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THE EFFECT OF SMALL SIDEDS GAME AND INTERVAL TRAINING ON PHYSICAL FITTNES AMONG FEMALE

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A THESIS SUBMITTED TO BAHIR DAR UNIVERSITY SPORT ACADEMY DEPARTMENT OF SPORT SCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE DEGREE OF MASTER OF FOOTBALL COACHING (specialization).

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Approval sheet

As thesis research adviser I hereby certify that I have read and evaluated this thesis entitled The Effects of small sided game and interval training on physical fitness among female soccer players. Prepared under my guidance by Mahder Enyew Kebede I recommend that it was submitted as fulfilling the thesis requirements.

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Approval sheet

As a member of board of examiners of MSc Thesis Open Defense Examination, we certify that we have read and evaluated thesis work prepared by Mahder Enyew kebede and examined the candidate, we recommended that the thesis be accepted as fulfilling the thesis requirements for the Degree of Masters of Science in sport Science Specialization FOOTBALL COACHING.

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DEDICATION

This work is dedicated to the Almighty God, the Creator of Heaven and Earth, to Him alone is all the Glory, Honors and Adoration (Amen).

NAME: MAHDER ENYEW

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STATEMENT OF THE AUTHOR

First, I declare that this thesis is my genuine work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for Football Coaching Degree at Bahir dar University and is deposited at the university library to be made available to browsers under rule of library. I gravely declare that this thesis is not submitted to other institutions anywhere for the award of any academy degree diploma or certificate.

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ABSTRACT

The purpose of the study was to examine and compare the effect of small sided games and interval training on physical fitness like cardiovascular endurance, speed, agility power and flexibility among soccer players. To achieve the purpose of this study, 32 female soccer trainees/players were purposely selected as subjects from Ethiopian Youth Sport Academy. Their age ranged from 16 to 20 years. The selected participants were pretested together then purposely categorized in two groups after making single blind randomization based on pretest result and training year experience in the academy. such as Group 1 underwent small sided games training (n=16) and group2 underwent interval training (n=16) for three days per week and one session per day and each session lasted for 60-75m for small sided game training group, 55-80m for interval training group for ten weeks. The data on cardiovascular endurance, speed, agility, power and flexibility were collected by administering by yoyo intermittent recovery test level 2, 30M acceleration, Illinois agility test, vertical jump and sit & rich. The pre and posttests data were collected on selected criterion variables prior and immediately after the training program. The pre and posttest scores were statistically examined by the independent sample t test and paired'-test for each and every selected variable separately. It was concluded that the small sided games training had shown significantly improved in cardiovascular endurance, agility, power and flexibility. Interval training had shown significantly improved in cardiovascular endurance, speed and power. Based on these findings, a few recommendations were made. These include full integration of small-sided games to soccer training for skill development, use of interval training should be much more emphasized off-season to maintain fitness level and more variation of small-sided games could be designed by the coaches to foster the skills improvement.

Keywords: Small sided games training, interval training, cardiovascular endurance, Speed, Agility, flexibility power, Soccer

ACRONYMS AND ABBREVIATIONS

BMI- Body Mass Index

IT- Interval Training

MD-Mean Difference

SAQ-Speed Agility and Quickness

SD- Standard Deviation

SE-Standard Error

SIT - Sprint Interval Training

SPSS - Statistical Package for Social Sciences

SSG- Small Sided Game

VJ – Vertical Jump

VO 2max – Maximal Aerobic Capacity

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Football is an intermittent sport characterized by ~1200 a cyclical and unpredictable changes in activity (each every 3 to 5 s) involving, among others, 30 to 40 sprints, more than 700 turns, and 30 to 40 tackles and jumps. In addition, the game requires other intense actions such as decelerations, kicking, dribbling, and tackling. All these efforts exacerbate the physical strain imposed on the players and contribute to making football highly physiologically demanding. (Iaia F, Hellsten Y, Nielsen JJ, Fernstrom M, Sahlin K, Bangsbo J).

Soccer (football) is among the most popular sports in the world. The game of soccer is not an invented game but one that went through a process of evolution. 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 even nations. Its simple rules and minimal equipment requirements have no doubt aided its spread and growth in popularity. An amateur soccer player is one who competes for personal satisfaction and not for monetary gain. An estimated 100 million registered players exist worldwide in men, women, youth and veteran competitions, with many millions more, playing non-organized football (Reilly, Bangsbo, & Franks, 2000).

The Federation of International Football Association (FIFA) World Cup, played every four years, is widely considered the world's biggest sporting event. 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 (Reilly & Gilbourne, 2003). According to Bangsbo & Michalsik (2002), football is a multidimensional sport requiring players to jog, sprint, accelerate, decelerate, jump, change direction and get up from the ground after falls and knocks. Specific skills of soccer such as tackling, heading, passing, shooting, trapping, maintaining balance and holding body position when under defensive pressure, jointly comprise the physical demands of the sport. However, the interplay of anthropometric, physiological, technical and perceptual factors contributes to successful performance in football (Oladipo & Moses, 2004).

Soccer requires physiological qualities at the highest intensity for skill execution with an exceptionally high standard of technical ability, as well as a tactical understanding of the game dynamics. Bangsbo (2002) opined that the physical qualities needed in the game should include aerobic and anaerobic endurance, agility, sprinting ability, jumping and kicking power. Physiological testing is best used as a guide to potential successful performance in football, and can especially be used as a monitoring tool to determine individual's status at a given time (Owolabi, & Adesipo, 1990).

However, these qualities do not necessarily guarantee the highest level of performance. Many other factors, in particular, technical skill execution of the sport and tactical understanding cannot be underestimated. In many cases, dominant technical and tactical abilities allow players to reach the highest level of performance to consistently outperform their opponents (Rampini, Impellizzeri, Castagna, Coutts & Wisloff, 2009).

Cardiovascular endurance (Aerobic work capacity) is a fundamentally important physiological quality for any soccer players. Aerobic power reflects the ability to produce aerobic energy at a high rate and is characterized by VO2max (Agbonjimi, & Amusa, 1990). The role of aerobic performance in football at all levels has been frequently researched (Bangsbo, Marcello & Krustup, 2007). It is generally accepted that aerobic performance is influenced by three factors which include maximal aerobic power, anaerobic threshold, and work economy (Hoff, Wisloff, Engen, Kemi & Helgerud, 2002). (Dupont, Akakpo & Berthoin 2004) made a submission from their findings that based on the length of the game (90 minutes), at least 90% of energy requirements would have to come from aerobic energy sources. Hill-Haas, Coutts, Rowsell & Dawson (2009) later estimated that as much as 98% of all energy requirements in football come from aerobic sources, with only 2% from anaerobic sources. (Bradley, Sheldon, Wooster, Olsen, Boanas & Kustup 2009) however affirmed that the role of the anaerobic system cannot be underestimated, as the most crucial parts of the game generally occur at high intensities requiring energy from anaerobic sources.

Many researchers believe that soccer specific training like the small-sided games training improve VO2max more than other training methods (Kemi, Hoff, Engen, Helgerud, Wisloff, 2003). They recommended performance of a series of simulated trainings than intermittent trainings and believe that these trainings increase aerobic fitness and better performance in

exercise. Hoff et al. (2002) suggested that the manner of arranging players in training time for small-sided games must be based on the kind of muscular group's involvement during a match or a soccer play. Soccer players are more attracted to drills performed with the ball than to formal fitness work such as repetitive runs. In a study of the energy cost of dribbling a ball, Helgerud, Engen, Wisloff & Hoff (2001) showed that oxygen consumption, heart rate, blood lactate and perceived exertion were elevated by the task of dribbling compared to normal running. Their recommendation was that training drills should be used with the balls where possible. Small-sided games increase individual player involvement in play. Dellal, Hill-Haas, Lago-Penas & Chamari (2011) posited that it is possible to enhance participation of individual players in the game by imposing conditions on play in smaller-sided games (e.g. 5 vs 5), setting limits in the number of touches allowed (one-touch, two-touch) and restricting play to certain areas of the field.

Interval training is a favorite of coaches because of its effectiveness in cardiovascular endurance build-up and its ability to make more well-rounded players. Interval training is a series of repeated bouts of exercise alternated with periods of relief. Typically, interval training is suited to dynamic activities such as running, cycling, rowing and swimming. 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 key to successful interval training lies in utilizing the proper intensity of exercise followed by a rest interval (Reilly & Doran, 2003). The rest intervals prevent accumulation of fatigue products, thus permitting more intensive workouts without the additional pains of fatigue. Bompa & Haff (2004) suggested that a 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 first few weeks of training are critical; therefore care must be taken to prevent severe muscular soreness and overindulgence (Sokmen, Beam, Witchey & Adams, 2002)

Performance related variables are components of physical fitness which include agility, power, balance, coordination, reaction time and speed. Agility has relationships with trainable physical qualities such as strength, power and technique, as well as cognitive components such as visual-scanning techniques, visual-scanning speed and anticipation. Agility testing is generally confined

to tests of physical components such as change of direction speed, or cognitive components such as anticipation and pattern recognition. (Roozen, 2004). According to Wiemann, & Klee (2003), all of these movements could be classified as simple agility only, in that there is no temporal or spatial uncertainty involved. Many strength and conditioning coaches believe that strength and power measures and sprinting performance are strongly linked, as correlations in the literature generally suggest moderate to strong relationships (Odetoyinbo & Ramsbotton, 1995).

The vertical jump test is a test of lower body, non-resistance maximum power. Many strength and conditioning programs use the vertical jump test to measure the physiological adaptations from training (Baechle & Earle, 2000). 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 (Sayers, 2000).

Football demands a combination of high levels of technical and tactical ability and physiological strengths. It is therefore important to develop and maintain this area of performance. Taking into account the need for high aerobic performance in football, combined with the limitations in time to develop all important physiological, tactical and skill qualities, training techniques that are time efficient as well as effective need to be investigated. This paper will therefore examine and compare effects of small-sided games and interval training on the cardiovascular endurance capacity speed agility power and flexibility of female soccer trainees/player at Ethiopian youth sport academy.

1.2 Statement of the problem

Soccer in the world of sport is an instrumental force to reckon with for economic development, social integration, global recognition, sports development and promotion. During the last decade, soccer has gradually changed pace; play has become faster, players cover more distances and high intensity running changed rapidly (Strøyer, Hansen, and Klausen, 2004).

Coaches commonly use interval and small-sided games training programs, but not a regular study has been made to review the effect of this training on physical fitness factors. Despite the widespread use of small-sided games in football, there are surprisingly few studies comparing their effectiveness in comparison to traditional forms of fitness training (Casaju, 2001).

Small sided game training is very beloved and popular training method in both internationally and nationally even regionally and locally but according to the researcher opinion from experience in our country specially regional and local level means different level of training projects have a big problem to understand and specify proportionality of number of players pitch size. Furthermore there is a problem with many coaches and professionals to clear understanding benefits and ultimate goal of small sided game training. The researcher believes that some concerned organization and professionals are responsible to solve or identify this type of problems by making practical and experimental researches based on basic theories. But the researcher can't get enough research on this title in our country. So that the researcher select this topic and the purpose of the study was to examine and compare the effect of small sided games training on the aerobic physical fitness capacity like endurance, speed, agility, power and flexibility of female soccer players/trainees at Ethiopian youth sport academy.

1.3 Objectives of the study

1.3.1 General objective

To examine and compare the effects of small-sided games and interval training on physical fitness which is cardiovascular endurance, speed agility power and flexibility of Ethiopian youth sport academy u 20 female soccer players/trainees.

1.3.2 Specific objectives

The following were the specific objectives of this study:

- To examine and compare the effect of 10 weeks small sided game and interval training on the fitness of cardiovascular endurance.
- To determine and compare the effect of 10 weeks small sided game and interval training on the fitness of speed.
- To investigate and compare the effect of 10 weeks small sided game and interval training on the fitness of agility.
- To know and compare the effect of 10 weeks small sided game and interval training on the fitness of power.
- To identify and compare the effect of 10 weeks small sided game and interval training on flexibility.

1.4 Research hypothesis

The following hypotheses were tested in this study

1. Small-sided game and interval training will significantly improve the endurance performance of football players.

2. µ Small-sided game and interval training will not significantly affect the speed performance of football players.

3. µ Small-sided game and interval training will not significantly affect the agility performance of football players.

4. µ Small-sided game and interval training will not significantly affect the power performance of football players.

5 µ Small-sided game and interval training will not significantly affect the flexibility performance of football players.

1.5 Significance of the study

The aim of this study is to provide a framework of scientifically-proven training methods, modified to improve the game of football in Ethiopian youth sport academy and other part of countries that will adopt the findings of this study. The findings of this study will be relevant to football development in Ethiopia, because of the rapid development in football which makes scientific research a significant integration into mode of training for consistent outstanding performance.

This study will provide insight for football coaches, trainers, and other related stakeholders into small-sided games training for improved skill development and optimal wellbeing in relation to the game of football. This study will bring to bear the significance of physical testing for the game of football in Ethiopia. The training programs used in this study which include; small-sided game and interval training program will be properly modified to be an efficient tool for skill development in the game of football. It may be use an input of Ethiopian youth sport academy, Ethiopian football federation, Different regions and cities football federations, Football coaches and other team sport coaches.

The study will also use as reference for other interested in this subject matter and it also help the student for partial fulfillment of the requirement of 2nd degree of football coaching

1.6 Delimitation of the study

This study was delimited to the following:

1. The Randomized pretest-posttest experimental group research design
2. Two experimental groups
3. Purposive and single blind randomization sampling techniques
4. thirty two female soccer players in Ethiopian youth sport academy
5. A 10-weeks small-sided games and interval training program
6. One trained research assistants

1.7 Limitation of the study

The following limitations were envisaged in the study:

1. The researcher was faced with the challenge of low motivation for optimal performance by the athlete in the course of the experimental study but will work out technical modality for reinforcement with the coach.

2. The incidence of climatic disturbance such as rain may extend the period of the experimental study.

3. Any other limitation that may arise during the course of the study was noted and managed appropriately.

1.8 Definition of terms

Coach: is a person who helps or train trainees or players to reach a pick performance.

Soccer: It is also referred to as football. It is a competitive team sports categorized among the ball games.

Small-sided games (SSGs) are played on reduced pitch areas, often using modified rules and involving a smaller number of players than traditional football.

Interval training: It is a series of repeated bouts of exercise alternated with periods of rest and relief.

Aerobic Work capacity: Work done as a result of the capacity of the body to maximize the use of oxygen.

Maximum oxygen uptake: it is an indicator of cardio respiratory fitness, which corresponds to the highest rate at which oxygen can be taken up and utilize by the body during maximum exercise.

