



**EFFECT OF EIGHT WEEKS HIHG INTENSITY INTERVAL
TRAINING ON PHYSICAL FITNESS VARIABLES IN UNDER-
17 MALE FOOTBALL PROJECT TRAINEES IN KOREM
HAWASSA CITY ADMINISTRATION**

MSc THESIS

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HAWASSA, ETHIOPIA**

NONMBER 2022

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**A THESIS SUBMITTED TO DEPARTMENT OF SPORT SCIENCES,
COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES,
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THE DEGREE OF MASTERS OF SCIENCE IN SPORT SCIENCE
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ETHIOPIA,**

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APPROVAL SHEET

This is to certify that the thesis entitled “Effect of eight weeks high intensity interval training on physical fitness variables in under-17 male football project trainees in Korem Hawasa city administration” submitted in partial fulfillment of the requirements for the degree of masters of science in sport sciences with specialization in football coaching, the graduate program of the department of sport science, and has been carried out on regular program under our supervision. Therefore, we recommended that the student has fulfilled the requirements and hence can submit the thesis to the department.

Major Advisor

Signature

Date

Co- Advisor

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AUTHOR DECLARATION

First of all, I declare this thesis is my original work and that all source of materials used have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for M.Sc. Degree in Football Coaching at Hawasa University and is deposited at the University library to be made available to borrowers under rules of library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the dean of the school of graduate studies at Hawasa University when he/she reaches judgment that the proposed uses of the material is in the interest of scholarship. In all other instance, however, permission must be obtained from the author.

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ACRONYMS AND ABBRIVATION

CM	Centimeter
DQC	Data Quality Control
DT	During Training
FA	Football Association
FIFA	Federation de International Football Association
HU	Hawassa University
M	Meter
MD	Mean Difference
FITT	Frequency, Intensity, Time and Type
POT	Post Training
PT	Pre Training
SEC	Second
SNS	Sidamma Regional State
SSC	Stretch Shortening Cycle
U-17	Under-17

ABSTRACT

The main purpose of the study was to assess the effects of eight weeks high intensity interval training on physical fitness variables in U-17 male football project trainees in Korem Hawasa city administration. For this study, the experimental research design was employed and the researcher randomly assigned a total of 30 U-17 football players in both control and experimental groups of study. A total of 15 players were assigned to each of the groups. To achieve the objective of assessing the effect of interval training on physical fitness, players were regularly participated in the training program for eight consecutive weeks of time working for three days per week. The researcher used speed, agility, power and strength types of physical fitness variables. For this study the data was taken from pre-test and post-test and, which was analyzed by using SPSS software of version 25. For the method of analysis, the researcher applied a paired sample t-test, two sample independent t-test and correlation tests to assess the mean difference in pre and post-test as well as to assess the mean difference of physical fitness between control and experiment groups. Generally, the interval trainings (a 30-m run test, Illinois agility run test, vertical high jump test and Wall Squat test) that were given for eight consecutive weeks were found to significantly improves the speed, agility, power and strength of the football players who were assigned to the intervention (experiment) group ($p < 0.05$). The researcher would like to recommend that interval training exercises should be included in all trainings session that involve the development of physical fitness components for demanding the physical challenges of sport everywhere in order to create physically fit generation.

Keywords: *physical fitness, interval training, football players, Illinois test, Wall squat test*

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Youth football program is a founding stage at which future elite players was equipped with the basic and advanced technical, tactical, physical, and psychological demands of modern football. With this in mind, a well-structured youth football development program is primarily mandatory (Ethiopian Ministers of youth and sport (1999 E.C:1)).

Currently a large number of sports are practicing in the world, football standing out due to its constant transformation, social acceptance, excessive media coverage, cultural importance and economic profit that lead to top-quality performance, especially teams with international recognition (Lago, Rey &Lago, 2009). Football is about eleven players on the pitch at one time but these eleven individuals have different needs with regards to fitness. For example external midfield player could take forty high-speed sprints in one game while a holding midfield player might only manage twelve high-speed sprints in a game. The coach and the sports scientists can design training which tolerates the demand of game. One size does not fit all so it to find the right loads with regards to intensity, frequency and volume Christos P, Ioannis G, (2015).

Football requires players to perform numerous actions that require speed, agility, and muscular endurance, complete numerous jumps during a 90- minute match. In fact, earlier studies identified that higher levels of Speed, Agility, and muscular endurance are crucial in success football match performance. The history of football is a much interwoven tangle of different threads that come to make what we call football today. In many parts of the world, football evokes great passion and plays an important role in the life of individual fans, local communities, and nations according to Reilly & Gilbourne (2003).

Football is an intermittent, labor-intensive sport that requires players to perform repeated high Intensity bouts over the course of a game Impellizzeri (2006). Football is a widely popular sport, with nearly 300 million people playing worldwide Haugen, T., & Seile, S. (2015).

Football is a high-intensity, multi-dimensional sport that is physically, mentally, technically demanding and conditioning has become an integral part of football training. Indeed, counter attacks and high pressure defending are key parts of the high-tempo, modern-day game, and attaining high levels of fitness is critical to succeeding. Players today are quicker, stronger and greater stamina than ever before. In fact, one of major differences between top class and low class players are the amount of high-intensity actions they perform during a game Stolen (2005). Sport serves as a means of transference for education, leadership, health and fair play for all who contribute and are involved in sport. Our society loves and celebrates the success of sporting teams and individuals. The focuses are even more given to limited sports like athletics, volleyball, football, basketball etc. National Sport Policy (2004). The most truth evidence concerns health benefits, which prevent or decrease physical and mental health problems and save on health care budgets, there are some negative health effects from sports injuries, typically for younger people, but in contrast the optimistic health benefits from sport are more essential, participant-wide and particularly essential to older people, there is also in sport involve improves pro-social behavior and to minimized crime Taylor, Davies, Wells, Gilbertson, & Tayleur (2015). While being the most professional sports on international scale football is mostly popular sport approximately 265 million players and 5 million referees and officials are actively involved or 4% of the world population, according to FIFA. The game is in nature stopping and starting at irregular intervals and involves multiple motor skills, such as running, dribbling, kicking, jumping, throwing and tackling. Performance depends on a difference of individual skills and their interaction and integration among different players within the team Haugen & Stephen, as cited in Bradley (2013).

Moreover, football standing out due to its constant transformation, social acceptance, excessive media coverage, cultural importance and economic profit that lead to top-quality performance, especially teams with international recognition Brown, Crabbe, & Mellor (2009). Besides, Football is a high-intensity, multi-dimensional sport that is required physically, tactically, technically, and psychologically demanding and conditioning has become an integral part of football training.

Football is differing from individual sports in that there is no definitive index of each player's performance. Football practitioners require many attributes to become successful. Practitioners included trainers, coaches, managers and administrators as documented by Reilly and Williams,

(2003).

Similarly, Seke and Ravi dram (2011) conducted a study on the influence of uphill running and downhill. Running on speed parameters and discovered significant improvement on speed and speed endurance between groups tested.

In order to attain the maximum physical performance, soccer specific training program is used to improve selected physical fitness variables like speed, abdominal strength, leg explosive power agility and flexibility as conducted by Sukmur, (2018). According Rosch *et al.* (2000) analysis of an individual player's physical profile, in relation to mean values for a similar age group and skill level, might be of assistance to the coach in objectively evaluating the effects of a specific training program on football player's performance in turn on match success.

Fitness is a situation in which an individual has adequate energy to avoid fatigue and enjoy life. It is necessary for elderly people to maintain and improve their physical fitness in order to fulfill Health, high quality of daily life. Physical fitness is categorized into two general area health related and skill or performance related fitness components Corbin, Walk, Corbin&Welk,(2008). Interval training is a series of repeated bouts of exercise alternated with periods of relief. The training session involves a given number of work intervals, each followed by a rest or relief interval and the degree to which the ATP-PC system is restored during the relief interval is related to the duration of the relief interval. The first few weeks of football training are critical; therefore care must be taken to prevent severe muscular soreness and overindulgence (Sokmen, Beam, Witchey & Adams, 2002). Bompa and Haff (2004) suggested that an interval training session in the game of football should involve standard features of training such as warm-up, stretching, the training session proper and a cool-down. The key to successful interval training lies in utilizing the proper intensity of exercise followed by a rest interval (Reilly & Doran, 2003). The concept of interval training has been around for years as the basis for athletic fitness training, and helps burn more calories, increase speed, strength, endurance, and improve overall athletic performance. Interval training programs manipulate the intensity and duration of the work intervals, and the length of the rest periods, to create the desired training responses. A complete interval training program usually comprises several short, alternating periods of both higher and lower intensity exercises Interval training has since evolved into a more structured and sophisticated way of fast tracking your fitness training. Unlike Fartlek training, which causes a temporary build-up of lactic acid, interval training involves alternating periods of activity and

recovery. Recovery is achieved by maintaining movement throughout the entire workout, which facilitates the removal of lactic acid and other waste products. Interval training programs are also designed scientifically and specifically for individual athletes. Interval training was worked during the intense periods of activity, interval training works repetitively on the aerobic and anaerobic systems. Interval training can be applied to all levels of fitness training – for beginners, intermediate exercisers and well-conditioned athletes. Interval training enables greater exposure to more intensive training without the excess fatigue. Intense repetition forces the athlete's body to respond by adapting to the new process (Adaption Response). This leads to many benefits

Taking these precedents in to account the aim of this study is was examined the effect of interval training at the end of the training sessions on speed, agility, muscular strength and power performance of U- 17 korem male football project trainees in Hawassa city administration.

1.2. Statement of the Problem

Sports are practiced in the world, football standing out due to its constant transformation, social Acceptance, excessive media coverage, cultural importance and economic profit (Brown et al. 2009). Because of this global acceptance, the majority of investigators conducted different Studies regarding football; for instance, Bangsbo et al. (2006) stated that, physical fitness is one Of the most important elements that affect football players performance because of the high Physical demand in the real match situations. For example: -Gbenga J.B (2014) on speed and power and Afeworte Asale Doffana (2018) on speed, agility, expensive power, balance, coordination and cardiorespiratory endurance. Therefore, the current study was tried to address the gap of the above investigators by including the effects of eight week high intensity interval training on some selected physical fitness variable on muscular strength, agility, power, and speed on players' in case of Under-17 male Football Project Trainees in Hawassa City Administration. A local study conducted on the effect of selected training program is a significant effect on developing and promoting the speed, agility, and flexibility on performance of football players Mulugeta Debebe(2019); Hailu, Deribachew, & Mengistu(2018). Despite, other studies have focused on health related and skill related physical fitness components on body composition, speed, agility, and muscular endurance have a significant effect on physical performance of football players Debebe (2017). However, these investigators

have ignored power from skill related physical fitness that considered as an impact on the players performance. Therefore, the current study was tried to address the gap of the above investigators by including power from skill related physical fitness, the some selected physical fitness variable on Muscular strength, agility, power, and speed in case of (U-17) korem male football project.

In another way, Demise (2017) stated that, forward players was better than mid fielders in lower body power output compering to international standard, Forward players was better than other position players in agility, power, and speed test. Goal keepers power and speed score found to be below the average standard of the test and according to Ketema (2016) also stated

That, there are significant difference among different position players in four skill related physical fitness components in agility and reaction time on goalkeepers, power on defenders and speed on attackers

Similarly, few researches address on the area of eight week interval training on selected physical fitness variables are important factors for the development of football players' performance.

However, as to the knowledge of the researcher of this study is concerned, no or

little research investigation was conducted on the effect of Muscular strength, agility, power, and speed training on male players performance variables at a football project level in case of Under-17(U-17) korem male football Project. As far as the present research is concerned, these variables were not thoroughly comprehensively investigated on football project players. It is; therefore, highly indispensable to make a closer investigation as to how this variable affects players' performance at football project trainees in Hawassa U-17 male football project korem Ethiopia.

Beside on this, the reality in South Sidama Region specifically at korem meda football project, a very little research study, there is no obvious data records that show which training program should be done to having better Muscular strength, agility, power, and speed.

To improve this limitation, it was cleared that participating in eight week high intensity interval training on some selected physical fitness Variable training program must and given a critical attention for future performance of football players. For such reasons, the investigator interested to examine the effects of eight week interval training on some selected physical fitness variable training on the players' performance of U-17 male football project.

1.2.1 Hypothesis of the Study

The statements build around the question of why something is happening and focus on either proving or refuting the null hypothesis that nothing is differing from the norm. Therefore it was examine whether there is any significance difference between control group and experimental group with regard to pre and post test results of physical fitness variable with the standard normative data value due by intervention. This study was used the most common method of statistical testing the proposed assumption i.e. intervention at the end of training session has an effect on fitness components under study. Thus was null hypothesis which postulates the absence of an effect (e.g. no relationship between variables, no difference between groups, or no effect of treatment) as described by Verdam *et al.*, (2014) and alternative hypothesis which propose that there is an association between the predictor and outcome variable as described in Banerjee *et al.* (2009). Thus this study hypothesizes to test the raised assumption as follows:-

1. Ha: There is significance difference on strength as a result of eight weeks high intensity Interval training on korem under-17 male football trainees.
2. Ha: The interval training does improve Agility performance of on korem under- 17 male football trainees.
3. Ha: There is significance difference change on Power as a result of eight weeks high intensity interval training on korem under-17 male football trainees.
4. Ha: The interval training does improve speed performance of on korem under-17 male football trainees.

1.3. Objectives of the study

1.3.1 General Objective

The general objective of this study was to assessing *the effects of eight weeks high intensity interval training on physical fitness variables in under U-17Male football project trainees in Korem Hawassa city administration, Sidama Regional State.*

1.3.2. Specific Objectives

The specific objectives of this study are:

- To examine the effect of eight weeks high intensity interval training intervention on the strength of U-17 male football project trainees.
- To determine the effect of eight weeks high intensity interval training intervention on the agility of U-17 male football project trainees.
- To evaluate the effect of eight weeks high intensity interval training intervention on the power of U-17 male football project trainees.
- To identify the effect of eight weeks high intensity interval training intervention on the speed of U-17 male football project trainees.

