the development of players' power, speed and agility skills. Thus it concludes that a 40 minute core strength training for six week relatively improve power, speed and agility of U-17 soccer trainees.

## 5.2 Conclusions

In light of the results within the limitations of the present study, and the framework of statistical treatments used, the following conclusions are enumerated:

- Core strength trainings have a significant effect on the improvement of power, speed and agility of U-17 soccer trainees.
- The results of the study showed that six week of core strength training has relative positive effect on power of U-17 soccer trainees as measured by vertical jump test and standing long jump test.
- The output of the study showed that six week of core strength training has a significant improvement on agility of U-17 soccer trainees measured by Illinois agility test and T-test.
- The finding of this study yields a significant benefit on improvement of soccer trainees' speed measured by 20m dash and 30m dash tests.
- In general six week of core strength training has statistically significant improvement and change was observed in male U-17 soccer player's power, speed and agility skills.



### 5.3 Recommendations

Based on the findings of this study, the following points are recommended to investigate more on the effects of core strength training on power, speed and agility in U-17 soccer players.

- Sport commission and other concerned body around Digotsion town are recommended opportunity for the coach to develop his or her skill about the subject through the training.
- Male U-17 soccer trainees of Digotsion town shall give emphasis and practice core strength training so as to improve their power, speed and agility.
- Coaches, physical education teachers and other football trainers who support this project shall consider the impact of core strength training on skill related fitness components and add it on their regular soccer training.
- Sport officers and professionals who support and sponsored this youth soccer project shall aware and prepare trainings for soccer trainers/coaches about progressive assessment and evaluation of each training sessions to enhance their players' performance too.
- It is necessary to raise awareness among trainees with the importance of core strength training for soccer players.
- Using sufficient training contents and durations are recommendation as possible to strength the players' core for improving their power, speed and agility performances.
- Increasing training opportunity for the coach increase the chance sharing experience of communicating, planning, guiding and coordinating skill for the team being supervised.
- Further research in the area should be conducted on other specific fitness components through increasing subjects, adding players of other teams and classifying by their positional play to bring improvement and progressive development in male players' skills.
- And Studies should be conducted in the same area on different samples in terms of age and gender.

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**APPENDICES**

**Appendix- A**

**JIMMA UNIVERSITY**

**COLLEGE OF NATURAL SCIENCE**

**DEPARTMENT OF SPORT SCIENCE**

**Questionnaire to be filled by Soccer Players**

**Dear!** Soccer players, at present I am conducting a research towards my fulfilment for the Degree of Master Science in Sport Science in Football Coaching specialization at Jimma University. The research is concerned with “the effect of core strength training on selected skill related fitness components of Digotsion Town male U-17 soccer, North Western Ethiopia.” So you are kindly requested to give appropriate information for the following questions regarding to your current health status. I deeply appreciate your co-operation.

**I. Player’s General information**

Name ----- Age----- (yrs), Body mass----- (Kg), Height----- (m)  
Birth Date-----/-----/-----Sex –M----F-----Academic Qualification-----  
Address----- Telephone Number-----  
Parent (Guardian) Name -----Telephone number -----

**II. Personal health history (answer yes or no and give description if necessary)**

1. Have you taken any physical fitness test especially performance related? \_\_\_\_\_
2. Do you know your current level of physical fitness? \_\_\_\_\_
3. Have you injured seriously while you play soccer in the past two month? \_\_\_\_\_if yes which body part of injury you got?  
\_\_\_\_\_
4. Have you had a major surgery in the last two month? \_\_\_\_\_
5. Are you currently undergoing any medical treatment? -----

I have read the above and understand its content and have given accurate information. And I agree to participate in this study.

Player’s name \_\_\_\_\_ signature\_\_\_\_\_ Date-----/-----/-----E.c

## **Appendix- B**

**JIMMA UNIVERSITY  
COLLEGE OF NATURAL SCIENCE  
DEPARTMENT OF SPORT SCIENCE  
Skill related fitness test consent form `**

**Researcher's Name: Desie Wale Wondale**

**Advisor's Name: Hirko Taye(Assist. proffesor)**

**Co-Advisor's Name: Mekoya Mengesha (Lecturer)**

**Thesis title: Effects of core strength training on selected skill related fitness components of Digotsion Town male U-17 soccer players, North Western Ethiopia.**

### **Purpose of the study:**

The purpose of this study is to investigate the effects of core strength training on selected skill related fitness components (power, speed and agility) of male U-17 soccer players in Digotsion Town.

### **Procedure and duration:**

You are kindly requested to participate in this research study as described below. This study will be governed by the regulation on human beings. These regulations require that researcher should obtain a signed agreement (consent) from you/the players/ to participate in this research project. Even if taking such soccer related skills test is one component of your regular soccer training program, the researcher will explain detail about the purpose of the project, the procedure will be used, the potential benefit and the possible risk of participation in this thesis. And you can ask the researcher any question and doubts that you have about the study and you shall expect satisfactory responses regarding your questions. So if you are interested and ready to participate, Please confirm your agreement by your signature with the researcher and language translators. You can discontinue at any time from the study if you choose to do so. A basic explanation of the project will be summarized below.

### **Risk and safeguard:**

Since subjects are somehow experienced and had regular soccer training for the last 3 years the expected injury in administering such skill related fitness tests for you may be little. But while in application of the regular soccer trainings and administering the tests you may

experience muscle fatigue, usually happened soccer related injuries such as muscle soreness and little sprain may exists due to intense demand of soccer game but not the test only.

But if any unexpected physical injuries occur, appropriate first aids will be provided, but no financial compensation will be given.

**Confidentiality:**

The information obtained from the participants (you) will be kept in confidence, but it will be free to release to their own owners, to the local wordas, zonal as well as regional sport federation offices if it is needed. And all the collected information will be used only for scientific purpose through grouping without identifying them as an individual.