Cardiovascular Endurance is how efficiently your heart, blood vessels, and lungs to supply oxygen rich blood to working muscles during physical activity (aerobic activity like walking, running, cycling or playing a sport) for a prolonged period of time or for more than 90 seconds

Performance-related Variables: These are variables needed for skill performance in selected sports such as agility, power, speed, flexibility etc.

Speed - Max velocity. This requires several seconds of straight line running to get up to max speed.

Agility is the ability to start, stop, change speed, and change direction quickly with precision

Power the ability to exert muscular strength quickly: when speed and strength is combined.

Flexibility is the degree to which an individual muscle will lengthen.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical review on soccer

Physiological, technical, and tactical skills are important to soccer performance. Factors such as acceleration, running velocity, jumping height, and capacity to release energy are also of major importance. During a 90 minute match, players run about 10 km at an intensity close to anaerobic threshold or 80–90% of maximal heart rate (Helgerud, Engen, & Wisløff, 2001). He later found out that aerobic endurance performance is dependent on three important elements: maximal oxygen uptake (VO2max), anaerobic threshold, and work economy. Previous studies have shown a significant relation between VO2max and distance covered during a match (Wagner, 1996). These findings are also supported by Wisloff, Helgerud and Hoff (1998) who have shown a substantial difference in VO2max in members of the top team compared with those in the lowest placed team in the Norwegian elite league.

According to Hoff, Helgerud and Wisloff, (1999) work economy could be improved by maximal strength training without improving VO2max. However, there is a paucity of research into the effect of improved work economy on soccer performance. Helgerud et al (2001) showed that interval training increases work economy as VO2max increases. This approach could be used in future studies to determine the effects of exclusively improved work economy on soccer performance. However, playing soccer is not believed to provide sufficient exercise intensity over time to improve VO2max very much (Wisloff, Helgerud, & Hoff, 1998).

2.2 Small-Sided Games (SSGs) in Football

Small sided games (SSGs) are a match specific type of training**.** Team sports are characterized by long periods of low intensity activity including walking and jogging interspersed by repeated bouts of high intensity running/efforts. Furthermore, team sport athletes are typically required to perform explosive actions such as kicking, dribbling, jumping, changes of direction, and sprinting during training and competition. Currently different training methods such as endurance training, high-intensity interval training and strength training have been proposed to enhance team sport-related physical fitness. More recently, specific sport training or small-sided

games (SSG) have been extensively investigated in order to develop the team-specific performance of players (Edwards et al. 2003).

2.3 Reasons to Affect SSGs Intensity

The exercise intensity of SSGs can be demonstrated through a player's movement and/or physiological/perceptual responses. Many prescriptive variables that can be controlled by the coach may influence the exercise intensity during SSGs. These factors include pitch area, player number, coach encouragement, training regimen (continuous or interval, including work-rest manipulations) rule modifications, and the use of goals and/or goalkeepers. The following section will review how each of these factors have been manipulated to alter the exercise intensity during football SSGs.

2.3.1 Number of Player

The number of players on each team in a SSG can also be altered to regulate the intensity of this training mode. Studies that have investigated the effect of altering player number on SSGs training intensity have altered player numbers while, at the same time, held many other factors constant, including the pitch area. In summary, despite some methodological concerns (very short game duration; differing work: rest ratios), most studies have shown that SSGs containing smaller numbers of players elicit greater HR, blood lactate and perceptual responses. On closer analysis, the results suggest the possible existence of a threshold pitch area. For example, the most pronounced reductions in HR occurred when two versus two was increased to three versus three, and three versus three was increased to four versus four, on a 25x20 meter pitch area. In contrast, less pronounced reductions in HR occurred when two versus two was increased to three versus three, and three versus three was increased to four versus four on 20x15 meter and 30x25 meter pitch areas, respectively.

These previous studies only examined the influence of altering the player numbers on teams containing equal numbers of players (e.g. two vs. two or three vs. three). In training situations, SSGs are often implemented that contain teams of unequal numbers (e.g. four vs. three players or six vs. five). Reasons for creating an imbalance between opposing teams may include technical development and unavailability of players due to injury. A further variation in player number involves creating temporary 'overload' and 'under load' situations between opposing teams, via the use of a 'floater' player. This neutral player transitions to the team in possession of the ball,

to create temporary overload and under load situations. This SSG game design is typically used to develop defensive or attacking proficiency or to increase the physical load on the 'floating' player. (Bangsbo et al. 1991)

2.3.2 Proportional Manipulation of Pitch Area and Player Number

Few studies have systematically examined the influence of the concurrent manipulation of pitch area and player number on exercise intensity in SSGs. In addition, there are several differences in the design and prescription of the SSGs in the studies that inadvertently manipulated both player number and pitch area, making comparisons between these studies very difficult. Indeed, differences in the training prescriptions, age and ability of players, intensity measures and sizes in pitch area amongst the studies, all of which may affect the exercise intensity in these SSGs. In general, it appears that a concurrent increase in player number and relative pitch area per player in SSGs elicits lower exercise intensity.

Rampinini et al (2009) investigated the effects of concurrently increasing the player number and pitch area on %HRmax, blood lactate concentration and RPE in 20 amateur football players. The main finding of this study was that the exercise intensity during all game formats was decreased when there was an increase in the number of players and more pitch area per player similarly; (Jones and Drust 2011) also reported a reduction in %HRmax when both player number and pitch area were increased.

One important aspect that has not been considered by studies where both pitch size and player number were altered concurrently was the influence of the relative pitch area per player. In all of these studies, an increase in absolute pitch area and player number also resulted in a greater relative pitch area per player. Therefore, the observed reduction in SSG intensity by several of these studies may have been due to either the independent effects of increasing the number of players or the inability of the additional players to cover more of the available pitch area. Clearly, more research is required to determine the effect of an increase in player number on characterized by significantly longer (average and maximal) effort durations and distances for speeds >18km/h. However, since it is the internal response to training (e.g. HR and RPE) and not the external training load (e.g. distances travelled in speed zones) that determines each players adaptation to a training stimulus, it is recommended that each player's internal load be monitored to assess how players are coping with different SSGs design. (Kirkendall 2001).

2.3.3 Modifications of rules

In practice, football coaches quite often modify playing rules in SSGs to achieve greater exercise intensity, or develop specific technical and tactical skills. However, there have only been a few studies that have examined how the modification of rules can influence these variables.. Two studies reported an increase in %HR max and another reported an increase in blood lactate concentration due to rule changes. Simple rule changes have also been reported to increase the perception of effort, which may be due to the increased cognitive load required of players as a consequence of new rules. To date, the only study to have reported on the influence of rule changes on movement characteristics is by (Mallo and Navarro2012). Compared with normal football rules, these specific rule changes resulted in an increase in total distance travelled and time spent performing high-intensity running, with less spent time spent stationary.

2.3.4 Goalkeepers

One common rule modification in SSGs is the removal of goalkeepers from the game in an attempt to increase the number of goals scored. Goalkeepers are an integral part of football; however, surprisingly few studies have investigated the use of goalkeepers and their possible effect on SSGs training intensity. (Mallo and Navarro 2009) reported a significant decrease in % HRmax, total distance and time spent in high intensity running, in three versus three SSGs with goalkeepers.

It was suggested that the reduced physiological and time-motion responses were due to increased defensive organization near the goal area, which reduced the tempo of play and subsequently the physiological and time-motion responses. In contrast, (Dellal et al 2012). Reported a 12 % increase in heart rate response in eight versus eight SSGs with goalkeepers. The presence of goalkeepers may have increased the player's motivation to both attack and defend, thereby increasing the physiological load. At present, the influence of goalkeepers on exercise intensity in football SSGs is not clear. They may have an important role in keeping team structures and formations intact, as well as increasing communication, all of which may influence movement, skill and physiological demands. Future studies are required to determine the influence of goal keepers on the physiological and technical/tactical demands in SSGs.

2.3.5 Training schedule (Including Game Duration and Work-Rest Ratios)

Similar to interval running, many prescriptive variables can be used in SSGs to alter exercise intensity. The majority of the studies have used a traditional 'interval' training format, whereby several consecutive bouts of SSGs play are interspersed with active or passive rest periods. The duration of each SSG bout interval, alternating with planned rest periods, is used to determine work-rest ratios. Although most studies examining SSGs have prescribed the SSG bouts using intervals with short rests, some recent studies have used continuous SSG formats of differing duration. Unfortunately, previous studies have not used consistent work-rest ratios and there is a large variation in the length, duration, and number of work bouts and rest intervals amongst studies which makes comparison difficult.

For example, a SSG 'interval' training prescription consisting of a 1·3-minute work bout with a 12-minute rest represents a very low work-rest ratio (1:4) and a very short total game duration (3 minutes). Other studies have used different work-rest ratios across various SSGs. Together, these may confound the physiological and perceptual responses, as well as the time motion characteristics of the games. A recent study involving youth football players examined the acute physiological and perceptual responses and time-motion characteristics of two different training regimens (continuous and intermittent).

These intermittent (4·6-minute bouts with 1.5 minutes passive rest) and continuous (24 minutes) regimens were applied to various SSGs including two versus two, four versus four and six versus six. The main finding of this study was that intermittent regimens were characterized by increased distances covered at speeds of >13km/h. However, paradoxically, the global RPE and %HRmax was significantly higher in continuous regimens. The results of this study demonstrated that both SSG training regimens could be used during a season for match-specific aerobic conditioning, but were unlikely to provide a sufficient stimulus overload for fully developing maximal oxygen consumption (VO2max). In summary, research shows that neither training regimen appears to offer any major advantage over the other, and that both regimens could be used for in-season aerobic fitness maintenance training. (Allen et al,1998).

2.3.6 Encouragement of coach

Direct supervision and coaching of exercise sessions have been shown to improve adherence to an exercise programmer, increase training intensity and increase performance measures in a variety of training modes. In football, active, consistent coach encouragement has also been suggested to have an influence on training intensity. Rampinini et al (2009) demonstrated that HR, blood lactate concentration and RPE were higher when coaches provided consistent encouragement during SSGs with 20 amateur football players in a variety of SSG formats (three vs. three, four vs. four, five vs. five and six vs. six players and on small, medium and large-sized pitches). Similarly, Sampaio et al (2008). Reported a significant increase in RPE (for two vs. two and three vs. three SSGs) with verbal encouragement, but no significant change in %HRmax. Collectively, these studies support the role of the coach in providing consistent encouragement during SSGs, especially when it is planned that high intensities be achieve.

2.4 The physiology of interval training

In interval training, repeated work bouts 0.5–5 min in duration are interspersed with recovery periods of somewhat similar lengths. These schedules are used extensively by swimmers, cyclists, rowers and runners and can be adapted for soccer players. High muscle lactate levels may be induced by the exercise bouts and lactate levels in blood may rise progressively with each repeated effort. There is evidence that recovery from the intense efforts is improved as a result of aerobic training (Tomlin and Wenger, 2001). This ability may be trained by maintaining an activity level at about 60% of the maximal heart rate in between the more strenuous efforts. Active recovery between the successive exercise bouts enhances the removal of lactate from the blood.

There is a linear relation between the intensity of the active recovery, and blood lactate disappearance up to an exercise intensity of about 60% VO2max (Gollnick and Hermansen, 1973). The coach can vary the number of repetitions, the duration of the effort, the exercise intensity and the recovery time between the efforts. Altering the duration of the efforts between days introduces variety into the training stimulus. The number of repetitions can be increased systematically as fitness is developed whilst the pace can then be quickened. Finally, the

recovery periods can be shortened; anaerobic endurance is also stressed when these periods are inadequate to allow full recovery.

In 'interval training' as originally developed, the optimum exercise intensity was deemed to be that which elicited heart rates of about 180 beats·min-1 while recovery was terminated when the rate fell to about 120 beats·min-1. These rates were thought to provide the optimum stimulus for the heart. This method of training is more likely to increase maximum oxygen uptake than is continuous sub-maximal exercise performance (Rusko, 1987). Placing an emphasis on high intensity exercise promotes the recruitment of FT muscle fibers and so enhances training of peripheral as well as central factors.

2.4.1 Variations in interval training

Fartlek, pyramid training and parlauf are forms of interval training that are not so rigid. Fartlek or 'speed play' originated in the running trails of the Swedish forests and entails sustained exercise in which the tempo is frequently altered, usually to coincide with the type of terrain. The intensity may be varied spontaneously from hard efforts to light exercise according to the individual's disposition. This relative freedom makes fartlek enjoyable when players train their own. The flexibility in applying this training stimulus ensures that all the major metabolic pathways are stressed at some time. Incorporating a fartlek session 3 times a week into the training program has proved to be more effective than 20min at so-called 'anaerobic threshold' in improving 10km time of runners. Both programs decreased the blood lactate response during sub-maximal exercise without increasing VO2max (Acavedo and Goldfarb, 1989).

Pyramid training provides a formal means of varying the duration and intensity of exercise and the recovery intermission. Sessions may involve, for example, consecutive runs of 100, 200, 400, 800 and 1,200 m with a short time in between allowed for recovery. The individual then returns down the distances to finish with a sprint before warming down. This program is suitable for application in small groups. A soccer squad, for example, may be broken down into 3–4 separate groups compatible with their running abilities. Parlauf or continuous relays can be introduced into training routines to stimulate team spirit for games players. This form of training can engage two, three or four members per team for a period pre-determined by the coaching staff. In the two-per-team format, rest periods do not permit complete recovery so that performance may

inevitably deteriorate. This type of regimen promotes competition between pairs and is suited for training by games players when variety is needed.

2.5 Development of cardiovascular endurance in football

This refers to the ability of the heart and lungs to meet the demands of the body. This can be assessed at rest and in response to aerobic exercise by measuring heart rate/pulse and blood pressure. In general, a lower heart rate and blood pressure indicate more efficient cardio respiratory functioning and better cardio respiratory fitness. Aerobic training implies that the training program is designed to improve the oxygen transport system. It is imperative during soccer match-play and training sessions that there is a good supply of oxygen to the active muscles and that these tissues have the capability to use the oxygen that is provided by the circulatory system.

Aerobic training therefore has central and peripheral aspects; the cardiac output and the circulation of blood and on the other hand an increased ability of the muscle to take up and utilize the oxygen that is offered. The dimensions of the training stimulus are its duration, intensity and frequency. Improvements in aerobic fitness are reflected in the capability to sustain exercise at a given intensity for longer than was previously possible. Endurance suggests an ability to maintain exercise for a prolonged period and can be improved by focusing either on the duration or the intensity of training. Training at high intensity can entail intermittent exercise, with recovery periods intervening between the strenuous efforts. Aerobic training enhances the ability to recover quickly from strenuous activity as well as improve the capability to sustain exercise (Tomlin and Wenger, 2001).