1.4 Significance of the Study

The findings of the present study interested to provide information about:

- ✓ Eight weeks of high intensity interval exercise training which may be help for improvement on physical, fitness of high school students.
- ✓ The safety of high intensity interval training stretching exercise to football practitioners (i.e. players, trainers, coaches, managers and administrators) who use them in their training session.
- ✓ It was provided scientific information to football practitioner's to use interval exercise stretching as an important part of the fitness training program in football specific training program.
- ✓ This research work was also serving as a benchmark for other students that might be interested in doing related researches on soccer.
- ✓ These research works were contributed to provide information for football practitioners of fitness program for football players, coaches and teachers.

1.5. Scope of the study

The specific boundaries and characters i.e. study area specified availability of the researcher. The study was delimited to the age group of u-17 years male and subjects hence the required qualities they possesses (football trainees) and sample size (the study was delimit to 15 control group and 15 experimental groups of male football players) is delimited due by the limited number of

players in the intended age category of the football project under study. To make the study specific and manageable, the study was delimited the area of the study to Sidama regional state, Korem Hawassa city U-17 male football project trainees. The extend in which this study was cover or in net shell this research work was focus on the effect of eight week high intensity interval training intervention on muscular strength, speed, agility, and power performance of U-17 male football project trainees in the field. The study clarify the intervention by specifying the training program was interval training exercise, the duration of intervention extends for eight weeks and the time for intervention were 40 minute for all interval exercise practice and 2 minute for each practice in a single training session. Furthermore it was also compare the pretest result and the interval exercises induced effect (i.e. post test result) on the selected physical fitness performance parameters of U-17 male football trainees.

1.6 .Limitation of the study

When organizing this study, the researcher was lacks the following limitations which were not under control of the researcher,

- *Diet and daily activity of the subjects*
- *Living conditions*
- *Personal habits of subjects*

1.7. Operational definitions

Interval training: is a fantastic form of exercise, however, the most common problem associated with interval training is that people tend to get over excited, because of the intense nature of the exercises, and push themselves harder than they normally would.

Physical fitness: - can be defined as the capacity to do physical work within granted levels of performance quantitatively and qualitatively Corbin (2003)

Agility: refers to the ability to change your entire body position in space rapidly with quick and speed Dawes, (2008).

Muscular strength: is maximum amount of force that a muscle can exert against some form of resistance in a single effort. Anderson (1995).

Power: is the combination of strength and speed, Josh Hewett (2018)

Speed: is the ability to perform a movement in a short period of time as Bourgase (2012).

1.8. Organization of the Study

This thesis was organized in three parts. The first part of this research discussed the introduction. In the second part, review of related literature from different sources was stated. In this part, based on the existed literature review, scientific approaches concerning about developing components of physical fitness variables or performance enhancing qualities of football was discussed. Part three dealt with research methods used for this research. In this part, description of the study area, study design, study population and participant, sampling method and sample size determination, procedure of data collection, experimental approach to the problem, exercise intervention protocol, and method of data analysis. On part four the work, the result was presented and interpreted. In chapter five, summary, conclusion and recommendation of the study were presented.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURES

According to Wiersma (1995) this review of literature provides a theoretical and practical basis of background and context for the research problem as well as it indicates that the researcher is knowledgeable about different areas which related with this study.

2.1. Origin of Football

Currently Football is the world's most popular ball game in numbers of participants and spectators. Simple in its principal rules and essential equipment, the sport can be played almost anywhere, from official football playing fields (pitches) to gymnasiums, streets, school playgrounds, parks, or beaches. Football's governing body, the Federation International de Football Association (FIFA), estimated that at the turn of the 21st century there were approximately 250 million football players and over 1.3 billion people "interested" in football; in 2010 a combined television audience of more than 26 billion watched football's premier tournament, the quadrennial month-long World Cup finals. Richard C. Giulianotti, Jack Rollin, Peter Christopher Alegi, Eric Weil, Bernard Joy, (2018)

Although , the long time ago ,it was one of the earliest examples of a game that similar to football exited in China, around 200B.C a game called "Tsuchu" (kick ball) was played with 30 feet high bamboo poles as poles. It can play by the Roman, Greek, and Japanese long before the British started our contemporary game in the Mid 1800s.

Modern history of football started in 1863in England, when the rugby union football and association of football was splinted and football association in England (FA) as established becoming the sport's governing body. FA quickly provided the first laws of football association in 1863 and the sport of modern football (soccer) began. From that point on soccer flourished in Britain, with the football association cup introduced in 1872 and foundation of football league in 1889. At the same time this computation spread throughout Europe, with Denmark, Belgium, Switzerland, all having association of football clubs by 1880.

At the beginning of modern Olympic program in 1896 all clubs of European nation and most countries of Latin America had football. The 1896 Olympics in Athens did not include footballas

a medal sport, but demonstration Match was played. In 1904 in St. Louis, Football was introduced as an official Olympic sport for the first time. Canada won the gold medals. Only three teams participated at this time.

At the outset of this study, the relevant literature acquainted to discuss previous research findings from global to local, broader to focused and from past to current order about all what is known (i.e. how much is known?, what is not known? and what should be done based on what is lacking) about the study topic as described in report of Getu and Tegbar (2006). Indeed studies show that, fitness in a soccer-specific context refers to a range of individual characteristics that is a composite of many attributes and competencies. Thus competencies by definition include physical, physiological and psychomotor factors as reported by Reilly, and Doran, (2003). The game of soccer places varying physiological demands on performers as described in the work reported by Bangsbo, (2014).

In Paris may 21 1904 FIFA (federation international De football association) was founded and the international conference was held in representatives from France, Belgium, Holland, Denmark, Sweden, Spain and Switzerland. The first soccer world cup was held in Uruguay. Since then, the event is held every four year and id hosted by countries all over the world. Although Englishman Daniel Wool fall was elected FIFA president in 1906 and all of the home nations (England, Scotland, Ireland, and Wales) were admitted as members by 1911, British football associations were disdainful of the new body. FIFA members accepted British control over the rules of football via the International Board, which had been established by the home nations in 1882. According to Stolen, (2005) performance in football is a construct requiring a myriad of skills but is highly dependent upon a subtle blend of player's physical, tactical, technical and socio psychological abilities

According to wondimu and Demela, (2004) there are no proper documents that trace back the beginning of football In Ethiopia. On other hand, the journal indicates that some foreigners were playing the game as early as 1980. According to this journal, the first football team in Ethiopia to have been documented is the Addis Ababa selected team which was established in 1935, by a group of Ethiopians and Armenians. The team played with the French sailors club during its first year of formation.

According to Kimberly (2010), speed training is a form of training designed to decrease the amount of time it takes an individual to move from one point to another during training. The current paradigm of speed development is undergoing change in the sport science community, wherein a greater emphasis is being placed not just on acceleration, top speed and speed endurance training, but also on change of direction speed drills (Sporis, Ruzic&Leko, 2008). Stolen, Chamari, Castagna and Wisloff (2005) opined that soccer depends on the athlete's ability to develop high level of power. Robinson and Owens (2004) in their study on relationship between running speed and measures of vertical jump among basketball players concluded that there was a marked relationship between sprinting speed and measures of peak power relative to the body mass. Since soccer game demands numerous explosive movements, power development will contribute greatly to economy of motion and ability to sustain lower intensity efforts. Little and Williams (2005) opined that if a muscle is required to work at maximal velocity with a high level of force then power is developed. Similarly, Shambhuulin gayaswamy, Seke and Ravindram (2011) conducted a study on the influence of uphill running and downhill Running on speed parameters and discovered significant improvement on speed and speed endurance between groups tested.

The Federation of International Football Association (FIFA) World Cup, played every four years, is widely considered the world's biggest sporting event.

Football is an intermittent, labor-intensive sport that requires players to perform repeated high Intensity bouts over the course of a game. This is illustrated by the extraordinary heart rate Values players maintain during matches, which averages close to 95% of their maximum heart rates. Performing sprints, jumps, tackles and other explosive actions throughout the match Increases blood lactate levels, and is largely responsible for fatigue experienced during and especially towards the end of a match (Impellizzeri et al., 2006).

Youth football program is a founding stage at which future elite players was equipped with the basic and advanced technical, tactical, physical, and psychological demands of modern football. With this in mind, a well-structured youth football development program is primarily mandatory. For a nation to be successful and competent in sport at a continental and international level, it is mandatory to train and cultivate youth athletes with such a continual and consecutive program.

The areas that this program needs to be planned and run (implemented) are schools. The trends and result of other nations is a convincing fact for the necessity and significance of this program in schools (Ethiopian Ministers of youth and sport (1999 E.C:1)).

The history of football is a much interwoven tangle of different threads that come to make what we call football today. In many parts of the world, football evokes great passion and plays an important role in the life of individual fans, local communities, and nations. According to Reilly & Gilbourne (2003), football's growth in popularity over the past 20 years has seen a similar increase in the amount of research conducted in all fields of sports science.

The application of a systematic approach to training and match preparation is apparent in the academy and senior team structures of many of the top clubs worldwide as described in the work of Reilly and Doran, (2003). Fitness profiling is achieved by means of a battery of tests. The test items may either be part of a comprehensive physiological assessment or be dedicated solely to assessing performance in soccer. The fitness profiles generated from such batteries have some value in allowing comparisons between individuals and, with the use of normative ranges, individual weaknesses may be identified and remedial training prescribed. Repeated fitness assessment is of further value in that change in fitness profiles within individuals and throughout the team as a whole can be measured as described in a study reported by Turner, (2011). In this way, the appropriateness and progression of the training regimen applied to the players and the squad can be gauged not only in determining adaptation, but also failure to adapt and maladaptation (over-training) as described in a study Reilly and Doran, (2003) and Reilly, (2007). Based on the findings this study tries to discuss about relevant findings of scientific approach of soccer specific fitness development under this part as follows.

Interval training is a series of repeated bouts of exercise alternated with periods of relief. The training session involves a given number of work intervals, each followed by a rest or relief interval and the degree to which the ATP-PC system is restored during the relief interval is related to the duration of the relief interval. The first few weeks of football training are critical; therefore care must be taken to prevent severe muscular soreness and overindulgence Sokmen, Beam, Witchey & Adams, (2002). Bompa and Haff (2004) suggested that an interval training session in the game of football should involve standard features of training such as warm-up, stretching, the training session proper and a cool-down. The key to successful interval training

lies in utilizing the proper intensity of exercise followed by a rest interval Reilly & Doran, (2003).

Fitness demands of football

Football is played worldwide by young and old, male and female, amateur and professional. The game makes many and varied physical demands on players. Football has several conditioning challenges. The dimensions of the rectangular playing field must lie between 90m – 120m long and 45m – 90m in width (FIFA, 2005). Considering this and given that the duration of the game is of two continuous forty five-minute halves, the long performance time and large playing area would suggest a need for elite football players to be highly-trained aerobic and anaerobic endurance players.

Despite the endurance nature of football, high intensity anaerobic work, such as sprints, jumps or tackles, are involved in the most interesting and the most significant events of match play. Several studies report that the midfield players run the longest distances during a game and that professional players run longer distances than non-professional. Strength and power are equally as endurance. In football maximal strength refers to highest force that can be performed by the neuromuscular system during one maximum that influences power performance (Mohr et al., 2003).

2.2. A Scientific Approach to Developing Fitness Component

The application of scientific principles to training for soccer calls for a bridge between theory and practice as described in report of Morgan *et al.* (2014). The fact that fitness for games embraces many components and many concepts makes the design of training programs for soccer players quite complex. It is essential that practitioners understand training principles so that they are able to intervene when things go wrong, when plans are disrupted and performances are under par as described in work of Reilly (2007). The importance of training as necessary preparation for playing soccer is now underlined at all levels of the game. Whilst playing and practicing games skills play a large part in preparing for match-play, these are not enough on their own without a formal program of fitness work as described by Reilly and Doran (2003).

Physical training is a key part of preparing to play soccer (football) at any level, but organizing a genuinely effective training program requires both an understanding of the physiological principles involved and a practical knowledge of the demands of the game as described in the

work of Reilly, (2007) and Bangsbo, (2014). Identifying the demands of the sport are often done first as this allows the coach to identify what qualities the athlete needs to possess in order to perform well in that sport. Therefore the demands of sport analyzed with regard to the key physical, physiological, and biomechanical components as described in the work of Read *et al.* (2014). In doing so, based on the evidence provided, a subsequent testing battery has been proposed by which coaching professionals can effectively assess and monitor the abilities of their athletes to assist in the development of optimal training provision with the aims of reducing injuries and optimizing performance as described in the work of Turner, (2011). Therefore a needs analysis is often conducted in three parts; thus are sport-orientated needs analysis, profiling the athlete (athlete-orientated analysis) and comparative analysis as described by Walker, (2016).

2.3. Football-Oriented Needs Analysis

Performing a needs analysis prior to designing a training program is essential as it provides vital information on the demands of the sport, the current profile of the athlete, and what the athlete needs to be successful in their sport as described by Walker, (2016). Understanding these will typically provide enough information for the strength and conditioning coach to create an appropriate and effective training program. It is consistently proven that well-designed physical training program can reduce injury rates as described in the work of Barengo *et al.* (2015) and improve athletic performance as reported by Chaouachi *et al.* (2014) and Ozbar *et al.* (2014). As a result, it is the primary responsibility of the strength and conditioning coach to ensure both these training objectives are achieved. This responsibility means a strength and conditioning coach was conducted an extensive needs analysis on the sport, and spend large quantities of time planning their physical training program.

As with any sport to which a fitness battery is to be implemented, the strength and conditioning professionals must first undergo a needs analysis to identify the biomechanical and physiological requirements of the sport. Only after this, can an efficacious testing battery be formulated as described in a study reported by Turner, (2011). As soccer makes demands on the majority of the body's physiological systems as described by Bangsbo, (2014), fitness for the game includes many factors besides competence in game skills and tactical awareness. A key aim in fitness for soccer is to enhance or maintain fitness in areas of strength while correcting weaknesses as

described by Reilly and Doran, (2003). In this way the goal of securing an optimal combination of fitness measures can be realized as described in work of Reilly, (2007).