**Rights:**

Participation in this study will be a fully voluntary based. You have the right to declare to participate or not in the study. And if you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled.

**Appendix- C**  
**JIMMA UNIVERSITY**  
**COLLEGE OF NATURAL SCIENCE**  
**DEPARTMENT OF SPORT SCIENCE**

**Sample Consent Form**

I (print name) \_\_\_\_\_ hereby consent to participating in the anthropometric test and six week of scientific studies which is conducted on the effect of core strength training on male U- 17 soccer players on the following terms: I have been informed about the wellness, current status of health assessment and questionnaires, the training procedures and understand what I will be required to do. And I understand that I will be partaking in eight week of core strength training besides the regular soccer training.

I understand that there is always a risk of injury associated with strength and soccer training. And I can withdraw my consent, freely and without prejudice, at any time. I understand that the information obtained from the test will be treated confidentially, with my right to privacy assured. However, the information obtained may be used for statistical analysis or scientific purpose with my right to privacy retained. And I accept that: this is my personal interest and willingness to participate in any of the necessary procedures which involves in any steps of this study as possible.

Participant's signature \_\_\_\_\_ Date \_\_\_\_\_

Parent/Guardian name \_\_\_\_\_ signature \_\_\_\_\_ Date \_\_\_\_\_

**Contact Address**

If there is any question or enquire any time about the study or the procedure, please contact in the following address:

1. Institutional research ethics review committee (IRERC) at -----

2. Hirko Taye (assist. professor) (main advisor) (+251911039867)

Email ; hirkotaye@gmail.com

3. Mekoya Mengesha(Lecturer) (co- advisor) (+251924411620)

Email; mekoyamengesha1@gmail.com

4. Desie Wale Wondale (investigator) (+251920262244)

Email: desiewale@gmail.com



## Appendix- D

**JIMMA UNIVERSITY  
COLLEGE OF NATURAL SCIENCE  
DEPARTMENT OF SPORT SCIENCE**

**Players' Physical Examination (health status data) recording sheet**

Health Centre's name -----, Place venue-----, Date-----, Time-----

Player's name -----

Sex -----

Age -----

Blood pressure -----

RHR (PR) in one min ----- (beat/minute),

Respiratory rate ----- (in So<sub>2</sub>)

Body temperature ----- (in C<sup>0</sup>),

Body Mass ----- (in kilogram)

Height ----- (in metre),

Clinical Examiner (Physician) name -----, Signature----- Date-----

Investigator's name----- Signature----- Date-----

## Appendix-E

### JIMMA UNIVERSITY COLLEGE OF NATURAL SCIENCE DEPARTMENT OF SPORT SCIENCE

**Table 1: Individual folder Recording sheet for Field tests**

Players' name-----, Serial code of a player -----, Sex-----, Age-----

Pre- Power tests (cm)								Post- Power tests(cm)							
Date;								Date;							
Time;								Time;							
Vertical jump test				Standing Long jump Test				Vertical jump test				Standing Long jump Test			
Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score

Pre- Speed Tests ( second)						Post- Speed Tests (second)					
Date;						Date;					
Time;						Time;					
20 meter dash test			30 meter dash test			20 meter dash test			30 meter dash test		
Trial 1	Trial 2	Best Score	Trial 1	Trial 2	Best Score	Trial 1	Trial 2	Best Score	Trial 1	Trial 2	Best Score

Pre- Agility tests (second )								Post- Agility tests ( second )							
Date;								Date;							
Time;								Time;							
Illinois agility test				T-Test				Illinois agility test				T-Test			
Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Investigator's name----- Signature----- Date-----

**Appendix- F**  
**JIMMA UNIVERSITY**  
**COLLEGE OF NATURAL SCIENCE**  
**DEPARTMENT OF SPORT SCIENCE**

**Table 2: Recording sheet for Power tests (vertical jump test & standing long jump test)**

NO	Serial Code	Power tests (cm)							
		Vertical jump test				Standing Long jump Test			
		Trial 1	Trial 2	Trial 3	Best Score	Trial 1	Trial 2	Trial 3	Best Score
1	EG1								
2	EG2								
3	EG3								
4	EG4								
5	EG5								
6	EG6								
7	EG7								
8	EG8								
9	EG9								
10	EG10								
11	CG1								
12	CG2								
13	CG3								
14	CG4								
15	CG5								
16	CG6								
17	CG7								
18	CG8								
19	CG9								
20	CG10								

Test Type-----

Date-----

Time-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Investigator's name----- Signature----- Date-----

**Appendix- G**  
**JIMMA UNIVERSITY**  
**COLLEGE OF NATURAL SCIENCE**  
**DEPARTMENT OF SPORT SCIENCE**

**Table 3: Recording sheet for Speed tests (20m dash and 30m dash test)**

NO.	Serial Code	Speed Tests ( second)					
		20 meter dash			30 meter dash		
		Trial 1	Trial 2	Best Score	Trial 1	Trial 2	Best Score
1	EG1						
2	EG2						
3	EG3						
4	EG4						
5	EG5						
6	EG6						
7	EG7						
8	EG8						
9	EG9						
10	EG10						
11	CG1						
12	CG2						
13	CG3						
14	CG4						
15	CG5						
16	CG6						
17	CG7						
18	CG8						
19	CG9						
20	CG10						

Test Type ----- Date----- Time-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Investigator's name----- Signature----- Date-----

**Appendix- H**  
**JIMMA UNIVERSITY**  
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**DEPARTMENT OF SPORT SCIENCE**