In a soccer context, the major need to raise the level of aerobic fitness applies in the preseason period. The game itself may improve the oxygen transport system but not at a rate to achieve optimal physiological changes. For this reason the training prior to the competitive season is likely to have more formal fitness and conditioning work than at other times during the season. Gains accrued from aerobic training are likely to be less pronounced within the competitive season. The duration of exercise that is sustainable is inversely related to the intensity at which it is performed. The longer that exercise is continued, the lower is the exercise intensity or work-rate that can be tolerated. All-out short-term exercise is fuelled mainly by anaerobic sources whereas sustained endurance exercise is almost entirely supported by aerobic metabolism an

understanding of the biochemical processes involved is provided by considering the means of energy production.

2.6 Speed and agility in soccer

Speed is very crucial to the game of soccer. An effective speed training program would be based on the realistic aspects of the game. When soccer players play on the field there are a couple of aspects such as reflexes, tactical anticipation, and agility that influence their speed. Today, soccer is a highly demanding game in which the participants are subjected to numerous actions that require overall strength and power production, speed, agility, balance, stability, flexibility, and the adequate level of endurance (Krustrup, Mohr, Ellingsgaard & Bangsbo, 2005), thus making the conditioning of players a complex process. One of the goals is to minimize the unknown variables to the least possible number. Recently, acceleration, speed, and agility have been found to be independent, unrelated qualities that produce a limited transfer to each other (Little & Williams, 2005).

The next step is to investigate methods that produce the integral effects that can be used in the conditioning of soccer players. But, we found that few studies have investigated the training methods that produce the integral effects on various abilities. One of the most popular training methods that produce the mentioned results is the SAQ (speed, agility, quickness) method (Pearson, 2001). Within the context of randomized intermittent, dynamic and skilled movement type sports (randomized intermittent, dynamic type sports to which soccer undoubtedly belongs, the integrated effects are wanted. The problem is to decide which type of conditioning should be implemented (programmed or random conditioning) to improve SAQ in soccer.

A study that has investigated this problem Bloomfield, Polman, O'Donoghue & McNaughton, (2007) leads to the conclusion that programmed conditioning enhances power performance to agreater extent. However, random conditioning is not rejected, yet it comes as an advisable addition to programmed conditioning (Krustrup & Bangsbo, 2001). That kind of conditioning uses randomized intermittent patterns seen in match performance. Both types follow the basic principles of conditioning and thus deliberately produce effects that can be in some way planned. The downside of random conditioning is that it has the inability to achieve the desired level of volume and intensity depending on motivation and effort, but on the other hand, the use of open skills produces specific demands that are used in a real match.Bloomfield, Polman, O'Donoghue,

and McNaughton (2007) found that programmed conditioning is more preferred when it comes to speed and agility, when it comes to endurance, but it is speculated that random conditioning can have more effect. Thereby, both conditioning methods are valid in overall performance enhancing.

2. 7 Power training in soccer

Training for muscle strength entails use of the overload principle and progressive resistance exercise offers a means by which the training stimulus can be upgraded on a regular basis. The intensity can be regulated by use of the RM principle, which can be determined from a single maximum effort (1 RM) or a number of repeated efforts (e.g. 10-RM). The training program may be designed on the basis of the number of repetitions of each specific exercise, the number of sets of these repetitions and the rest periods in between.

The intensity of the exercise or the level of force demanded by the active muscle determines the type and number of motor units that are recruited. This concept applies irrespective of the velocity of the action. Only a few motor units are activated when low force is required and these tend to be associated with slow-twitch muscle fibers. At moderate intensities the FTa (Type IIa) fibers are recruited whilst in efforts of maximal strength the FTb (Type IIb) fibers are called into play. Therefore strenuous efforts for brief repetitions (e.g. 6 X 6-RM) represent a good means of activating the majority of the muscle fibers. When all of the motor units are recruited, the muscle can exert its greatest possible force.

Training for power must exploit the force–velocity characteristic of muscle. This requirement reflects the trade-off due to the velocity-specific effects of training. (Perrin 1993) concluded that concentric exercise performed at slow velocities improves force production only at the training velocity whereas exercise at high velocities is not so specific to the exact velocity used.

The football player requires both great force production for muscle development and fast actions for game-related movements. Muscle strength can be increased by a more effective recruitment of muscle fibers contributing to the generation of force and a reduction of neural inhibitory influences. Neural adaptations resulting in increased voluntary activation of muscle may account for improvements in strength over the initial weeks of a resistance-training program (Staron et al., 1994).

2. 8 Flexibility refers to the ability to move a joint throughout its natural range of motion. Different types of joints have different ranges of motion. For example: the knee is a hinge joint and is therefore able only to move forward and backward. The hip, on the other hand, is a ball and socket joint; this type of joint is able to move forward, backward, side to side, and in a circle. To maintain and increase flexibility it is important to stretch regularly. The minimum recommendation is two to three times a week. Spend ten to fifteen minutes stretching at the end of a training session or match. As well as saving time on separate flexibility sessions you will also be thoroughly warmed up. You are flexible when the muscles are long enough and the joints are free enough to allow movement. People with good flexibility have fewer sore and injured muscles. Make Stretching before and after activities will help to improve flexibility. The sit-and-reach and the trunk lift are two tests used to measure flexibility (Corbin, *et al*., 1994).

2.9 Principle of training and relevance issues

In planning a training program there are some basic principles that need to be considered. They are discussed under the following headings

2.9.1 Program Design

The act of resistance training, itself, does not ensure optimal gains in muscle strength and performance (Kraemer & Ratamess 2004). The key to successful resistance training is an appropriate program design. To obtain the best results, one has to consider the science behind exercise prescription and also take a practical approach. To perform this process efficiently one has to consider the following training variables: the exercise and workout structure, mode of resistance training, exercise intensity, rest intervals and frequency of training, volume of training, speed of movement, and progression. It is the correct manipulation of these training variables that optimize the resistance training outcomes

2.9.2 Frequency of Training

Training frequency refers to the number of training sessions in a defined period. For example, training frequency may vary between 5 and 14 sessions per week depending on the sport, level of performance of the athlete, and stage of training cycle (Smith 2003). Ideally, each major muscle group should be trained twice a week (Feigenbaum & Pollock 1999; Winett & Carpinelli 2001). Those athletes who have more time and want to improve further can increase their frequency of resistance training per muscle group to three times per week (Feigenbaum & Pollock 1999; Hass,

Feigenbaum, & Franklin 2001). For adequate recovery, resistance training days for specific muscle groups should be separated by at least 48–72 hours (Feigenbaum & Pollock 1999; Winett & Carpinelli 2001) and a minimum of 24h should normally separate training sessions (Pearson, Faigenbaum, Conley, & Kraemer, 2000).

The recovery period is important for muscle recovery and adaptation, and also to prevent overtraining (Feigenbaum & Pollock, 1997; Hass et al. 2001; Pearson et al. 2000). Based on an extensive literature review in this regard, there seems to be no optimal frequency of training as various muscle groups respond differently to frequency overload (Feigenbaum & Pollock 1997). The chest, arms, and leg muscle groups may respond better on ≥3 days per week; however, the lumbar extensors and smaller trunk muscles respond favorably to less training sessions per week (Feigenbaum & Pollock 1997). Generally, lesser trained athletes need more recovery time than their more highly trained counterparts (Kraemer & Ratamess 2004). Two to three days per week has been shown to be effective during the initial phases of resistance training, but the number of training days can be increased as one becomes more experienced and conditioned (American College of Sports Medicine, 2002).

A general guideline is to gauge the complexity of the exercise, the number of muscle groups involved, and the actual weight lifted to determine the rest period. For example, in a heavier strength program design, an exercise such as the power clean or back squat (multi-joint, complex, large muscle group involvement) would require 3–5 min rest, an exercise like the Lat pulldowns (multi-joint, less complex, moderate muscle group involvement) 2–3 min and a bicep curl (singlejoint, simple, small muscle group involvement) 1–2 min between sets. All programs will lead to improvements in strength regardless of the length of the rest interval, but the design should be such that it optimizes the time utilized during training in relation to the expected training outcomes.

2.9.3 Duration

This refers to the time or amount of the exercise session. This is sometimes confused with the volume of training, which quantifies training over a period of time and combines duration and frequency (Smith 2003). Athletes competing at the international level need to train for approximately 1000 hours per year (Bompa 1999)

2.9.4 Intensity

Exercise intensity is a measure of "how hard is the exercise?" and is related to the power output. The exercise intensity lies somewhere on a continuum between rests (basal metabolic rate) and maximal effort, which coincides with the maximal oxygen uptake for that activity. Exercise intensity can be monitored by measuring submaximal oxygen consumption (Daniels 1985), heart rate (Lambert, Mbambo, & Gibson, 1998), blood lactate (Swart & Jennings 2004), the weight lifted during the exercise (Sweet, Foster, McGuigan, & Brice, 2004), or the perception of effort (Foster et al. 2001).

Training intensity is the major training stimulus that influences adaptation and performance. Athletes are only advised to incorporate high intensity training into their training programs after they have developed a sufficient base (Laursen & Jenkins 2002). If too much high intensity training is carried out the athlete will be at risk of developing symptoms of fatigue associated with overreaching (Meeusen, Duclos, Gleeson, Rietjens, Steinacker, & Urhausen, 2006) and overtraining or will increase the risk of getting injured (Noakes 2001).

2.9.5 Overload

An athlete has to be exposed to an overload stimulus at regular intervals for the induction of training adaptations. An overload stimulus can be manipulated by changing the mode of exercise, duration, frequency, intensity, and recovery period between training sessions (Bompa 1999). An overload training stimulus can also be imposed by altering nutrition and influencing the intracellular milieu before the training session. For example, to mimic the metabolic stress in the muscles towards the end of a marathon an athlete could start the training session with a low muscle glycogen concentration. This can be achieved by reducing carbohydrate intake about 24 hours before the training session. The athlete then begins the training session with lower than usual glycogen levels in the liver and muscles. After about 20–30 km of the running training the metabolic flux will be similar to the metabolism that occurs towards the end of a marathon. An advantage of this strategy is that a metabolic overload can be imposed without the same mechanical muscle stress and damage that occurs towards the end of a marathon.

2.9.6 Specificity

The principle of specificity states that adaptations are specific to the type of training stress. It follows that the type of training must be structured and planned in accordance with the requirements of the competition. However, this principle can be applied inappropriately if it is assumed that all training should simply mimic the demands of competition (Young 2006). In certain sports the physical demands of competition can induce muscle imbalances and the risk of injury is also higher in many types of competition compared to training for the competition. Therefore, it is necessary to vary training and structure so that the athlete can develop a good base of fitness before attempting the higher risk, competition-specific fitness. This concept of varying training volume at various stages of the season is explained by the principle of periodization.

2.9.7 Periodization

Periodization is the process of systematic planning of a short- and long-term training program by varying training loads and incorporating adequate rest and recovery. The plan serves as a template for the athlete and coach (Smith 2003). While it is important to have a plan, the day to day implementation of the plan should not be rigid, but rather should be modifiable based on the symptoms of the athlete (Lambert & Borresen 2006; Noakes 2001). The classic approach of periodized training has been to distinguish between high volume, low intensity training designed to develop aerobic capacity, usually in the early part of the season, and high intensity training designed to develop qualities linked to performance, as the season progresses (Hellard, Avalos, Millet, Lacoste, Barale, & Chatard, 2005).

This approach to training reduces the risk of overtraining, while the athlete is more likely to peak at a predictable time, usually coinciding with important competition (Hellard et al. 2005; Stone et al. 1999). Another reason for this systematic approach to training is that different physiological systems vary in their retention rate after training (Hellard et al. 2005). Therefore, by varying the training loads as the season progresses, the desired adaptations, which are associated with peak performance, are achieved.

They found that at the elite level training variables only accounted for 30% of the variation in performance (Hellard et al. 2005). This supports the concept that training programs need to be highly individualized for elite athletes (Hellard et al. 2005). Monitoring the training load–

response relationship is important for elite athletes to ensure that the training program is individualized and accommodates the needs of each athlete (Lambert 2006). There are several different models for periodizing training (Bompa 1999). These models differ depending on the sport, but they all share a common principle in having phases of general preparation, specific preparation, competition preparation and competition, transition or active rest. The terminology for dividing the cycles is referred to as follows:

- **macrocycles**: long plan, usually 1 year;
- **mesocycles**: shorter plan from about 2 weeks to several months; and
- **microcycles**: short plan of about 7 days (Stone et al. 1999).

2.9.8 Structure of Training

All training should follow some well-established principles. The first principle is to train initially to increase weekly training duration. Once the appropriate weekly training duration has been reached, then specific training sessions of high intensity can be introduced. An athlete should gradually and systematically increase training distance until the maximum training load that the athlete can tolerate has been reached. Signs that the maximum training load has been reached is a failure to adapt to a new, higher training load, an increase in muscle fatigue, a feeling of "tired, heavy legs," an increase in the time taken to complete a given training session (i.e., getting slower, rather than faster), or the appearance of a mild injury or illness (Noakes 2001). The total training load that can be tolerated depends on genetic factors and careful increase in the training distance, and takes years to develop fully. Ignoring signs that the body is failing to adapt to the training load can result in overtraining.

2.9.9 Tapering

To achieve the best possible performance, at some point every athlete should reduce their overall training load. Typically, this is primarily a reduction in training volume, with a smaller reduction in the high intensity sessions. Many athletes fear that they will lose their fitness by reducing their training load. Contrary to this opinion, however, an appropriate reduction in training load at the right time before a major competition will enhance performance (Bosch, Thomas, & Noakes, 1999). In the third week before competition, training load can be reduced to approximately 80% of the normal training load in terms of weekly duration or distance; 2 weeks before competition the training load can be further reduced to 60–70% of the normal training load. In the final week

training should be maintained, but at the reduced, or even more reduced, level. By maintaining the high training load, athlete is physically incapacitated. These athletes often present to the medical practitioner for help because they are convinced that there is something medically wrong with them. While this may well be the case in some instances, it is important for the sports medicine practitioner to realize that it is quite normal for performances to decline after a period of peaking, tapering, and racing. A period of reduced training should be planned at this phase of training before the next build-up to another peak begins, otherwise overtraining can result. Once in the over trained state it may take the athlete many weeks to recover and be able to resume normal training (Noakes 2001).

CHAPTER THREE

RESEARCH METHODS

3.1 Introduction

This chapter presents the research method. It focuses the method which was used in conducting this research which covers the study area where the research is going to be done, the research design which was implemented, source of data, population, sample size and sampling techniques, data collection instrument, procedures of data collection, data analysis technique and the ethical considerations to conduct the study. So as to achieve the objectives which were mentioned above in chapter one the researcher was used the following methods up to the overall completion of the study.

