THE EFFECT OF SMALL SIDED GAMES OF BASKETBALL ON SOME SELECTED PHYSICAL FITNESS VARIABLES

MSC THESIS

BY

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Acceptance form

I hereby certify that I have supervised, read, and evaluated this thesis titled **"Effects of a Small-Sided Game of Basketball on Some Selected Physical Fitness Variables"** by **Alemayehu Turga,** prepared under my guidance. I recommend the thesis be submitted for oral defense.

Advisor‟s name	**Signature**	**Date**

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We, the undersigned, members of the Board of Examiners of the thesis open defense by _____have read and evaluated his thesis entitled **"Effects of Small Sided Game of Basketball on Some Selected Physical Fitness Variables,** and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for a master's degree.

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Department/School Graduate Committee (DGC/SGC) of the candidate's department.

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Dedication

I dedicate this thesis to God Almighty, my creator, my strong pillar, and my source of inspiration, wisdom, knowledge, and understanding. He has been the source of my strength throughout this program, and only on his wings have I soared. I would also like to recognize Wondwosen Gizaw (Assi Pro), who introduced me to the idea for my thesis. To tell the truth, he is my role model. I also dedicate this work to my beloved family, who have encouraged me attentively with their fullest and truest attention to accomplish my work with truthful self-confidence..

Declaration

The researcher, the undersigned, declares that this research work entitled **"Effects of Small Sided Game of Basketball on Some Selected Physical Fitness Variables** The originality of this thesis is the investigation of the small-sided basketball training that occurred in male U-17 project basketball players using pre- and post-test measurements to compare the experimental and control groups of the players. I solemnly declare that this thesis is my real original work, and it has not previously formed the basis for the award of any degree, diploma, university, or other institution of higher learning except where due acknowledgement is made in acknowledgements.

Name of the author: Alemayehu Turga

Signature: _____

Date of submission: _____

I, the undersigned, certify that I have read and evaluated this thesis entitled **"Effects of a Small-Sided Game of Basketball on Some Selected Physical Fitness Variables,**" prepared under my guidance by Alemayehu Turga. I recommend that it be submitted for defense as fulfilling the thesis requirements.

Advisor: Wondwosen Gizaw(ass.pro)

Signature: _____

Date: _____

Biography

The author, so-called Alemayehu Turga, was born on August 18, 1986, in the western part of the Central Ethiopian Region in the Gurage Zone-specific place of Wolkite City. I attended my primary and junior school at Segome Learning Center and secondary school at Yaberus Secondary and Preparatory School. After successfully passing the Ethiopian school leaving certificate examination, i joined Wolkite University sport science department in 2008 E.C. and graduated with a Bachelor of Science in Sport Science (BSc) in 2010 E.C. On completion, i was employed at Wolkite University from December 20/2011 to December 20/2012 and worked as a graduate assistant I; from December 2012 to 2013, a graduate assistant II; and from December 2013 up to now, I am working as an assistant lecturer.

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Abbreviations

SSGs: Small sided games

CVE: Cardiovascular endurance

IRERC: Institutional research ethics review committee

SNNPR: Southern Nations, Nationalities and Peoples' Region

SPSS: Statistical package for social science

RPE: Rate of perceived exertion

HR: Heart rate

U-17: under the age of 17

Vo2max: maximum oxygen uptake

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Abstract

Small-sided games (SSGs) are modified versions of traditional team sports that are played with fewer players on a smaller field or court. It involves reducing the number of players on each team and adjusting the rules to create a more fast-paced and skill-intensive environment. SSGs are commonly used in training and development programs to enhance player skills, decision-making, teamwork, and fitness levels. However, earlier research has not yet considered the effects of SSG in basketball. The main focus of this study is to determine whether SSGs have a significant impact on these physical attributes: CVE, agility, and speed. A single-factor experimental design was used. Participants underwent a 10-week SSG training program. Pre- and post-intervention, a 2.4 km run test, a T-test, and a 20-meter acceleration test were used to determine the cardiovascular endurance, agility, and speed, respectively. The mean, standard deviation, paired sample t-test, and independent sample t-test were used for statistical analysis. Participants underwent a 10-week SSG training program. Pre- and post-intervention, a 2.4 km run test, a T-test, and a 20-meter acceleration test were used to determine the cardiovascular endurance, agility, and speed, respectively, at 0.05. The result shows that there is a significant improvement between the pre-post results of CVE (M = 14.45', SD = 1.57) and agility (M = 12.86', SD = 1.71); and agility (M = 11.29", SD = 0.75) and agility (M = 9.8", SD = 0.8). On the other hand, there was no significant improvement in speed (M = 3.58", SD = 0.21) or (M = 3.54", SD = 0.24). Therefore, it can be concluded that the 10-week SSG has a significant effect on CVE and agility. These results provide valuable insights for coaches, trainers, teachers, instructors, and other researchers to use as a starting point to incorporate training protocols.

Keywords Small Sided Games, Cardiovascular endurance, Agility, Speed, Basketball

CHAPTER ONE

INTRODUCTION

1.1.Background of the Study

Numerous interconnected factors can influence athletic success. The most important element that directly affects how an athlete's performance improves is training. Sports training is a pedagogical process built on scientific principles, according to Hardial Singh (1991) with the goal of preparing athletes for better performances in sporting events.

Any training program's main goal should be to maximise an athlete's performance both in practice and competition. To do this, coaches and athletes must work together to develop and carry out thorough training plans that assist athletes better prepare physiologically for a given event. Athletes should improve various fitness traits through scientific training in order to succeed in ball games. Modern basketball demands a high level of both general and specific fitness. A match lasts for about 40 minute totals, during which time there are numerous, intense offence and defences. Direct contact with opponents occurs while playing, as players frequently accelerate, pivot, and jump. As a result, choosing the best training programme to improve an athlete's fitness entails understanding how to use various training techniques to promote physiological adaptations (Helgerud et al., 2007)

Basketball is an extremely popular sport all around the world. More people than any other sport in the world choose to watch and play basketball. It is played in streets, high schools, colleges, parking lots, backyards, and professional venues. In 1936, basketball is added to the list of Olympic Sports. Basketball is an athletic game that is often played on a court that is indoor between two opposing teams of five players, with each team attempting to

score by tossing an inflatable ball. The winning team is the one that accumulates the most of these throws through field goals or free throws. Basketball is one of the most popular and widely played sports in the world because of its constant motion and frequent scoring (Somashakar & Sudhakara, 2019).

Basketball is one of the most physically demanding sports since it needs players to move around a lot while performing repetitive sets of extremely strenuous activities that involve both aerobic and anaerobic energy-driven processes (Narazaki, Berg, & Stergiou, 2008).

In order to succeed, basketball players must train physically by enhancing their levels of agility, speed, power, and other skill-related fitness (Apostolidis, Nassis, Bolatoglou, & Geladas, 2004). Basketball physical variables are particularly significant since they affect team performance as a whole. These physical variables include movement skills like sprints, jumps, and flexibility features as well as effective throwing. A successful performance in basketball requires some degree of force in the lower body, upper body, speed, and an overall kinaesthetic that is needed for ball control, according to (Chittibabu 2014 and Sinclair, Coetzee, and Schall 2021).

Basketball players run between 4,500 and 7,500 m per game, engage in up to 1,000 different actions (defence, sprinting, changing direction, jumping, walking, etc.), and make about 45 jumps, according to studies on external load (Ben Abdelkrim et al., 2010; McInnes, Carlson, Jones, and McKenna, 1995). Additionally, only a small number of game sequences last longer than 40 seconds (Barrios, 2002).

Players who are physically fit can handle the physical demands of the game and employ their technical skills more effectively (Babu & Reddy, 2009). Due to the intense competition in basketball, players must be extremely fit. Power, agility, endurance, speed, and coordination are some of the most important physical attributes (Sudha, 2015).

Additionally, the players' anthropometrics, like as their height, arm length, and leg length, are crucial in determining how effectively they play (Torres-Unda, et al., 2013).

Small-sided games (SSGs) are modified game forms in which the coach adjusts the number of players, the design of the field, or some game rules to teach a particular tactical concept to team sports participants (Davids et al., 2013). In terms of tactical behaviour (Clemente et al., 2020), technical execution (Clemente and Sarmento, 2020), or physiological and physical demands, the modification of these restrictions (or conditions) encourages an instantaneous influence on players' responses (Clemente, 2016; Sarmento et al., 2018). The regular application of these practices over a period of weeks is likely to encourage adjustments in players' tactical or technical abilities or their level of fitness (Práxedes et al., 2018a) (Hammami et al., 2018; Moran et al., 2019a; Clemente et al., 2021).

Small-sided games were initially designed as an optimization task to shorten training sessions by addressing a wide range of fitness needs without compromising decision-making or skill performance. As a result, they are widely employed in a variety of soccer codes to enhance technical and tactical performance as well as physical fitness levels (Aguiar et al., 2008; Duarte et al., 2009, Hill-Haas et al., 2008, 2009a, b, c, and 2010).

However, apply this application to basketball-related projects. The number of players involved, the size and shape of the field, the length of exercise and rest periods, the rules of the game, the coaches' encouragement, the availability of balls, or the method of scoring points can all affect or manipulate the intensity of these basketball-specific training drills with the ball to provide different physical, technical, and tactical responses, (Hill-Haas et al., 2009a).

As a result, basketball is a sport that requires speed, agility, flexibility, dynamic balance, explosive power, and anaerobic and aerobic training. Players need high agility, speed, and balance along with good cardiovascular endurance to be effective in the court during training and competition. A player's ability to move quickly and change directions quickly on the court allows them to be more effective on both offence and defence. Additionally, players with good CVE are able to move quickly and consistently across the court to compete at the level of competition required. Therefore, the ultimate of this study will be to examine the effect of small sided games of basketball training on CVE, agility and speed in Wolkite U-17 male basketball project players.

1.2.Statement of the Problem

Small-sided games in basketball have been studied to analyze their effects on the physical, technical, and positioning performance of young players (Sogand et al. 2020). The number of players, court size, and work-to-rest ratios has been found to influence the demands of small-sided games (Markus et al. 2015). These games have been shown to increase the technical, physiological, and physical demands on players, with fewer players resulting in higher demands (Laura et al., 2021). However, the effects of small-sided games on the tactical behaviour and skill efficacy of novice players have not been fully explored (Chen et al., 2015). Further research is needed to determine if the training-induced effects of small-sided games are significantly better compared to other approaches (Rui, Zhao, Hailin, & Wu, 2021). The development of small basketball has been flourishing and has been found to enhance children's physical fitness and cultivate good exercise habits.