2.3.1. Physical Demand of football

2.3.1.1. Physical Fitness Profiling of World Class football Players in Position

Fitness for soccer cannot be determined by a single parameter since the game demands a large ensemble of physical, physiological and psychological capabilities. Fitness profiles are likely to vary within the playing season and the emphasis placed on different components of fitness will change with the stage of the season. Variables linked with fitness are influenced not just by training regimens but also by the stimulus provided by competing regularly as described by Reilly and Doran, (2003). The most important variables for measuring performance in team sport, like football is physical condition, technical and tactical performance. However, because of the complexity of the game of football, it is difficult to ascertain the relative importance of each of these variables, analysis of an individual player's physical profile, in relation to mean values for a similar age group and skill level, might be of assistance to the coach in objectively evaluating the effects of a specific training program, as described in a study reported by Rosch, (2000).

The activity profile and demands on a player are determined by his/ her positional role in the team. Physical fitness profiling, may be useful in a player's selection and development and for specific training programs as reported by Sporiset *al.* (2009). Other study also indicates that players in different positions could benefit from more specific conditioning programs as described in the work of Bloomfield *et al.* (2007). Moreover, each field position has characteristics that demand appropriate anthropometric and physical fitness features as described in the work of Porte *set al.* (2015). Physical fitness profile of soccer in different playing position is described in detail as follows;

Goalkeepers

Goalkeepers are the tallest and the heaviest players in the team. They are also the slowest players in the team when sprinting ability is required. Goalkeepers were able to perform better at explosive power tests than players in the field (attackers, midfielders, and defenders). This may

be related to the special requirements of the position and players maturing in tactical judgment with experience in the game. It may also be related to a lower incidence of chronic injuries and degenerative trauma in goalkeepers compared with out field positions as reported by Sporis *et al.* (2009). Goalkeepers have more Agility, lower limb strength and muscle power than players from other field positions as described in the work of Porte *et al.* (2015).

Defenders

They are players in the team may be related to the specific requirements of the position. It is known that defenders cover, on average, 8.4 km, attackers 9.8 km, whereas mid fielders cover the greatest number of kilometers during a match (approximately 10.9 km) as described in work of Reilly (2007). Because of the lower distance covered and smaller number of sprints required during a soccer game, defenders have less tissue damage and are able to play for a longer period than their mid fielder and attacker team mates as reported by Sporis *et al.* (2009). Despite the few differences in agility and maximal oxygen consumption, goalkeepers and defenders from an elite international soccer club are taller, heavier, and have more lean mass than midfielders and forwards as described in the work of Porte *et al.* (2015).

Mid fielders

Mid fielders are the shortest players and with the smallest amount of body fat as compared with the other positional roles. Moreover, midfielders cover far greater distances as compared with attackers and defenders. In the phase of attack, midfielders take a ball to the opponent's half, whereas the defenders, in most cases, make a slight shift forward, and the attackers wait for the ball from the mid fielders. In the defensive phase, attackers run (short runs at low intensity), mid fielders run back, and the defenders wait for the opposing players. The specific role of mid fielders on the team could be responsible for their physical characteristics. Nevertheless, lack of height is not in itself a bar to success in soccer but it represents just one of the criteria for positional role selection. Midfielders and strikers also engaged in significantly more of the 'other' type movements (jumping, landing, diving, sliding, slowing down, falling and getting up) with strikers performing the most of the three positions as report by Bloomfield, (2007).

Attackers

Attackers appear to be the fastest players on the team. Significant differences were found between attackers and midfielders, with no significant differences found between attackers and defenders. This was expected because attackers have to be fast if they want to pass defenders, and defenders have to be fast if they want to stop attackers in their intention to score a goal. Sprints of 1 to 5 m and 5 to 10 m account for most of the sprinting actions of soccer players as reported by Hoff and Hlgerud, (2004). Other study also indicates that they have lower adiposity than athletes from all other positions as described in the work of Porte *et al.* (2015).

2.3.1.2. Physical Fitness Profiling of Ethiopian Foot Ball Player's in Position

Study shows that the physical fitness status of Ethiopian females' premier league players are considerably better than the world's standards in terms of different physical fitness status, i.e. body mass index, sit up and push up tests. Whereas they had poor in terms of agility and sit and reach tests. A considerable attention should be given by the Ethiopian football federation to bring players to the world's standards in terms of agility and sit and reach fitness as reported by Hizbayesh and Sisay, (2017). Forward players have better than mid fielders in lower body power output. Comparing to international standard, forward players are better than other position players in agility, power and speed test. Goal keepers power and speed score found to be below the average standard of the test, this indicates that the goal keepers' speed and power performance is not in line with the test standard. Agility and speed are prevailing performance limitations of goal keepers as reported by Ayele *et al.* (2015) and Bizuayehu and Sisay, (2017).

2.3.2. Injury Analysis in football

Previous studies counted injuries occurring in competition, and training injuries in soccer. There are different classification systems to indicate severity of injury; some classified on the basis of the medical treatment used, and some on the number of days absent because of injury. Severity should be classified according to the number of days absent because of injury: minor (0–6 days), moderate (7–30 days) and major (>30 days) as described in the work of Wong and Hong (2005). The most common injury mechanisms in soccer are tackling, running, being tackled, shooting, twisting and turning, and jumping and landing as described in the work of Wong and Hong (2005). Knee, ankle, upper leg, groin, and hip are the most injured anatomical regions as

described by Reilly and Williams, (2003). Preventive strategies must be developed to reduce injury. Preventive programs such as the (the Federation of the International Football Association) FIFA warm-up program as described in the work of Coso *et al.* (2018).

2.3.3. Physiological Demands of Football

The physiological demands of soccer play are indicated by the exercise intensities at which the many different activities during match-play are performed as described in the work of Bangsbo, (2014). The physiological costs of movements in football or the energy expenditure during match-play has been estimated to be about 1,500 kcal. The major metabolic route is aerobic glycolysis, anaerobic glycolysis constituting a relatively minor role. Fat metabolism comes increasingly into play with the duration of exercise. Endurance training improves the capability to utilize fat as a fuel for exercise, thereby sparing muscle glycogen and delaying the onset of fatigue as described in the work of Reilly, (1997).

Other study also shows that, football is an intermittent sport in which the aerobic energy system is highly taxed as described in the works of Krstrup *et al.* (2005). Muscle glycogen is probably the most important substrate for energy production, and fatigue toward the end of a game may be related to depletion of glycogen in some muscle fibers. The oxidation of fat appears to increase progressively during a game, partially compensating for the progressive lowering of muscle glycogen. It can be concluded that the rate of glycolysis is high for short periods of time during a game as described in the work of Bangsbo, (2014).

2.3.4. Biomechanical (kinematic and kinetic) Demand of football

Biomechanics can be applied to gain an insight into the performance of soccer skills. Many skills in the games of soccer are amenable to biomechanical analysis. Principles of biomechanics are relevant in considering prevention of soccer injuries as described by Reilly and Williams, (2003). The biomechanical analysis method requires the calibration of each individual's stride length for each of intensity of motion. An alternative approach is to track the player's movement on a computerized model of the pitch, using changes in mathematical co-ordinates of the player's location to establish the distance moved and the velocity of motion. The overall distance covered consists of 24% walking, 36% jogging, 20% cruising or striding, 11% sprinting or all-out activity and 7% moving backwards as described in the works of Reilly, (2007). The greater distances

were covered standing, walking or jogging, follow by moderate-speed running, low speed running, high-speed running and sprinting as described in the work of Barros *et al.* (2007).

2.4, Athlete-Orientated Analysis

2.4.1. Physical Requirements of football

Study suggests that, soccer is characterized as a high intensity, intermittent contact team sport that requires a number of proficient physical and physiological capabilities to perform successfully as described in the works of Krustupet *et al.* (2005) and Walker, (2016). Aside from the necessary technical and tactical skills required, soccer players retain a high level of aerobic and anaerobic conditioning, muscular endurance, speed, agility, strength, and power as described in the work of Reilly and Williams, (2003) and Turner and Stewart, (2014). Players in different positions could benefit from more specific conditioning programs. For example, defenders and strikers could benefit from speed and agility type conditioning whereas midfielders would benefit more from interval running over longer distances in accordance to the findings conducted by Bloomfield *et al.* (2007). The physical requirement of the player is required not only in football but also in other sport as described in Realet *et al.* (2014). Analysis has shown that less than half of 'purposeful movement' is performed in a forward direction, players perform the different types of movement with a range of intensities and players perform frequent turns during movement patterns as described by Bloomfield *et al.* (2007).

Football is a high-intensity, multi-dimensional sport that is physically, mentally, technically demanding and conditioning has become an integral part of football training. Indeed, counter attacks and high pressure defending are key parts of the high-tempo, modern-day game, and attaining high levels of fitness is critical to succeeding. Players today are quicker, stronger and greater stamina than ever before. In fact, one of major differences between top class and low class players are the amount of high-intensity actions they perform during a game (Stolen *et al.*, 2005).

2.4.1.1. Agility

Agility: refers to the ability to change your entire body position in space rapidly with quick and speed (Dawes, 2008). The best current definition of agility described by Sheppard and Young (2006) that it is a rapid whole body movement with change of velocity or direction in response to

a stimulus. Agility is also defined as the ability to change direction rapidly, without losing balance, using a combination of strength, power, and neuromuscular coordination as described in a study reported by Bloomfield *et al.* (2007) and Little and Williams, (2005). Though agility requires the use of cognitive components, it is also composed of other qualities – namely ‘physical’ and ‘technical’. In a nutshell, agility is vital for successful performances in most sports as describe by Young and Henry, (2015). Thus, the ability to produce fast-paced variable actions can impact soccer performance and therefore, a soccer player’s agility must be assessed as described in the study reported by Ayeleet *al.* (2015), and Bizuayehu and Sisay, (2017).

2.4.1.2. Power

Power is the combination of strength and speed (Josh Hewett, 2018). Power is a measure of force being applied at speed and therefore is a fitting commodity in the majority of sports requiring fast dynamic movements such as sprinting, jumping, throwing, weightlifting and most field sports as described by Pye, (2005). Among field sports soccer players are frequently required to produce high power output and sometimes to maintain or repeat it with only a brief period for recovery. Training for power must exploit the force–velocity characteristic of muscle as reported by Reilly, (2007). This requirement reflects the trade-off due to the velocity-specific effects of training. The maximal ability to generate muscular power can be measured as a response to jumping on a force platform. The vertical distance is a good measure of muscular performance as described by Reilly and Doran, (2003).

2.4.1.3. Speed

Speed: is the ability to perform a movement in a short period of time as described by Bourgase, (2012). speed is the ability to move more quickly with by more quickly contract of the leg muscles, but the brain and nervous systems also have to learn to control these faster movements efficiently as described by Pye, (2005). Sprinting ability is an integral component of successful performance in a variety of sports and the ability to accelerate in soccer underlies successful game play as described in a study reported by little and Williams (2005). Short sprints are very common in many team sports including soccer, rugby, basketball, hockey etc. High intensity activities are defined as those that are carried out from 5.3 to 6.3 m·s⁻¹ as acquaint by Salvo *et al.*

(2007). These are distinct qualities of speed, and specific tests should be used to evaluate each component within an appropriate test battery.

2.4.1.4. Muscular Strength

According to the research result conducted on the skeletal muscle mass and muscle strength in relation to extremity performance of older men and women suggest that low muscle strength, but not muscle mass, is associated with poor physical function (Paul *et al.*, 2000).

According to Hoeger, (2002) have condemned the idea that strength is necessary only for highly trained athletes and other individuals who have jobs that require muscular work. Actually, muscular strength refers to the maximum amount of force a muscle can exert against an opposing force. Fitness testing usually consists of a one –time maximum lift using weights, bench press, leg press, etc.

2.5. Fitness demands of football

Football is played worldwide by young and old, male and female, amateur and professional. The game makes many and varied physical demands on players. Football has several conditioning challenges. The dimensions of the rectangular playing field must lie between 90m – 120m long and 45m – 90m in width (FIFA, 2005). Considering this and given that the duration of the game is of two continuous forty five-minute halves, the long performance time and large playing area would suggest a need for elite football players to be highly-trained aerobic and anaerobic endurance players.

Despite the endurance nature of football, high intensity anaerobic work, such as sprints, jumps or tackles, are involved in the most interesting and the most significant events of match play. Several studies report that the midfield players run the longest distances during a game and that professional players run longer distances than non-professional. Strength and power are equally as endurance. In football maximal strength refers to highest force that can be performed by the neuromuscular system during one maximum that influences power performance (Mohr *et al.*, 2003).

2.6. Training method of physical fitness

During the general preparation phase, there should be a moderate amount of physical training, complete at game intensity. The volume of training should increase to a high volume during the specific preparation phase and decrease during the in-season phase (Taylor, 2004).

Regular training is required for all areas of fitness. Start with a good plan. Here are some important factors to remember when planning an effective training program. The training should be directed to achieve specific goals and be individualized to maximize the physical capabilities of particular players. In order to improve, the physical load needs to be increased over time as the players get fitter. By using cross-training and by incorporating fitness into the training drills it will keep the conditioning interesting and maintain the motivation of the players. Intermittent high intensity exercise is an effective form of conditioning for physical fitness because it simulates the heart rate experienced during games and the fast-paced nature of the sport Stonkus (2006).

2.7. Fitness Training in football

While after the fitness profiling is achieved by means of a battery of tests, allowing comparisons between individuals with the use of normative ranges, individual weaknesses may be identified and remedial training prescribed as described by Reilly and Doran, (2003). Therefore, fitness training is an important part of the overall training program. Study shows that the effect of specific training program significantly improves selected physical fitness variables i.e. speed, abdominal strength, leg explosive power agility and flexibility due to six weeks of specific training program prescribed to soccer players in a study conducted by Rosch *et al.* (2000), and Sukumar, (2018).

Players strive to be at an optimal tactical, technical, physical, psychological and physiological state for competition. Hence, it appears that coaches and trainers have gradually become more welcoming to scientific approaches in preparation for football match play. Such approaches include physical testing to assess fitness and to monitor training to ensure optimum performance. Aspects such as body composition, agility, speed, muscular endurance, balance and power, are of primary importance in evaluation of football performance (Haugen & Seiler, 2015).

The majority of fitness testing with football players has consisted of a battery of field tests, fitness tests performed in the field enhance the specificity of the evaluation, use minimal equipment and are more cost efficient, test results it is difficult to calculate the overall performance during match-play because of the complex nature of the demands of the games vensson & Drust(2005).