3.2 Research site

The study were conducted in the Ethiopia youth sport academy. Ethiopia youth sport academy has two training campus the main campus is located in Addis Ababa city, and the other one is oromoia region asela city. This study conducted Ethiopian youth sport academy main campus which is located Addis Ababa city.

3.3 Research Approach

This study employed a quantitative research approach, which collecting numeric data from a sample using instruments with pre-set hypothesis and post-tests. Besides, it is vital for comparing groups, or relating variables using statistical analysis, and interpreting results by comparing them with prior predictions and past research (Creswell, 2012).

3.4 Research design

The study was an experimental study design. The researcher was used purposive sampling technique to select 32(thirty two) female soccer players/trainees as a subject of the study from Ethiopian youth sport academy. From those subjects 16 of them as small sided game training group and the rest 16 players interval training group in which allege ranging 16-20 years old. The study was carried out for 10 consecutive weeks three times per week i.e.

Table 1 research design

Frequency	3 days/week
Total duration	10weeks
Duration /session	dynamics see appendix 3 a&b
Intensity	dynamics see appendix3 a&b
Exercise days	Morning Monday, Wednesday, Friday
	Tuesday, Thursday, Saturday
Time of training	b/n 12:10---1:30 early morning and b/n 10:30----12:00

Both of two experimental group subjects was participated in the training program mentioned on appendix (2 a & b).The training program was based on the training principles. Under this design, the studied parameters were the cardiovascular endurance, speed, agility, power and flexibility performance. The pre, and posttest results of the both experimental group subjects was administered and data was collected by the researcher.

3.5 Population sample size and sampling techniques

The study was conducted on female football player at Ethiopian youth sport academy since the research is experimental to monitor in training method as well as manageable in test administrations, the total populations of the players are 32. In order to select the samples for this experimental study, first, population (purposive) sampling techniques were used. The total samples selected for the study was 32 academy female football trainees/players. Next, the total 32 players were involve in pre-test then divided in to two groups by using single blind randomization based on their pre-test results and training experience at academy. The researcher is used to assign small sided training group and interval training group, which means the players who have got relatively the same score, one of the players assign in to small sided game training group and the other players assign in to interval training group. Since this kind of sampling technique is very important for player's performance level equally distributed in to two groups and the research did not face fallacy by the level of physical fitness between intervention groups.

3.6 Source of data and Data Collection Instrument

For this study primary source of data was the players' test result. Because of its experimental nature of the study, the researcher was used test measurements as data collection instrument. Therefore, the researcher was applied a set of tests: Pre-test and Post-tests. Here, Pre-test was given before the intervention by the researcher and Post-test was given after doing the treatment or the intervention. The researcher was used the following equipment throughout the study in the field. The equipment's were watch, measuring tape, pen, paper, cone, meter, flag, record sheet, and whistle used during training as well as in the tests.

The following instruments were used in the study

3.6.1 Yo-Yo Intermittent Recovery Test Level 2 (YYIRTL2)

The yo-yo intermittent recovery test is a test of the ability to undertake intermittent exercise. The participants in this test have a short 10 seconds active break after each 40m (2 x 20 m runs), with the speed increasing at intervals. This test is performed to an audio recording of beeps (or bleeps). Along with the audio recording, the test requires two parallel lines of cones spaced 20 meters from each other. An assistant will help to record the scores. The performers must run from one line of cones to the other and make it past the starting line cones within the allotted time (before the second beep). When a performer fails to do so, he is given a warning. The second time he fails his test is over and the final level he attempted is recorded. The benefit of performing the YYIRTL2 is its specificity to the demands on the aerobic energy system for soccer players. The test is performed at a relatively fast pace and in between each interval there is a 10 second rest period similar to the game of soccer.

Purpose: The test evaluates an individual's ability to repeatedly perform intervals over a prolonged period of time, particularly for athletes from sports such as tennis, team handball, basketball and soccer or similar sports.

Equipment required: Flat, non-slip surface, marking cones, measuring tape, pre-recorded audio track, multimedia audio player and recording sheets

Procedure: Use cones to mark out three lines; 20 meters and 2.5 (endurance test) or 5 meters (recovery test) apart. The subject starts on or behind the middle line, and begins running 20 m when instructed by the sound. This subject turns and returns to the starting point when signaled by the recorded beep. There is an active recovery period (5 and 10 seconds respectively for the endurance and recovery versions of the test) interjected between every 20 meter (out and back) shuttle, during which the subject must walk or jog around the other cone and return to the starting point. A warning is given when the subject does not complete a successful out and back shuttle in the allocated time, the subject is removed the next time they do not complete a successful shuttle.

3.6.2 30 Meter Acceleration Test

The objective of this test is to monitor the development of the athlete's ability to effectively and efficiently accelerate from a standing start to maximum speed.

Required resources to undertake this test you will require:

- ✪ 400m track – with a 30m marked section on the straight
- ✪ Stop watch
- ✪ Assistant

How to conduct the test

The test comprises of 3 x 30m runs from a standing start and with a full recovery between each run. The assistant should record the time for the athlete to complete the 30m.

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 would indicate an improvement.

3.6.3 Illinois Agility Test

Agility is an important component of many team sports. The Illinois Agility Test (Getchell, 1979) is a commonly used test of agility in sports, and as such there are many norms available.

Purpose: To test running agility

Equipment required: Flat non-slip surface, marking cones, stopwatch, measuring tape, timing gates (optional)

Procedure: The length of the course is 10 meters and the width (distance between the start and finish points) is 5 meters. Four cones are used to mark the start, finish and the two turning points. Another four cones are placed down the center an equal distance apart. Each cone in the center is spaced 3.3 meters apart. Subjects should lie on their front (head to the start line) and hands by their shoulders. On the 'Go' command the stopwatch is started, and the athlete gets up as quickly as possible and runs around the course in the direction indicated, without knocking the cones over, to the finish line, at which the timing is stopped.

3.6.4 Power Test using Vertical Jump

Purpose: To measure anaerobic power of the legs

Equipment: Chalk, vertical board or wall marked in cm, tape measure, board cleaner

Test procedure

1. Adequate warm up of light jogging, jumping and stretching. The participants will stand sideways on the floor and the body close to the board. Either the left or right side against the board is permitted for testing.

2. The participant will then chalks the fingertips and reaches upwards along the board as high as possible without the flat foot leaving the ground and makes a mark. This mark creates the baseline measure.

3. For testing, the subject can now take one step backwards with the other foot firmly grounded on the take-off point. The athlete has now assumed a crouched position with jumps as high as possible, reaching with the hand leaving a chalk mark on the measuring board.

4. Three attempts will be allowed. Scoring: the score is the distance between the initial chalk mark and the mark of the highest trial for the jump tests. The jump distance is then recorded in centimeters

3.6.5 Sit and Reach Test

The objective of this test is to monitor the development of the athlete's lower back and hamstring flexibility.

Required resources to undertake this test you will require:

- 'Sit & reach' table or a bench with a ruler
- Assistant.

How to conduct the test

The sit and reach test is conducted as follows:

- The starting position is sitting on the floor with shoes removed, feet flat against the table, and legs straight.
- Reach forward and push the fingers along the table as far as possible
- The distance from the finger tips to the edge of the table represents the score for that person.

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 would indicate an improvement.

3.7 Method of data analysis

The researcher was analyzed by using Statistical Package of Social Sciences (SPSS) for software, version 23 the level of statistical significance for the study was set at $p \leq 0.05$. To examine whether there was significant difference in female football player's physical fitness response to small sided game and interval training, independent sample t-test was run. In addition, to evaluate the pre-post training effect of each training modality, paired sample t-test was employed.

To assist in understanding the magnitude of observed differences between groups, effect sizes were also calculated for test results. The magnitude differences between groups were expressed as standardized mean difference s (i.e., Cohen's effect sizes = difference in means divided by between subject standard deviation). And the criteria to interpret the magnitude of the effect sizes was; <0.2 trivial, 0.2- 0.6 small, 0.6-1.2 moderate, 1.2-2.0 large, and >2.0 very large (Batterham & Hopkins, 2006).

3.8 Ethical consideration

Before the data collection, the purposes of the study will explain to the participants and they will ask their consent to participate in the interview and focus group discussion. The participants will also inform that the information they have provide would only use for the study purpose and that it could not give to a third party. In addition, the researcher ensures confidentiality by making the participants anonymous, respect the rights of the participants, honor the requests and restrictions of the research site, report the research fully and honestly, the informed consent agreement will prepare and signed by all participants before the data collection, respect for privacy, no harm to researchers or subjects, and no one lying in the sequence of research.

CHAPTER FOUR

RESULT ANALYSIS AND DISCUSSION ON FINDINGS

4.1 Introduction

This chapter deals with the analysis of data collected from the 32 samples respondents. The purpose of this study was to examine and compute the effects of football small sided game vs interval training on physical fitness like endurance speed agility power and flexibility. Thirty two subjects of females' trainees with the age range of 16 – 20 years old. All thirty two academy players (trainees) were comprehensively selected to the study and based on their pre-test result and training age they were divided into 2 groups namely Group –A(1) small sided game training group and Group B(2) interval training group and each group consisting of 16 subjects.

In this study, field tests were taken two times (Pre and Post). Under this, five dependent variables (endurance, speed, agility, power and flexibility) had been evaluated by yoyo intermittent recovery run test, 30m dash acceleration run test, Illinois agility run test vertical jump test and sit & rich test. The results of those variables were discussed as follows.

4.2 Result and analysis

General characteristics of participants in mean +/_ standard deviation

Table 2 Profile of the subject by group

Variables	Group	N	Mean	Std. Deviation
Age	SSG	16	18.00	.63
	IT	16	18.06	.10
Height	SSG	16	158.94	2.64
	IT	16	161.44	3.83
Weight	SSG	16	53.19	1.42
	IT	16	54.06	1.65
BMI	SSG	16	21.10	.29
	IT	16	21.04	.27

As shown from above Table 2 Descriptive characteristics of 32 female football players from Ethiopian youth sport academy age of SSG = 18±63 ITG = 18.06±10, height SSG=158.94±2.64 ITG=161.44±3.83, weight SSG = 53.19±1.42, ITG = 54.6±1.65) and BMI

SSG = 21.10±29, ITG = 21.04±27. Subjects were relatively had the same age, height, weight and BMI.

Table 3: Distribution of participants by Training age

Training year	Group	Frequency	Percent
3.00	SSG	8	50
	IT	8	50
4.00	SSG	8	50
	IT	8	50

Table 3 showing the participants' training age, SSG 8 (50 %) of the participants were 3rd year, 8 (50 %) were 4th year and also IT 8 (50 %) of the participants were 3rd year, 8 (50 %) were 4th year. Because of single blind randomization, there is equal distribution b/n the group from training age aspect.

Table 4: Distribution of participants by grade

Academic status (grade)	Group	Frequency	Percent
9.00	SSG	0	0
	IT	1	6.25
10.00	SSG	11	68.75
	IT	10	62.5
11.00	SSG	1	6.25
	IT	1	6.25
12.00	SSG	4	25.0
	IT	4	25.0

Table 4 showing the participants' educational status (grade), SSG 0(%) of the participants were grade 9 student 11(65.75 %) were grade 10 student, 1(6.25 %) were grade 11 student, 4(25.0%) were grade 12 student. ITG 1(6.25 %) of the participants were grade 9 student 10(62.5 %) were grade 10 student, 1(6.25 %) were grade 11 student, 4(25.0%) were grade 12 student.

Table 5: independent sample t-test statistics of pre-test result between two groups

Types of physical fitness & test items	Group	N	Mean	SD	Std. Error Mean
Endurance Yoyo	SSG	16	550.00	62.82	15.70
	IT	16	550.00	62.82	15.70
Speed 30m dash	SSG	16	5.302.	.28	.07
	IT	16	5.77	.14	.03
Illinois agility	SSG	16	19.10	.34	.09
	IT	16	19.023	.25	.06
Power vertical jump	SSG	16	37.12	1.15	.29
	IT	16	37.12	1.15	.29
Flexibility sit & rich	SSG	16	12.56	1.59	.40
	IT	16	12.62	1.54	.38

SSG=small sided game training group, IT= Interval training group, N = number of football players (trainees), SD = standard deviation, CM= cent-meters, M= meter, SEC. = second.

The above table displays the pre- test results of yoyo intermittent recovery test for both small sided game and interval training group. As indicates in the table the pre- test mean value of SSG were found to be 550.00m with SD= 62.82 and IT pre- test mean value were found to be 550.00 with SD= 62.82. So, the mean value score of yoyo intermittent recovery test indicated that there is the same between two intervention groups on the fitness of cardiovascular endurance performance before beginning the training program.

The table above also indicates the pre- test results of Speed 30m acceleration test for both intervention groups. As indicate in the table the pre- test mean value of SSG were found to be 5.30sec with SD= .28 and IT pre- test mean value were found to be 5.78sec with SD= .14. Therefore, the mean value score of Speed 30 acceleration test shows there is no the same performance between two groups on the fitness of speed before beginning the training program.

The above table also displayed that the pre- test results of Illinois agility test for both small sided game and interval training group. From the data we can see that in the table the pre- test mean value of SSG were found to be 19.10sec with SD= .34 and IT pre- test mean value were found to

be 19.03sec. With SD= .25. However, the mean value score of Illinois agility test indicate that, there is relatively the same performance between two groups on the fitness of agility before starting the training program.

The table above also revealed that the pre- test results of vertical jump test for both intervention groups. As shown in the table the pre- test mean value of SSG were found to be 37.12cm
With SD= 1.15 and IT pre- test mean value were found to be 37.12cm with SD= 1.15. So, the mean value score of vertical jump test indicated that there is the same between two intervention groups on the fitness of power performance before beginning the training program.

The table above also indicates the pre- test results of Sit & rich test for both intervention groups. As indicate in the table the pre- test mean value of SSG were found to be 12.56cm with SD= 1.59 and IT pre- test mean value were found to be 12.62cm with SD=. 1.54. Therefore, the mean value score of Sit & rich test shows there is almost the same performance between two groups on the fitness of flexibility before beginning the training program.

Note: from the above explanation of five physical fitness test variables, we can say that there was still the same. But, it is impossible to tell here if the similarities are statistically significant between two groups. Hence independent sample t-test comparing pre-test between groups and which was computed to examine whether this number show statistical similarities or not for each physical fitness test variables of female football players between groups, the t-test results presented in the table which is follows.