Small-sided game training has been found to have a positive impact on the skills of basketball players. It has been shown to improve harmonic abilities and basic skills, such as control dribbling and shooting skills (Ahmed et al., 2023; Brett, Carter, & Jiling, 2023) enhance technical skills, including the number of dribbles performed (Erşan et al., 2022), the development of offensive and defensive tactical-technical actions, such as space creation without the ball, and the frequency of closeouts and double-teaming (Sogand et al., 2020). Furthermore, small-sided games have been found to improve physical performance, such as agility-based technical responses and sprint times (Sarah et al., 2022). Additionally, small-sided game training in basketball can lead to marked improvements in cardiovascular and musculoskeletal fitness, making it suitable for recreational settings (Sogand et al. 2020). Furthermore, small-sided games with different rules can be used to train different tactical behaviours important to formal games,

providing versatility in training approaches (Sarah et al. 2018). Overall, small-sided game training provides a comprehensive approach to skill development for basketball players, improving both the technical and physical aspects of the game. However, how and which small-sided game grid is still controversial. Even though it's worthwhile to assess the current training in local contexts and evaluate its effectiveness in improving player performance, additionally, further research is needed to determine the optimal duration and frequency of small-sided game training sessions for maximum benefit.

Little is known in local studies on the effect of small-sided games. While I participated in national and club competitions, our national team and my clubs did not apply such training methods. I later realized the importance of incorporating them into our routine. These training methods not only enhanced our performance but also helped us stay ahead of our competitors.

However, according to the researcher's view from experience in our country, specifically at the regional and local level, different levels of training projects have a big problem of understanding and applying these training methods in their training programs. Since 2012 G.C., the researcher has been playing basketball through experience and observation as a player. The researcher has had the opportunity to work with several coaches at each level over the previous ten years as a basketball player for the wereda, zone, region, club, and Ethiopian national team, but nearly no coach used small-sided game training in their training program. In addition, many coaches and professionals struggle with a clear understanding of the advantages and ultimate purpose of small-sided game training. And also, the researcher can't get enough research on this title in our country. The researcher selected this topic, and the purpose of the study will be to examine the effect of small-sided

game training on some selected physical fitness variables like cardio-vascular endurance, speed, and agility of male U-17 male basketball project players in Wolkite City.

However on the researchers searching limitations, knowledge, and experience the researcher didn't gain the relevant studies included show the effect of ten-week small sided game training on basketball cardiovascular endurance, agility, and speed, lack of relevant study in basketball, and specifically in Ethiopia, and the study area initiates the researcher to conduct. Therefore it is pragmatic to study the effect of 10-week small sided game training on CVE, agility, and speed in Wolkite city male U-17 basketball project players.

1.2.1.Research hypothesis

H0: Small-sided game training has not significantly affect the cardiovascular endurance performance of basketball players.

H1: Small-sided game training has significantly affect the cardiovascular endurance performance of basketball players.

H0: Small-sided game training has not significantly affect the agility performance of basketball players.

H1: Small-sided game training has significantly affect the agility performance of basketball players.

H0: Small-sided game training has not significantly affect the speed performance of basketball players.

H1: Small-sided game training has significantly affect the speed performance of basketball players.

1.3. Objectives of the Study

1.3.1 General Objective

The general objective of this study was to investigate the effects of ten weeks SSG training on CVE, agility, and speed.

1.3.2 Specific objectives

The specific objectives of the study was:

- To examine the effect of ten-week SSG training intervention on the CVE of male U-17 basketball project players.
- To determine the effect of ten-week SSG training intervention on the agility of male U-17 basketball project players.
- To evaluate the effect of ten-week SSG training intervention on the speed of male U-17 basketball project players.

1.4.Significance of the Study

The main significance of this study was to cross check the effect of small-sided game training on CVE, agility, and speed in Wolkite City basketball players and bring solutions as much as possible. Besides this, the study will intend to signify the following importance:

- ✓ This study will be helpful to the coaches in training athletes to improve their Agility, CVE and Speed.
- ✓ This study will be necessary to address the players and coaches who are not having adequate information about those trainings. It provides meaning full information for players who involves on small sided game training for the improvement of CVE, speed, and agility.

- ✓ It may help in formulating suitable SSGs training in a conditioning schedule for the athletes to improve the physical fitness level and performance enhancement in competition events.
- ✓ This training program will be used as a motivational factor other than SSGs training and is concerned with improving physical fitness.
- ✓ This research work will also serve as a landmark for other researchers that might be interested in doing related research on basketball.

1.5. Scope of the Study

The study was focused on examining the effects of 10-week small sided game training on cardiovascular endurance, agility, and speed in the case of Wolkite City U-17 male basketball project players, which is located in the central Ethiopian Region, Gurage zone.

This study was delimited to Wolkite City U-17 male basketball project players, aged between 14 and 16 years old. Selected dependent variables were speed, CVE, and agility, whereas independent variables were delimited to small-sided game training. The study was conducted in the years 2022–2023 G.C.

1.6. Limitation of the Study

While conducting this study, the researcher recorded some draw backs/ limitations as follows:

- ➢ The researcher could not control the diet and other psycho-social conditions, which might have influenced the results. Since the players were belonging to different culture and socioeconomic background. however, the researcher could not consider this while planning the content of the experimental intervention
- ➢ Mainly the absence of scientific test measurements like speed sense of machine (timing gate). It is difficult to measure the exact time that was taken by using

stopwatch. Because the fraction of seconds that missed during the test could affect the study

- The weather condition was one limitation because in the training time most of the time it was raining i.e the court was not comfortable for the training.
- Lack of adequate published literature related to the issue and the researcher experience.

However, the researcher managed and tried to manage those limitations by creating aweairness ,established restrict rules and creat consusus with family,coaches and trainees.

1.7. Operational Definitions

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

Wolkite City U-17 Male basketball Project Players: basketball players who are engaging at Wolkite city in the age between 14-16 years.

Physical Fitness Variables: are variables that very important in basketball players and form a condition for higher performance.

1.8. Organization of the Study

This study was organized based on common scientific procedures. The research consisted of five chapters. Chapter one deals with the introduction, consisting of the background of the study, statement of the study, research questions, objectives, significance, delimitations, limitations of the study, operational definition, and organization of the study. Chapter two is all about the reviews of related literature. Chapter three deals with the methodology of the study, the research design, source of data, participants, sampling size and sampling technique, an instrument of data collection, procedures, data analysis method.The fourth chapter had included the results and discussion of the data. The last

chapter had presented a summary, conclusion and recommendations. Finally, references and appendixes has been attached to the last part of the study report.

CHAPTER TWO

REVIEW OF RELATED LITRATURE

2.1 Small Sided game trainings in basketball

In the past ten years, game-based conditioning has emerged as a new method for improving team-sport athletes' fitness. The benefits of game-based conditioning are said to include increased physiological adaptation transfer when the exercise simulates sports-specific movement patterns (Baechle & Earle, 2008), the simultaneous development of technical and tactical skills under intense physical demands (Gabbett, Jenkins, & Abernethy, 2009), and increased motivation of athletes who engage in sport-specific rather than conventional conditioning (Stone & Kilding, 2009). Small-sided games used for sport-specific conditioning have been thoroughly studied in team sports like football (Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011), rugby (Gabbett, 2006; Gabbett, Jenkins, & Abernethy, 2010; Gamble, 2004), and handball (Buchheit et al., 2009), but basketball has received less attention, (Castagna, Impellizzeri, Chaouachi, Ben Abdelkrim, & Manzi, 2011; Sampaio, Abrantes, & Leite, 2009). Given that small-sided games are used pretty entirely in both junior and senior programs, it is surprising that there are so little research papers on basketball training. Sport-specific conditioning can boost physical fitness just as much as or even more than conventional conditioning exercises (Gabbett et al., 2009; Hill-Haas et al., 2011; Stone & Kilding, 2009). Game-based conditioning can lead to improvements in skill execution, which can lead to increases in performance in competition (Gabbett, 2006; Gabbett et al., 2009). Given the potential benefits of small-sided basketball games for developing both skills and conditioning, it is crucial to identify (under controlled circumstances) training prescription variables that affect the relative

contributions of the physical (movement patterns), physiological (cardiovascular), and technical (skill repetition) demands of different small-sided basketball games.

As they develop multiple aspects (such as technical/tactical and physical/physiological factors), SSGs can be crucial in the development of young and youth team sports (Fernández-Espnola et al., 2020). These drills may in fact provide players with a multifaceted stimulus while maintaining their focus on particular tactical elements of the game (Ometto et al., 2018). Depending on the player's age group, skill level, and level of fitness, SSGs have varying effects on young and youth team sports players (Olthof et al., 2018; Práxedes et al., 2018b). However, since they are participating in a modified game that preserves the core dynamics and unique characteristics of their sport, SSGs may encourage changes in players' physical, tactical, and technical performance (Davids et al., 2013).

A different method of developing a player's aerobic fitness while preserving other crucial basketball skills, like agility, speed, reaction time, and hand-eye coordination, is small-sided game-based basketball training. The amount of time spent exercising with the ball will be optimized while maintaining a high level of motivation (Buchheit et al., 2008). In contrast to traditional games, small-sided game training or skill-based training frequently uses modified games on smaller pitches with altered regulations and fewer players.

SSG is currently one of the training drills that both amateur and professional teams employ the most frequently to increase physical fitness while also improving technical and tactical proficiency. (Hill-et al., 2011). Recent research on the physiological reactions of SSG in team sports showed that a significant level of neuromuscular and metabolic stress can be achieved during SSG, with mean heart rates (HR) typically exceeding 80% of HR max and blood lactate concentrations above 6 mm/l. Accordingly, SSG seems to be a successful

approach for several team sports components (i.e., physical, technical, and tactical skills) while also ensuring a high level of motivation (Los et al 2015).

Future elite players will be prepared with the fundamentals of superior technical, tactical skills at the beginning stage of youth basketball programs. Basketball in the present day has both physical and mental demands. A well-organized young basketball development program is therefore essentially required. Youth athletes must be developed and trained under such a continuous and systematic program for a country is to be successful and competent in sport at the continental and international levels. Schools and youth sports projects are the locations where programs need to be created, implemented, and managed.

2.2. SSG in basketball and its importance

Small-sided games (SSGs) in basketball refer to modified versions of the sport that are played with fewer players on a smaller court. Instead of the traditional 5-on-5 format, SSGs involve teams with 3-on-3 or 4-on-4 players, utilizing a reduced playing area. These modified games have gained popularity in basketball training and development programs due to their numerous benefits in skill acquisition, tactical understanding, and physical conditioning.

- One important aspect of SSGs in basketball is their ability to enhance player skill development. By reducing the number of players on the court, individuals have more opportunities to handle the ball, make decisions, and execute various offensive and defensive moves. This increased involvement and active participation can lead to improved dribbling, shooting, passing, and defensive skills (Garganta, 2009). Additionally, the smaller court size allows for more frequent player interactions, encouraging quicker decision-making and promoting creativity in finding scoring opportunities (Hughes & Franks, 2004).