2.7.1. Cooling down Program in football

Various low-intensity drills in small groups could be devised as warm-down practices towards the end of normal training. The training context may also be the more appropriate for targeting specific flexibility exercises as described by Garcia *et al.* (2015). Including some dynamic flexibility exercises into the warm-down routine can help in alleviating feelings of stiffness. The stretching exercises can engage calves, hamstrings, quadriceps, adductors, gluteals and lower-back muscles to enhance player's performance as described by Jagers *et al.* (2008) and Molacek *et al.* (2010). Coaches may accept their physiotherapist's advice about warming down after training; they are more reluctant to advocate a 'team warm-down' after a game as described by Reilly (2007).

2.7.2. Interval Training in football

Interval training programs are also designed scientifically and specifically for individual athletes. Physiologists and trainers measure precise periods of activity that match the athlete's sport and current level of fitness and a scientific procedure. This is the only exercise, which effects in most parts of the body. Interval Training develops the personality of an individual, physically, mentally, morally and intellectually. Interval Training is universal benefiting all people of all ages as described by Mande. (2016). Short interval Training has beneficial effect on agility and muscular strength and thus, such training may be recommended to enhance sports performance as conducted by Singh *et al.* (2011). The science of interval Training proclaims that interval techniques and practices aim at selective as well as wholesome shaping of human body and mind. Hence a selective package of interval practices of physical postures, breathing practices and mental practices would prove a positive impact among the soccer players in executing the skills for the better playing performances as conducted by Johnson *et al.* (2007).

Train on smooth, flat surfaces.

And don't forget to incorporate regular stretching training into your fitness program. The added intensity of interval training requires that your muscles and joints be flexible and supple.

While the ultimate goal of interval Training is to the union of the body, mind, and soul, the complex training with interval Training practices groups have significantly improved on speed,

agility, muscular strength, explosive power, muscular endurance, coordination and playing ability when compared with control group. The study divulge that regular interval Training practices could contribute to the development and enhancement of skill related variables and could complement the sports training methods for skill acquisition as conducted by Mande, (2016).

Aside from the necessary technical and tactical skills required, soccer players must also develop and retain a high level of aerobic and anaerobic conditioning, speed, agility, strength, and power as described in the work of Turner and Stewart, (2014). It is recommended that these physical qualities are developed using appropriate training methods. Scientific approach of training in soccer used to optimize the performance of players. To do that a needs analysis is often conducted in three parts, i.e. sport-orientated needs analysis, profiling the athlete (athlete-orientated analysis) and comparative analysis as described by Walker, (2016). Then the demands of soccer analyzed with regard to the key physical, physiological, and biomechanical components and the physical profile of the athlete analyzed in the light of the physical qualities or requirements of the soccer. In doing so, based on the evidence provided, a subsequent testing battery has been proposed by coaching professionals. This enables the practitioner to assess monitor the abilities of their athletes to assist in the development of optimal training provision with the aims of reducing injuries and optimizing performance

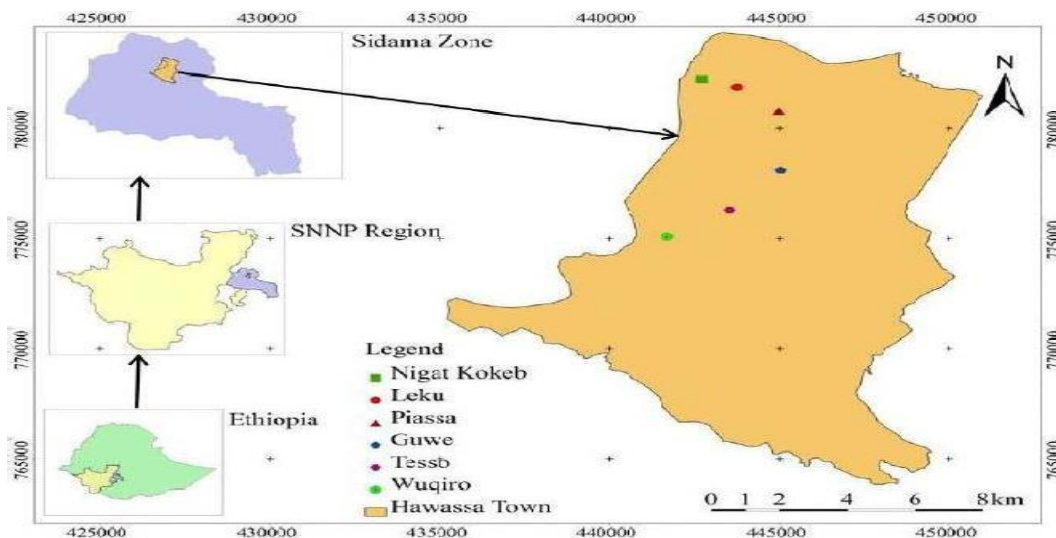
CHAPTER THREE

MATERIALS AND METHODS

The methods or procedures section is really the heart of the research (Wiersma, 1995). These units briefly explain about the methodology used by the researcher to overcome the problem and gather the genuine information, hence the researcher was used some techniques in order to minimize the existed problem under this research.

3.1 Study area

This study was conducted in Sidama National Region (SNR) Hawasa city Administration. Hawasa city administration located in the Sidama National Region on the shores of lake Hawasa in the Great Rift valley; 273km south of Addis Ababa. Hawasa is the capital city of Sidama National Region. Astronomically Hawasa city lies between Hawasa 7°3'0" latitude N, and 38°28'0" longitudes E. Hawasa city administration is bounded bay lake Hawasa in the west, Oromia region in the north, wondo Genet woreda in the east, Shebedino woreda in the south.



Adopted from; Ethiopian mapping agency

Figure 1 map of the study area

3.2. Study design

Quasi-experimental design was used in order to manipulate the treatment on independent variable to see the change on dependent variable. Pre and post-test was given to both experimental and control group on selected physical fitness variables such as wall sit one leg, vertical jump, 30m acceleration and Illinois tests. Only the experimental group was engaged in the Eight weeks training program.

3.3. Study Population

The study population was selected volunteer to carry out the intended investigation in a specific community, i.e. in U-17 male football project in Hawasa in Sidama region Hawassa. The project has 30 players and one head coach and one assistance coach. Players those are currently involving in the team of U-17 male football projects in Sidamma Hawassa city were the subjects of this study.

3.4. Source of data

The study was used primary data source to get relevant and sufficient information according to the nature of the study. The primary data was taken from pre-post-test measurements in the field before and after 8 weeks training by standardized physical fitness tests .The related supportive data obtained from different secondary sources such as; different documents like, books, journals and internet sources to get relevant and sufficient information regarding the study area.

3.5. Sample Size and Sampling Techniques

The source of population for this study was korem U-17 male football project Hawassa. Based on this, Randomization sampling technique was used because all the project players or entire populations were included in this study. The study subjects was 30 male football players who was currently participating in this project and the selection was depends on health history questionnaires, interest and availability of project players. From those the researcher randomly selected 15 participants to intervening group and the remaining 15 participants' to comparison group. This study was used to randomizing particularly homogeneous sampling methods, also called random sampling method. Therefore subjective methods were used to decide which participants are included in the study then randomizing. Then it was deliberately choose a

participant due to the required qualities that a participant possesses. It was also focuses on participants who share similar trait or specific characteristics. The study was select sample participant considering injury and other health problem. Due to this fact participant of this study was similar in terms of age, jobs or life experiences i.e. football trainees. The idea is to focus on this precise similarity and how it relates to the topic being researched or the need of the study being done as described in a study reported by *Ilkeret al. (2016)*.

Furthermore once the participants (i.e. 30 trainees) of the study select from the population of the study (i.e. 30 trainees and 2 coaches), the trainees was stratify, by the identification of variable (i.e. position) which may be related indirectly to the research hypothesis and thus the participant grouped in to mutually exclusive strata. Thus are experimental (15 trainees) and the remains are 15 trainees was control group. The sample size of this study was 30 whom they are randemaizingly select from U-17 male football projects in Hawassa Korem Meda, SNR as the sample size determined in other previous study reported by Bizuayehu and sisay,(2017) with modification.

3.6. Method and procedure of data collection

3.6.1. Procedures of data collections

This study was tries to use purposive sampling methods, all football players were part of the study. Therefore subjective methods were used to decide which participants are included in the study through randomizing. Based on lottery technique, participants are classified in to experimental and control groups. It was also focuses on participants who share similar traits or specific characteristics. The study was select sample participant considering injury and other health problem. Due to this fact participant of this study was similar in terms of ages, jobs or life experiences i.e. football players. The idea is to focus on this precise similarity and how it relates to the topic being researched or the need of the study being done as described in a study reported by *Ilkeret al. (2016)*.

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players were control group. The sample size of this study was 30 whom they are purposively select from U-17 male football projects in Korem Meda Hawassa, SNR as the sample size determined in other previous study reported by Bizuayehu and Sisay, (2017) with modification

3.6.2. Data Collection instruments

The selected data collection instrument was standardized physical fitness tests of Davis B Physical Education and the Study of Sport; (2000) and [https://www.Topendsports .com](https://www.Topendsports.com). (vertical jump, Illinois agility test, wall sit one leg test and 30m acceleration run).

The data was recorded by the investigator with the help assistance data recorders Stop watch, exercise mats, marked walls, marking cones; pen, paper, football, wooden blocks, measuring tape, meter, cones, recording sheet, measuring tape, bench, whistle and etc. were tools used for the collection of the appropriate data

3.7. Experimental Approach to the Problem

Testing and measurements are the means of collecting information or data up on the which subsequent performance examinations and decisions are made and it is the process which is done step by step as reported by Hopkins, (2004).

3.7.1 Independent variables

The independent variable in this study is the interval training given to the study groups for U-17 male football trainees.

3.7.2. Dependent variables

The outcome or the effect of strength, power, speed, and agility changes after moderate to high intensity training is the dependent variables of this study.

3.7.3. Selection of Physical Fitness Components and Test Type

First this study selected the following physical fitness components to achieve the objectives' of this study, in turn to address the recommendation given by previous studies reported by Jaggerset *al.* (2008), Molaceket *al.* (2010) and Rodriguez *et al.* (2016). So that the following fitness parameters were test, thus are muscular strength, agility, power and speed. Then it selects suitable method of measuring the selected physical fitness components. In doing so each soccer

player were perform the following test such as vertical jump test to assess their power, wall sit one leg test to assess their leg strength, Illinois agility run test and 30-meter sprint test to assess their ability to change direction quickly, acceleration and speed off the mark and a sit-and-reach to assess their flexibility performance, before starting intervention program (pre-test) and after completing static hamstring stretching program (post-test) as used by Davis, (2000), Pye, (2005), and Bizuayehu and Sisay, (2017).

3.8. A Testing Battery for the Assessment of Physical Fitness of football Players

Once the demands of the sport have been analyzed in combination with the athlete's personal training goals and those set by the coach, then the planning process of the training program can be begin as described by Walker, (2016). Various field tests, which assess the different components of physical fitness reported by Pye, (2005) and as specific to soccer as described by Reilly and Doran, (2003). A rationale for the choice of recommended tests will be reasoned and a timeline for implementation, as described in a study reported by Turner, (2011).

3.8.1 Field Test

Soccer coaches are continually on the lookout for appropriate tests which allow them to assess fitness of players in field conditions as described by Reilly and Doran, (2003). The success of a training program is largely dependent upon satisfying the performance aims associated with fitness test and evaluation (testing and measuring) is the means of collecting information upon which subsequent performance evaluations and decisions can be made. In constructing a test it is important to make sure that it really measure the factors required to be tested, and is thus objective rather than subjective. In doing so all tests should therefore be specific (designed to assess an athlete's fitness for the activity in question), valid (test what they purpose to test), reliable (capable of consistent repetition) and objective (produce a consistent result irrespective of the tester) as described in the work of Pye, (2005). Field tests are better suited for such goals and popular with both coaches and players because of their simplicity, time efficiency, and lack of equipment required than employing a very expensive test i.e. Laboratory tests as reported by Turner, (2011).

3.8.2. Sequence of Testing and Rest Period Between Test

Knowledge of exercise physiology helps guide the order of tests and the duration of rest periods between tests to ensure reliability. Testing tasks which are highly skillful, such as those which require coordinated movements and an attention to “form,” should be conducted before performance tests tasks that cause an inducing fatigue in order that the latter do not distort the results. The National strength and conditioning association (NSCA) suggests the following order: resting and non-fatiguing (resting heart rate, body composition, flexibility and jump tests), agility, power and strength, sprints, local muscular endurance, anaerobic capacity and aerobic capacity tests as reported by Turner, (2011).

3.8.2.1. Agility Tests

The multi-dimensional movement demands of field and court games dictate a revaluation of the traditional approach to the development of agility. There are the underlying foundation for agility and the prerequisite for technical skills. The following are examples of agility tests: hexagonal obstacle agility test, zigzag test, 505 agility test, Illinois agility run test, Lateral change of direction test, quick feet test, burpee test and 'T'drill test as described in the work of Pye, (2005). According to the report of Hachana *et al.* (2014) soccer can use specific agility tests like Illinois agility run test , study also been developed, arguably the most popular one, due to its simplicity, is the zigzag test as described in a study reported by Little and Williams, (2005).

3.8.2.2. Power Test

The Vertical Jump test is a measure of power in turn to measure performance. Vertical jumps test are often used as a measurement of lower-body power, and thus as an indirect measure of performance. As there appears to be a relationship between vertical jump height, 0-30m sprint times and 1RM back squat strength as reported in Rodriguez *et al.* (2016), it may be a useful measure of performance. This relationship is likely due to the vertical force vectors which all of these activities (vertical jump, sprinting and the back squat) are characterized by. This test may therefore be appropriate for assessing performance in a variety of sports such as handball, basketball, volleyball, Olympic weightlifting, American football and football (soccer). The test is extremely practical as it uses a simple device which is portable and can be used in a variety of

settings to measure power performance. However, the Vertical device has been shown to both under estimate as described in Buck Thorpe *et al.* (2012).

3.8.2.3. Speed Test

Speed tests are typically used solely to measure an athlete's linear speed capabilities. The average sprint distance covered in team sport that has been reported to be between 15-21m as reported by Andrzejewski *et al.* (2013). The following are examples of speed tests: 10 stride test, 30 meter acceleration test, 60 meter speed test, shuttle run test, 150 meter endurance test, 250 meter endurance test, 400 meter sprint test and on as described by Pye, (2005). Among those 30 m sprint test use by soccer specific speed testing as employed by Ayele *et al.* (2015) and Bizuayehu and Sisay, (2017).