Table 6: independent sample t-test pre- test result measured between two groups

Independent Samples t Test

Test items (variables)		Levine's Test for Equality of Variances		Levine's Test for Equality of Variances						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
yoyo	EVA	.00	1.00	.00	30	1.00	.00	22.21	-45.36	45.36
	EVNA			.00	30.00	1.00	.00	22.21	-45.36	45.36
30m dash	EVA	13.59	.001	-5.97	30	.00	-.47	.079	-.63	-.31
	EVNA			-5.97	21.97	.00	-.47	.079	-.64	-.31
Illinois	EVA	.99	.33	.70	30	.49	.07	.10	-.14	.29
	EVNA			.70	27.37	.49	.07	.10	-.14	.29
Vertical jump	EVA	.00	1.00	.00	30	1.00	.00	.40	-.83	.82
	EVNA			.00	30.00	1.00	.00	.40	-.83	.83
Sit & rich	EVA	.03	.86	-.113	30	.91	-.06	.55	-1.19	1.07
	EVNA	.	.	-.113	29.97	.91	-.06	.55	-1.19	1.07

EVA= equal variance assumed, EVNA= equal variance not assumed,

An independent sample t-test was conducted as the result of pre- test to compare the average yoyo intermittent recovery test between two groups (small sided game and interval training group). As it was assessed by Levine's test for equality of variances (p = 1.00) homogeneity of variance was not violated, so equal variance assumed were used; T = -.00, Df = 30, P = 1.00 two tailed, Mean Diff = .00, SE Diff = 22.21, the 95% CI is (-45.36, 45.36). Which does contain 0; this result does violate P value of the significant test. So, there is not a significant difference between small sided game and interval training groups (P >.05).

The above table pre- test results revealed that speed 30m dash test were found to be statistically significant difference between two groups (small sided and interval group). As it was assessed by Levine's test for equality of variances (p = .00) homogeneity of variance was

not violated, so equal variance assumed were used; T = -5.97, Df =30, P = .00two tailed, Mean Diff = -.47, SE Diff =.079, the 95% CI is (-.64 -.31). Which does not contain 0; this result does violate P value of the significant test. Therefore, there were a significant difference between two intervention groups (P <.05).

Independent sample t test result indicated that Illinois agility pre- test results were not found to be statistically significant difference between two groups (small sided game and interval group). As it was assessed by Levine's test for equality of variances (p = .33) homogeneity of variance was not violated, so equal variance assumed were used; T = -.70, Df =30, P = .49two tailed, Mean Diff = .075, SE Diff =..11, the 95% CI is (-.14 .29). Which does contain 0; this result does violate P value of the significant test. However, there was not a significant difference between small sided game and interval training groups (P >.05).

An independent sample t-test was conducted pre- test result to compare the average time taken to vertical jump test between two groups (small sided game and interval training group). As it was assessed by Levine's test for equality of variances (p = 1.00) homogeneity of variance was not violated, so equal variance assumed were used; T = .00, Df = 30, P = 1.00two tailed, Mean Diff = .00, SE Diff = .40, the 95% CI is (-.83 .83). Which does contain 0; this result does violate P value of the significant test. Therefore, there were not a significant difference between two intervention groups (P >.05).

The above table pre- test results revealed that sit & rich test were not found to be statistically significant difference between two groups (small sided and interval group). As it was assessed by Levine's test for equality of variances (p = .87) homogeneity of variance was not violated, so equal variance assumed were used; T = -.11, Df =30, P = .91 two tailed, Mean Diff = .55, SE Diff =.55, the 95% CI is (-1.19 1.07). Which does contain 0; this result does violate P value of the significant test. Therefore, there were not a significant difference between two intervention groups (P >.05).

Table 7: Post- test result independent sample t-test to know the effect between two groups

Types of physical fitness & test items	Group	N	Mean	SD	Std. Error Mean
Endurance Yoyo	SSG	16	772.50	40.57	10.14
	IT	16	747.50	54.10	13.52
Speed 30m dash	SSG	16	5.27	.24	.059
	IT	16	5.57	.20	.05
Illinois agility	SSG	16	18.78	.58	.14
	IT	16	18.96	.34	.09
Power vertical jump	SSG	16	37.81	.98	.24
	IT	16	37.87	1.63	.40
Flexibility sit & rich	SSG	16	13.06	1.43	.36
	IT	16	12.75	1.53	.38

SSG=small sided game training group, IT= Interval training group, N = number of football players (trainees), SD = standard deviation, CM= cent-meters, M= meter, SEC. = second.

The table above displays the post test results of yoyo intermittent recovery test for both small sided game and interval training group. As shown in the table the post- test mean value of SSG were found to be 772.50m with SD= 40.58 and IT post- test mean value were found to be 747.50m with SD= 54.10. So, the mean value score of yoyo intermittent recovery test indicate that, after exposed small sided game versus interval training with selected exercise the subjects were performed yoyo intermittent recovery test with deference between two groups. One can see that there was still a difference. Yet, we cannot determine here if this difference was statically significant.

The table above also indicated the post test results of 30m dash test for both intervention groups. As indicate in the table the post- test mean value of SSG were found to be 5.27sec.with SD= .24 and IT post- test mean value were found to be 5.57sec. With SD= .20. Therefore, the mean value score of vertical jump test indicate that, after intervention small sided game versus interval training the subjects were performed 30m acceleration speed with deference between two groups. We can see that there was still a difference. But, we cannot determine here if this difference was statically significant or not.

The above table revealed that the post test result of Illinois agility test for both small sided game and interval training group. From the data we can see that in the table the post- test mean value of SSG were found to be 18.78sec. With SD= .58 and IT post- test mean value were found to be 18.96sec. With SD= .34. So, the mean value score of Illinois agility test indicate that, after intervention small sided game versus interval training with selected exercise the subjects were performed the given test protocol is not the same second between two groups. One can see that there was still not the same. However, we cannot determine here if this similarity was statically significant.

The above table also shows the post test results of vertical jump test for two intervention groups. As indicate in the table the post- test mean value of SSG were found to be 37.81cm with SD= .98and ITG post- test mean value were found to be 37.87cm with SD= 1.63. So, the mean value score of vertical jump test indicated that, after intervention small sided game versus interval training method the subjects were performed the given distance with deference centimeters between two groups. We can see that there was still a difference. Yet, we cannot determine here if this difference was statically significant or not.

The table above also indicates the post- test results of Sit & rich test for both intervention groups. As indicate in the table the post- test mean value of SSG were found to be 13.06cm with SD= 1.44cm and IT pre- test mean value were found to be 12.75cm with SD= 1.53. So, the mean value score of vertical jump test indicated that, after intervention small sided game versus interval training method the subjects were performed the given distance with deference centimeters between two groups. Hence independent sample t-test comparing post- test between groups and which was computed to examine whether this number show statistical difference or not for each physical fitness test variables of female football players between groups, the t-test results presented in the table which is follows.

Table 8: independent sample t-test post result measured between two groups

Independent Samples Test

Test items (variables)		Levine's Test for Equality of Variances		Levine's Test for Equality of Variances						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Yoyo	EVA	1.26	.27	1.48	30	.15	25.00	16.91	-9.53	59.53
	EVNA			1.48	27.82	.15	25.00	16.91	-9.64	59.64
30m dash	EVA	1.24	.27	-3.83	30	.00	-.30	.079	-.46	-.14
	EVNA			-3.83	29.38	.00	-.30	.079	-.46	-.14
Illinois	EVA	4.67	.04	-1.07	30	.29	-.18	.17	-.53	.16
	EVNA			-1.07	24.40	.29	-.18	.17	-.53	.17
Vertical jump	EVA	1.45	.24	-.13	30	.89	-.06	.47	-1.03	.91
	EVNA			-.13	24.62	.89	-.06	.47	-1.04	.92
Sit & rich	EVA	.18	.67	.60	30	.56	.31	.52	-.76	1.38
	EVNA			.60	29.89	.56	.31	.52	-.76	1.38

EVA= equal variance assumed, EVNA= equal variance not assumed

Independent sample t test post results revealed that an average performance of yoyo intermittent recovery test between small sided game and interval training group. As it was assessed by Levine's test for equality of variances (p = .27) homogeneity of variance was not violated, so equal variance assumed were used; t = 1.48, Df = 30, P = .15 two tailed, Mean Diff = 25.00, SE Diff =16.91, the 95% CI is (-9.53 59.53). Which does not contain 0; this result does violate P value of the significant test. So, there was not a significant difference between small sided game and interval training groups (P >.05) with small effect size (Cohen's d = 0.52).

Independent sample t- test vertical speed 30m acceleration test post result indicates that, there is statistically no significant difference. As it was assessed by Levine's test for equality of

variances (p = .27) homogeneity of variance was violated, so equal variance not assumed were used; t = -3.83, Df = 29.38, P =.00 two tailed, Mean Diff = -.30, SE Diff =.079, the 95% CI is (-.46 -.14) which does not contain 0; this agree with P value of the significance test. However, it is possible to say that, there were significant difference between small sided and interval training group These results had shown that, players who involved in the interval training group significant difference from players who involved in the small sided game training group (P <.05) with very large effect size (Cohen's d = 1.35).

Based on independent sample t-test, Illinois agility test post result was found to be statistically significant. As it was assessed by Levine's test for equality of variances (p = .04) homogeneity of variance was violated, so equal variance not assumed were used; t = -1.07, Df = 24.40, P =.29 two tailed, Mean Diff = -.18, SE Diff = .17, the 95% CI is (-.53 .17) which does not contain 0; this result does not violate P value of the significance test. These results had shown that, players who involved in the small sided game training group difference from players who involved in the interval training group (P< .05) with small effect size (Cohen's d= 0.38).

Based on independent sample t-test, vertical jump test for fitness of power post result was found to be statistically significant. As it was assessed by Levine's test for equality of variances (p = .24) homogeneity of variance was not violated, so equal variance assumed were used; T = -.13, Df = 24.63, P =.90 two tailed, Mean Diff =-.06, SE Diff =.47, and the 95% CI is (-1.03. 91) which does not contain 0; this result agreed with P value of the significance test. So there was not a significant difference between small sided game and interval training groups (P >.05) with trivial effect size (Cohen's d= 0.05).

Based on independent sample t-test, sit & rich test for fitness of flexibility post result was found to be statistically significant. As it was assessed by Levine's test for equality of variances (p = .67) homogeneity of variance was not violated, so equal variance assumed were used; T = .60, Df = 30, P = .56two tailed, Mean Diff .31, SE Diff =..52, and the 95% CI is (-.76 1.38) which does not contain 0; this result agreed with P value of the significance test. The result indicates that players who involved in the small sided game training group difference from players who involved in the interval training group (P< .05) with small effect size (Cohen's d= 0.21).

Table 9: Pretest-Posttest Means and Standard Deviations and standard error for SSgt Experimental Group One

Variables	Pretest			Posttest			Mean Difference
	Mean	Standard deviation	Standard error	Mean	Standard deviation	Standard error	
Endurance yoyo	550.00	1.15	.28	772.50	40.58	10.14	-222.50
Speed 30m dash	5.30	.28	.071	5.27	.24	.06	.03
Agility Illinois agility test	19.10	.35	.09	18.78	.58	.14	.33
Power vertical jump	37.12	1.15	.29	37.81	.98	.24	-69
Flexibility S&R	12.56	1.59	.40	13.06	1.44	.36	-50

Table 9 shows the mean and standard deviation of the variables measured at the pre and post training stages in the small sided training group. This group had a pretest yoyo intermittent mean of 550.00, SD 1.15, standard error .29 and posttest mean of 772.50, SD 40.58 standard error 10.14 which showed a mean difference of -222.500. There were significance improvement with very large size effect Cohen's d= 5.61

The pretest speed 30m acceleration mean of this group was 5.30, SD .28 standard error .07 and posttest mean of 5.27, SD .24 standard error .06 which showed a mean difference of .03. There were no significance improvement with small size effect Cohen's d= 0.37

The pretest Illinois agility mean of this group was 19.10; SD .35 standard error .09 and posttest mean of 18.78, SD .58 standard error .14 which showed a mean difference of .33. There were significance improvement with moderate size effect Cohen's d= 0.83

The pretest vertical jump mean of this group was 37.12, SD 1.15 standard error .29 and posttest mean of 37.81, SD .98, standard error .24 which showed a mean difference of -69. There were significance improvement with moderate size effect Cohen's d= 0.87

The pretest sit & rich mean of this group was 12.56, SD 1.59, standard error .40 and posttest mean of 13.06, SD 1.44 standard error .36 which showed a mean difference of -50. There were significance improvement with moderate size effect Cohen's d= 0.97

Those each test protocol indicated that, there were mean difference between the pre and post-tests of interval training group. Yet, it is impossible to tell here if the differences are statistically significant. Hence a paired sample t-test comparing the pre- test and post test scores of within the group and which was computed to examine whether those number show statistical difference for each test protocol level of female football project players, the t- test results presented in the table which is follows.

Table 10: Comparison paired sample t-test differences pre-post results measured of small sided game training group

VARIABLE	Paired Differences					t	Df	Sig. (2-tailed)
	Mean difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Yoyo pre-post	-222.500	38.56	9.64	-243.04	-201.95	-23.08	15	.000
30m dash pre-post	.03	.080	.02	-.01	.07	1.47	15	.162
Illinois agility pre-post	.33	.39	.10	.12	.54	3.32	15	.005
Vertical jump pre-post	-.69	.79	.20	-1.11	-.26	-3.47	15	.003
Sit & rich pre-post	-.50	.52	.13	-.77	-.22	-3.87	15	.002

The above Table (10) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of endurance in yoyo intermittent recovery test indicated a statistically significant difference. As we show table (9) the mean value of yoyo intermittent recovery test before

training was 550.00m and it increased 772.50m after ten weeks intervention with small sided game training.

The result suggests that small sided game training group was significantly improved the fitness of endurance. (MD = -222.50 SD = 38.56, p = 0.00) when exposed to 10 weeks of SSG training method with selected exercise. Hence, (P <0.05) Post- test value of endurance was significantly increased in yoyo intermittent recovery test than pre- test value. In the former table (9) it was indicated that the mean score of yoyo intermittent recovery test after giving small sided game training method was higher than that of before giving the exercise. The mean value difference was -222.50.m this value showed that the performance of endurance was significantly increased from pre-posttests in distance measured by meter. This indicates that ten weeks' SSG training could have a beneficial modality of the improvement of endurance.

The above table (10) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of speed in 3om acceleration test indicated a statistically no significant difference. As we show table (9) the mean value of speed in 3om acceleration test before training was 5.30s and it improved 5.2731s after ten week's intervention with small sided game training. The result suggests that small sided game training group was no significantly improved the fitness of speed. (MD = .03 SD = .08, p = .16) when exposed to 10 weeks of SSG training method with selected exercise. Hence, (P >0.05) Post- test value of speed was no significantly increased in speed 30m dash test than pre- test value. In the former table (9) it was indicated that the mean score of speed 30m acceleration test after giving small sided game training method was not much higher than that of before giving the exercise. The mean value difference was .03s this value showed that the performance of speed was not significantly increased from pre-posttests in second measured by time. This indicates that ten weeks' SSG training couldn't have a beneficial modality of the improvement of speed.