- Another advantage of SSGs is their effectiveness in developing tactical understanding and decision-making abilities. With fewer players on the court, players have more space to read and react to the game, improving their spatial awareness, court vision, and ability to make effective decisions under pressure (Ferraz et al., 2012). The reduced numbers also facilitate greater communication and teamwork, as players must work together more closely to achieve success (Bloomfield et al., 2018).
- Furthermore, SSGs provide an opportunity for players to improve their physical conditioning. The small-sided format often leads to higher-intensity and more frequent bursts of activity, resulting in increased aerobic and anaerobic demands (Kelly & Drust, 2009). The fast-paced nature of SSGs promotes cardiovascular endurance, agility, speed, and overall fitness levels (Impellizzeri et al., 2006)

2.3. Agility

In team sports, agility isn't just about being able to change direction quickly; it also includes the capacity to read and respond to specific game scenarios, predict the opponent's movement, and read the game (Gamble, 2013). Because different sports events are flexible and the situation might alter at any time, actions that are performed frequently and quickly can begin under a variety of circumstances. Agility is categorically defined as "rapid whole-body movement with change of velocity or direction in response to stimuli by (Sheppard & Young, 2006). Therefore, agility includes not only the ability to change directions but also perception and decision-making in the context of team sports.

Basketball agility drills are a good approach to increase speed since they make athletes lighter on their feet and enhance their coordination and balance. Basketball is a game of frequent starts, stops, sprints, and rapid direction changes.

Importance of agility in basketball

- Make sharper cuts for the ball
- Make quicker basketball moves
- Stick with their player on defence
- Sneak through openings between players to grab rebounds
- Avoid unwanted contact
- Chase down loose balls
- Make defensive stops from the help side

2.4 Speed

Speed in basketball refers to the ability to move quickly and cover distances in a short amount of time. It plays a crucial role in various aspects of the game, including offense, defense, transition play, and overall performance. Here are some key points highlighting the importance of speed in basketball:

Fast Break Opportunities: Speed enables players to quickly transition from defense to offense, creating fast break opportunities. According to a study conducted by Sampaio et al. (2015), faster players were more successful in fast break situations, leading to increased scoring chances and overall offensive efficiency.

Beat Defenders: Speed allows players to blow past defenders, create separation, and drive to the basket. A study by Sarmento et al. (2014) found that faster players had a higher success rate in one-on-one situations, indicating the significance of speed in beating defenders and creating scoring opportunities.

Defensive Agility: Speed is crucial for defensive purposes, as it helps players close out on shooters, contest shots, and stay in front of opponents. According to a study by Scanlan et

al. (2015), defensive speed was positively associated with defensive performance, including steals, deflections, and overall effectiveness in disrupting the opposing team's offense.

Transition Offense: Speed allows players to quickly advance the ball up the court, leading to effective transition offense. A research paper by Vaquera et al. (2016) highlighted the importance of speed in transition play, as faster teams were more likely to score and had a higher overall offensive efficiency.

Recovery and Help Defense: Speed is valuable for recovering on defense and providing help defense to teammates. Quickness in closing out passing lanes, rotating, and contesting shots can disrupt the opposing team's offense. A study by Cepero et al. (2016) indicated that faster players demonstrated better performance in defensive recovery and help defense situations.

Overall Performance and Versatility: Speed contributes to a player's overall performance and versatility on the court. It allows players to excel in various positions, contribute in multiple roles, and adapt to different game situations. A study by Farrow et al. (2017) emphasized that speed was one of the key attributes associated with successful performance in basketball.

2.5 Cardiovascular endurance

This refers to the ability of the heart and lungs to meet the demands of the body. By measuring heart rate/pulse and blood pressure, this can be evaluated both at rest and in response to aerobic exercise. A lower heart rate and blood pressure generally signify improved cardio respiratory fitness and more effective cardio respiratory functioning. Training for an aerobic activity suggests that the program is intended to enhance the oxygen delivery system. Having an adequate supply of oxygen to the working muscles

during basketball games and practices is essential, as is the ability of these tissues effectively utilizes the oxygen provided by the circulatory system(Wolters K, 2018).

Thus, aerobic exercise has both central and peripheral effects, increasing cardiac output and blood circulation as well as the muscle's capacity to absorb and use oxygen. The training stimulus's duration, intensity, and frequency are its three dimensions. The ability to exercise for longer at a given intensity than was previously possible is a sign of an improvement in aerobic fitness. Focusing on either the length of training sessions or their intensity can help athletes improve their endurance, which refers to the capacity to continue exercising for an extended period of time. 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).

2.6 Variables Affecting SSG Intensity

Players' movements and/or physiological and perceptual responses can serve as indicators of the exercise intensity of SSGs. The intensity of the workout during SSGs may be influenced by a variety of prescriptive factors that the coach can manage.

2.6.1 Pitch Area

Basketball SSCGs may be more intense depending on the overall court area, both in absolute and relative terms (Hill-Haas et al., 2011). The entire pitch area divided by the total number of players yields the relative pitch area per player. There is evidence from both trials that a greater area enhances HR responses and perceived exertion (Atli, Koklu, Alemdaroglu, and Koc, 2013; Klusemann et al., 2012). Despite the shortage of studies in basketball, comparable results have been discovered in SSGs from soccer (Rampinini et al., 2007; Williams and Owen, 2007). Because each player must cover a greater area and

have fewer opportunities to rest, larger courts may result in higher heart rates and blood lactate concentrations (Clemente, Lourenc o FM, and Mendes, 2014). According to Klausemann et al, (2012) court size had less of an impact on technical requirements than game format. However, compared to full-court games, half-court games produced about 20% more passing and technical components overall. Similar research demonstrated that half-court games had statistically higher frequency of shoots, rebounds, and passes (Atli et al., 2013).

2.6.2 Number of players

The intensity of this training mode can also be adjusted by changing the number of players on each team in an SSG. Studies that examined the impact of changing the player count on the level of SSG straining intensity changed the player number while keeping the pitch size constant. In summary, the majority of research has demonstrated that SSGs with lower numbers of players elicit increased HR, blood lactate, and perceptual responses despite significant methodological problems (extremely short game duration; different work: rest ratios). After further examination, the findings point to the potential presence of a threshold pitch area. For instance, when two vs two was increased to three versus three, and when three versus three was expanded to four versus four, the HR was reduced most noticeably. (Sampaio, Abrantes, and Leite,2009); (Delextrat and Kraiem,2013); (Klusemann, Pyne, Foster, and Drinkwater,2012); and (Castagna, Impellizzeri, Chaouachi, Ben Abdelkrim, and Manzi,2011), For 2-on-2 games, HR intensity ranged from 86 to 90% HRmax; for 3-on-3 games, it was between 86 and 87% HRmax; for 4-on-4 games, it was between 83 and 87% HRmax; and for formal format games (5 players per team), it ranged from 82 to 90% HRmax.

SSGs with teams with different numbers of players are frequently used (e.g. four vs. three players or six vs. five). Technical advancement and player availability due to injury are two factors that can cause an imbalance between opposing teams. Making temporary "overload" and "under load" situations between competing teams by using a "floater" player is another variant of player number. This neutral player switches to the team with the ball to temporarily increase and decrease the physical load on the "floating" player. This SSG game design is often employed to improve defensive or offensive proficiency (Hill-Hass et al., 2011).

2.6.3 Rule Modifications

In order to accomplish a physical and tactical purpose, trainers frequently modify the regulations and create special conditions during training sessions. These changes are intended to improve players' perceptions of some tactical acquisitions (Davids, Araujo, Correia, and Vilar, 2013). Because of this, it's also critical to take these individual alterations into account as a significant factor affecting physiological, physical, and tactical needs. There were no statistically significant differences in mean heart rate, blood lactate, or peak blood lactate when man-to-man and zone defences were compared in international and national games, showing that the defensive strategy had no discernible effect on physiological responses (Abdelkrim, Castagna, Fazaa, and Ati JE, 2010). The time spent in sprint and overall recovery, both of which were longer in man-to-man style, revealed significant statistical differences (Abdelkrim et al., 2010). Basketball coaches use dribbling as one method of increasing the intensity of training as well. To enhance and decrease the training intensity, they prevent dribbling or place a cap on the number of dribbles.

2.6.4 Training Regimen (Including Game Duration and Work: Rest Ratios)

Similar to interval running, the intensity of exercise may be changed in SSGs by adjusting a number of prescriptive variables. The majority of the research has made use of the conventional "interval" training method, which involves playing SSGs repeatedly followed by periods of active or passive relaxation. The length of each SSG bout interval, alternated with pre-planned rest intervals, is utilized to calculate the work-to-rest ratios. Although short rest intervals have been utilized to prescribe SSG bouts in the majority of studies looking at SSGs, some newer studies have used continuous SSG formats with varying durations (e.g. 10–30 minutes). Unfortunately, past research has not consistently used work-to-rest ratios, and there is a wide range in length, duration, and number of work bouts and rest intervals between studies, making comparisons challenging. For instance, an SSG "interval" training prescription that provides for a 1-3 minute work session followed by a 12-minute break has an extremely low work-to-rest ratio (1: 4) and a very low overall game duration (Hill-Hass et al, 2011).

2.6.5. Logistics and Planning

Coaches should also take into account the logistical issues involved in planning SSGs training, since these may have an impact on player motivation and training intensity. For instance, if the goal is to utilize evenly balanced teams, the total number of players eligible to participate in every session will determine the number of SSG teams that can be established as well as the type of games executed Little, (2009) In practice, coaches frequently want to set up "competitive playing structures," which typically call for all SSG teams to play each other an equal number of times throughout a session. This kind of playing structure is considered to boost motivation levels by increasing competitiveness and emphasizing outcomes, but this has not yet been scientifically proven. The selection of

an improper training routine and, thus, a subpar training stimulus, may occur as a result of the overuse of a competitive playing framework. This could undermine long-term training adaptations if it happens frequently. Coaches are advised to choose SSGs carefully as a result (Hill-Hass et al, 2011).

2.7. Physical Fitness Concept and Techniques

Physical fitness, as defined by Rani R (2021), is a condition of health and well-being and, more particularly, the capacity to engage in certain activities related to sports, jobs, and daily living. The three pillars of physical fitness: a healthy diet, moderate-intense exercise, and adequate rest. Fitness was once understood to be the ability to complete the day's tasks without becoming excessively exhausted. Physical fitness is today viewed, however, as a measure of the body's capacity to perform effectively and efficiently in work and leisure activities, to stay healthy and fight hypokinetic disorders, and to respond to developing conditions as a result of automation and changes in lifestyle.

The quality or state of being fit is referred to as fitness. The use of the word "fitness" in Western grew by a factor of 10 around 1950, possibly in line with the industrial revolution and the treaties of World War II. Modern definitions of fitness refer to a person's or a machine's ability to carry out a particular task or, more broadly, to a person's capacity to adapt to various environments. Due to the correlation between physical fitness and attractiveness, the global fitness and fitness equipment sectors have been stimulated. Regarding a particular function, fitness is defined as having significant anaerobic and aerobic capacity, such as strength or endurance. Instead than focusing on just one area of fitness, such only weight training or only cardio/respiratory endurance, a person will benefit from a well-rounded fitness program.

One or more specific skills, age- or health-related demands, such as bone health, are often the emphasis of a complete fitness program designed specifically for a person. In addition to physical fitness, several sources stress the importance of mental, social, and emotional wellness. This is sometimes shown in textbooks as a triangle with three points that stand for physical, emotional, and mental fitness. Many chronic health disorders brought on by an unhealthy lifestyle or age can be prevented or treated with physical activity. Exercise can also improve some people's quality of sleep and may even benefit some people with mood disorders.