3.9. Protocol of Sequence of Testing Battery and Data Collection Instrument

Sequence of Testing

All soccer specific field tests were performed sequentially with increasing performance tests inducing fatigue. So a test was begun from testing tasks which are highly skillful, to tests which are inducing fatigue in order that the latter do not distort the results. Therefore this study will perform a test beginning from sit and reach, Illinois agility run, vertical jump, to 30 m sprints test as described in the study reported by Turner, (2011). The tests were performed on a natural grass soccer pitch, and the subjects will wear soccer kit.

3.9.1 Illinois Agility Run Test

Thirdly this study was using this test to measure their ability to change direction quickly as described in the study reported by Oliver and Meyers, (2009) cited in Lockie *et al.* (2013), Ayele *et al.* (2015), and Bizuayehu and Sisay, (2017). The test needs 8 cones, a stopwatch and a training partner to record the time. Rapid activity occurs in the crucial seconds of the game and can make the difference between scoring and conceding a goal. The IAR (in seconds) involves four markers being placed to indicate an area that is 10-m long and 5-m wide. In the center of the area, 4 markers were placed 3.3 m apart. Two timing gates will be used; one at the start line and one at the finish. No technical advice was given as to the most effective movement technique. Players were only instructed to complete the test as quickly as possible. Players used a standing start 30 cm behind the start line in order to trigger the first gate as described in a study reported

by Oliver and Meyers, (2009) cited in Lockie *et al.* (2013). They were also instructed not to cut over the markers; they were used to run around them. If a subject failed to do this, the trial will stop and re-attempted after the requisite recovery period, so that 3 successful trials was completed as the methods reported by Pye, (2005) and Lockie *et al.* (2013).

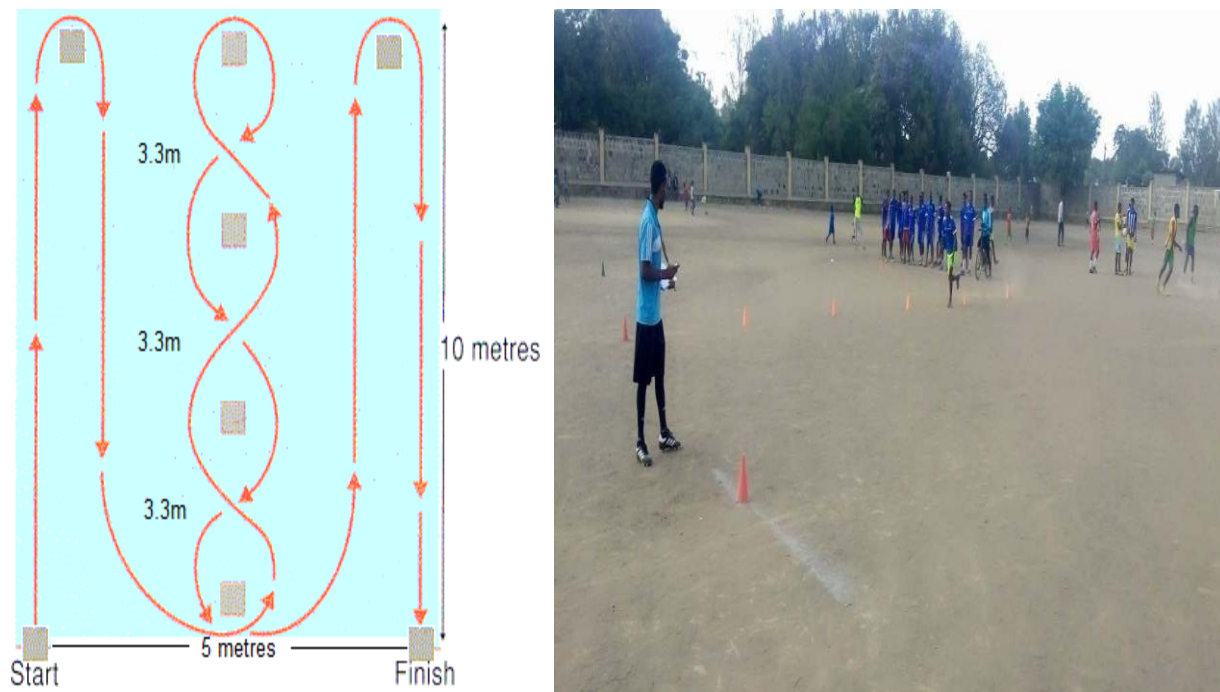


Fig 1. Illinois Agility Run Test

Objective: The objective of Illinois agility run test is to monitor the development of the player's agility.

Materials: required resources to undertake this test are: flat non-slippery surface, 8 cones, stop watch, assistants coach, pen and note book.

Procedure: Subjects was laid 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.

Scoring: the stop watch was started at the starting point when the player start and stop at the finishing of the agility test and the total seconds was recorded.

3.9.2 Vertical Jump Test

This study was used this test (in cm) to a measurement of lower-body power in particular to assess the player's leg power. First the player will do warm up for 10 minutes. Then players will nick by chalks at the end of his or her fingertips. Then the players will stand side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips of the finger mark or M 1). Then the player performs a static position was jumped as high as possible and marks the wall with the chalk on the fingers (M2). The assistant was then measure and records the distance between M1 and M2. The player repeats the test 3 times. Then the assistant was calculated the average of the recorded distance and uses this value to assess the player's performance as the reports of Davis, (2000) and Bizuayehu and Sisay, (2017) with modification.

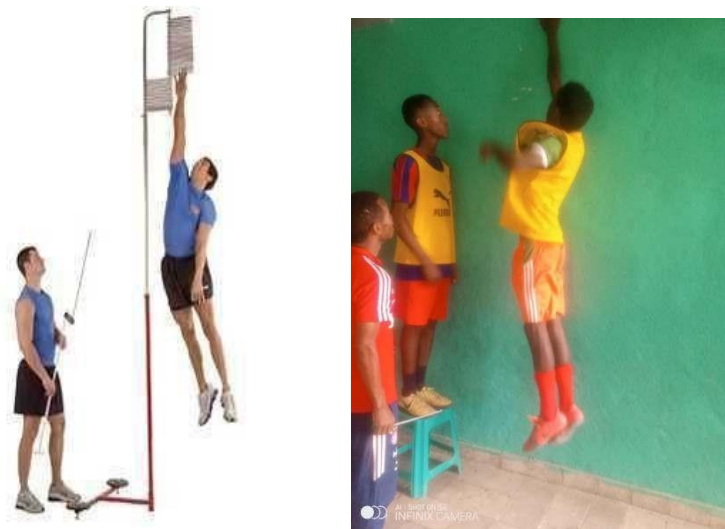


Figure 2 vertical jump tests

Objective: The objectives of this test are to measure the leg muscle strength and explosive power.

Required resources: To undertake this test the investigator requires measuring tape or marked wall, chalk for marking wall, measuring instrument note book, pen and assistance coach.

Procedure: 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. The athlete then stands away from the wall, and jumps vertically as high as possible using both arms and legs to assist in projecting the body upwards. Attempt to touch the wall at the highest point of the jump.

Scoring: The difference in distance between the standing reach height and the jump height is the score.

3.9.3 A 30-Meter Acceleration Test

This study was used this test (in second) to measure acceleration and speed off the players as reported in a study by Ayele *et al.* (2015) and Bizuayehu and Sisay, (2017). A longer distance isn't relevant to soccer where players rarely run flat out for more than 20- 30meters/yards. The 30-m sprint test will involve three maximal-effort sprints from a stationary start with a 5-min rest in between. Players will position the foot 50 cm behind the start line. The subject will start from a standing position placing their forward foot just behind the starting line and their rear foot on the pedal after having positioned the pedal according to their natural starting position. The stopwatch starting pedal will position behind the starting line. The timing will start as soon as the foot of the player left the pedal. Before testing, each subject will perform a sub-maximal sprint to familiarize themselves with the test procedure. The fastest sprint will select for the analysis as used by Pye, (2005).



Figure 3 30 meter dash test

Objective: The objective of this test is to monitor of the player's ability to effective and efficient acceleration and maximum speed.

Required resources: To undertake this test the investigator requires marked track /measuring tape/, cones, stop watch, assistant coach pen and note book.

Procedure: the test comprised of 3 x 30m runs from a standing start or from the starting block and with a full recovery between each run. On the "Go" command the participant run quickly and with speed from starting line and the assistant started the stopwatch, when the participant passed the finishing line the assistant stopped the stopwatch and record the time for the participant to complete the 30m distance.

Scoring: three trials were given to the subject and out of the three times the possible best smallest time was recorded.

3.9.4 Muscular Strength

According to the research result conducted on the skeletal muscle mass and muscle strength in relation to extremity performance of older men and women suggest that low muscle strength, but now muscle mass, is associated with poor physical function (Paul *et al.*, 2000).

According to Hoeger, (2002) have condemned the idea that strength is necessary only for highly trained athletes and other individuals who have jobs that require muscular work. Actually, muscular strength refers to the maximum amount of force a muscle can exert against an opposing

force. Fitness testing usually consists of a one –time maximum lift using weights, bench press, leg press, etc.

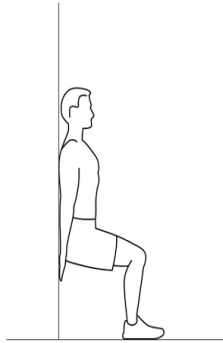


Figure 4. Walls sit one leg Test

The objective of this test is to monitor the development of the athlete's quadriceps strength endurance.

Required resources

To undertake this test you will require:

- Warm dry location – gym
- Smooth wall
- Stop watch
- Assistant coach
- Pen and
- Note book

How to conduct the test

Stand comfortable on both feet with your back against a smooth wall

- ❖ Slide your back down the wall to assume the position shown in the diagram
- ❖ There is to be a 90° angle at the hip and knee
- ❖ When you are ready
- ❖ Lift one foot 5cm off the ground

- ❖ Assistant starts the stop watch
- ❖ Balance for as long as possible
- ❖ The watch is stopped when you put your foot back on the ground
- ❖ Take a rest and then repeat the test with the other leg.

Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis was indicated an improvement.

Target group

This test is suitable for active individuals but not for those where the test was contraindicated.

Reliability

Reliability was depending upon how strict the test is conducted and the individual's level of motivation to perform the test.

Validity

There are published tables to relate results to potential level of fitness and the correlation is high.

On-line calculator

Select the following link to access the on-line calculator wall squat test.htm

Training protocol

ACSM (1995) recommended that clients beginning an exercise program should perform three days per week on nonconsecutive days. Duration of training 60-90 minutes of continuous or intermittent activities dependent on the intensity of the activity; thus, lower intensity activity should be conducted over a longer period of time (60 min or more), and conversely, individuals training at higher levels of intensity should train at least 60 min or longer. Moderate duration is recommended (45-60 min) excluding spent of warming up and cooling down.

The training group/experimental was classified into four groups, simultaneously when the first group (four players) were performing wall sit one leg test, the second (four players) were performing Illinois agility test, the third group (four players) were performed vertical jump test and the fourth group (three players) were performed 30 meter acceleration test. After the trainees were exposed with four types of exercise, they have recovered in 1:3 ratios. Youth trainees were

performed the designed exercise at 90-95% maximal heart rate of High intensity with manual management by the investigator.

The training program was carried out for three days per week for 8 consecutive weeks. The training includes kinds of plyometric exercises that represent each selected fitness variable. The training program includes, warming up that involved 10-15 minutes period accordingly and it contains walking, jogging, rope jumping, moderate running, trunk rotation and dynamic stretching. Main activity contains 45-60 minutes of high intensive interval training exercise for consecutive eight weeks then gradually lowering the minutes to 45 minutes of moderate to high intensity exercises, like squat jumps, power cleans, half squat, steeping, jump to box and lateral jump to box, back stretch and lower back stretch, depth jump, leafing barbell, squat jump, bounding, jump knee up to chest, front and revers lunge, step quick feet, lateral/backward/forward shuttle, carioca forward/backward(left and right foot), vertical jump and cooling down contains meditation, light exercises and static stretching that followed 5-10 minutes. Participants took active recovery time before proceeding to the next type of training and water break on a session. All exercises were conducted on Hawassa korem football field. The training programs were conducted selecting the day from the weeks on Monday, afternoon 10:00-11:30, Wednesday, afternoon 10:00-11:30 and Friday afternoon 10:00-11:30 sometimes the training duration was changed if there is an environmental hazardous problem (i.e. Rain, coarser...). The training program was based on FITT principle and also this was strictly followed, guided and dependent on the subject's responses and also The training program was made for the participants were designed and given by the researcher and the subjects were underwent their respective training programs as per schedules under the supervision of the researcher. The type of exercises done was written (in the Appendix).



Data Collection Procedure

The data was collected using the following pre and post fitness tests on which each subject should complete both pre and post testing trials on three non-consecutive days no longer than 3 days apart as reported in a study of Jagger, (2008). The materials that was used for this study was exercise mats, marking cones; pen, paper, stepper, stop watch and whistle will be used as instruments for the training as well as to collect the data during the test. When considering the rest periods between tests this study was used the guideline of strength and condition professionals which is the rest between trials the power tests lasting around 1 second (e.g. the power clean) and strength and speed tests lasting around 4 seconds (e.g., the 1RM back squat and 30-m sprint), 3–5 minutes between trials may be required because these depend on intramuscular stores of ATP. However, for longer lasting tests, for example, repeated sprint tests, which also tax intramuscular stores of PCr, 8 minutes between repetitions / tests may be warranted as reported by Turner, (2011). The tests was performed between 9 am and 2 pm, and the subjects were wear a standard soccer kit as described in a study conducted by Sporis *et al.* (2009), with modification.

Table 1: Data collection protocols of testing battery.

Period of Test		Time to Test	Test Trial (number)	Fitness Test and Rest Between Test Trial		Remark
				Fitness test	Rest (minute)	All the test will perform between 9 am and 2 pm.
Pre test	1 week before HIIT intervention	3 days with ≤ 3 day apart for each test	3/test type	Wall sit one leg test	5 min	
				Illinois Agility run test	5 min	
Post test	1 week after HIIT intervention	3 days with ≤ 3 day apart for each test	3/test type	Vertical Jump test	1 min	
				30 meter acceleration test	5 min	

Therefore this study was used a test protocol i.e. number of test days as used by conducted of Jagger, (2008), the time to perform a test as used by Sporiset *al.* (2009) and rest in between test as used by Turner, (2011).