The above table (8) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of agility in Illinois agility test indicated a statistically significant difference. As we show table (9) the mean value of Illinois agility test before training was 19.10sec. Then it improved

18.78sec. After ten weeks intervention with small sided game training. The result suggests that small sided game training group was significantly improved the fitness of endurance. (MD = .33 SD = .39, p = 0.005) when exposed to 10 weeks of SSG training method with selected exercise. Hence, ($P \leq 0.005$) Post- test value of agility was significantly increased in Illinois agility test than pre- test value.

As we shown In the former table (9) it was indicated that the mean score Illinois agility test after giving small sided game training method was higher than that of before giving the exercise. The mean value difference was 0.005sec. This value showed that the performance of agility was significantly increased from pre-posttests in second measured by time. This indicates that ten weeks' SSG training could have a beneficial modality of the improvement of agility.

The above table (10) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of power in vertical jump test indicated a statistically significant difference. As we show table (9) the mean value of vertical jump test before training was 37.12cm. Then it improved 37.81cm. After ten weeks intervention with small sided game training. The result suggests that small sided game training group was significantly improved the fitness of endurance. (MD = -.69 SD = .79, p = .003) when exposed to 10 weeks of SSG training method with selected exercise. Hence, ($P < 0.005$) Post- test value of power was significantly increased in vertical jump test than pre- test value. As we shown In the former table (9) it was indicated that the mean score vertical jump test after giving small sided game training method was higher than that of before giving the exercise. The mean value difference was .003cm. This value showed that the performance of power was significantly increased from pre-posttests in centimeter measured by height. This indicates that ten weeks' SSG training could have a beneficial modality of the improvement of power.

The above table (10) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of flexibility in sit & rich test indicated a statistically significant difference. As we show table (9) the mean value of sit & rich test before training was 12.56cm. Then it improved 13.06cm. After ten weeks intervention with small sided game training. The result suggests that small sided game training group was significantly improved the fitness of endurance. (MD = -.50

SD = .52, p = .002) when exposed to 10 weeks of SSG training method with selected exercise. Hence, (P < 0.005) Post- test value of flexibility was significantly increased in sit & rich test than pre- test value. As we shown In the former table (9) it was indicated that the mean score sit & rich test after giving small sided game training method was higher than that of before giving the exercise. The mean value difference was .002sec. This value showed that the performance of flexibility was significantly increased from pre-posttests in centimeter measured by length. This indicates that ten weeks' SSG training could have a beneficial modality of the improvement of flexibility.

Table 11: Pretest-Posttest Means and Standard Deviations for and standard error IT Group

Variables	Pretest			Posttest			Mean Difference
	Mean	Standard deviation	Standard error	Mean	Standard deviation	Standard error	
Endurance yoyo	550.00	62.82	15.70	747.50	54.10	13.52	-197.50
Speed 30m dash	5.78	.141	.03	5.57	.20	.05	.20
Agility Illinois agility test	19.03	.25	.06	18.96	.34	.09	.07
Power vertical jump	37.12	1.15	.29	37.87	1.63	.40	-.75
Flexibility S&R	12.62	1.54	.38	12.75	1.53	.38	-.12

Table 11 shows the mean and standard deviation of the variables measured at the pre and post training stages in the IT training group. This group had a pretest yoyo intermittent mean of 550.00, SD 62.82, standard error 15.70 and posttest mean of 747.50, SD 54.10, standard error 13.52 which showed a mean difference of -197.50. There were significance improvement with very large size effect Cohen's d= 4.95

The pretest speed 30m acceleration mean of this group was 5.78, SD .14, standard error .03 and posttest mean of 5.57, SD.20 standard error .05 which showed a mean difference of .20. There were significance improvement with moderate size effect Cohen's d= 0.99

The pretest Illinois agility mean of this group was 19.03; SD .25 standard error .06 and posttest mean of 18.96, SD .34 standard error .09 which showed a mean difference of .07. There were no significance improvement with small size effect Cohen's d= 0.34

The pretest vertical jump mean of this group was 37.12, SD 1.15 standard error .29 and posttest mean of 37.87, SD 1.63, standard error .41 which showed a mean difference of -75000. There were significance improvement with moderate size effect Cohen's d= 0.87

The pretest sit & rich mean of this group was 12.62, SD 1.54, standard error .38 and posttest mean of 12.75, SD 1.52 standard error .38 which showed a mean difference of -12.50. There were no significance improvement with small size effect Cohen's d= 0.29

Those each test protocol indicated that, there were mean difference between the pre and post-tests of interval training group. Yet, it is impossible to tell here if the differences are statistically significant. Hence a paired sample t-test comparing the pre- test and post test scores of within the group and which was computed to examine whether those number show statistical difference for each test protocol level of female football players, the t- test results presented in the table which is follows.

Table 12: Comparison paired sample t-test differences pre-post results measured of interval training group

VARIABLE	Paired Differences					t	Df	Sig. (2-tailed)
	Mean difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Yoyo pre-post	-197.50	39.92	9.98	-218.77	-176.23	-19.79	15	.000
30m dash pre-post	.20	.22	.05	.08	.32	3.65	15	.002
Illinois agility pre-post	.07	.21	.05	-.04	.18	1.34	15	.199
Vertical jump pre-post	-.750	.86	.21	-1.21	-.29	-3.50	15	.003
Sit & rich pre-post	-.12	.34	.08	-.31	.06	-1.46	15	.164

The above table (12) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of endurance in yoyo intermittent recovery test indicated a statistically significant difference. As we show table (11) the mean value of yoyo intermittent recovery test before training was 550.00m and it increased 747.50m after ten weeks intervention with small sided game training. The result suggests that small sided game training group was significantly improved the fitness of endurance. (MD = -197.50 SD = 39.92, p = 0.000) when exposed to 10 weeks of IT training method with selected exercise. Hence, (P <0.05) Post- test value of endurance was significantly increased in yoyo intermittent recovery test than pre- test value.
In the former table (11) it was indicated that the mean score of yoyo intermittent recovery test after giving interval training method was higher than that of before giving the exercise. The mean value difference was -197.50m this value showed that the performance of endurance was significantly increased from pre-posttests in distance measured by meter. This indicates that ten weeks' IT training could have a beneficial modality of the improvement of endurance.

The above table (12) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of speed in 3om dash test indicated a statistically significant difference. As we show table (11) the mean value of speed in 3om acceleration test before training was 5.78 and it improved 5.57 after ten week's intervention with interval training. The result suggests that interval training group was significantly improved the fitness of speed. (MD = .20 SD = .22, p = .002) when exposed to 10 weeks of IT training method with selected exercise. Hence, (P <0.05) Post- test value of speed was significantly increased in speed 30m acceleration test than pre- test value. In the former table (11) it was indicated that the mean score of speed 30m acceleration test after giving small sided game training method was higher than that of before giving the exercise. The mean value difference was .20 this value showed that the performance of speed was significantly increased from pre-posttests in second measured by time. This indicates that ten weeks' IT training could have a beneficial modality of the improvement of speed.

The above table (12) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of agility in Illinois agility test indicated a statistically has no significant difference. As we show table (11) the mean value of Illinois agility test before training was 19.03ec. Then it improved 18.96 after ten weeks intervention with interval training. The result suggests that interval training group was no significantly improved the fitness of agility. (MD = .07, SD = .21, p = .20) when exposed to 10 weeks of SSG training method with selected exercise. Hence, (P > 0.005) Post- test value of agility was no significantly increased in Illinois agility test than pre-test value. As we shown In the former table (11) it was indicated that the mean score Illinois agility test after giving interval training method was higher than that of before giving the exercise. The mean value difference was .20sec. This value showed that the performance of agility was not significantly increased from pre-posttests in second measured by time. This indicates that ten weeks' SSG training couldn't have a beneficial modality of the improvement of agility.

The above table (12) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result of fitness of power in vertical jump test indicated a statistically significant difference. As we show table (11) the mean value of vertical jump test before training was 37.12cm. Then it improved 37.87 after ten weeks intervention with interval training. The result suggests that small sided game training group was significantly improved the fitness of endurance. (MD = -.75 SD = .86, p = .003) when exposed to 10 weeks of SSG training method with selected exercise. Hence, (P < 0.005) Post- test value of power was significantly increased in vertical jump test than pre- test value. As we shown In the former table (11) it was indicated that the mean score vertical jump test after giving interval training method was higher than that of before giving the exercise. The mean value difference was .003cm. This value showed that the performance of power was significantly increased from pre-posttests in centimeter measured by height. This indicates that ten weeks' IT training could have a beneficial modality of the improvement of power.

The above table (12) displays the test of significance differences between pre and post test results within the group. According to the data presented in the table, the pre and post test result

of fitness of flexibility in sit & rich test indicated a statistically significant difference. As we show table (11) the mean value of sit & rich test before training was 12.62cm. Then it scored 12.75 after ten weeks intervention with interval training. The result suggests that interval training group was not significantly improved the fitness of flexibility. (MD = -.12, SD = .34, p = .16) when exposed to 10 weeks of interval training method with selected exercise. Hence, (P > 0.005) Post- test value of flexibility was not significantly increased in sit & rich test than pre- test value. As we shown in the former table (11) it was indicated that the mean score sit & rich test after interval training method was higher than that of before giving the exercise. The mean value difference was .164sec. This value showed that the performance of flexibility was not significantly increased from pre-posttests in centimeter measured by length. This indicates that ten weeks' interval training couldn't have a beneficial modality of the improvement of flexibility.

4.2 Discussion of findings

About cardiovascular endurance:

Cardiovascular endurance is a fundamentally important physiological quality for any soccer players. Aerobic high-intensity training typically focused on enhancing VO2max, utilizing training protocols that elicit high percentages of VO2max that are sustainable for an extended period of time. Aerobic power reflects the ability to produce aerobic energy at a high rate and is characterized by V02max (Agbonjimi & Amusa, 1990)

in the base line as the result of pre-test indicated that, there is no significant difference between two groups in the level of cardiovascular endurance performance at 0.05 level of confidence (P = .000) (table 6) when assessed by yoyo intermittent recovery test. However, there was significant increment from the pre to post test results evaluated by yoyo intermittent recovery test in the SSG. The result suggests that SSG significantly increased muscular endurance performance (MD = -222.50, SD= 38.55, p= .000), significant at 0.05 level of confidence. This increment of cardiovascular endurance performance in the SSG was due to exposed of 10 weeks of SSG training method. At the end of the study, the mean difference of SSG in

cardiovascular endurance performance was significantly increased by -222.50M. This indicates that SSG training plays a vital role in developing cardiovascular endurance performance.

On the other point there was significant increment between the pre to post test results evaluated by yoyo intermittent recovery test within the group. The result suggests that ITG significantly increased cardiovascular endurance performance (MD = -197.50, SD= 39.92, p = .000), significant at 0.05 level of confidence. This increment of muscular endurance performance in the ITG was due to the exposed of 10 weeks of interval training method. At the end of the study, the mean difference of ITG in cardiovascular endurance performance was significantly increased by 197.50m. This indicates that interval training plays a vital role in developing cardiovascular endurance performance.

As we have seen the above explanation both groups were significantly increased in cardiovascular endurance performance. But, SSG MD=-222.50M. ITG MD= 197.50000. These results indicate SSG score better than ITG score. So, the formulated hypothesis that Small-sided game and interval training will significantly improve the endurance performance of football players were accepted at 0.05 level of confidence.

About speed:

before start the training program as the result of pre-test had shown that, there was significant difference between two groups in the fitness of speed at 0.05 level of confidence (p = .000) (table 4) when assessed by 30meter dash test. However, there was a no significant difference between the pre to post test score in the SSG when assessed by 30meter dash test. The result suggests that SSG was not significantly improved fitness of speed (MD = .02937, SD = .07979, p = .162), significant at 0.05 level of confidence. This result indicated that effective change was not observed on football players who exposed in 10 weeks small sided game training on the fitness of speed. So, small sided game training is not effective method to enhancing fitness of speed.

On the other hand, there was significant difference between the pre to post test score in the ITG when assessed by 30meter dash test. The result suggests that ITG was significantly improved the fitness of speed (MD = .20, SD = .22, p = .002), significant at 0.05 level of confidence. The improvement of ITG in the fitness of speed was due to interval training with selected exercise

in which they were engaged in. This result indicated that effective change was observed on football players who engaged in 10 weeks interval training on the fitness of speed. Therefore, interval training is an effective modality to develop fitness of speed.

As we have seen the above description indicated IT groups significantly increased fitness of speed. But, SSG group has not scored significant improvement. This result indicates that players who involved interval training group scores better and significant result than players who involved small sided game training group So, the formulated null hypothesis that Small-sided game and interval training will not significantly affect the speed performance of football players is rejected at 0.05 level of confidence from the interval training perspective and accepted from the small sided game training perspective.

About agility: in the base line as the result of pre-test displayed that, there is no significant difference between groups in the fitness of agility at 0.05 level of confidence (p = .169) (table 4) when assessed by Illinois agility test. Whereas, the finding of this study on results presented in case of fitness of agility, Table (9) proved that, there were significant differences between the pre to post test scores in the SSG (MD = 33, SD = .35, p = .005), significant at 0.05 level of confidence. This result indicated that effective improvement was observed on football project players in fitness of agility who engaged in 10 weeks SSG training. This indicates that SSG training could have a great effect to enhancing fitness of agility.

On the other hand, the finding of this study on results presented in case of fitness of agility, Table (11) proved that there were no significant differences between pre to post test scores in the ITG (MD = .071, SD = .21, p = .20), significant at 0.05 level of confidence. This result indicated that effective improvement was not observed on football project players in fitness of agility that exposed of 10 weeks interval training method. We can say that interval training is not beneficial modality of improving fitness of agility.

As we have seen the above description indicated that, SSG groups significantly enhanced fitness of agility. These results indicate that players who involved in the SSG training group scores better and significant result than players who involved in the interval training group. So, the formulated null hypothesis that Small-sided game and interval training will not significantly

affect the agility performance of football players is rejected at 0.05 level of confidence from the small sided game training perspective and accepted from the interval training perspective.

In case of power: before start training program, the result of pre-test indicated that, there is no significant difference between groups in the fitness of power at 0.05 level of confidence (P =.1.00) (table 7) when assessed by vertical jump test. on the other hand, the finding of this study on results presented in case of fitness of power Table (10) proved that there were significant differences between the pre to post test scores in the SSG (MD = -.69, SD = .79, p = .003), significant at 0.05 level of confidence. This result indicated that effective improvement was observed on football project players in fitness of power who engaged in 10 weeks' small sided game training method. This indicates that SSG training is an effective method of improving fitness of power.