**Table 4: Recording sheet for agility Tests (Illinois agility test and t-test)**

NO	Serial Code	Agility tests ( second)							
		Illinois agility test				T-Test			
		Trial1	Trial2	Trial 3	Best Score	Trial 1	Trial2	Trial3	Best Score
1	EG1								
2	EG2								
3	EG3								
4	EG4								
5	EG5								
6	EG6								
7	EG7								
8	EG8								
9	EG9								
10	EG10								
11	CG1								
12	CG2								
13	CG3								
14	CG4								
15	CG5								
16	CG6								
17	CG7								
18	CG8								
19	CG9								
20	CG10								

Test Type----- Date----- Time-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Assessor's name ----- Signature----- Date-----

Investigator's name----- Signature----- Date-----

**Appendix-I**  
**JIMMA UNIVERSITY**  
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**DEPARTMENT OF SPORT SCIENCE**

**Table 5: Players Physical Examination (health status) raw data**

N O.	Subjects	Sex	Age	Blood pressure	RHR in one min	Respiratory rate (So2)	Body temperature(C <sup>0</sup> )
1	EG1	M	16	90/60	90	22	36.1
2	EG2	M	16	105/60	64	23	35.7
3	EG3	M	16	110/80	60	20	36.2
4	EG4	M	16	110/60	62	20	35.4
5	EG5	M	16	100/70	56	20	35.5
6	EG6	M	15	100/70	80	22	35.6
7	EG7	M	16	100/70	70	24	36.0
8	EG8	M	16	100/60	67	22	35.4
9	EG9	M	16	100/60	71	22	36.1
10	EG10	M	16	120/60	66	24	35.6
11	CG1	M	16	100/70	60	20	35.5
12	CG2	M	15	100/70	60	22	35.5
13	CG3	M	16	125/70	60	20	36
14	CG4	M	16	100/60	66	24	36.2
15	CG5	M	16	110/70	70	22	35.9
16	CG6	M	16	110/70	66	24	36.5
17	CG7	M	16	100/70	60	22	36.2
18	CG8	M	16	110/60	52	24	36
19	CG9	M	16	120/70	86	20	36.2
20	CG10	M	15	100/70	69	24	35.6

**Appendix-J**  
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**Table 6: Anthropometric raw data of the Subjects**

NO.	Subjects	Sex	Age	Body Mass (Kg)	Height (metre)
1	EG1	M	16	48	1.62
2	EG2	M	16	54	1.68
3	EG3	M	16	46	1.64
4	EG4	M	16	55	1.70
5	EG5	M	16	53	1.68
6	EG6	M	15	41.5	1.62
7	EG7	M	16	52	1.70
8	EG8	M	16	49.5	1.64
9	EG9	M	16	45	1.60
10	EG10	M	16	52	1.65
11	CG1	M	16	51	1.70
12	CG2	M	15	53.5	1.70
13	CG3	M	16	54	1.71
14	CG4	M	16	47	1.64
15	CG5	M	16	54	1.76
16	CG6	M	16	44.5	1.60
17	CG7	M	16	43.5	1.62
18	CG8	M	16	47	1.65
19	CG9	M	16	52	1.70
20	CG10	M	15	41	1.55

**Appendix-K**  
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**Table 7: Raw data of Power Tests (vertical jump test & standing long jump test)**

NO.	Serial code of Subjects	Result of pre and post Power Tests (cm)			
		Pre-VJT	Post-VJT	Pre-SLJT	Post-SLJT
1	EG1	39	42	219	226
2	EG2	30	32	206	211
3	EG3	36	37	202	200
4	EG4	40	44	199	200
5	EG5	32	33	200	202
6	EG6	33	33	195	199
7	EG7	51	55	221	222
8	EG8	38	40	226	230
9	EG9	34	32	227	228
10	EG10	39	40	210	213
11	CG1	51	52	237	240
12	CG2	39	37	202	199
13	CG3	40	41	199	199
14	CG4	42	40	209	206
15	CG5	41	42	197	195
16	CG6	39	39	195	195
17	CG7	38	38	223	222
18	CG8	43	44	201	200
19	CG9	40	39	218	216
20	CG10	29	30	191	190



**Appendix-L**  
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**Table 8: Raw data of Speed Tests (20m dash and 30m dash test)**

NO.	Serial code of Subjects	Result of pre and post Speed Tests (in second)			
		Pre-20m dash	Post-20m dash	Pre-30m dash	Post-30m dash
1	EG1	3.27	3.21	4.96	4.91
2	EG2	3.29	3.20	4.87	4.76
3	EG3	3.16	3.10	5.12	5.01
4	EG4	3.50	3.33	5.15	5.06
5	EG5	3.35	3.25	5.04	5.05
6	EG6	3.56	3.51	4.96	4.89
7	EG7	3.01	2.97	4.49	4.44
8	EG8	3.18	3.20	4.76	4.67
9	EG9	3.49	3.50	4.99	5.01
10	EG10	3.20	3.18	4.60	4.54
11	CG1	2.92	2.95	4.33	4.37
12	CG2	3.33	3.31	5.08	5.11
13	CG3	3.31	3.35	5.01	4.99
14	CG4	3.28	3.29	4.57	4.60
15	CG5	3.39	3.41	4.40	4.42
16	CG6	3.61	3.59	5.47	5.44
17	CG7	3.16	3.15	4.70	4.68
18	CG8	3.42	3.44	4.30	4.33
19	CG9	3.41	3.42	4.93	4.88
20	CG10	3.05	3.11	5.31	5.35

**Appendix-M**  
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**Table 9: Raw data of agility Tests (Illinois agility test and t-test)**