3.10. Analysis and Standard Normative Data for the Field Test

Analysis of the Field Test

This study was analyzing the test result of each of the fitness test by comparing (pre and post test result) it with the subject's previous results for this test. It is expected that, the analysis was indicated the fitness components which needs improvements with appropriate training to fit with the need of a sport as the methods by Davis, (2000), Rosch, (2000) and Reilly, (2007).

Standard Normative Data for the Field Test

This study was used a standard normative data (average test result to evaluate the player's physical fitness performance by using the appropriate fitness evaluation test results as reported in a study conducted by Hopkins, (2004). Therefore to make a decision on the collected data this study was used as a standard norms for both pre and post test result to measure each of the

selected physical fitness performance of U-17 male football project players, thus standard normative data are; sit and reach as describe in a report by Pye, (2005), and Rodriguez *et al.* (2016), Illinois agility run as reported by Davis, (2000) and Pye, (2005), and vertical jump test as reported by Davis, (2000) and 30-meter acceleration test as reported by Davis, (2000) and Pye, (2005). The standard norm data was used for both intervene (experimental) group, and control group. It then used to place the players in appropriate training group and placing them on a proper playing position.

3.11. Data Collection Procedure

Data collection procedure was proceeds through the following steps. Ethical approval was taken from Hawassa football burial office to progress to the target area of the study i.e. to U-17 male football projects in Korem Meda. So that here it also persuades the target stakeholders club managers, coaches, and players of the football project through detail and brief description of the objective of the study. This was making to have strong agreement and to enhance their cooperativeness. Then directly skipped to select sample participant and all the tests was administered in four categories regarding to playing position of the participant on similar field and test types.

3.12. Data Quality Control

To ensure quality of data, only standardized physical fitness tests was used according to guide lines of test sequence order and based on the tests objectivity, consistent and soundness. To minimize the mistakes during data collection all data was secreted as well as the assistant fitness test recorders was trained to collect the appropriate data. Additionally, pre training and checking instruments of pilot tests was given and tests was recorded with video and photograph for further check on the test procedure.

3.13. Methods of Data Analysis

Both descriptive and inferential statistics techniques were applied to analyze the data obtained. The data obtained from the experimental study were processed, classified and tabulated. The data was generated by SPSS version 20 and analyzed and presented by using descriptive statistical analysis techniques such as tables, frequencies and graphs and by using inferential statistics by using paired t-tests, independent sample t-test and correlation test. In order to assess the effect of

interval training on the effectiveness of the physical fitness components among the players, a paired- t-tests and independent - two samples -t-tests were used.

A paired T-test is used when the independent variable (interval training exercises) are measured in pre and post-test (when we compare the pre training test result and post training test result) whereas the independent - 2 sample T- test is used when we compare the mean difference of the two groups (control group and experiment group) and to compare which group of study is found to be significant improving the physical fitness of the players (speed, agility, power and endurance).

A correlation analysis was also applied to measure the magnitude of the relationship between the pre and post results of interval training on the physical fitness components among the players.

Independent-Samples T-Test

The independent-Samples t- test procedure compares means for two groups of cases. Ideally, for this test, the subjects should be randomly assigned to two groups, so that any difference in response is due to the treatment (or lack of treatment) and not to other factors. For each variable, sample size, mean, standard deviation, and standard error of the mean were calculated. For the difference in means: mean, standard error, and confidence interval.

In this research, the researcher applied a 2 - sample independent T-test to compare the effect of treatment groups (interventions) and control group on the components of physical fitness (speed, power, agility and endurance).

Assumptions of using independent2 – sample T- test:

For the equal- variance t test, the observations were independents, random samples from normal distributions with the same population variance. For the unequal- variance t test, the observations should be independent, random samples from normal distributions. The two- sample t test is fairly robust to departures from normality. When checking distributions graphically, look to see that they are symmetric and have no outliers.

The Correlation Analysis

The Pearson correlation analysis is used to study the magnitude of the relationship between two continuous (numeric) independent variables. Thus, a Pearson correlation coefficient measures the extent (strength) to which the two variables are linearly related and is calculated as follows: The range of r is from -1 to +1. If $r = -1$, then there is a perfect negative correlation between the two variables and if $r = +1$, then there is a perfect positive correlation between the two variables. There will be no any relation between the two variables when the correlation coefficient becomes zero i.e., $r = 0$. Statistical significance was calculated, 95% confident interval was taken and P-values or significance level was set which corresponds to $p < 0.05$ which is used by most academic research as described by Greenland *et al.* (2016).

3.14. Ethical Consideration

The study was deal with the ethical issues related to the investigation. Making guarantees and confidentiality on the information that was given to the study and risk of harm due to participation. Therefore, the study was conducted according to on the university rules, code of conduct and policies concerning to research ethics. The protocols was approved and reviewed by the university guide lines and written consent was given and informs the concerned bodies. The signed consent was provided to parents or care givers and participant earlier with a written letter. The entire participants were cleared with information about the purpose and procedure of the study prior to the beginning of the study. The potential benefits and possible risks in were explained to the subjects. The participants do not at risk of any harm, and have an opportunity to leave the study at any time if they feel they need to do so. The result of the close ended questionnaires kept confidential.

3.15. Pilot test

The pilot test was conduct U-17 male football projects in Hawassa Korem Meda which was considered as purposive in this study. So, 7 trainers were participated in the pilot study from the total 30 trainers. Thus 15 trainees are experimental and the remains 15 trainees were control group. The conclusions of the study derived from the analysis of the data collection from the trainers of Hawassa Korem Meda. This unbiased data was helpful for the consciously with

reference to the test standards provided. The pilot test was conducted in Hawassa Korem Meda which was considered as purposive in this study. So, 7 trainers participated in the pilot study. The conclusions of the study were derived from the analysis of the data collection from the U-17 male football projects in Hawassa Korem Meda. This unbiased data was helpful for the conclusion to be reliable and externally valid.

3.16. Validity

Validity is required for this research to examine the effect of eight weeks interval training on selected physical fitness variables in case of U-17 Korem male football project. Content-related validity was used for this research as it refers to the relevance of the effect of eight weeks interval training measured in the actual field test of this research. The measurement approach was related to the construct being measured based on recognized test standards that have been validated globally. The approach for determining the validity of the tests was started with the operationalization of the construct of interest. As indicated in the research variables, the appropriate corresponding tests were used to measure the effect of eight weeks interval training on selected physical fitness variables in case of U-17 Korem male football project.

3.17. Reliability

Reliability refers to the consistency or dependability of a measurement technique (Andrich, 1981; Leary, 2004). If the measurement of this field test is reliable, then there will be less chance that the obtained score is due to random factors and measurement error so that the accuracy of the data was increased. Multiple recording and agreement among records is one of the methods used to determine the reliability of a certain test which refers to the stability of test scores recorded by different observers. In addition, Test-retest over time that involves repeating the same test on at least one other occasion was used to ensure reliability. These methods were used in this field test to make sure that the scores of the students in the field tests are reliable. Moreover, the data from the actual field test was not biased as the researcher himself and two others were recording the results of the students consciously with reference to the test standards provided.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION

4.1 Introduction

In this chapter, the researcher provided the result, discussion and analysis obtained from the SPSS software output. The data were obtained from the control and experiment group of football trainees as well as the pre and post test result of the components of physical fitness. A total of 30 selected football trainees were used in the study and they were randomly assigned into the control and experiment group. Then, the study was lasted for 8 consecutive weeks of time. The experiment group trainees were followed and were provided the interval training in order to assess the effect of interval training on the physical fitness on the Korem male under-17 year football project trainees in Hawasa city administration. The main objective of this study was to assess the effect of the 8 weeks high intensity interval trainings on the physical fitness on the selected football project players in Hawasa city administration. The study applied the speed, power, agility and strength variables of physical fitness. The researcher measured and recorded the pre-test and post-test on the selected components of physical fitness (power, agility, speed and strength) for both control and experiment group of trainees. Then, the researcher applied descriptive statistics, the paired t- test, two-sample- independent t- test, and correlation analysis on each physical fitness components for both control and experiment. The descriptive and inferential result were provided and discussed as given follow.

4.2 Socio- Demographic Characteristics of the study participants (football trainees)

Table 4.1 Socio- Demographic Characteristics of the study participants

Characteristics	Mean value	Standar deviation	Minimum	Maximum
Age	16.23	2.27	16.00	17.00
Weight	55.86	5.98	45.00	65.00
Height	1.60	0.09	1.35	1.75

Source: experiment data, (2022)

The table given above describes the descriptive statistics of the socio-economic characteristics of the sample football players who were assigned in the control group. As indicated in the output

above, the average age of the both control and experiment group football players were 16.23 years while the minimum and maximum age were respectively 16 years and 17 years. The result of weight reveals that the average and standard deviation were, respectively 55.8667 kg and 5.986 kg. With regard to the height, it was found the groups have an average weight of 1.60 m and standard deviation of 0.09 m with the maximum height of 1.75 m.

4.3 Descriptive statistics for Control and experiment groups of U-17

4.3.1 Descriptive statistics for Control groups of football trainees

Table 4.2: pre-test descriptive statistics for control group under the components of physical fitness (power, agility, speed and strength)

Variables N=15	Tests	Mean	Std. Deviation
Power	Pre-test	38.73	4.728
	Post-test	38.13	4.470
Agility	Pre-test	20.45	.660
	Post-test	20.16	.793
Speed	Pre-test	4.37	.225
	Post-test	4.45	.346
Strength	Pre-test	43.20	17.817
	Post-test	48.47	12.988

The above table provides the descriptive statistics for the 15 trainees under the control group based on the four selected physical fitness component. The result reveals the mean, standard deviation, value of each physical fitness components. For agility component, it was found that there is no significant change in the mean and standard deviation in both pre-test and post-test. This might be due to the fact that control group are not in the interval training focus. The mean and standard deviation of pre-test and post-test result in the power component is also the same and the difference between pre-test and post-test is insignificant. Therefore, there is no significant difference between the pre and post-test in the control group of trainees. In the speed component, the result revealed that there is no difference in the pre and post-test. The result for muscular strength physical fitness component has shown significant change for the mean and standard deviation of pre and post result under the control group of trainees.

4.3.2 Descriptive statistics for Experiment groups of trainees

Table 2.3: post-test descriptive statistics for experiment group under the components of physical fitness (power, agility, speed and strength)

Variables	Tests	Mean	Std. Deviation
N =15			
Power	Pre-test	42.93	6.262
	Post-test	46.80	5.38
Agility	Pre-test	20.01	.495
	Post-test	18.66	.732
Speed	Pre-test	4.30	.248
	Post-test	4.01	.205
Strength	Pre-test	62.00	36.168
	Post-test	107.27	48.183

The above output provides the descriptive statistics for the 15 trainees under the experiment group based on the four selected physical fitness component (power, agility, speed and strength). As it is indicated, there is a significant change in mean and standard deviation between pre-test and post-test. Therefore, the result clearly indicates that the experiment group of trainees has used a minimum time (Illinois Agility Run Test). Thus, the change in the mean of seconds is significant and thus the post-test of Illinois agility run Test of agility has shown good progress in improving the agility of the trainees in the experiment group.

In case of the power component, the result revealed that the post test result has shown an increment in improving the power of the trainees in jumping a high vertical jump than the pre-test. Trainees in the post test after the vertical high jump were found to jump higher meter than trainees in the pre-test before taking the exercise and thus the change is significant. Therefore the vertical high jump has assisted the trainees to improve their power of physical fitness.

The mean and standard deviation of pre-test and post-test for speed component has revealed a significant difference after taking the 30-m run test. This indicated that trainees in the post test result of the 30-m run test used a fewer time (in seconds) than trainees in the pre-test before taking the run test. Therefore, the 30-m run test (speed) has improved the speed of the trainees.

The result for strength physical fitness component has also shown significant change for the mean and standard deviation of pre and post result. The trainees took large second to finish the wall-squat test in the post test result and thus, the wall-squat test has improved the strength of the trainees in the post-test. Therefore, the researcher concluded that the interval training (Illinois agility run Test, the vertical high jump, the 30-m run test and wall sit one leg test) has greatly improved the agility, power, speed and strength of the trainees in the post test result. So, the researcher has observed a significant change and good improvement in the experiment group of trainees after taking the interval trainees for the eight consecutive weeks of time.

Table 4. 3 The following are standard norms for 16 up to 19 years old.

Rating For male	<i>vertical jump test</i>	30m speed test	Illinois agility test	wall sit one leg test
Excellent	>70	<4.0 sec	<15.2 sec	>102sec
Above average	51-60	4.0-4.2 sec	15.2-16.1 sec	102-76 sec
Average	41-50	4.3-4.4 sec	16.2-18.1 sec	75-58 sec
Below average	31-40	4.5-4.6 sec	18.2-18.3 sec	57-30 sec
Poor	21-30	>4.6 sec	>18.3 sec	<30 sec

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

Table 4. 4 CONTROL GROUP AND EXPERIMENTAL GROUP OF FOUR FITNESS TEST RECORDED RATING DATA UNDER -17 TRAINEERS.

Rating For male	<i>vertical jump test</i> (power test)		30m speed test (speed test)		Illinois agility test (agility test)		wall sit one leg test (strength test)	
	(CG)	(EG)	(CG)	(EG)	(CG)	(EG)	(CG)	(EG)
Excellent				2				8
Above average		4	4	12				
Average	5	11	4	1		8	3	5
Below average	10		2				10	2
Poor			5		15	7	2	

The above table shows that trainees rating scale about control group based On normative data of physical fitness(power) five participants recorded average and ten participants recorded below average, (speed) four participants were recorded above average, four participants recorded average, two participants were recorded below average and five participant also recorded poor,(agility) fifteen participants recorded poor and (strength) three participants were recorded average, ten participants recorded below average and two participants also recorded poor. And also The experimental group of physical fitness (power) four participants recorded above average and eleven participants recorded average, speed two participants were recorded excellent, twelve participants recorded above average and one participant also recorded average, agility eight participants recorded average and seven also recorded poor, strength eight participants were recorded excellent, five participants recorded average and two participants also recorded below average.