On the other point of view, the finding of this study on results presented in case of fitness of power. Table (11) proved that there were significant differences between the pre to post test scores in the ITG (MD = -.75, SD = .86, p = .003), significant at 0.05 level of confidence. We can see that effective improvement was observed on football project players in fitness of power that exposed in 10 weeks interval training. So, interval training method is an effective modality of improving fitness of power.

As we have seen the above explanation both groups were significantly increased in fitness of power. But, and SSG MD=.-.69Cm and ITG MD=.-.75Cm, this result indicated players who participate in the interval training score better result than players who participate in the small sided game training. However the formulated null hypothesis that Small-sided game and interval training will significantly improve the power performance of football players were rejected at 0.05 level of confidence.

About flexibility: in the base line as the result of pre-test displayed that, there is no significant difference between groups in the fitness of agility at 0.05 level of confidence (p = . .91) (table 5) when assessed by sit & rich test. Whereas, the finding of this study on results presented in case of fitness of flexibility, Table (9) proved that, there were significant differences between the pre to post test scores in the SSG (MD = -.50, SD = .52, p = .002), significant at 0.05 level of confidence. This result indicated that effective improvement was observed on football project

players in fitness of flexibility who engaged in 10 weeks SSG training. This indicates that SSG training could have effect to enhancing fitness of flexibility.

On the other hand, the finding of this study on results presented in case of fitness of flexibility, Table (11) proved that there were no significant differences between pre to post test scores in the ITG (MD = -.12, SD = .34, p = .16), significant at 0.05 level of confidence. This result indicated that effective improvement was not observed on football project players in fitness of flexibility that exposed of 10 weeks interval training method. We can say that interval training is not beneficial modality of improving fitness of flexibility.

As we have seen the above description indicated that, SSG groups significantly enhanced fitness of agility. These results indicate that players who involved in the SSG training group scores better and significant result than players who involved in the interval training group. So, the formulated null hypothesis that Small-sided game and interval training will not significantly affect the agility performance of football players is rejected at 0.05 level of confidence from the small sided game training perspective and accepted from the interval training perspective.

This study agreed with the findings of (Impellizzeri et al 2006) in their study on the 18 junior elite soccer players, using small sided games to train them for 4 weeks preseason plus 8 weeks in season 4 times a week at 90-95% HRmax and found out significant effects on their V02max, speed, lactate threshold and running economy.

This finding also agreed with (Eddy, 1977) reported a similar increase in VO2max, endurance and endurance performance in response to 7 weeks of continuous cycling training and interval cycling training in men and women.

Many researchers believe that soccer specific training like the small-sided games training improve V02max more than other training methods (kemi, Hoff, Engen, Helgerud, & Wisloff, 2003). (Ziogas, Patras, Stergious and Georgoulis, 2010) confirmed that several studies have analyzed V02max in soccer players. Most of them reported values ranging from 55-68 m L.kg.min-1, which are lower than those, traditionally, found in endurance runners (70 mL.kg.min1) and on the contrary higher than the V02max reported by this study (40-52

mL.kg.min-1). The difference may be found to be related to the training characteristics of soccer players which focus on aerobic power and capacity. Bompa and Haff (2004) suggested that a 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.

In addition, Helgerud et al, (2001) in one of their studies showed that interval training (90 -95% of maximal heart rate) which involve running uphill four period of four minutes separated by three minutes of active rest at 70% of maximal heart rate, twice a week over nine weeks-increased maximal oxygen uptake by 11% (from 58.1 ml/kg/min to 64.3 ml/kg/min). This resulted in a 20% increase in distance covered during a game, a 23% increase in involvement with the ball, and a 100% increase in the number of sprints, highlighting the advantage of a high V02max in soccer.

This study also agreed with the study on the energy cost of dribbling a ball carried out by Helgerud, Engen, Winsloff and Hoff (2001) which showed that oxygen consumption, heart rate, blood lactate and perceived exertion were elevated by the task of dribbling compared to normal running. The statistical results of the mean arterial pressure, heart rate reserve and the vital capacity showed a significant improvement after the eight weeks training

This finding similar to Sudhakar & Kumar, (2014) Speed was significantly improved by Fartlek training group and Interval training group when compared with control group. Speed was significantly improved in Interval training group when compared with Fartlek training group.

This study therefore agreed with Krustrup, Mohr, Ellingsgaard, and Bangsbo, (2005) that power performance parameters is in direct dependency to soccer success and thus emphasized the importance of the Speed Agility and Quickness training method.

The results of this investigation are also supported by the following studies of Owen (2012), Young & Rogers (2013), and Chaouachi, et al., (2014).

And this finding is disagree with jalysmi boluwaji (2014) small side game is improved speed agility and power among soccer players. The researcher believes the deference of the result is in case of prevention and test instrumentation. jalysmi boluwaji (2014) make a lot of Varity

small sided game to experimental group as a prevention and test instrument was 50meter sprint the researcher don't believe 50 meter running is more effective speed improvement measurement for soccer player so on this study speed measured by 30m meter acceleration test. Another reason for the deference of result might be altitudinal difference. Of course there is a lot of reason to differ the result like back ground of the player, nutrition etc.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The purpose of this study was to examine and to compare the effect of 10 weeks small sided game and interval training with selected exercise on cardio vascular endurance, speed, agility power, and flexibility among female football players at Ethiopian youth sport academy. For this purpose, the researcher reviewed the available literatures in order to decide the focus of the study and methodologies. In order to attain the general objective of the study, the following specific research objectives were formulated.

- To examine and compare the effect of 10 weeks small sided game and interval training on the fitness of cardiovascular endurance.
- To determine and compare the effect of 10 weeks small sided game and interval training on the fitness of speed.
- To investigate and compare the effect of 10 weeks small sided game and interval training on the fitness of agility.
- To know and compare the effect of 10 weeks small sided game and interval training on the fitness of power.
- To identify and compare the effect of 10 weeks small sided game and interval training on flexibility.

Based on the above specific objectives, the hypothesis was formulated. In dealing with these basic objectives, the study conducted on female soccer trainees/players. Among the population of 32 female football players using based on pre-test result and subject back ground of single-blind randomization in order to assign small sided game training group (16) and interval training group (16). The research focused on experimental study within 10 weeks small sided game training and interval training with selected exercise. Training was done 3 times per week see appendix (3a, b).

The selected physical fitness variables:-

- cardiovascular endurance measured by yoyo intermittent recovery test,
- speed measured by 30meter dash sprint test,
- agility measured by Illinois agility test,
- power measured by vertical jump test
- Flexibility measured by sits & rich test were taken from the participants immediate before and after the prevention.

Independent sample t- test and Paired sample t-test was used to find out the significant difference ($p \leq 0.05$) between two groups and the post training result and pre training result of each variable respectively. In all cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate. The study finally showed that there is a significant difference between small sided game versus interval training group on speed, agility and flexibility.

Through paired t-test and independent sample t test the data was analyzed. Hence, the following findings were investigated.

The finding of this study revealed that cardiovascular endurance performance of football player was significantly improved in both groups (small sided game and interval training groups) after 10 weeks of small sided game and interval training. The magnitude is not equal. SSG training is more effective than interval training than interval training for cardiovascular endurance performance.

The finding of this research revealed that fitness level of speed was significantly improved in both IT group and after exposed to 10 weeks interval training method. Which means significant change between pre to post test was observed. But the result which scored small sided game training group was not significant change after 10 week intervention. So there is significant difference between small sided game and interval training groups on fitness of speed. So, Interval training is better than small sided game training modality for fitness of speed.

The finding of this study displayed that fitness of agility was significantly improved in SSG groups after exposed to 10 weeks small sided game training method. Which means significant

change between pre to post test was observed. But the result which scored interval training group was not significant change after 10 week intervention. So there is significant difference between small sided game and interval training groups on fitness of agility. So, small side game training is better than small sided game training modality for fitness of agility.

The finding of this study revealed that power performance of the players was significantly improved in both groups (small sided game and interval training groups) after 10 weeks of small sided game and interval training. But the magnitude is not equal. SSG training is more effective than interval training than interval training for the fitness of power.

The finding of this study displayed that fitness of flexibility was significantly improved in SSG groups after exposed to 10 weeks small sided game training method. Which means significant change between pre to post test was observed. But the result which scored interval training group was not significant change after 10 week intervention. So there is significant difference between small sided game and interval training groups on fitness of flexibility. So, small side game training is better than small sided game training modality for fitness of flexibility.

5.2 Conclusion

On the basis of the findings of this study, a number of conclusions can be drawn.

- The small-sided games and interval training programs were effective in the development of endurance performance of the participant soccer player.

- Interval training programs were effective in the development of speed performance of the participant soccer player.

- The small-sided games training programs were effective in the development of flexibility and agility performance of the participant soccer player.

- After the ten weeks of training there was significance difference in power cases in both of small sided game and interval training the groups.

5.3 Recommendation

The implication of the study shows that there is a need for the full integration of small sided games in training development by coaches, strength and conditioning trainers and team managers over interval or traditional training method.

More variation of small-sided games could be designed by the coaches to foster the skills improvement of the athletes, as it can benefit all the players in the team including the goalkeeper. Every form of skills related to football could be developed through small-sided games if well employed.

The use of interval training should be much more emphasized when the coaches want improve cardiovascular endurance speed and power. While small-sided games should be given priority during the want to improve the players endurance flexibility agility power with technical and tactical situation.

Coaches, football training centers and academies should to engage small sided game training at least 3 times per week for better improvement of cardiovascular endurance, flexibility, agility and power for football players.

Sport center leaders, coaches, and researchers shall to give emphasis to small sided game as well as interval training program to football projects, training centers even club players and take actions to improve players' better physical fitness enhancement.

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APPENDIX I

INFORMED CONSENT FORM

You will be involved in an interval training program for ten weeks which will involve some exercises on the field and thereafter some test will be carried out. The training will be in stages with a period of relief. The activities will be monitored, timed and recorded. If certain changes exist during the training, efforts will be made to manage the changes accordingly. The results obtained from the training program may assist to identify the cause of poor performance in sports competition and in evaluating the type of training that will be needed for optimal performance. Please note that all information will be confidential and therefore be subjected to statistical analysis for the purpose of the research study.

Any questions about the procedures used in the interval training program and the small sided games or in the sport specific test are welcome. If you have any doubts or questions, please ask further clarifications. Your participation in this training program is voluntary.

I have read through the information provided above and I understand the test procedures that I will perform. I hereby give my consent to participate in this test and training

Name of Participant

_____

Signature of Participant & Date

_____

Name and Signature of the researcher

_____

APPENDIX II

BIO DATA FORM

Intervention group: subject. 1. Name: 2. Age: 3. Training age 4.Grade

5. Height: 6.Weight 7. BMI

YOYOIL2 test for cardiovascular endurance:	
YOYOIL2 test scores in meters (m)	
Trial 1:	
Trial 2:	
Trail 3:	
Typical Score:	

30m acceleration test for speed:	
Speed test scores in seconds./time	
Trial 1:	
Trial 2:	
Trail 3:	
Typical Score	

:

Illinois Agility test for agility:	
Agility test scores in seconds./time	
Trial 1:	
Trial 2:	
Trail 3:	
Typical Score:	

Vertical jump test for power:	
Vertical jump test scores in centimeters (cm)	
Trial 1:	
Trial 2:	
Trail 3:	
Typical Score	

Sit& rich test for flexibility:	
Sit& rich test scores in centimeters (cm)	
Trial 1:	
Trial 2:	
Trail 3:	
Typical Score:	

APPENDIX II-a

Participant's personal profile and test result

Small sided game training group personal profile

VARIABLES	Age	Grade	Sex	Training age	Height	Weight	BMI
SSG 1	18	12	F	4	157	52	21.09
SSG2	19	10	F	4	161	54	20.80
SSG3	18	10	F	4	158	52	20.82
SSG4	17	10	F	4	157	52	21.09
SSG5	17	10	F	4	159	53	20.96
SSG6	18	11	F	4	160	54	21.09
SSG7	17	10	F	4	159	53	20.96
SSG8	19	12	F	3	164	56	21.64
SSG9	18	12	F	3	161	55	21.21
SSG10	18	10	F	3	165	56	20.56
SSG11	18	10	F	3	157	52	21.09
SSG12	18	10	F	3	157	52	21.09
SSG13	18	10	F	3	158	53	21.24
SSG14	18	12	F	3	157	52	21.09
SSG15	19	10	F	4	157	52	21.09
SSG16	18	10	F	3	156	53	21.77

Small sided training group test result/data

variables	Yoyo pre	Yoyo Post	30m speed Pre	30m speed post	Illinois agility pre	Illinois agility pre	Vertical jump pre	Vertical jump pre	Sit & rich pre	Sit & rich pre post
SSG 1	600	840	5.21	5.20	18.78	18.26	38	39	13.00	13
SSG2	400	720	5.39	5.37	19.07	18.76	39	39	12.00	13
SSG3	600	800	5.19	5.11	18.98	19.11	38	38	12.00	13
SSG4	480	720	5.43	5.29	19.39	19.00	36	36	12.00	12
SSG5	600	800	5.02	5.18	18.99	18.30	36	36	12.00	13
SSG6	560	760	5.11	5.09	19.03	19.80	36	37	14.00	14
SSG7	600	800	5.00	5.00	18.98	18.41	37	37	10.00	11
SSG8	440	720	5.89	5.69	20.04	19.99	38	38	15.00	15
SSG9	520	760	5.62	5.59	19.76	19.42	36	37	11.00	11
SSG10	520	760	5.60	5.59	19.06	18.66	36	38	11.00	12
SSG11	560	760	5.58	5.48	19.00	18.89	36	38	11.00	12
SSG12	560	760	5.60	5.56	18.99	18.86	36	38	16.00	16
SSG13	600	840	5.10	5.08	18.70	18.04	39	39	13.00	13
SSG14	600	800	5.00	5.05	18.99	18.22	38	38	13.00	14
SSG15	560	720	5.10	5.07	19.01	18.60	37	38	12.00	12
SSG16	600	800	5.00	5.02	18.90	18.11	38	39	14.00	15

APPENDIX II-b

Participant's personal profile and test result

Interval training group personal profile

VARIABLES	Age	Grade	sex	Training age	height	weight	BMI
It 1	20	12	F	4	167	53	21.00
It2	19	10	F	4	160	54	20.81
It3	18	10	F	4	168	52	20.80
It4	17	10	F	3	160	54	21.01
It5	17	10	F	3	162	53	20.91
It6	18	11	F	4	161	54	21.02
It7	17	10	F	4	159	53	20.96
It8	19	12	F	3	164	57	21.60
It9	18	12	F	3	161	55	21.20
It10	18	10	F	3	166	56	20.58
It11	18	10	F	3	159	52	21.00
It12	16	9	F	3	157	55	21.00
It13	18	10	F	3	158	57	21.18
It14	19	12	F	4	157	52	21.00
It15	19	10	F	4	167	53	21.00
It16	18	10	F	4	157	55	21.64