2.8. Types of Physical Fitness

According to Hoeger, W. W. et al. (2018), it became obvious that a number of distinct factors contribute to a person's overall level of fitness as the fitness concept grew at the end of the twentieth century. Health-related and skill-related physical fitness are the two categories. Physical fitness for health refers to the capacity to carry out everyday tasks without feeling overly tired out and is associated with a low risk of premature hypokinetic disorders. Cardiorespiratory (aerobic) endurance, muscular fitness (muscular strength and endurance), muscular flexibility, and body composition are the components of fitness that are associated with health. Agility, balance, coordination, reaction time, speed, and power are skill-related fitness factors.

These components mostly have an impact on how well athletes perform in sports and with their motor skills. Skill-related activities help with physical fitness, but when it comes to well-being and general health promotion, the focus of physical fitness programs should be on health-related components. It also emphasizes elements that support optimum health, prevent the development of disease, and address issues related to activity (Mason, M. 2009).

2.8.1 Health-Related Physical Fitness Components.

Physical fitness is crucial to leading a healthy and fulfilling life, (claims Amal C. Bose 2021). Physical fitness that is tied to certain aspects of health is known as health-associated fitness. The main factor affecting this kind of physical health is people's exercise habits. This makes it a dynamic state that is subject to change.

Cardiorespiratory endurance (cardiovascular endurance), muscular endurance, muscular strength, flexibility, and body composition are the five elements of health-related physical fitness. These lower the risk of hypokinetic diseases and are closely associated with good health. Each of the health-related fitness elements is crucial in moderation for disease prevention and health promotion. The degree of skill performance is directly correlated with a higher level of health-related fitness. A high level of muscular strength helps to improve performance in weightlifting, powerlifting, and throws, for example, while a moderate level of muscular strength is needed to maintain posture and prevent knee, back, or neck pain, etc.

Cardiovascular Endurance/ Cardio-Respiratory Endurance

How effectively your heart, blood vessels, and lungs supply oxygen-rich blood to working muscles during physical activity is referred to as cardiovascular endurance. Due to the heart's inability to efficiently provide blood to various body areas, a lack of cardiorespiratory fitness may hinder daily activities. Exercise that involves prolonged cardiorespiratory effort is also known as aerobic exercise. Examples include cycling, jogging, swimming, and walking. A person's cardiorespiratory endurance is a sign of their general physical health. For the muscle to function correctly during prolonged or high-intensity workouts, it needs a sufficient supply of oxygen and other nutrients. Lack of nutrients causes waste products to build up in the muscle, which leads to tiredness.

Muscular endurance

Muscle endurance is the capacity of muscles to work for a prolonged period of time without becoming fatigued. A muscle's or a muscle group's capacity to continuously and repeatedly apply force against resistance over an extended period of time is referred to as muscular endurance. It is crucial to the physical demands of the day. Planks, squats, sitting, pull-ups, walking lunges, and other exercises can help you build more muscular endurance. Muscular endurance in resistance training activities refers to the number of repetitions of a specific exercise you can perform before stopping and taking a break. You can measure this by seeing how many sit-ups or squats you can complete..

Muscular strength

It is the capacity of a muscle to apply force to a resistance while making a single, maximal effort. The maximum amount of force a muscle can create in one single contraction. Moving and lifting objects are related to muscular strength. It is determined by the amount of force you can generate and the amount of weight you can raise quickly.

Body composition

Body composition, as defined by Kotecki, J. E. (2011), is the ratio of fat mass to fat-free mass (muscle, bone, organs, and water) in the body. The proportion of body fat is a common metric used by health professionals to evaluate health concerns. The majority of medical specialists concur that body fat percentages between 10% and 25% and 20% and 30% for men and women, respectively, are regarded as below average or average hazards, despite the fact that there are no exact criteria standards for the ideal body fat percentage. Focusing on consistent physical exercise (including both aerobic and resistance training) and eating a balanced, nutrient-rich diet is the greatest method to develop and maintain a healthy body composition. You may prevent the effects of creeping obesity and the

detrimental effects of frequent weight gains and reductions by putting your attention on these two key areas.

Flexibility

Stretching exercises can be viewed as the means by which to help build flexibility, according to Morc Coulson & David Archer, (2009). Flexibility has frequently been defined as the capacity to move a joint through its full range of motion. In the sense that a person may be flexible in one joint but not another, flexibility can be thought of as joint-specific. Stretching exercises come in a variety of forms. Static, dynamic, ballistic, and PNF (proprioceptive neuromuscular facilitation) are a few of these that can be used to preserve or extend joint range of motion. Stretching is widely advised as a means of injury prevention, despite the fact that flexibility is a fitness characteristic that is frequently examined.

2.8.2 Skill-Related Physical Fitness Components

Skill-related physical fitness is a component of fitness that has association with improved performance in athletic activities. Skill-related fitness factors are essential for success in sport. These are:-

Agility - the ability to change the position of the body quickly and with control. This helps team players escape their opponents.

Balance - the capacity to keep the center of mass above the base of support whether moving or standing still (static balance) (dynamic balance). This keeps game players from falling over quickly and aids gymnasts in maintaining their balance.

Co-ordination - the use of two or more body parts together This makes it easier for all athletes to move rapidly and smoothly, especially while controlling a ball.

Power - the capacity to use strength quickly. This enables sportsmen to sprint, throw long, and jump high. Strength x speed equals power.

Reaction time: - the interval between the stimulus's presentation and the beginning of a movement this aids swimmers in getting off to a quick start.

Speed: - the difference between how quickly someone can move or perform a movement or travel a distance in a certain amount of time. This enables all players to get into position or rapidly escape opponents.

(https://www.bbc.co.uk>bitesize>guides>revision).

2.9. Effects of SSG on sprint, agility

Strength, power, speed, and agility are explosive, short-duration, high-intensity actions that, especially during key periods of competition, are crucial to success in team sports (Faude, Koch, and Meyer, 2002). Coaches and athletes in team sports are very interested in the growth and development of these specific physical abilities. Studies have focused on the effect of SSG on several traits. In comparison to a specific change of direction training program, it has been demonstrated that six weeks of SSG training in young soccer players improved agility tests with the ball (Chaouachi et al., 2014). In addition, research has demonstrated that U-18 Australian Rules football players' reactive agility and decision-making speed improved after 7 weeks (2 sessions/week) of SSG training compared to change of direction training throughout the season. Rugby league players that participated in a 9-week SSG training program (2 sessions/week) showed larger improvements in sprint performance than those who participated in standard conditioning (i.e., running exercises with no skill component), (Young and Rogers, (2014); Gabbett, 2006).

CHAPTER THREE

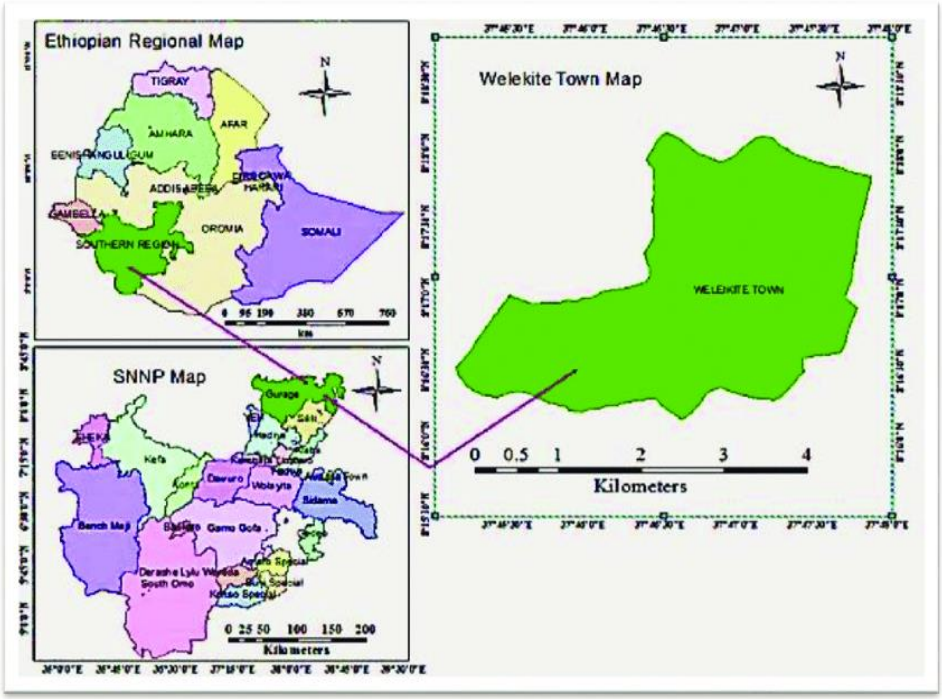
MATERIALS AND METHODS

3.1. Study Area

The study was conducted in the Central Ethiopian Regions (Gurage Zone, Wolkite City Administration) in wolkite city U-17 male basketball project players. From February 15, 2023, to April 15, 2023. Welkite (also transliterated Wolkite) is a town and separate wereda in south-western Ethiopia. The administrative center of the Gurage Zone of the Central Ethiopian Region , the town has well over 150 years of age. This town has a latitude and longitude of 8°17′N, 37°47′E, and an elevation between 1910 and 1935 meters above sea level. It is surrounded by Chehaa Wereda.

According to the Central Statistical Agency's 2007 Census, this town has a total population of 28,866, of which 15,074 are males and 13,792 are women. 48.17% of people in the area claimed to be Ethiopian Orthodox Christians, making up the majority of the population. The remaining percentages were Muslims (42.31%), Protestants (7.86%), and Catholics (1.34%).

Figure 1:map of Wolkite city



Source: https://www.google.com/search

3.2. Study Design

To manipulate the treatment on the independent variable and observe the change on the dependent variable, a single factor experimental design was used. Both the experimental and control groups got pre- and post-tests on CVE, agility, and speed, including the 2.4 km run test, T-test, and 30 m speed run tests. The ten-week training program was only available to the experimental group.

The main purpose of this study was to determine the effects of small-sided game training on some selected physical fitness variables of basketball players. In the case of the *Wolkite City* U-17 male basketball project players, the research design for this study was an a single factor experimental design involving quantitative data. The research methodology used in this study was an experimental design, depending on the type and appropriateness of the pre- and post-test data. Because it makes it easier to measure, evaluate, assess, and

analyze how an independent variable affects a dependent variable. The single factor experimental design was therefore chosen because, among all of the possible research methods, it is the most effective at proving cause-and-effect correlations between variables. Both groups participated in their three daily basketball practice sessions as usual, but the experimental group also participated in a SSGs training schedule.