No.	Serial code of Subjects	Result of pre and post Agility Tests ( second)			
		Pre-IAT	Post-IAT	Pre-T-Test	Post-T-Test
1	EG1	16.90	16.66	12.63	11.57
2	EG2	17.08	16.99	10.86	10.67
3	EG3	16.99	17.01	12.17	11.73
4	EG4	16.87	16.74	11.99	12.00
5	EG5	18.01	17.89	12.79	12.63
6	EG6	17.17	17.03	11.75	11.77
7	EG7	17.13	17.07	10.60	10.32
8	EG8	16.38	16.22	10.46	10.07
9	EG9	16.86	16.56	11.59	11.00
10	EG10	17.28	17.01	11.00	10.59
11	CG1	16.97	17.01	10.16	10.20
12	CG2	17.80	17.78	11.25	11.17
13	CG3	17.88	17.69	13.33	13.56
14	CG4	16.38	16.43	10.48	10.43
15	CG5	17.50	17.46	11.33	11.39
16	CG6	18.00	17.91	11.49	11.41
17	CG7	17.57	17.57	12.92	13.01
18	CG8	16.89	16.99	10.52	10.61
19	CG9	16.99	16.86	12.80	12.72
20	CG10	17.67	17.71	11.57	12.13

## Appendix-N

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**Table 10: Descriptive and Paired Samples Statistics of Experimental Group**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-VJT	37.20	10	5.903	1.867
	Post-VJT	38.80	10	7.193	2.274
Pair 2	Pre-SLJT	210.50	10	11.881	3.757
	Post-SLJT	213.10	10	12.574	3.976
Pair 3	Pre-ST1	3.3010	10	.17489	.05531
	Post-ST1	3.2450	10	.16622	.05256
Pair 4	Pre-ST2	4.8940	10	.21706	.06864
	Post-ST2	4.8340	10	.22177	.07013
Pair 5	Pre-IAT	17.0670	10	.41323	.13067
	Post-IAT	16.9180	10	.43667	.13809
Pair 6	Pre-T-Test	11.5840	10	.82874	.26207
	Post-T-Test	11.2350	10	.82729	.26161

**Table 11: Descriptive and Paired Samples Statistics of Control Group**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-VJT	40.20	10	5.391	1.705
	Post-VJT	40.20	10	5.574	1.763
Pair 2	Pre-SLJT	207.20	10	14.551	4.601
	Post-SLJT	206.20	10	15.433	4.880
Pair 3	Pre-ST1	3.2880	10	.19921	.06300
	Post-ST1	3.3020	10	.18677	.05906
Pair 4	Pre-ST2	4.8100	10	.41382	.13086
	Post-ST2	4.8170	10	.40172	.12703
Pair 5	Pre-IAT	17.3650	10	.52741	.16678
	Post-IAT	17.3410	10	.48706	.15402
Pair 6	Pre-T-test	11.5850	10	1.09929	.34762
	Post-T-test	11.6630	10	1.14985	.36361

## Appendix-O

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**Table 12: Paired Samples test of Experimental Group**

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair1	Pre-VJT - post-VJT	-1.600	1.838	.581	-2.915	-.285	-2.753	9	.022
Pair 2	Pre-SLJT – post-SLJT	-2.600	2.547	.806	-4.422	-.778	-3.228	9	.010
Pair 3	preST1 – postST1	.05600	.05562	.01759	.01621	.09579	3.184	9	.011
Pair 4	Pre-ST2 – post-ST2	.06000	.04522	.01430	.02765	.09235	4.196	9	.002
Pair 5	Pre-IAT – Post-IAT	.14900	.09837	.03111	.07863	.21937	4.790	9	.001
Pair 6	Pre-T-test – post-T-Test	.34900	.31765	.10045	.12177	.57623	3.474	9	.007

**Table13: Paired Samples test of the Control Group**

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair1	Pre-VJT – Post-VJT	.000	1.247	.394	-.892	.892	.000	9	1.000
Pair 2	Pre-SLJT– post-SLJT	1.000	1.764	.558	-.262	2.262	1.793	9	.107
Pair 3	Pre-ST1– post-ST1	-.01400	.02591	.00819	-.03253	.00453	-1.709	9	.122
Pair 4	Pre-ST2– post-ST2	-.00700	.03335	.01055	-.03086	.01686	-.664	9	.523
Pair 5	Pre-IAT – post-IAT	.02400	.09009	.02849	-.04044	.08844	.842	9	.421
Pair 6	Pre-T-test– post-T-Test	-.07800	.19685	.06225	-.21882	.06282	-1.253	9	.242

**Appendix-P**  
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**Tables of Test Protocols/Norms**

**Table 14: Vertical Jump Test Protocols**

	Males		Females	
rating	(inches)	(cm)	(inches)	(cm)
<b>Excellent</b>	> 28	> 70	> 24	> 60
<b>very good</b>	24 - 28	61-70	20 - 24	51-60
<b>above average</b>	20 - 24	51-60	16 - 20	41-50
<b>Average</b>	16 - 20	41-50	12 - 16	31-40
<b>below average</b>	12 - 16	31-40	8 - 12	21-30
<b>Poor</b>	8 - 12	21-30	4 - 8	11-20
<b>very poor</b>	< 8	< 21	< 4	< 11

**Table 15.: Standing long jump test protocols: adult team sport athletes**

	Males		Females	
rating	(cm)	(feet, inches)	(cm)	(feet, inches)
<b>Excellent</b>	> 250	> 8' 2.5"	> 200	> 6' 6.5"
<b>very good</b>	241-250	7' 11" — 8' 2.5"	191-200	6' 3" — 6' 6.5"
<b>above average</b>	231-240	7' 7" — 7' 10.5"	181-190	5' 11.5" — 6' 2.5"
<b>Average</b>	221-230	7' 3" — 7' 6.5"	171-180	5' 7.5" — 5' 11"
<b>below average</b>	211-220	6' 11" — 7' 2.5"	161-170	5' 3.5" — 5' 7"
<b>Poor</b>	191-210	6' 3" — 6' 10.5"	141-160	4' 7.5" — 5' 2.5"
<b>very poor</b>	< 191	6' 3"	< 141	< 4' 7.5"