4.4. Effects of eight week high intensity interval training on physical performance

4.4.1 Assessing the effect of Power (in Vertical jump) on experiment group of trainees (Paired t- test analysis)

Table 4. 5 Assessing the effect of Power (in Vertical jump) on experiment group of trainees (Paired t- test analysis)

Variables (N=15)	Mean	Std. Deviation	95% CI of the Difference		T	Df	Sig.
			Lower	Upper			
Power	-8.67	6.41	-12.21	-5.11	-5.23	14	.000

The result in the paired t-test reveals that the mean difference of pre and post-test is -8.67 ± 6.41 . This mean difference is negative which shows that players has jumped higher meter in the post result than pre- test. Thus, this result reveals that players in the post-test have jumped a higher meter and their power ability is well improved. Therefore, it is concluded that the post-test result of power component (vertical high jump) has shown a significant change among the players in improving the power. In addition to this, the significance value (p-value) for testing the mean difference was found to be 0.000). This significance value is less than the alpha level of significance ($\alpha=0.05$). Thus, the decision is to reject the null hypothesis and accept the alternative. Thus, at $\alpha = 5\%$ level of significance, the result is interpreted as there is a significance mean difference for the improvement of power of vertical high jump between the pre and post –test result. Therefore, the post test result of vertical jump has shown a significance improvement in increasing the power of the players in the experiment group of players in Korem U-17 football project trainees. Thus, the interval training of vertical high jump has positively affects and improves the power component of physical fitness among the players.

4.4.2 Assessing the effect of Agility component (Illinois Agility Run Test) on experiment group of trainees (Paired t- test analysis)

For Agility Paired Samples Test

Table 4. 6: Assessing the effect of Agility component (Illinois Agility Run Test) on experiment group of trainees (Paired t- test analysis)

Variables (n=15)	Mean	Std. Deviation	95% CI of mean difference		t	Df	Sig.
			Lower	Upper			
Agility	1.500	1.099	.892	2.108	5.28	14	0.00

The result in the paired t-test reveals that the mean difference in the pre- and post-test was found to be 1.50 ± 1.09 is a positive value, which shows that the pre-test agility measure was higher and it takes a small second and in the post-test result. Thus, this result reveals that players in the post-test result has taken a shorter seconds and they were so fast than in the pre-test result. Therefore, it is concluded that the post-test result of agility (Illinois Agility Run Test) component has shown a significant change among the players in improving the agility physical component.

The significance p-value for testing the mean difference was found to be $p = 0.000$. This significance value is less than the alpha level of significance ($\alpha=0.05$). The decision is to reject the null hypothesis of equality of the mean in the pre and post test result. Thus, the decision is to reject the null hypothesis and accept the alternative. The conclusion is accepting the alternative hypothesis of difference of mean in the pre and post result. Therefore, there is a significant difference between the pre and post mean among the football players in under -17 football players. The mean second of Illinois agility run Test among the players in the post test is smaller than pre -test. So, players have shown a good progress in improving agility physical fitness.

4.4.3 The paired t- test analysis of mean difference in the pre-test and post-test result of the physical fitness component in the experiment group of trainees

4.4.3.1 Assessing the effect of Speed component (a 30-m run test) on experiment group of trainees (Paired t- test analysis)

Table 4. 7 Paired t- test for the effect of speed component on the experiment group of trainees

Samples Statistics

Variables (n=15)	Mean	Std. Deviation	95% CI of the Difference		T	df	Sig.
			Lower	Upper			
Speed	.45	.449	.198	.695	3.856	14	.002

The above table shows the paired t-test results of mean 30m speed performance pre- and post-test was found to be $.45 \pm .449$, is a positive value, which shows that the pre-test speed measure was higher and it takes a higher second and in the post-test, the speed measure was lower and it takes a fewer time (second). Thus, this result reveals that players in the post-test result has taken a shorter seconds and they were so fast than in the pre-test result. Therefore, it is concluded that the post-test result of speed component (a 30-m run test) has shown a significant change among the players in improving the speed physical component.

In addition to this, the significance value (p-value) for testing the mean difference was found to be ($p = 0.00$). This significance value is less than the alpha level of significance ($\alpha = 0.05$). As a rule of thumb, we reject the null hypothesis when the p-value is less than the alpha value and reject it otherwise. Thus, the decision is to reject the null hypothesis and accept the alternative. At $\alpha = 5\%$ (0.05) level of significance, the result is interpreted as there is a significance mean difference for the improvement of speed (30-m run test) between the pre and post –test result of 30-m run test. Therefore, the post test result of a 30-m run test (speed) has shown a significance improvement for the speed of the football trainees after taking the interval training. So, the trainees has used a shorter time (in seconds) to finish a 30-m run test in the post test result after taking the interval training.

4.4.4 Assessing the effect of strength (Wall sit one leg test) on experiment group of trainees (Paired t- test analysis)

Table 4. 8: Paired t- test for the effect of muscular strength on the experiment group of trainees

Samples Statistics

Variables (n=15)	Mean	Std. Deviation	95% CI of the Difference		T	Df	Sig.
			Lower	Upper			
Muscular strength	58.800	43.100	-82.668	-34.9	-5.28	14	.000

The mean difference of pre and post-test was found to be 58.8 ± 43.10 . This positive mean difference clearly indicates that the players in the post-test have used small time (in second). Therefore, it is concluded that the post-test result of strength component by using wall sit one leg

test has shown a significant change among the players in the post test and it improves the strength of the players. The significance value for testing the mean difference was found to be 0.000. This significance value is less than the alpha level of significance ($\alpha=0.05$). At $\alpha = 5\%$ level of significance, the result is interpreted as there is a significance mean difference for the improvement of strength of wall sit one leg test between the pre and post –test result. Therefore, the post test result of wall sit one leg test has shown a significance improvement in increasing the strength of the players in the experiment group of players in Korem U-17 football project trainees.

4.5. Comparison of mean difference between experimental and control group

Table 4 .9 independent t-test analysis in both control and experiment group

Variables N=15	Control group		Experimental group		95% CI of the Difference		t	Df	Sig.
	M	SD	M	SD	Lower	Upper			
Power	38.13	4.47	46.80	5.38	-12.21	-5.11	-5.2	14	.000
Agility	20.16	.793	18.66	.732	.892	2.108	5.28	14	.00
Speed	4.45	.35	4.01	.205	.198	.695	3.86	14	.002
Muscular strength	48.47	12.99	50.27	15.18	-82.66	-34.9	-5.2	14	.000

The above result is an independent 2- sample T-test was performed to compare the experimental group (EG) and control group (CG) of physical performance after eight weeks interval training intervention was conducted.

The statistical analysis revealed that Experimental groups on power (vertical jump test), agility (Illinois test), speed (30m dash test), and muscular strength (wall sit test) of control group were 46.80 ± 5.38 , $18.66 \pm .73$, $4.01 \pm .20$ and 50.27 ± 15.19 respectively while the control groups on power (vertical jump test), agility (Illinois test), speed (30m dash test), and muscular strength (wall sit one leg test) of control group were 38.13 ± 4.47 , $20.16 \pm .79$, $4.45 \pm .35$ and 48.47 ± 12.99 respectively.

Significance difference was found between the experimental and control groups. From the above table there is statistical difference between experimental and control groups on vertical jump test

, 30m dash test, Illinois test, and wall sit strength test at .05 level of confidence. Thus, it indicates eight weeks of interval training have a positive effect on power, agility, speed and muscular strength of football players.

4.6. Discussion of the findings

The main aim of the study was to examine the effect of eight weeks high intensity interval training on physical fitness variables of koream under-17 male football project trainees in Hawassa city administration.

A lot of exercises were used on designed program to develop physical fitness and to measure fitness of participants. For this study vertical jump was used to measure the power of the players, 30m dash run was used to measure speed and also Illinois agility test was used to measure agility and wall-sit one leg test was used to measure strength while of two training groups. The analysis of data was done through t-test to observe the difference. The level of significance was set at 0.05. As the tests result indicated that there was progressive improvement in selected fitness variables from pre-test to post-test on experimental groups due to the interval training in 8 weeks.

The results of this study revealed that interval trainings are significantly improved on power, strength after post training compared with pre training by increasing the height in centimeter. Similarly, the study conducted by Lenhart et.al (2009) revealed that eight weeks high intensity interval training increased the explosive power of players. In line with this, study conducted by De Villarreal et al., (2009) concluded that subjects with interval training showed the greatest increases in vertical jump height and also Ying-Chun, W., & Na Zhang., (2016) interval training is a technique used to increase strength and explosiveness.

Similarly the findings of this study is also agreed to the findings of Fatouros et al., (2000) that the effects of interval and resisted jump-training on speed and explosive power of young athletes showed the greatest amount of change in vertical jump and, interval training has been shown to be one of the most effective methods for improving explosive power and other physical fitness parameters. But the result of this study argument with, Conroy (1998) which concluded that interval exercises did not lead to a significant difference between a control and experimental group in terms of improvement in the vertical jump. And also Jensen and Ebben (2003)

concluded that interval exercises not only do not improve the participants' vertical jumps, but they also make their vertical jumps weaker.

Additionally the results of this study revealed that interval trainings are significantly improved the speed of the participants after the intervention of 8 weeks on different plyometric training program by decreasing the time. Similarly, the finding Mohebi et al (2012) revealed that eight weeks of interval training had significant effects on speed records reduction and also Hennessy and Kilty,(2001) concluded that interval training performance also bears significant relationships to 30m and 40m sprint times But did not match with Hosseini et al (2011)

Bal et al (2011) concluded that the results of eight weeks of interval training had significant effects on agility records reduction. Similarly, this finding was agreed with McArdle et al., 2007; Miller et al., 2006) which revealed that significant improvement was achieved in the Illinois agility test scores after ten-weeks of training. The results were consistent but did not match with Alemaglu et al (2012)

Generally, a wide variety of training studies shows that interval training can improve the physical performance of the players in vertical jumping, sprinting and agility. Just one or two types of interval exercise completed 3 times a week for 8 to 12 weeks can significantly improve the physical fitness parameters. Finally, the finding of this study assured that interval training could significantly improve the selected physical fitness

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The main objective of the study was to assess the effects of the interval training on the selected physical fitness variables of male U-17 Korem football project trainees in Hawasa city administration. For this end, the researcher selected a total of 30 male U-17 football players in from Korem football project. Besides, the researcher distributed questioners to check their health status of those players before the implementation. The type of the study was experimental and the study time has taken a total of 8 weeks of high intensity interval training in order to assess the effect of the interval training on the selected physical fitness components among the players in the experimental group of trainees. The study randomly assigned the target population into two different groups as control and experimental (intervention) and the researcher assigns an equal of 15 trainees to both groups and the interval training was given three days per week for 8 weeks. The types of selected physical fitness component that the researcher applied are: Speed (a 30-m run test), Agility (Illinois agility test), Power (Vertical high jump) and strength (Wall sit one leg test). In order to check the initial level of the players, the pre-test result was taken from the study groups before the intervention of interval training. Then after 8 weeks of time of interval training intervention, the post-test was taken to assess the effects on the selected physical fitness components. The experimental data on selected physical fitness variables were statistically analyzed by using a paired sample t-test to determine the significant improvement between the paired means of the pre-test and post-test results of each dependent variable of interest. In addition to this, an independent two- sample t-test was also applied to examine if there is a significant mean difference between the two of study by setting a level of significance to be ($p \leq 0.05$). The study reveals that the mean of 30-m run test in the experiment group used a minimum seconds than mean in the control group of trainees. So, the 30-m run test of speed has shown a significant change in improving the speed component in the players. Similarly, the interval training (30-m run test, vertical high jump, wall sit one leg test and Illinois run test) given for 8 weeks of time has shown a great change and the training shows significant

improvement on the physical fitness components (speed, agility, power and strength) of the football players.

5.2 Conclusion

Based on the major finding of the study, the researcher has concluded the following points:

After 8 consecutive weeks of training, the post-test result of the 30-m run exercise has shown a significant positive effect and it improves the speed ability of the football players in the experiment group. The other conclusion obtained from the study is that the post-test result of vertical jump has shown a significance improvement in increasing the power of the players in the experiment group of players in Korem U-17 football project trainees. Thus, the interval training of vertical high jump has positively affects and improves the power component of physical fitness among the players just after the 8 weeks of interval training ($p < 0.05$). The conclusion is at $\alpha = 5\%$ level of significance, there is a significance mean difference Illinois agility run test between control and experiment group of study. This reveals that the mean time of Illinois Agility Run Test in the experiment group is reduced and used small amount of time than mean of Illinois agility run test in the control group.

There is a significance mean difference in a 30-m run test between the control and experiment group of football trainees. This reveals that the mean of time in second of 30-m run test in the experiment group is reduced than mean in the control group. Thus, players in the experiment (intervention) group have shown an improvement in speed than players in the control group.

The mean of vertical high jump (in meter) in the experiment group is reduced and used small time in seconds than mean of vertical high jump (in meter) in the control group of players. Therefore, the conclusion is that vertical high jump has shown a significant change in improving the power component among players in the experiment group. The mean time (in second) of wall squat test in the experiment group was found to be small than mean in the control group of players. So, wall sit one leg test has shown a significant change in improving the strength component in among experiment group of players.

Generally, the interval trainings (a 30-m run test, Illinois agility run test, vertical high jump and Wall Sit one leg test) that were given for 8 consecutive weeks were found to significantly improves the speed, agility, power and strength of the football players assigned to the intervention (experiment) group.

5.3 Recommendation

Based on the major findings and conclusions of this study, the researcher would like to recommend the following basic direction of solutions to the some concerned bodies:

- Since the interval training has lots of advantages, particularly to the young football players, it is highly recommended that the sport professionals and related fields should educate and give awareness creation activities on the importance of interval training to significantly improve the physical fitness components.
- Fitness coaches and athletic trainer should choose the high intensity interval training as it greatly changes the ability of speed, power, agility and strength of the football players.
- The researcher would like to recommend that high intensity interval training exercises should be included in all trainings session that involve the development of physical fitness components for demanding the physical challenges of sport everywhere in order to create physically fit generation.
- Since the interval training exercises are easy to perform and suitable to manage, and doesn't need any fancy equipment, coaches are highly recommended and be encouraged to apply in their usual training programs to produce effective, skilled, creative football players that have a good speed, agility, power and strength.
- In addition to this, the researcher highly recommends that efforts should be taken to familiarize the benefits of high intensity interval training exercises among all football players to significantly improve the physical fitness component.
- Finally, further investigations should be conducted by other researchers on the effect of interval training program on physical fitness that incorporates football players of sex and age categories.