This study's structure is as follows:

Table 1:Training program layout of experimental groups

Treatment	Small sided game training
Training weeks	10 weeks
Session	Small sided game training
Duration of session	44-47 minutes
Intensity	Low, moderate, and high (progressively increase throughout the session)
Exercise days	Monday, Wednesday, and Friday
Training (1vs1, 2Vs2 and 3Vs3) and place Wolkite city basketball court	The same
Training method	Repetition and Interval

3.2. Study Population

The target population of this study was Wolkite City male U-17 basketball players. All 16 basketball players and two head coaches are the population of the study. The total population consisted of 16 male basketball players.

3.3. Sample Size and Sampling Technique

Random sampling technique is used to categorized 16 male basketball players who are currently engaged in this project. Therefore, the researcher grouped eight individuals by using random sampling method for the experimental group and the other eight for the control group.

3.4. Method and procedure of data collection

3.4.1 Data Collection Instrument

For this study, the primary source of data was the players' test results. Test measurements were used by the researcher as a data gathering tool because the study is experimental. As a result, the researcher used a variety of tests, involving pre- and post-tests. Here, a pre-test was administered prior to the researcher's intervention, and a post-test was administered after the treatment or intervention had been completed. Throughout the field study, the researcher made use of the following tools: The same tools were used for training and testing: a watch, measuring tape, pen, paper, flag, meter, record sheet, and whistle.

3.4.2 Procedure of Data Collection Instrument

The data collection procedure was carried out through the following steps: obtaining ethical approval from the Wolkite City Sport Office to proceed to the target area of the study, i.e., to Wolkite City Basketball Club. So that here is also the target stakeholders, club managers, coaches, and players of the basketball project through a detailed and brief description of the objective of the study. This will lead to a strong agreement and enhance their cooperatives. then directly skipped selecting a sample participant, and all the tests were administered in three (3) categories regarding the playing positions (guards, forwards, and centers) of the participants on the same field and test types.

Data Quality Control

In accordance with rules for test sequence order and based on the tests' objectivity, consistency, and soundness, only standardized physical fitness tests were used to assure the quality of the data. Additionally, pre-training and instrument checks were given, and tests were recorded with videos and photographs for additional test method verification.

3.5. Method of Data Analysis

Due to the nature of the experiment, it was necessary that the data for the experimental be gathered at both the initial and final measuring and Descriptive statistics (mean ± SD) for the different variables were calculated.

In order to assess the changes seen among participants who received physical training, the data gathered through fitness tests was tabulated, analyzed, and converted into a meaningful idea using a computer. Computerized statistical package software (SPSS), version 25, was used for data analysis. To compare the pre- and post-training data, the paired sample T-test was employed. and to compare the control and experimental groups, an independent sample t-test was used. At 0.05%, the level of significance is set.

3.6. Reliability of the test

The reliability and validity of the test in the study was assured by the necessary and effective fitness tests that are valid to each corresponding variables such as 20 meter speed test for speed, agility t test for agility, and 2.4 km run test for CVE` before and after the designed training. Before pre and post test measurement, adequate warming up were performed and also the exact measurement of each fitness test were carefully used. In addition to this the same testing area (pitch), measurement unit, materials (cone, stopwatch, meter etc), and time were used to ensure the uniformity of all groups in pre and post test

measurement. The investigator has taken all three measurements in the study by making several trials and from my advisor suggestions.

3.7. Ethical Consideration

The study dealt with the ethical issues related to the investigation. It protected the privacy of research participants and makes guaranty and confidentiality of the information that had given to the study, and risk harm due to participation. Participation of subjects in this study was totally a voluntary based activity and their right not to participate and could resign at any time of training session had been respected. Therefore, the study was conducted in accordance with the university rules, code of conduct, and policies concerning research ethics. Ethical approval had been obtained from the institutional research ethics review committee (IRERC) of Hawassa University. The protocol was approved by the university guidelines, and written consent had been given after informing the concerned body.

Prior to the study's beginning, all participants received information regarding its goals and methods. The subjects received an explanation of the potential benefit and any potential risks. The participants are not in any danger and are free to exit the study whenever they feel the need to do so. The results of the closed-ended questionnaires will remain private.

3.8. Experimental Approach to the Problem.

According to Hopkins (2004), testing and measuring are the procedures that gather information or data that is then used to support decisions and performance evaluations that are made afterward.

3.8.1 Independent variables

The independent variable in this study is small sided game trainings

3.8.2. Dependent variables

The outcome or effect of cardiovascular endurance, agility, and speed changes after low to high intensity training is the dependent variable of this study.

Table 2:Test Items and Fitness Variables

Test Items	Fitness variable
1. 2.4 km run test	Test of CVE
2. T-test	Agility
3. 20 Metre Acceleration Test	Speed

3.9. Sequence of Testing And Rest Periods Between Tests

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

3.9.1. Test of cardiovascular endurance

2.4Km Run Test

The objective of this test is to monitor the development of the athlete's aerobic fitness

required resources

To undertake the test the following resources requires:

- 400metre track
- Stop watch
- Assistant.

How to conduct the test?

The test is conducted as follows:

- Athlete to complete a 10-minute warm up
- Athlete to run 2.4 km (6 laps of a 400m track) with the best effort
- Assistant to keep athlete informed of the number of laps remaining to complete the test
- Assistant to record the time taken for the athlete to run 2.4km.

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.

Target group

This test is suitable for active athletes but not for individuals where the test would be contraindicated.

3.9.2. Agility Test

The T- Test is a simple running test of agility, involving forward, lateral, and backward movements appropriate to a wide range of sports.

Purpose: The T-Test is a test of agility for players, and includes forward, lateral, and backward running.

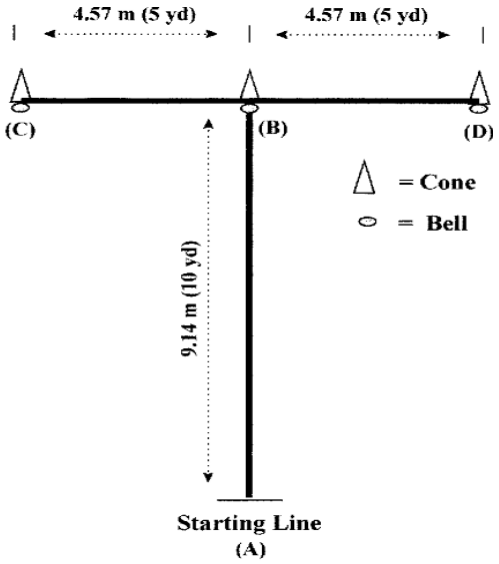
Equipment required: tape measure, marking cones, stopwatch, timing gates (optional).

Pre-test: Explain the test procedure to the subject, perform screening of health risks and obtain informed consent. Prepare forms and record basic information such as age, height, body weight, gender, and test conditions. Measure and mark out the test area. Perform an appropriate warm up, including some practice and exercise. See more details of pre-test procedures.

Procedure: test setup, set out four cones as illustrated in the diagram below (5 yards=4.57m, 10 yards=9.14m). The subject starts at cone A, on the command of the timer, the subject sprints to cone B and touches the base of the cone with their right hand, and then they turn left and shuffle sideways to cone C, and touch its base with their left hand, then shuffles sideway to the right to con D and touches the base with the right hand, then they shuffle back to cone B touching with left hand, then run back to cone A.

Scoring: The trial will not be counted if the subject crosses one foot in front of the other while shuffling, and fails to touch the base of the cones or fails to face forward throughout the test. Take the best of three successful trials to the nearest o.1 seconds (pauole et al. 2000).

Figure 2:Agility T-test



3.9.3. Speed test

20 metre 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 or from starting blocks to maximum speed.

Required resources

To undertake this test you will require:

- Flat non-slip surface
- Stop watch
- Measuring tape
- An assistant.

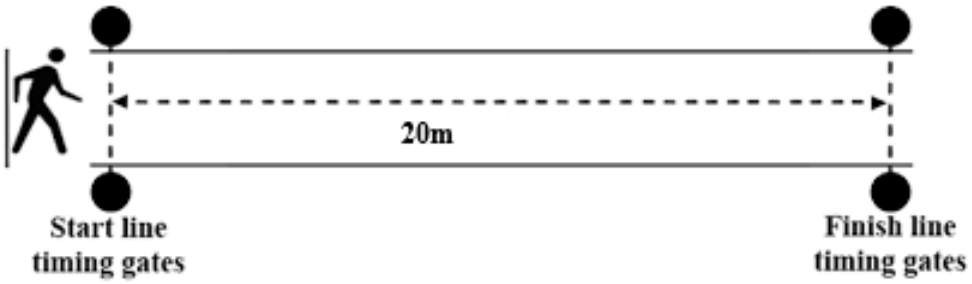
  How to conduct the test

  This test requires the athlete to sprint as fast as possible over 20 meters.

- The athlets warm up for 10 minutes
- The assistant mark out a 20-m straight section with cones.

- The athletes starts on the signal go from the assistant and sprint as fast as possible over the 20 meters
- The assistant starts the stopwatch on the athletes 1st-foot strike after starting and stoping the stopwatch as the athletes torso crosses the finishing line.
- The test conducted three times
- The assistant uses the fastest recorded time to asses the athletes performance.

Figure 3:20 metre Acceleration Test



3.10. Small sided games

The head coach created the SSG teams with the aim of balancing the playing positions and technical and tactical ability levels of the opposing teams (e.g., 1 guard and 1 center against 1 guard and 1 center). Scores were kept during games and strong verbal encouragements were provided by the coaching staff to improve players' motivation. Each SSG was refereed by assistant coaches who were qualified to referee. To enable continuous play, a few minor rule changes were made, including a 12-second shot clock and awarding a point when fouled while in the act of shooting (Klusemann et al., 2012). Studies indicate that a 24-second shot clock (in a half-court setting with fewer players) is too long to invoke the high physical and physiological demands necessary for conditioning purposes. During the training there is no free-throws or time-outs (Delextrat and Kraiem, 2013). In the event of fouls, turnover or ball out-of-bounds, the game was restarted when an offensive player

ran to the nearer sideline and caught the spare ball from an assistant (Conte et al., 2016). During each SSG session, players were randomly assigned a pairing (consisting of a guard, and either a forward or a center), and new pairings were formed in the following session.In the last three weeks (weeks 7–10), during the training sessions, only two dribbles were permitted in order to increase players movement and the intensity of the training. The defensive style throughout the training was man-to-man defence. Team coaches provided athletes with verbal encouragement to maintain high levels of exertion.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1 Introduction

This chapter deals with the analysis of data collected from the 16 samples respondents. The purpose of this study was to examine the effects of basketball small sided games training on selected physical fitness variables like cardiovascular endurance, speed and agility. Sixteen subjects of male trainees with the age range of 14 – 16 years old. All sixteen project players (trainees) were purposively selected to the study and based on their pre-test result they were divided into 2 groups namely small sided game training group and control group and each group consisting of 8 subjects. In this study, field tests were taken two times (Pre and Post). Under this, three dependent variables (cardiovascular endurance, speed and agility) had been evaluated by 2.4 km run test, 20m acceleration run test, t-test agility test. The results of those variables were discussed as follows.