## Appendix-Q

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**Table 16: 30m dash test protocols**

30 meter Sprint Rating	Male	Female
Excellent	< 4.0	< 4.5
Above Average	4.2 - 4.0	4.6 - 4.5
Average	4.4 - 4.3	4.8 - 4.7
Below Average	4.6 - 4.5	5.0 - 4.9
Poor	> 4.6	> 5.0

Reference: Davis B. et al; Physical Education and the Study of Sport; 2000

**Table 17: Illinois agility test protocols**

Rating	Males (seconds)	Females (seconds)
Excellent	< 15.2	< 17.0
Above Average	16.1-15.2	17.9-17.0
Average	18.1-16.2	21.7-18.0
Below Average	18.3-18.2	23.0-21.8
Poor	> 18.3	> 23.0

**Table 18: T-Test protocols**

Rating	Males (seconds)	Females (seconds)
Excellent	< 9.5	< 10.5
Good	9.5 to 10.5	10.5 to 11.5
Average	10.5 to 11.5	11.5 to 12.5
Poor	> 11.5	> 12.5

**Appendix-R**  
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**Guidelines for preparing for Testing**

- For any fitness assessment, it is recommended that you ensure that your body is primed physically to perform to your potential.
- Maximum performance is more likely if these nutritional and physical guidelines are followed.

**Nutritional Preparation**

- Ensure you are well nourished on the day of testing.
- Where possible, consume a high carbohydrate diet in the 24 hours prior to the testing sessions (such as pasta, potatoes, cereals, toast, fruit etc.).
- In the two hours before completing the tests do not consume a heavy meal; however, you are strongly advised to have eaten some food in the four hours preceding testing.
- Caffeine products (such as coffee, cola or tea) should be avoided on the day of testing.
- Alcoholic beverages and tobacco products should be avoided 24 hours prior to testing.
- Ensure you are fully hydrated, particularly in hot conditions. Drink regularly in the days leading up to the test, particularly in the 12 hours prior to testing.
- Top up body fluids by drinking water regularly throughout the testing session. Continue to consume adequate fluids following exercise to replace any fluids lost during testing.

**Physical Preparation**

- Avoid heavy strenuous exercise for the 24 hours prior to testing.
- Do not exercise at all on the day of testing to ensure you are well rested.
- Wear appropriate clothing for the conditions (e.g. shorts/track pants and t shirt/singlet/sports top) and non-slip athletic footwear with laces securely fastened.
- Remove restrictive jewelry, watches, bracelets or hanging earrings that may get caught in equipment.
- Do not participate in the testing if you are suffering any injury or illness that is likely to worsen as a result of participation or you are unwell/not in good general health.
- Be sure to warm-up prior to the commencement of testing. See warm up guidelines.
- Cool down appropriately.

- Do not sit or lie down immediately following maximal exercise. Following completion of testing continue moderate-to light aerobic activity (jog or walk) for 5 minutes followed by some light stretching of both the upper and lower body.

### **Test Sequence**

The order in which the fitness tests are performed can affect performance in subsequent tests. Here are some guidelines when deciding on what order to conduct the test. These guidelines can be used to determine the best order in your situation. There are other factors to consider such as logistics of getting from one test location to another group sizes, numbers of assessor and time constraints.

- **Health Checks:** Blood pressure and resting heart rate should always be tested first while the person is fully rested.
- **Anthropometry:** There should be no physical activity prior to the measurements of body composition. This test should always take place first and directly after any health checks.
- **Flexibility:** Depending on whether the test protocol requires a warm up or not, the flexibility tests should be scheduled early in the session prior to any activity, or after a thorough warm up or after the speed tests.
- **Speed / Power tests:** Power tests are usually performed first, followed by speed, agility, strength, muscle endurance and, finally, cardio-respiratory or repeat sprint tests. A thorough warm-up should precede any speed and power test. The vertical jump test may be performed prior to the sprint test.
- **Muscle Strength:** Muscle strength (1-10RM) tests should always be completed prior to muscle endurance tests, but after the speed and power tests
- **Muscular Endurance:** A minimum break of five minutes is recommended between muscle strength and muscle endurance tests. If there are several muscular strength and endurance tests in one session, you must allow plenty of time for recovery between tests.
- **Aerobic Fitness:** Many of the sub-maximal aerobic tests are based on a heart rate response may be affected by previous tests and by the mental state of the athlete, and should be scheduled accordingly. Fatiguing maximal exercise tests, such as VO<sub>2</sub>max or beep test and repeat sprint tests, should always be scheduled at the end of a session.



## **Safety**

Safety checks should be done prior to any testing session, such as checking for the proper working of equipment, and adequate supply of safety equipment such as mats, water bottles and first aid kits. During the sessions, give adequate warm-up when necessary.

## **Test Assistants**

All test assistants should be adequately trained prior to testing, to ensure correct administration of the tests, and reduce error between testers.

## **Session Organization**

Good organization will ensure the testing session runs smoothly. If testing a large group, you may want to set up testing stations with a different tester at each station, or with one tester following the same group around the stations.