5.4 Direction for future research

- ✓ The study has unable to conduct in all areas of football i.e. technical, tactical, physical and psychology.
- ✓ The study has not observed the effect of other types of method of training.
- ✓ The study can be conducted contain a small size of number of participants.
- ✓ The study has not considered the accuracy of measurements while testing the subject, because of the shortage of digital counters.

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APPENDICES
APPENDIX-A
PARTICIPANT INFORMATION SHEET AND INFORMED CONSENT
FORM
RESEARCHER'S NAME TESFAYE DEA
ADVISOR'S NAME DAGHNE GETACHEW (ASS.PROFESOR)

Researcher's name is Tesfaye Dea Madebo. He is working as a data collected for the study being conducted in this male U-17 korem Hawassa city Administration football project and the purpose of partial fulfillment of master's degree of Hawassa University, college of natural and computational science. The researcher was explained to you in detail the purpose of the project, the procedures to be used, the potential benefits and the possible risks of participation in this study. You can ask the researcher any question that you may have about the study, and expect to receive satisfactory answers regarding the same. A basic explanation of the project is summarized below. You may discontinue at any time from the study if you choose to do so.

The study tittle

The effects of eight weeks high intensity interval training on physical fitness variables on Korem under U-17 Male football project trainees in Hawasa city administration, Sidamma Regional State.

1. Purpose of the Study:

The purpose of this research project is to investigate the effect of High intensity interval training of power, speed, agility and Muscular strength exercises on football players. The finding of this study would have a paramount importance for coaches, physical trainers and players. It also provides a basis for the development of specific training program for the physical performance of players.

2. Procedure and Duration

The subjects involved in this study were 30 male U-17 Hawassa city korem male football players project. There are four fitness variables are tested before and after treatment that were

participating in moderate intensity training 3 days per week for 8 consecutive weeks. So I kindly request you to spare me this time for exercise training and you will receive all the current standard care for your health

3. Risks and Benefits

While administrating the test and during training session, you may feel some localized muscle fatigue, soreness, and tear in your muscle, especially in lower extremities but while the following signs: abnormal heart rate; too fast or too slow breathing rate; coughing etc. were seen you immediately eliminated from the test or training. If any an expected physical injury occurs the researcher had given you first aid. If it is severe, I was covering every cost for you to recover.

There may be no personal benefit for participating in this study. However, it is hoped that it provides clear picture on plyometric training on fitness variables development.

4. Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and you do not have to answer any question that don not want to answer.

5. Confidentiality:

Your test result and other related personal information were being kept confidential. There was no information that was identifying you in particular. The findings of the study were general for the study community and were not reflect anything particular of individual person. The test results were coded to exclude showing names. No reference was made in oral or written reports that could link participants to the research

6. Agreement

I have read all the information provided on this form and consent to participate in this study.

Name of participant's _____

Signature of participant's _____

Address: _____

Date: _____

Signature of investigator _____ date _____

APPENDIX- B
HEALTH HISTORY AND PHYSICAL ACTIVITY READINESS
QUESTIONNAIRE (PAR-Q)

(Adopted from informed use of the PAR-Q: Reprinted from ACSM's Health/ Fitness Facility Slandered and Guidelines, 1997 by America Collage of sport medicine).

[http://www.memphis. Edu/hss/pdf/par-q.pdf](http://www.memphis.Edu/hss/pdf/par-q.pdf)

This close ended questionnaire is filled by the participants. Regular physical activity is useful fun healthy life and increasingly active in all people. Being more active is very safe for most people. However, some people should check their health status with their doctor before becoming much more physical activity.

It's designed to obtain information on the health status of the subjects participating for the research study. If one or more negative result is obtained from the participants, they were examined by physician and their participation is depending on the decision of physician. The information is kept strictly confidential. Furthermore, to make the questionnaires more brief and clear, it can be prepared in English language. If you are willing to become participate in this research and become more physically active than you are now, start by answering the following question carefully honestly and common sense is your guide indicates your correct response to each question by encircling it on the choice letter given.

To be filled by the participants

1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?

A. Yes

B. No

2. Do you feel pain in your chest when you perform physical activity?

A. Yes

B. No

3. In the past month, have you had chest pain when you were not doing physical activity?

A. Yes

B. No

3. Are you taking any prescription of drugs recently (for example water pilles) for your blood pressure or heart condition?

A. Yes

B. No

4. Do you lose your balance because of dizziness or do you ever lose consciousness?

A. Yes

B. No

Do you have a recent physical injury such as bone, muscle and joint which will be aggravated by physical exercise?

A. Yes

B. No

If your answer is yes, for the above question, indicate the type of injury that you have_____

Please identify any medical problem that you had

A. Cardiovascular

C. Respiratory

B. Neuromuscular

D. Metabolic E. None

7. Is there any history of Coronary Heart Disease within your family?

A. Yes

B. No

8. Do you currently drink more than the average amount of alcohol per week?

A. yes

B. No

9. Do you currently smoke?

A. Yes

B. No

10. Do you have suffered with heart condition?

A. Yes

B. No

11. Have you ever felt pain in your chest when you do physical exercise?

A. Yes

B. No

12. Do you have kidney problem?

If You Answered Yes To One or More Question

Talk to your doctor and you may be able to do any activity you want as long as you start slowly and build up gradually. Or you may need to restrict your activities to those which are demand safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his or her advice. But for this research purpose, I recommend you to refrain in participating.

You take medical examination and your participation on this study is determined by physician depending on your medical examination result.

Players' Code no: _____

Player's signature: _____

Date: _____

Investigators name _____

Signature _____

Date _____

(America college of sport medicine 1997)

APPENDIX-C
DATA RECORD SHEET
PRE AND POST TEST DATA RECORD SHEET FOR BOTH GROUPS
(EXPERIMENTAL AND CONTROL)

Code no	<i>Types of tests</i>																							re m ar k	
	Vertical jump test						30m acceleration test						Illinois agility test						Wall-squat test						
	Pre test			Post test			Pre test			Post test			Pre test			Post test			Pre test			Post test			
	T 1	T2	Av	T 1	T 2	A v	T 1	T 2	A v	T 1	T 2	A v	T 1	T 2	A v	T 1	T 2	A v	T 1	T 2	A v	T 1	T2		Av

Appendix-D

Training schedule

Experimental group only (the effect of eight weeks High intensity interval training on physical fitness variables in U-17 Korem male football project trainers)

Week	Warm up	Intensity	Duration	Frequency	Rest time	Cool down
1	10-15 Minutes	(60-70 %)	45-60 Minutes	3 days	2 minutes	5-10 minutes
2	10-15 Minutes	60-70%	45-60 Minutes	3 days	2 minutes	5-10 minutes
3	10-15 Minutes	70-75%	45-60 Minutes	3 days	2 minutes	5-10 minutes
4	10-15 Minutes	70-75%	45-60 Minutes	3 days	3 minutes	5-10 minutes
5	10-15 Minutes	80-85%	45-60 Minutes	3 days	3 minutes	5-10 minutes
6	10-15 Minutes	80-85%	45-60 Minutes	3 days	3 minutes	5-10 minutes
7	10-15 Minutes	85-90%	45-60 Minutes	3 days	3 minutes	5-10 minutes
8	10-15 Minutes	85-90%	45-60 Minutes	3 days	3 minutes	5-10 minutes

APPENDIX –F
NORMS OF THE TESTS
VERTICAL JUMP NORM TABLE

Categorizes the vertical jump height in centimeters and inches for adult men and women

Rating	Males (in inches)	Male (cm)	Female (inches)	Female (cm)	Remark
Excellent	>28	>70	>24	>60	
Very good	24-28	61-70	20-24	51-60	
Above average	20-24	51-60	16-20	41-50	
Average	16-20	41-50	12-16	31-40	
Below average	12-16	31-40	8-12	21-30	
Poor	8-12	21-30	4-8	11-20	
Very poor	<8	<21	<4	<11	

Figure1: vertical jump norm table <https://www.Topendsports.com>

Normative data for 30m speed test

Gender	Excellent	Above Average	Average	Below Average	Poor	Remark
Male	<4.0 secs	4.0 - 4.2 secs	4.3 - 4.4 secs	4.5 - 4.6 secs	>4.6 secs	
Female	<4.5 secs	4.5 - 4.6 secs	4.7 - 4.8 secs	4.9 - 5.0 secs	>5.0 secs	

Adapted from Davis et al. (2000)

Normative data for the Illinois agility run test

Table3. The following are national norms for 16 to 19 year olds.

Gender	Excellent	Above average	Average	Be average	Poor	Remark
Male	<15.2 secs	15.2-16.1 secs	16.2-18.1 secs	18.2-18.3 secs	>18.3 secs	
Female	<17.0 secs	17.0-17.9 secs	18.0-21.7 secs	21.8-23.0 secs	>23.0 secs	

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

Normative data for the strength test (wall squat test)

The following are national norms for 16 to 19 year olds.

Gender	Excellent	Above Average	Average	Below	Average Poor
Male	>102secs	102-76secs	75-58 secs	57-30 secs	<30 secs
Female	>60 secs	60-46 secs	45-36 secs	35-20 secs	<20 secs

APPENDIX-G

CONTROL GROUP OF PRE AND POST-TEST RECORDED DATA

Code no	Vertical jump		30 m speed test		Illinois test		Wall-squat test	
	Pre-test in cm	Post- test in cm	Pre-test in sec	Post-test in sec	Pre-test in sec	Post-test in sec	Pre- test in sec	Post-test in sec
16	36cm	36cm	4.3 secs	4.6 secs	21.5secs	20.2 secs	44 secs	44 secs
17	41cm	34cm	4.5 secs	4.8 secs	20.1 secs	19.5 secs	21 secs	30 secs
18	44cm	44cm	4.2 secs	4.2 secs	19.3 secs	18.7 secs	50 secs	51 secs
19	34cm	35cm	4.7 secs	4.8 secs	21.1 secs	20.7 secs	26 secs	29 secs
20	33cm	34cm	4.7 secs	4.3 secs	20.3 secs	19.5 secs	31 secs	33 secs
21	33cm	32cm	4.4 secs	4.3 secs	20.1 secs	20.1 secs	30 secs	51 secs
22	39cm	37cm	4.5 secs	4.4 secs	20.6 secs	19.3 secs	78 secs	69 secs
23	39cm	39cm	4.3 secs	5.2 secs	20.7 secs	20.0 secs	33 secs	49 secs
24	36cm	36cm	4.4 secs	4.2 secs	21.4 secs	21.3 secs	18 secs	69 secs
25	38cm	39cm	4.7 secs	4.9 secs	21.0 secs	21.5 secs	40 secs	41 secs
26	33cm	33cm	4.3 secs	4.4 secs	21.0 secs	20.9 secs	49 secs	49 secs
27	43cm	42cm	4.2 secs	4.0 secs	20.1 secs	20.6 secs	75 secs	70 secs
28	49cm	47cm	4.0 secs	4.5 secs	20.2 secs	20.0 secs	46 secs	46 secs
29	40cm	41cm	4.4 secs	4.2 secs	19.5 secs	19.4 secs	48 secs	48 secs
30	43cm	43cm	4.0 secs	4.0 secs	19.9 secs	20.7 secs	59 secs	48 secs

APPENDIX-H PARTICIPANT'S INFORMATION

Code no	Player's name	Phone number	Sign	Remark
1	BT			
2	BT			
3	TD			
4	MT			
5	LG			
6	YT			
7	NN			
8	YS			
9	TA			
10	AA			
11	AA			
12	BM			
13	HT			
14	SS			
15	HM			
16	LS			
17	TL			
18	CT			
19	BT			
20	BM			
21	AE			
22	MY			
23	RK			
24	AS			
25	AZ			
26	DA			
27	AA			
28	BT			
29	MT			
30	TT			

APPENDIX-I

EXPERIMENTAL GROUP OF PRE AND POST-TEST

RECORDED DATA

Code no	Vertical jump		30 m speed test		Illinious test		Wall-squat test	
	Pre-test in cm	Post-test in cm	Pre-test in sec	Post-test in sec	Pre-test in sec	Post-test in sec	Pre-test in sec	Post-test in sec
1	46cm	49cm	4.3 secs	4.0 secs	20.0 secs	19.9 secs	94 secs	124 secs
2	45cm	47cm	4.2 secs	4.0 secs	20.5 secs	19.3 secs	44 secs	70 secs
3	41cm	44cm	4.6 secs	4.4 secs	20.4 secs	19.0 secs	30 secs	65 secs
4	53cm	55cm	3.8 secs	3.4 secs	20.1 secs	18.0 secs	44 secs	44 secs
5	37cm	40cm	4.1 secs	4.0 secs	20.3 secs	19.3 secs	33 secs	72 secs
6	37cm	46cm	4.5 secs	4.0 secs	19.4 secs	18.1secs	29 secs	59 secs
7	43cm	45cm	4.4 secs	4.2 secs	20.1 secs	19.0 secs	30 secs	181 secs
8	43cm	44cm	4.4 secs	4.1 secs	20.4 secs	18.0 secs	59 secs	61 secs
9	33cm	45cm	4.9 secs	4.1 secs	20.8 secs	20.0 secs	87 secs	127 secs
10	40cm	43cm	4.3 secs	4.0 secs	20.1 secs	19.0 secs	65 secs	155 secs
11	37cm	40cm	4.2 secs	4.0 secs	19.8 secs	18.1secs	14 secs	48 secs
12	50cm	54cm	4.2 secs	4.0 secs	19.6 secs	18.0 secs	116 secs	150 secs
13	37cm	41cm	4.2 secs	3.9 secs	19.1 secs	18.1 secs	142 secs	156 secs
14	52cm	55cm	4.2 secs	4.0 secs	20.3 secs	18.1 secs	82 secs	156 secs
15	50cm	54cm	4.2 secs	4.0 secs	19.2 secs	18.1 secs	61 secs	141 secs

APPENDIX-G

PICTURES DURING TRAINING



















