4.2 Demographic Characteristics of Subjects

Table 1:Background data of respondents

OLAP Cubes					
Group: Total					
	Grops	N	% of Total N	Mean	Std. Deviation
Age	Experimental	8	50.0%	14.38	1.923
	Control	8	50.0%	15.00	.926
	Total	16	100.0%	14.69	1.493
Height	Experimental	8	50.0%	1.70	.077
	Control	8	50.0%	1.70	.114
	Total	16	100.0%	1.70	.094
Weight	Experimental	8	50.0%	61.12	2.58
	Control	8	50.0%	62.12	4.12
	Total	16	100.0%	61.62	3.36
BMI	Experimental	8	50.0%	21.63	2.55
	Control	8	50.0%	20.99	1.61
	Total	16	100.0%	21.31	2.09

As revealed on table 3, above, from the total of 16 participants half of them 8 (50%) were grouped under experimental group, and the other half 8 (50%) were grouped under control group. Accordingly, the average age of all the participants were m = 1.70 ± 0.09 meters, while the average age of experimental group members were m = 1.70 ± 0.77 and control group m = 1.70 ± 0.11. As well as, all participants average weight was m = 61.62 ± 3.36, while the average weight of the experimental group were m = 61.12 ± 2.58 and control group average weight was m = 61.12 ± 4.12. Accordingly, the average age total m = 21.31 ± 2.09, expermimental m = 21.63 ± 2.55 and BMI of control group m = 21.31± 2.09.

4.3 Analysis of Pre-Test Data

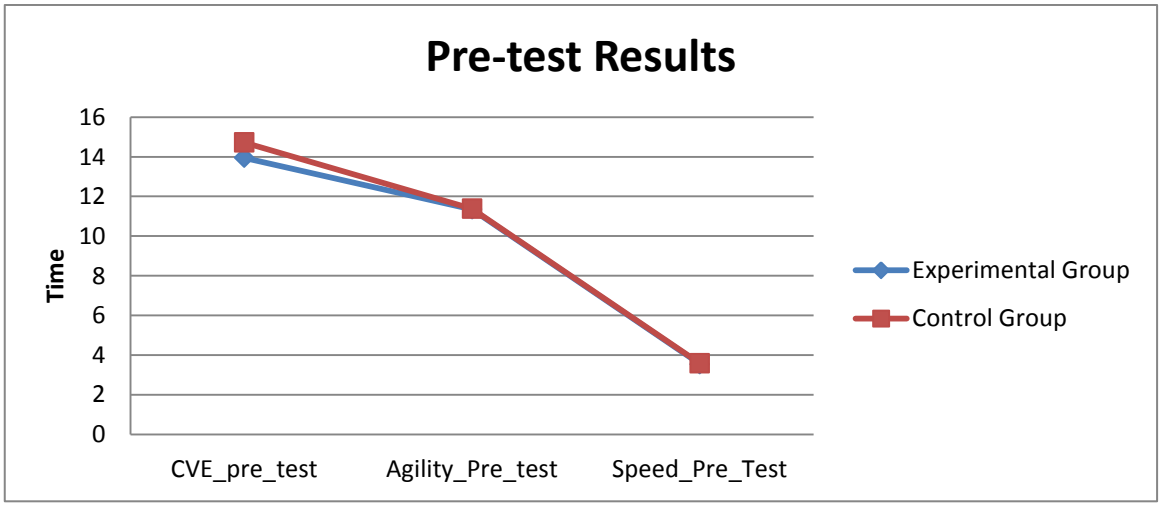
Table 2: Pre-test results of CVE, agility and speed

OLAP Cubes				
Group: Total				
Group		N	Mean	Std. Deviation
CVE_pre_test	Experimental	8	13.95	1.62
	Control	8	14.72	1.61
	Total	16	14.34	1.61
Agility_Pre_test	Experimental	8	11.35	.779
	Control	8	11.38	.634
	Total	16	11.36	.686
Speed_Pre_Test	Experimental	8	3.54	.241
	Control	8	3.58	.217
	Total	16	3.56	.222

As indicated on table 4. above, the pre test CVE, agility and speed performance testes were administered for both experimental and control groups. As shown on the table, the average results of CVE for exmerimental groups were 13.95 ± 1.62 and for control group were 14.72 ± 1.61, while the total mean (m) = 14.34 ± 1.61. Where as, the agility pretest results shows that the average value for experimental group was 11.35 ± 0.77 and for control

group were 11.38 ± 0.63; while the total mean value for agility test were m = 11.36 ± 0.68. On the other hand, pretest speed results showed that the average value of experimental group were m = 3.54 ± 0.21 and control group 3.58 ± 0.21; while the total mean value of speed pretest were 3.56 ± 0.22.

Figure 4:Pre-test results of CVE, Agility and Speed



The above figure displays that the pretest and post test results of CVE, Aglity and Speed. While control group results were took slightly more time than experimental group.

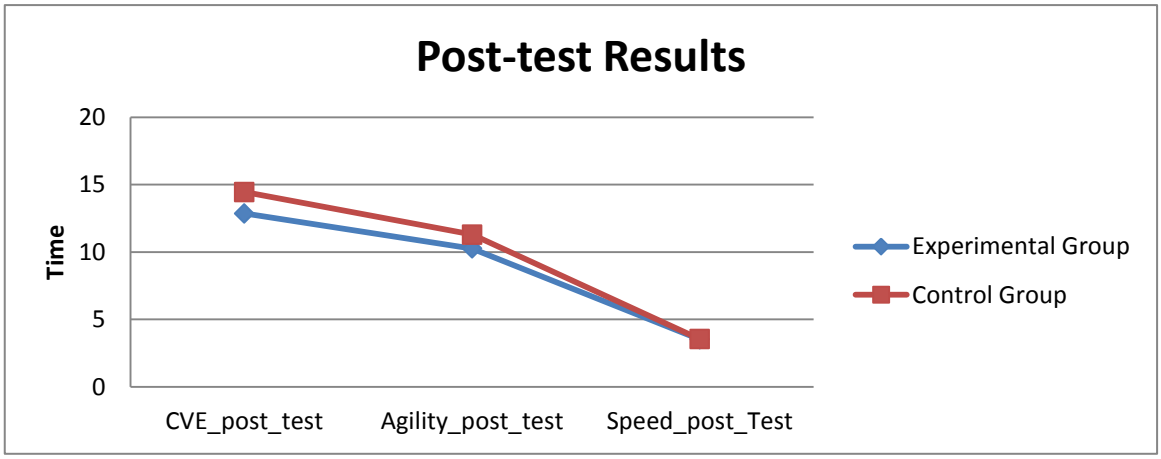
Table 3:Post test results of CVE, agility and speed.

OLAP Cubes				
Group: Total				
Group		N	Mean	Std. Deviation
CVE_post_test	Experimental	8	12.86	1.71
	Control	8	14.45	1.57
	Total	16	13.65	1.79
Agility_post_test	Experimental	8	10.26	.873
	Control	8	11.29	.757
	Total	16	10.77	.95
Speed_post_Test	Experimental	8	3.52	.238
	Control	8	3.54	.209
	Total	16	3.53	.217

The above table indicated the post results of CVE, agility and speed. Accordingly, the post test results of CVE for experimental group were m = 12.86 ± 1.71 and control group mean value were m = 14.45 ± 1.57; while the total post test value were 13.65 ± 1.79. As well as, agility post results revealed that the average value for experimental group were 10.26 ± 0.87 and control group m = 11.29 ± 0.75, while the total mean value for agility test were 10.77 ± 0.95. Moreover, the table also shown that the post test results for speed

performance. Whereas, the mean value for experimental group were m = 3.52 ± 0.23 and for control group m = 3.54 ± 0.20; while the total mean value for this test were 3.53 ± 0.21.

Figure 5: Post Test Results of CVE, Agility and Speed



As presented on figure 5 above, the post test results revealed that control group members have scored less performance than the experimental group. The figure implies that control group members average time to accomplish CVE and Agility test were much more than the mean of experimental group members.

Table 4: Paired samples test for CVE

	Paired difference					t	Sig. (2-tailed)
CVE	Mean	Std. deviation	St. Error Mean	95% confidence interval of the difference			
				Lower	Upper		
Experimental pre to post	1.09	.21587	.07632	.91453	1.27547	14.347	**.000**
Control pre to post	.270	.279	.09878	.03643	.50357	2.733	**.029**

The above tables 6, showed that there was a significance difference in the scores for experimental group CVE pre-test and CVE post-test; t (8) = 14.34, p = 0.00; where as, control group pretest and post test were; t(8) = 2.733, p = 0.029. As well as, on average experimental group CVE pre-test scores were 1.09 points lower than post-test scores (95 % CI [0.914, 1.275]). As well as, on average control group CVE pre-test scores were 0.27 points lower that post test scores (95% CI [0.036, 0.503]). These results suggest that small sided games training have a significant effect on the CVE performance.

Table 5 :Paired sample test for Agility

	Paired difference					t	Sig. (2-tailed)
Agility	Mean	Std. deviation	St. Error Mean	95% confidence interval of the difference			
				Lower	Upper		
Experimental pre to post	1.08750	.23711	.08383	.88927	1.28573	12.972	**.000**
Control pre to post	.09125	.18334	.06482	-.06202	.24452	1.408	**.202**

The above tables 7, showed that there was a significance difference in the scores for experimental group Agility pre-test and post-test; t (8) = 12.97, p = 0.00; where as, control group pretest and post test were; t(8) = 1.408, p = 0.202. As well as, on average experimental group agility pre-test scores were 1.087 points lower than post-test scores (95 % CI [0.889, 1.285]). As well as, on average control group agility pre-test scores were 0.091 points lower that post test scores (95% CI [-0.062, 0.244]). These results suggest that small sided games training have a significant effect on the agility performance.

Table 6:Paired sample test for speed performance

	Paired difference					t	Sig. (2-tailed)
Speed	Mean	Std. deviation	St. Error Mean	95% confidence interval of the difference			
				Lower	Upper		
Experimental pre to post	.020	.02138	.00756	.00213	.03787	2.646	**.033**
Control pre to post	.0437 5	.04470	.01580	.00638	.08112	2.768	**.028**

As shown on the above table 8, there was a significance difference in the scores for experimental group speed pre-test and post-test scores; t (7) = 2.646, p = 0.033; where as, control group pretest and post test were; t(7) = 2.768, p = 0.028. As well as, on average experimental group speed pre-test scores were 0.02 points lower than post-test scores (95 % CI [0.002, 0.037]). As well as, on average control group speed pre-test scores were 0.044 points lower that post test scores (95% CI [0.006, 0.811]). These results suggest that small sided games training have a significant effect on the speed performance.