## **Recording Sheets**

Well-designed scoring sheets make recording scores more efficient and avoid errors. They should include space for all relevant information. In addition to the test results, the following should also be recorded with every testing session:

- Date and time of testing.
- Personal details (name, age, contact details).
- Current state of the athlete (fitness level, any injuries, health status, fatigue level, sleep).
- Activity details (sport involved in, event).
- Basic physiological data (weight, resting heart rate).
- Current training phase (e.g. speed, speed endurance, strength, and technique).
- Current training load (the number of miles run, the number of sets and repetitions, and the number of attempts).
- Current training intensity (kilograms, percentage of maximum, percentage of VO<sub>2</sub>).
- Environmental and surface conditions (wet, slippery, wind, temperature, humidity, indoors).
- name of assessors

**Appendix-S**  
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**Description of the training program**

In sport training a well-designed and prepared plan is needed. The purpose of the training plan is to identify the work to be carrying out to achieve objectives and to be effective in training outcomes. And in sport the training can have be a short or a long term plan. Basically some fitness components may needs short term training and others may needs a long years of sport training to get performance improvements. Due to this reason the researcher will plan and implement a six of core strength training through following the general guidelines of strength training and principles of core strength training together (<http://www.acefitness.org/blog>)

**Principles of core strength training**

A core strength exercise program should be done in stages with gradual progression. It should start with restoration of normal muscle length and mobility to correct any existing muscle imbalances. Adequate muscle length and flexibility are necessary for proper joint function and efficiency of movement. Muscle imbalances can occur where agonist muscles become dominant and short while antagonists would become inhibited and weak. One example of a muscle imbalance pattern includes tightness and over-activity of the primary Hip flexor, which in turn causes reciprocal inhibition of the primary hip extensor (gluteus Maximus).further up the kinetic chain, this particular muscle imbalance leads to increased lumbar extension, with excessive force on the posterior elements of the spine. In addition, postural muscles have a tendency to become tight due to constant activity in order to fight the forces of gravity. Then, activation of the deep core musculature should be taught through lumbo-pelvic stability exercises.

**Beginning a core strengthening program**

Warm-up can include the “cat” and “camel” stretches and a short aerobic program. A core stability exercise program begins with recognition of the neutral spine position (mid-range between lumbar flexion and extension), touted to be the position of power and balance for

optimal athletic performance in many sports (Akuthota and Nadler, 2004). The first stage of core stability training begins with learning to activate the abdominal wall musculature.

### **Progressing a core strengthening program**

Once these activation techniques are mastered and the transverses abdominis “awakened,” training should be progressed. The beginner can then incorporate the “big 3” Exercises as described. These include the curl-up, side bridge (side plank), and quadruped position with alternate arm/leg raises (“bird dog”). The prone plank and Bridging also can be added at this stage. Pelvic bridging is particularly effective for activating the lumbar par spinals. Initial exercises are done in supine, hook-lying, or quadruped positions. It should be reiterated that the pelvis should not be tilted and the spine should not be flattened, but should maintain a neutral posture. Normal rhythmic diaphragmatic breathing also is emphasized. Once good control is demonstrated with the static core exercises, the individual can advance to exercises using a physioball. Fitness test and players profiling source (fitness testing and the physical profiling of player (Durandt, 2009).

## **Appendix-T**

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### **Description of core strength exercises**

A cool core exercise that also brings in other muscle groups into play and helps on the flexibility of your calves. A strong core is an invaluable asset. For starters, a strong and stable midsection can give you better balance and better posture, and it can even help reduce back pain. I find myself writing and saying this over and over again, because it's so true: Every move you make, both in daily life and during a workout, will be easier if your core is showing up and doing its job. It really is the center of all your movement. A strong, stable core will better help a soccer player: maintain stability on the plant foot when shooting a ball, keep their balance when faking left or right against a defender, shoot without placing stress on the low back, move the hip extensors (during the back-swing) and hip flexors and quadriceps (during the follow-through motion) on powerful shots, play with good posture so they can run at high speeds and change direction quicker and breathe more efficiently, which helps with recovering after high bouts of intense movement. Core stabilizing exercises train the lower back to be stable, protecting the health of the spine. In addition, they correctly train the core to act as a unit made up of multiple muscle groups: the hips, low back, abdominals and obliques must work together to effectively accomplish the actions listed above. Core stability is the foundation of a well-rounded soccer player. If a soccer player has mastered the staple core exercises, then it's time to up the ante with some more challenging variations.

### **Reverse Crunch**

The reverse crunch is a basic core strengthening exercise that also improves stability throughout the lower back, hips and spine. ... Tighten your abs to lift your hips off the floor as you crunch your knees inward to your chest. *Reverse crunch* is a great move that will help you target your lower abs and strengthen your core. Pair it with other core exercises for a great. The Reverse Crunch is an excellent abdominal exercise that targets one of the most difficult areas to train on the body, your lower abs. Reverse Crunches place less stress and strain on your lower back and neck than traditional sit-ups and crunches and provide a more effective means for overall ab training. Lie flat on your back on a flat bench with your hands gripping the bench by your ears and your legs bent to a 90-degree angle at the knee. Bring your knees over your waist. Using your lower abdomen, roll your hips back toward your rib cage until your lower back rolls off the bench a few inches and your knees come over your

chest. You should not feel pressure in your neck; if you do, you've rolled too far back. Reverse the motion, rolling back to the starting position where your lower back is flat against the bench. three sets of 10 to 12 reps is generally sufficient.

### **Flutter Kicks**

Lie faceup with legs extended, toes pointed, and hands tucked underneath glutes to support lower back. Lift both legs off the floor a few inches and alternately kick legs up and down.

### **Side Plank**

From plank position, press your right hand into a mat and turn your body so your weight is on the outer edge of your right foot; stack your left foot on top. Imagine you have a big beach ball under your right side; press your torso up and away from the ball, extending your left arm with fingers pointed toward the sky. Tighten your lower-ab muscles and brace your entire core. Hold for 60 seconds, then return to plank position and repeat on the left side; that's 1 rep. Do 3 reps

### **Hip Raiser**

The hip lift is a good ab exercise to strengthen your major abdominal muscles as well as the deep abs. It is less stressful on the back than some ab exercises such as crunches. The individual sits on the ground in an L-position with the back perpendicular to the ground and legs out straight. The palms are placed on the ground beside the hips. The soles of the feet are placed on the ground and the pelvis is lifted off the floor until the knees are bent at a 90-degree angle and the body is straight from the head to the knees, with the face pointed straight up. The position is held for a moment and then the body is returned to the starting position. Try to work up to two sets of 10 to 12 repetitions, with a short break between sets.