Interval training group test result/data

Variables	Yoyo pre	Yoyo Post	30m speed Pre	30m speed post	Illinois agility pre	Illinois agility pre	Vertical jump pre	Vertical jump pre	Sit & rich pre	Sit & rich pre post
It 1	600	800	5.81	5.20	18.79	18.79	38	40	13	13
It2	400	640	5.89	5.51	19.00	18.99	39	42	12	12
It3	600	840	5.99	5.71	18.91	18.90	38	38	12	12
It4	480	680	5.63	5.59	19.38	19.52	36	36	12	12
It5	600	760	5.72	5.68	18.90	18.49	36	36	12	12
It6	560	760	5.71	5.69	19.03	19.00	36	37	14	14
It7	600	760	6.00	5.30	18.97	18.25	37	38	10	11
It8	440	720	5.89	5.78	19.06	19.00	38	38	15	15
It9	520	720	5.62	5.59	19.79	19.76	36	36	11	11
It10	520	720	5.60	5.30	19.10	19.06	36	37	11	11
It11	560	720	5.78	5.73	19.07	19.07	36	37	12	12
It12	560	800	5.60	5.56	18.98	18.94	36	37	16	16
It13	600	800	5.80	5.78	18.71	18.88	39	40	13	13
It14	600	760	6.00	5.88	18.90	18.88	38	38	13	13
It15	560	680	5.70	5.27	19.00	19.03	37	38	12	12
It16	600	800	5.70	5.62	18.88	18.77	38	38	14	15

Appendix III-a

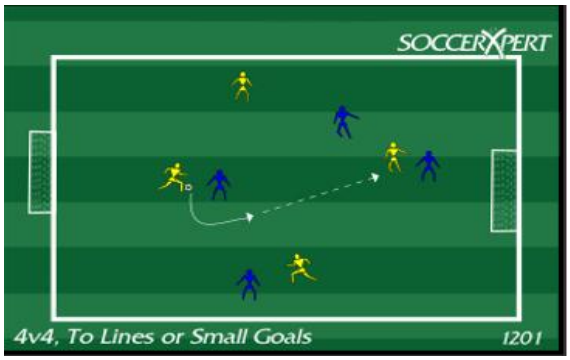
10 week **Training schedule** for the small sided game group soccer players

Week 1-4 4 vs 4 **without goal** **specific objective** intention to possession

Days	Warm up	Activity	Rep	Set	Relief &recover period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n activity	b/n rep				
Monday	Technical training out of intervention								3	
Tuesday	12m	Playing football 4 vs 4	5	1	dynamic	3m	6m	6m		60m
Wednesday	Technical training out of intervention									
Thursday	12m	Playing football 4 vs 4	5	1	dynamic	3m	6m	6m		60m
Friday	Technical training out of intervention									
Saturday	12m	Playing football 4 vs 4	5	1	dynamic	3m	6m	6m		60m
Sunday	Rest									

- Warming up =12m
- Serious Active Exercise Time = 6m (time per activity) x 5(rep) x 1 (set) = 30m
- Relief period (b/n rep) = 3m x 4 =12m
- Cooling down = 6m
- Total training time 12+30+12+6= 60m

✪ **pitch size** 40 x 20m



Appendix III-a

10 week **Training schedule** for the small sided game group soccer players

Week 5-7 3 vs 3 + 2 without goal **specific objective** intention to possession

Days	Warm up	Activity	Rep	Set	Relief &recover period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n activity	b/n rep				
Monday	Technical training out of intervention								3	
Tuesday	13m	Playing football 3 vs 3 +2	6	1	dynamic	3m	5m	7m		65m
Wednesday	Technical training out of intervention									
Thursday	13m	Playing football 3 vs 3 +2	6	1	dynamic	4m	5m	7m		65m
Friday	Technical training out of intervention									
Saturday	13m	Playing football 3 vs 3 +2	6	1	dynamic	3m	5m	7m		65m
Sunday	Rest									

- Warming up =13m
- Serious Active Exercise Time = 5m (time per activity) x 6(rep) x 1 (set) = 30m
- Relief period (b/n rep) = 3m x 5 =15m
- Cooling down = 7m
- Total training time 13+30+15+7= 65m ✪ **pitch size**35 x20m

Appendix III-a

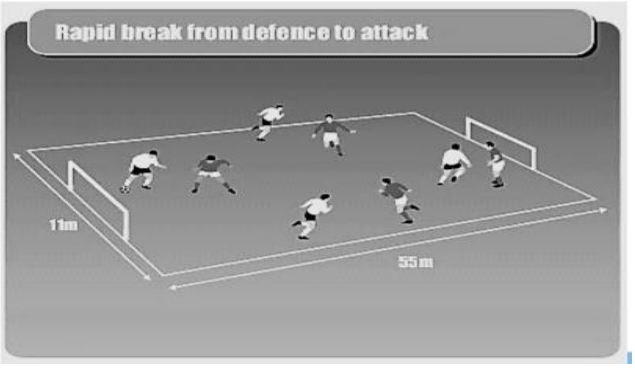
10 week **Training schedule** for the small sided game group soccer players

Week 8-10 4 vs 4 with goal **specific objective** intention score o win

Days	Warm up	Activity	Rep	Set	Relief &recover period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n activity	b/n rep				
Monday	Technical training out of intervention								3	
Tuesday	15m	Playing football 4 vs 4	6	1	dynamic	3m	6m	9m		75m
Wednesday	Technical training out of intervention									
Thursday	15m	Playing football 4 vs 4	6	1	dynamic	3m	6m	9m		75m
Friday	Technical training out of intervention									
Saturday	15m	Playing football 4 vs 4	6	1	dynamic	3m	6m	9m		75m
Sunday	Rest									

- Warming up =15m
- Serious Active Exercise Time = 6m (time per activity) x 6(rep) x 1 (set) = 36m
- Relief period (b/n rep) = 3m x 5 =15m
- Cooling down = 9m
- Total training time 15+36+15+9= 75m

✪ **Pitch size** 40 x 20m



Appendix III-b

Training Schedule

Ten Weeks training program for interval group soccer players' **week 1-3**

Days	Warm up/stretch	Activity	Rep	set	Relief period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n rep	b/n set				
Monday	Technical training out of intervention									
Tuesday	13m	Running 200m	3	4	105-120s	210-240s	35-40 sec.	6m		55m
Wednesday	Technical training out of intervention									
Thursday	14m	Running 200m	4	3	105-120s	210-240s	35-40 sec	7m	3	55m
Friday	Technical training out of intervention									
Saturday	13m	Running 200m	3	4	105-120s	210-240s	35-40 sec.	6m		55m
Sunday	Rest									

Tuesday & Saturday Total covered distance 200m x 3(rep) x 4(set) = 2400m

- ✓ Warming up 13m
- ✓ Serious Active Exercise Time = 40 sec. (time per activity) x 3(rep) x 4 (set) = 480s = 8m
- ✓ Relief period (b/n rep) = 120s x 2 x 4(set) =960s = 16m
- ✓ Relief period (b/n set) = 240s x 3 = 720s = 12m
- ✓ Cooling down = 6m

Thursday Total covered distance 200m x 4(rep) x 3(set) = 2400m

- ✓ Warming up 14m
- ✓ Serious Active Exercise Time = 40 sec. (time per activity) x 4(rep) x 3 (set) = 480s = 8m
- ✓ Relief period (b/n rep) = 120s x 3 x 3(set) =1080s = 18m
- ✓ Relief period (b/n set) = 240s x 2 = 480s = 8m
- ✓ Cooling down = 7m

Appendix III-b

Training Schedule

Ten Weeks training program for interval group soccer players' **week 4-6**

Days	Warm up/strech	Activity	Rep	set	Relief period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n rep	b/n set				
Monday	Technical training out of intervention									
Tuesday	13m	Running 150m	4	4	78-90s	156-180s	26-30 sec.	7m		55m
Wednesday	Technical training out of intervention									
Thursday	13m	Running 150m	4	4	78-90s	156-180s	26-30 sec	7m	3	55m
Friday	Technical training out of intervention									
Saturday	13m	Running 150m	4	4	78-90s	156-180s	26-30 sec.	7m		55m
Sunday	Rest									

Tuesday, Thursday & Saturday

- ✪ Total covered distance 150m x 4(rep) x 5(set) = 2400m
- ✓ Warming up
- ✓ Serious Active Exercise Time = 30 sec. (time per activity) x 4(rep) x 4 (set) = 480s = 8m
- ✓ Relief period (b/n rep) = 90s x 3 x 4(set) =1080s = 18m
- ✓ Relief period (b/n set) = 180s x 3 = 540s = 9m
- ✓ Cooling down = 7m

Appendix III-b

Training Schedule

Ten Weeks training program for interval group soccer players' **week 7-8**

Days	Warm up	Activity	Rep	Set	Relief period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n rep	b/n set				
Monday	Technical training out of intervention									
Tuesday	14m30s	Running 100m	6	4	66-75s	132-150s	22-25 sec.	8m		65m
Wednesday	Technical training out of intervention									
Thursday	16m	Running 100m	4	6	66-75s	132-150s	22-25 sec	9m	3	70m
Friday	Technical training out of intervention									
Saturday	14m30s	Running 100m	6	4	66-75s	132-150s	22-25 sec.	8m		65m
Sunday	Rest									

Tuesday & Saturday Total covered distance 100m x 6(rep) x 4(set) = 2400m

- ✓ Warming up =14m 30 sec.
- ✓ Serious Active Exercise Time = 25 sec.(time per activity) x 6(rep) x 4(set) = 600s = 10m
- ✓ Relief period (b/n rep) = 75s x 5 x 4(set) =1500s = 25m
- ✓ Relief period (b/n set) = 150s x 3 = 450s = 7m 30 sec.
- ✓ Cooling down = 8m

Thursday Total covered distance 100m x 4(rep) x 6(set) = 2400m

- ✓ Warming up 16m
- ✓ Serious Active Exercise Time = 25 sec.(time per activity) x 4(rep) x 6(set) = 600s = 10m
- ✓ Relief period (b/n rep) = 75s x 3 x 6(set) =1350s = 22m 30sec
- ✓ Relief period (b/n set) = 150s x 5 = 750s = 12m 30sec.
- ✓ Cooling down = 6m

Appendix III-b

Training Schedule

Ten Weeks training program for interval group soccer players' **week 9-10**

Days	Warm up	Activity	Rep	Set	Relief period		Duration per activities	Cool dawn	Frequency per week	Total time
					b/n rep	b/n set				
Monday	Technical training out of intervention								3	
Tuesday	13m	Running 50m	8	6	36-45s	118-135s	12-15 sec.	7m		70m
Wednesday	Technical training out of intervention									
Thursday	14m	Running 50m	6	8	36-45s	118-135s	12-15 sec	8m		80m
Friday	Technical training out of intervention									
Saturday	13m15s	Running 50m	8	6	36-45s	118-135s	12-15 sec.	7m		70m
Sunday	Rest									

Tuesday & Saturday Total covered distance 50m x 8(rep) x 6(set) = 2400m

- ✓ Warming up = 13m 15 sec.
- ✓ Serious Active Exercise Time = 15 sec.(time per activity) x 8(rep) x 6(set) = 720s = 12m
- ✓ Relief period (b/n rep) = 45s x 7 x 6(set) =1890s = 31m30sec.
- ✓ Relief period (b/n set) = 135s x 5 = 675s = 11m15 sec.
- ✓ Cooling down = 8m

Thursday Total covered distance 100m x 4(rep) x 6(set) = 2400m

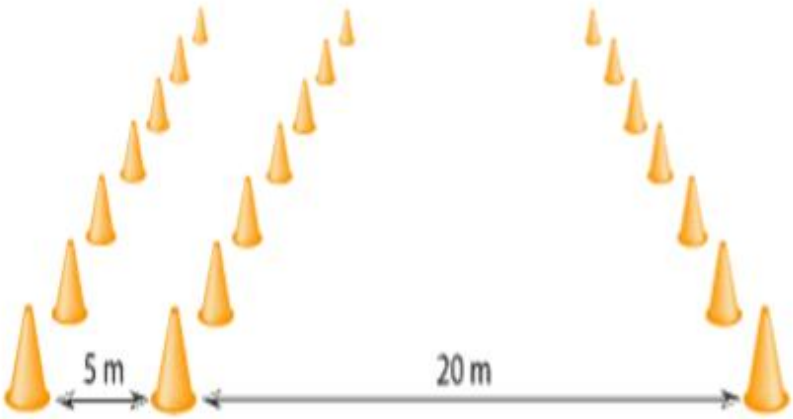
- ✓ Warming up 15m
- ✓ Serious Active Exercise Time = 15 sec. (time per activity) x 6(rep) x 8(set) = 720s = 12m
- ✓ Relief period (b/n rep) = 45s x 5 x 8(set) =1800s = 30m
- ✓ Relief period (b/n set) = 135s x 7 = 945s = 15m 45sec.
- ✓ Cooling down = 7m15sec.

APPENDIX IV

Diagram for test

APPENDIX IV-a

Diagram: Yo-Yo Intermittent Recovery Test Level Ii



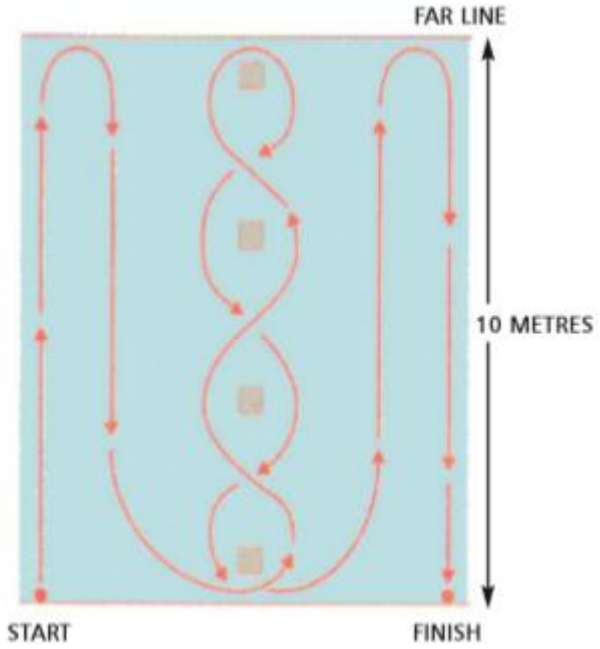
(*Source: Bangsbo, Marcello and Krustrup (2008)*

APPENDIX IV

Diagram for test

APPENDIX IV-b

Illinois agility test diagram



Illinois agility test after (cureton, 1951)

APPENDIX IV

Diagram for test

APPENDIX IV-c

Sit & rich test diagram