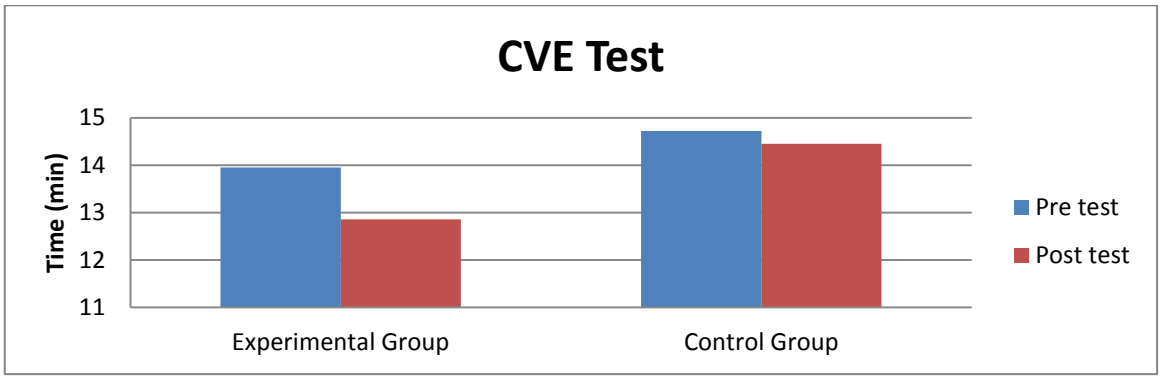
Table 7: Descriptive statistics of the groups

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
CVE_pre_test	Experimental Group	8	13.9550	1.62204	.57348
	Control Group	8	14.7275	1.61398	.57063
CVE_post_test	Experimental Group	8	12.8600	1.71520	.60642
	Control Group	8	14.4575	1.57112	.55548
Agility_Pre_test	Experimental Group	8	11.3550	.77980	.27570
	Control Group	8	11.3813	.63459	.22436
Agility_Post_Test	Experimental Group	8	10.2675	.87345	.30881
	Control Group	8	11.2900	.75757	.26784
Speed_Pre_Test	Experimental Group	8	3.5450	.24107	.08523
	Control Group	8	3.5850	.21706	.07674
Speed_Post_Test	Experimental Group	8	3.5250	.23887	.08445
	Control Group	8	3.5413	.20931	.07400

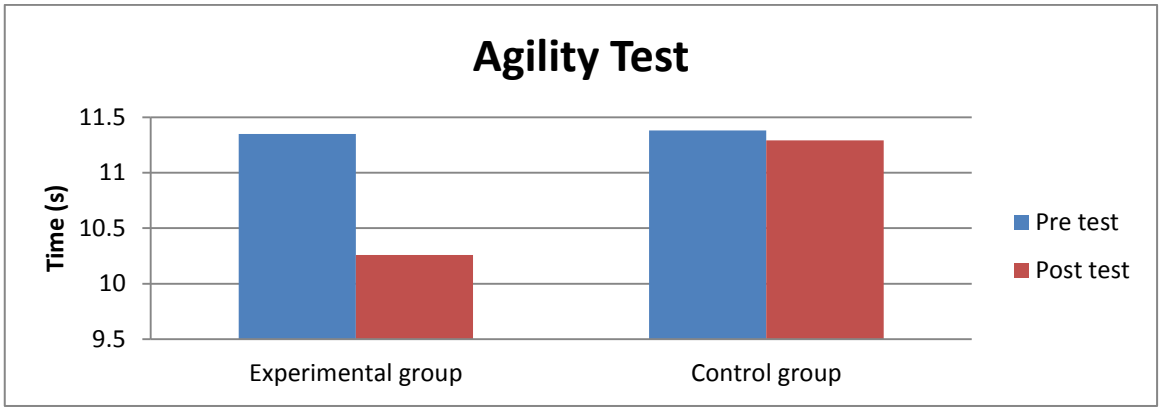
As shown on the above table, for CVE pre-test the mean value for experimental group was 13.955 ± 1.62 and control group 14.72 ± 1.61. However, after treatment for experimental group the mean for experimental group was much more improved (m = 12.86 ± 1.71) than the control group (m = 14.45 ± 1.57). Moreover, agility test pre-test results implied that the experimental group mean value was m = 11.35 ± 0.77 and control group 11.38 ± 0.63. While, the post test results showed that the experimental group mean value was m =10.26 ± 0.87 and control group m = 11.29 ± 0.75. On this test also there are some improvements on experimental group after the intervention of 'small sided games'. On the third test, speed performance were administered to participants. The pre-test results showed that experimental group mean value was m = 3.54 ± 0.24 and control group mean value was m = 3.58 ± 0.21.

Figure 6: CVE pre-test and Post-test comparison



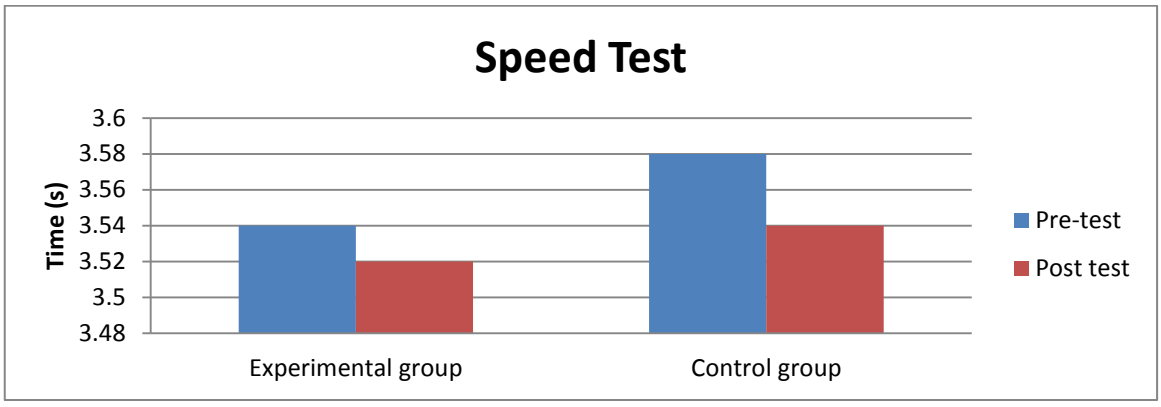
The above figure showed that the time taken to accomplish CVE test were significantly improved after treatment. As the figure implies experimental group have much improvement (less time to finished the given test) than the control group.

Figure 7: Agility pre-test and Post-test comparison



As illustrated on the above figure, the time taken to accomplish agility test were significantly improved (lowered) after treatment. As the figure implies experimental group have much improvement (less time to finished the given test) than the control group.

Figure 8: Speed pre-test and Post-test comparison



The above figure showed that the time taken to accomplish speed test. The figured shows that both groups performance improved on the second test.

Table 8: Independent Samples Test for CVE

	Levine's Test for Equality of Variances		t-test for Equality of Means						
CVE-post-test	F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std.Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.343	.567	-1.943	14	**.052**	-1.59	.822	-3.36	.166
Equal variances not assumed			-1.943	13.8	**.053**	-1.59	.822	-3.36	.167

An independent sample t-test was performed to evaluate whether there is a difference between the dependent variable (CVE) of experimental group and control group. As indicated on the above table, the result indicated that experimental group (M = 12.86, SD = 1.71) had significantly higher CVE performance than control group (M = 14.45,SD = 1.57), t([14]) = [-1.943], p = [0.05].

Table 9: Independent Samples Test for agility

	Levine's Test for Equality of Variances		t-test for Equality of Means						
Agility-post-test	F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std.Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.406	.534	-2.501	14	**.025**	-1.02250	.40878	-1.89925	-.14575
Equal variances not assumed			-2.501	13.726	**.026**	-1.02250	.40878	-1.90090	-.14410

An independent sample t-test was performed to evaluate whether there is a difference between the dependent variable (agility) of experimental group and control group. As indicated on the table above, the result indicated that experimental group (M = 10.26, SD = 0.87) had significantly higher agility performance than control group (M = 11.29,SD = 0.75), t([14]) = [-2.50], p = [0.025].

Table 10: Independent Samples Test for speed

	Levine's Test for Equality of Variances		t-test for Equality of Means						
Speed post_ test	F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std.Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.182	.676	-.145	14	**.887**	-.016	.11229	-.257	.224
Equal variances not assumed			-.145	13.763	**.887**	-.01625	.11229	-.257	.224

An independent sample t-test was performed to evaluate whether there is a difference between the dependent variable (speed) of experimental group and control group. As indicated on the table above, the result indicated that there was no significant difference between the speed of experimental group (M = 3.52, SD = 0.23) and control group (M = 3.54,SD = 0.20), t([13]) = [-0.145], p = [0.887].

4.4. DISCUSSION

The study evaluates the effects of small-sided basketball games on selected physical fitness variables of male basketball project players in Wolkite City. Trainees contributed throughout the treatment period and collaborated to gather essential data. Experimental groups participated in a 10-week small-sided game training, performing the selected physical fitness exercises designed for basketball players. However, the control group did not join a 10-week training program.

The analysis data with the appropriate statistical tools on the research problem brought out significant findings as training outcomes through the selected variables of the study. The result of this study for each variable is presented as follows:

4.4.1. Cardiovascular endurance

The primary finding of this study was that ten weeks of small-sided basketball game training (1 on 1, 2 on 2, and 3 on 3) significantly improved the cardiovascular endurance of project male basketball players. The result of the current study is in line with the findings of Arslan et al. (2022), who conducted a study comparing the effects of small-sided game training and high-intensity interval training (HIIT) on young basketball players. The results showed that both training approaches improved cardiovascular endurance, but small-sided game training had a greater effect on improving aerobic capacity.

This study finding was consistent with the finding of Delextrat & Martínez (2013), who investigated the effects of small-sided game training on aerobic capacity in basketball players. They found that small-sided game training led to significant improvements in aerobic capacity as well as technical skills in male junior basketball players.

The findings of this study are also in line with the findings of Karim et al. (2018), who conducted a study to explore effective training methods to improve football performance,

specifically focusing on the effects of small-sided games on cardiovascular endurance. The results showed that small-sided game training was effective in improving cardiovascular endurance among football players. These findings suggested that small-sided game training can be an effective method for improving cardiovascular endurance in basketball players. The high-intensity nature of small-sided games, combined with the continuous movement and aerobic demands of the sport, contribute to the improvement in aerobic capacity.

Thus, from the findings of this study, it is possible to say that small-sided game training methods are effective training methods for project basketball players, and then SSG training should be considered as the preferred training method due to its higher game-based specificity. The formulated null hypothesis No. 1, was rejected and the alternative hypothesis was accepted.

4.4.2. Agility

Other research findings also indicated that small-sided game training can be an effective training technique to improve an athlete's agility. This study finding was consistent with the finding of Arslan et al. (2022), who compared the effects of small-sided game training and high-intensity interval training on young basketball players. The study found that both training methods improved agility, but small-sided game training had a greater effect on agility compared to high-intensity interval training. This suggests that small-sided game training may be a more effective method for improving agility in basketball players.

The result of this study was also in line with the findings of a study conducted by Chaouachi et al. (2014), which compared the effects of small-sided game training and multidirectional sprint training on agility and change of direction ability in young soccer players. The study found that both training methods improved agility and change of direction ability, but there was no significant difference between the two methods. This

suggests that small-sided game training can be as effective as multidirectional sprint training for improving agility.