### **Oblique V-Up**

Lie on side, arms folded across chest. Keeping legs together, lift them off the floor as you raise top elbow toward hip. Place opposite hand on the floor if you need extra stability.

### **Russian Twist**

The Russian twist is a type of exercise that is used to work the abdominal muscles by performing a twisting motion on the abdomen. Russian twists strengthen your core, obliques, and spine. "It's a total core exercise that also works your balance, builds stability in your spine, and trims your mid-section all at once, Sit on the floor, knees bent and feet flat. Hold arms straight out in front of chest, with palms facing down. Lean back so that your torso is at a 45-degree angle to the floor. Twist to the right as far as you can, pause, then reverse movement and twist to the left. Reps/sets for best results: two to three sets of 10 to 12.

## **Plank**

Holding the plank position takes strength and endurance in your abs, back, and core. The plank is an isometric core strength exercise that involves maintaining a position similar to a push-up for the maximum possible time. Plank with the knees down on the floor, or plank on an inclined surface should work. So, for example, do 6 sets of 8 secs, or 5 sets of 10 secs of kneeling plank.. Lie facedown on the floor with feet together and forearms on the ground. Draw abs in and tighten glutes. Lift entire body off the ground until it forms a straight line from head to toe, resting on forearms and toes. Hold. Slowly return body to the ground, keeping chin tucked and back flat.

## **Bicycle Kicks**

Lie on back with legs extended and hands folded across chest. Pull right knee in toward chest while twisting left shoulder toward right knee. Return to starting position and repeat with other knee and shoulder.

## **Superman**

Lay face down on a mat or flat surface, with arms outstretched. Keep your hands and arms straight throughout the exercise. Raise your hand and legs 4-5 inches off the ground. Hold for 5 seconds, and then return to starting position. Hold this position for one minute or two to five seconds per set, depending on how many sets you intend to do. Keep your body completely rigid and don't relax your muscles at all. Holding the position is when your lower back muscles get their greatest work out.

## **Bird Dog**

The bird-dog is an excellent core exercise for beginners. It's not only your core strength that the bird-dog improves, because your balance and flexibility are both tested by the move too. Balance on hands and knees. Lift right leg and left arm, extending right leg to the rear and reaching forward with left arm. Hold. Repeat with opposite arm and leg. Sets/Reps: 2-3 sets of 8-10 reps on each side

## **Plank with Alternating Arm and Leg Raise**

Get into push-up position. Lift right arm and left leg at the same time without moving torso. Hold. Return to starting position, then repeat, lifting opposite leg and arm.

## **Body Saw**

body saw is a great core strengthening exercise to fire up your abs. To get started put your toes on a set of gliders or towels and then get into a forearm plank with your forearms on the floor, elbows directly underneath your shoulders, hands facing forward so that your arms are parallel, and legs extended behind you. Tuck your tailbone and engage your core, butt, and

quads. This is starting position. Slowly push with your forearms and elbows to slide the gliders or towels back toward the wall behind you. Move as far as you can without losing core engagement. Don't let your hips sag. Slowly pull with your arms and elbows to return to the starting position.

### **Side Bend**

This exercise activates the deep core muscles and the obliques. Start in a side plank with your right hand on the floor, directly underneath your right shoulder, and your feet staggered so the left is right in front of the right. You can also stack your left foot on top of your right. Engage your core and your butt. Let your left arm relax by your left side. Dip your hips down toward the ground and then lift them back up. This is 1 rep. Do all your reps on one side, and then repeat on the other side.

### **The Side Plank with Leg Raise**

This is an advanced variation of the standard Side Plank. Set up in a side plank position with your body straight and hips lined up with your shoulders. Raise the leg and keep your hips in a stable position. Contract the glutes throughout the movement. Sets/Reps: 2-3 sets of 10-15 reps on each side.

### **Bicycle Crunches**

Start by lying on the ground, with your lower back pressed flat into the floor and your head and shoulders raised slightly above it. Place your hands lightly on the sides of your head; don't knit your fingers behind. Be careful not to yank your head with your hands at any point during the exercise. Lift one leg just off the ground and extend it out. Lift the other leg and bend your knee towards your chest. As you do so twist through your core so the opposite arm comes towards the raised knee. You don't need to touch elbow to knee, instead focus on moving through your core as you turn your torso. Your elbow should stay in same position relative to your head throughout – the turn that brings it closer to the knee comes from your core. It might be best to think shoulder to knee as you move, rather than elbow to knee. Lower your leg and arm at the same time while bringing up the opposite two limbs to mirror the movement. Keep on alternating sides until you've managed 10 reps on each, aiming for three sets of 10 in total, or add the bicycle crunch into circuit training and just keep going for as long as the timer runs.

## Appendix- U

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**Table 19: Core strength Training plan and the Schedule for six weeks (March, 2019)**

Training Day	Time	Types of Exercises	Duration				
			Rep	Set	b/n set	Recovery time	40 min
T U E S D A Y	11:10- 11:50 am	General and specific warming up exercises walking, jogging, running with relaxation, static & ballistic, stretching activities.					10 min
		1.side bend	10	3	30s	30s	3 min
		2. reverse plank with leg raise	6(8s)	3	-	20s	2 min
		3. Bicycle kicks	10	2	-	25s	3 min
		4.modified sit-ups	15	3	10s	20s	3 min
		5. Russian twist	10	3	-	15s	3min
		6.leg and hip raiser	12	2	-	15s	3 min
		7. Alternative crunch	15	2	-	20s	3 min
		8. Oblique	8	2	-	20s	3 min
		9. single plank	12	3	-	25s	2 min
	10.cooling down and stretching	-	-	-	20s	5 min	
T H U R S D A Y	11:10- 11:50 am	General and specific warming up exercises walking, jogging, running with relaxation, static & ballistic stretching activities.					10 min
		1. Superman	8(5s)	3	-	15s	3 min
		2. Reverse crunches	10	3	-	10s	2 min
		3. Hip raiser	12	3	10s	20s	3 min
		4. bird-dog	8(5s)	3	-	20s	2 min
		5.body saw	15	2	-	20s	3 min
		6.flutter kick	15	2	-	15s	3 min
		7.Bicycle crunches	10	3	-	15s	3 min
		8. pushup to side plank	15	3	20s	30s	3 min
		9. single leg stabilizers	12	3	15s	25s	3 min
	10.cooling down and stretching exercises	-	-	-	-	5 min	

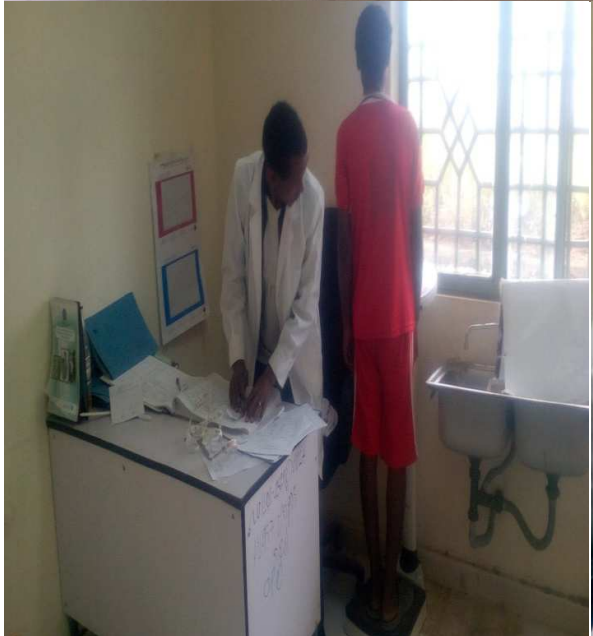


**Appendix-V**  
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**A display of various photographs taken during the course of the research project**



**Figure 1: pictures of players while taking anthropometric measurements before pre-test**



**Figure 2: pictures of players while taking physical examination before pre-test**



**Figure 3: pictures of players while taking pre-tests**

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**Figure 4: pictures of players while taking post-tests**



**Figure 5. The Experimental Group while performing warming up exercises**



**Figure 6. Pictures of the Experimental Group while performing core strength exercises**



**Figure 7; Experimental Group while performing & discussing on core strength exercises**



**Figure 8; Pictures of subjects while finishing post-tests**





**Figure 9; Pictures of the total subjects while discussing at the end of post-test**

Appendix-W

ጅማ ዩኒቨርሲቲ

የተፈጥሮ ሳይንስ ኮሌጅ

ስፖርት ሳይንስ ትምህርት ክፍል

በእግር ኳስ ተጨዋቾች የሚሞላ መጠይቅ

ውድ! እግር ኳስ ተጨዋቾች ይህ መጠይቅ ዋና አላማው “የሆድና የጀርባ (ኮር )የጥንካሬ ስልጠና በተመረጡ የክህሎት ተኮር የአካል ብቃት ክፍሎች የድጎጽዮን ከተማ በወንድ ከ17 ዓመት በታች የእግር ኳስ ተጨዋቾች ላይ የሚያመጣው ለውጥ፣ ሰሜን ምዕራብ ኢትዮጵያ” በሚል ርዕስ ለ 2ኛ ዲግሪ (ማስተር) የመመረቂያ ዕውቀት መረጃ ለመሰብሰብ ጥናትና ምርምር እያደረግሁ እገኛለሁ፡፡ ስለዚህ አሁን ባላችሁ የጤና ሁኔታ መሰረት ግልፅ መረጃ እንድትሞሉ በትህትና እጠይቃለሁ፡፡ ከልብ አመሰግናለሁ፡፡

I. የተጨዋቾች አጠቃላይ መረጃ

የተጨዋቾች ሙሉ ስም ----- እድሜ---, መጠነቁስ----(ኪግ), ቁመት----- (ሜ)  
የትውልድ ዘመን-----/-----/----- ያታ; ወ--- ሴ--- የት/ት ደረጃ -----  
አድራሻ----- ስልክ ቁጥር-----  
የወላጅ (ያሳዳጊ) ስም----- ስልክ ቁጥር-----

II. የጤና ሁኔታ በተመለከተ(አዎ ወይም የለም በማለት መልሱ፡፡ ማብራሪያ ካስፈለ በደንብ ግለፁ፡፡

- 1. የአቅም ብቃት ፈተና ወስደህ ታውቃለህ በተለይ የክህሎት ተኮር ?-----
- 2. አሁን ያለህን የአቅም ብቃት ታውቃለህ ?-----
- 3. ባለፈው ሁለት ወር ውስጥ ታመህና ተጎድተህ ነበር? አዎ ከሆነ የትኛውን የሰውነት ክፍል ነበር የታመምክ ወይም የተጎዳህ ? -----
- 
- 4. በዚህ ሁለት ወራት ውስጥ ቀዶ ህክምና ተደርገሃል ?-----
- 5. በአሁኑ ሰዓት የህክምና ክትትል ታደርጋለህ ?-----

መጠይቁን በደንብ አንብቤ በቂ መረጃ መሙላቴን በፊርማዬ አረጋግጣለሁ፣ ደግሞም በጥናቱ ላይ ለመሳተፍ ተስማምቻለሁ፡፡

የተጨዋቾች ስም ----- ፊርማ----- ቀን-----/-----/----- ዓ.ም