The result of this study was also in line with the finding of Delextrat & Martínez (2013), a study that compared the effects of small-sided game training and high-intensity interval training on physical and technical performance in junior basketball players. The study found that both training methods improved agility, but small-sided game training also improved aerobic capacity and technical skills. This suggests that small-sided game training can have additional benefits beyond just improving agility.

This result indicated that effective improvement was observed in the fitness of basketball project players who engaged in 10-week SSG training. This indicates that SSG training could have a great effect on enhancing agility. The formulated null hypothesis No. 1, was rejected and the alternative hypothesis was accepted.

4.4.3. Speed

The result of this study is consistent with the finding of Mahder, E. (2019), a study that compares the effects of small-sided games and interval training on physical fitness among female football players. The result indicated that no effective change was observed in football players exposed to 10-week small-sided game training on their speed. And suggest that small-sided game training is not an effective method for enhancing fitness and speed.

The findings of this study were not in line with those of Arumugam (2015), who studied the effect of small-sided game training on speed and agility among soccer players. The result of the study indicates that there was a significant improvement in speed and agility due to the effect of small-sided game training among soccer players when compared to the control group.

The result of this study is not consistent with the finding of Klusemann et al. (2012), who found that fewer players in small-sided basketball games substantially increased the technical, physiological, and physical demands. This increased demand likely leads to improvements in speed as players are required to move quickly and react to the game's fast pace.

The findings of this study also disagree with those of Chaouachi et al. (2014), a study that compared the training effects of a small-sided game (SSG) and multidirectional sprint intervention on agility and COD ability in young male soccer players. They suggested that small-sided games have a positive impact on agility and change of direction (COD) ability. While this study focused on soccer players, the findings can be applied to basketball players as well, as both sports require similar movements and agility.

This result indicated that no effective change was observed in basketball players who were exposed to 10-week small-sided game training on their speed. So, small-sided game training is not an effective method for enhancing fitness and speed. The formulated null hypothesis No. 1, was accepted and the alternative hypothesis was rejected.

CHAPTER FIVE

5 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary

Basketball's "small-sided games" (SSGs) are redesigned full-court games that are played on smaller courts with fewer players. To create a more intense, fast-paced, and skill-based playing atmosphere, SSGs involve reducing the number of players on each team, changing the size of the court, and modifying the rules. It was used to develop the players physical fitness and technical skills. The purpose of this study was to assess the effect of small-sided basketball game training on selected physical fitness variables among U-17 male basketball project players. In order to attain the general objective of the study, the following specific research objectives were formulated:

1. To examine the effect of a ten-week SSG training intervention on the CVE of male U-17 basketball project players.

2. To determine the effect of a ten-week SSG training intervention on the agility of male U-17 basketball project players.

3. To evaluate the effect of a ten-week SSG training intervention on the speed of male U-17 basketball project players.

After obtaining informed consent, 16 Wolkite City male U-17 basketball project players were purposively selected. Based on their pre-test results, the samples were divided into two groups. The two groups were assigned randomly, namely Group A Experimental Group and Group B Control Group, each consisting of 8 subjects. The experimental group underwent small-sided game training for a period of 10 weeks and was tested before and

after the training. Standardized tests were used to see changes (2.4 km test) for the player's CV, (20-meter sprint run test) for speed, and (T-test) for agility.

To see the effect of these training methods and to analyze whether there is a significant difference between their pre- and post-results, a paired sample t test was employed. In addition to comparing the differences between the two groups on player's CV, speed, and agility, an independent sample t-test with an alpha value of.05 was employed. After ten weeks of small-sided game training, the experimental group showed significant improvement in the selected fitness variables, namely CVE and agility. The result of the present study suggests that small-sided basketball games (1 on 1, 2 on 2, and 3 on 3) are effective in improving CVE and agility in ten weeks of training.

- Basketball SSGs training had a beneficial effect on the improvement of the players CVE and agility.
- This study evaluated and tried to investigate the effect of SSGs training on the CVE, agility, and speed of basketball players. A major finding of this investigation was that programed basketball ssgs training was vital to the trainer‘s CVE and agility. So, the indicated training has a significant effect on the trainer‘s selected physical fitness variables (CVE and agility).
- The intensity of training increased progressively; the subjects were trained for the first three consecutive weeks (47 minutes and 3 days per week), for the second three consecutive weeks (45 minutes and 30 seconds and 3 days per week), and for the last four consecutive weeks (44 minutes and 3 days per week) for ten weeks, and the training method was repetition (the act of repeating the skill) and interval (repetitions of work with a rest period).

- Test results from pre-to-post showed significant improvement in all the above-mentioned physical fitness variables. The improvement was observed and recorded from pre-test to post-test.
- The investigator noticed that the improvement was due to basketball-small-sided game training that improves CVE and agility.

5.2. Conclusions

Based on the findings found in the study, the researcher has investigated the following conclusions.

- The intervention of ten weeks small sided game training significantly improves the agility of players.
- Ten week small sided game training significantly improves the cardiovascular endurance of the players.
- The intervention of ten weeks small sided training was not significantly improve speed of players.

5.3. Recommendations

Based on the results, discussions, and finding of the study, the researcher recommended the following points.

- As shown in the study, small-sided game training improves the agility and CVE performance of the players. So it's better to apply well-planned and structured SSG training for players' fitness development.
- When considering the practical application of SSGT, coaches could consider many aspects of the training program. Elements of programming such as program length, frequency of sessions, intensity of exercises, and volume are also crucial to the effects of training and may differ depending on the outcome measure. The development of fitness depends on such variables.

- It is better that each fitness test be measured or recorded through well-designed scientific instruments to ensure its reliability. The errors that omit the fraction of a second in the speed and agility tests affect the study.
- And the researcher recommended that an additional study be conducted on these training types for the development of sport and performance enhancement. There are so many research studies that have been conducted on the “effects of small-sided game training on technical skill in male athletes, players, students, and other respondents". So the researcher recommended that it is better to conduct the effects of small-sided game training on several fitness variables in the case of female athletes, students, and participants, and that further study should be conducted on the effects of small-sided game training on several physical fitness components and skills of athletes.
- Coaches, basketball training centers, and academies is better to use SSGT for better improvement of agility and cardiovascular endurance.
- Sport center leaders, coaches, and researchers could give emphasis to small-sided game training programs for basketball projects, clubs, and training centers and take action to improve players' physical fitness.

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References

Abdelkrim NB, Castagna C, Fazaa SE, and Ati JE. (2010). the effect of players' standard and tactical strategy on game demands in men's basketball. J Strength Cond Res 24: 2652–2662.

Ahmed, K., Hassan., Mohammed, Shaab, Alibrahim., Yasser, Abdul, Rashid, Sayed, Ahmed. (2023). The effect of small-sided games using the FIT LIGHT training system on some harmonic abilities and some basic skills of basketball players. Frontiers in sports and active living.

Amal C. Bose, (2021). Health and Fitness Education, BFC Publications, 2021; ISBN, 9355091699,

American college of sport medicine, (2003). ACSM fitness book. Human Kinetics.

American College of Sports Medicine. (2018). ACSM's guidelines for exercise testing and prescription (10th ed.). Wolters Kluwer.

Apostolidis, N., Nassis, G. P., Bolatoglou, T., & Geladas, N. D. (2004). Physiological and technical characteristics of elite young basketball players.

Arslan, E., Kilit, B., Clemente, F., Murawska-Ciałowicz, E., Soylu, Y., Söğüt, M., & Silva, A. (2022). Effects of small-sided game training versus high-intensity interval training approaches on young basketball players.

Arumugam S. (2015) Effect of small-sided game training on speed and agility among soccer players.

Atli H, Koklu Y, Alemdaroglu U, and Koc¸ ar U. (2013). A comparison of heart rate response and frequencies of technical actions between half-court and full-court 3-a-side games in high school female basketball players. J Strength Cond Res 27: 352–356.

Babu, P. M., & Reddy, M. S. (2009). Comparative analysis of speed and agility among University players of different disciplines. Editorial Board, 8.

Baechle, T., & Earle, R. (2008). Essentials of strength training and conditioning (3rd ed.). Champaign: Human Kinetics.

Barrios R. Estudio del para´metro tiempoenel baloncesto actual. Cliinic 56: 10–12, 2002

Ben Abdelkrim N, Castagna C, Jabri I, Battikh T, El Fazaa S, and El Ati J. (2010). Activity profile and physiological requirements of junior elite basketball players in relation to aerobic–anaerobic fitness. J Strength Cond Res 24: 2330–2342.

Ben Abdelkrim N, El Fazaa S, and El Ati J. (2007). Time-motion analysis and physiological data of elite under-19-year-old basketball players during competition. Br J Sport Med 41: 69–75.

Bloomfield, J., Polman, R., & O'Donoghue, P. (2018). Physical demands of different small-sided games in elite soccer. Journal of Strength and Conditioning Research, 32(10), 2878-2884

Brett, J., Carter., Jiling, Liu. (2023). Implementing Small-Sided Games into Youth Basketball Practice. Strategies.

Capranica L. Tessitore A. Guidetti L. Figura F. (2001). Heart rate and match analysis in prepubescent soccer players. J Sports Science, 19, 379-384.

Castagna C, Impellizzeri FM, Chaouachi A, Ben Abdelkrim N, and Manzi V. (2011). Physiological responses to ball-drills in regional level male basketball players. J Sports Science 29: 1329–1336.

Chaouachi, A., Chtara, M., Hammami, R., Chtara, H., Turki, O., & Castagna, C. (2014). Multidirectional sprints and small-sided game training have an effect on agility and change of direction abilities in youth soccer.

Cepero, M., Valdivia-Moral, P., & García-Unanue, J. (2016). Player's speed in basketball: Analysis of the defensive recovery and help defense situations. Journal of Human Kinetics, 54(1), 101-109.

Chaouachi A, Chtara M, Hammami R, Chtara H, Turki O and Castagna C. (2014). Multidirectional sprints and small-sided games training effect on agility and change of direction abilities in youth soccer. J Strength Cond Res.; 28: 3121-7.

Chen, Sheng., Wu, Shengfeng., Chen, Yaqi. (2015). Ball-clamping-preventive basket.

Chittibabu, B. (2014). Relationship of selected physical fitness components on shooting accuracy of women handball players. International Journal for Life Sciences and Educational Research, 2(2), 49-51.

Clemente F. M. (2016). Small-sided and conditioned games in basketball training: a review filipe manuel clemente. *Strength Cond. J.* 38, 49–58.

Clemente F. M., Afonso J., Castillo D., Arcos A. L., Silva A. F., Sarmento H. (2020). The effects of small-sided soccer games on tactical behavior and collective dynamics: a systematic review. *Chaos Solitons Fractals* 134:109710.

Clemente F. M., Chen Y. S., Bezerra J. P., Guiomar J., Lima R. (2018). Between-format differences and variability of technical actions during small-sided soccer games played by young players. *Hum. Mov.* 19, 114–120.

Clemente F. M., Ramirez-Campillo R., Nakamura F. Y., Sarmento H. (2021). Effects of high-intensity interval training in men soccer player's physical fitness: A systematic review with meta-analysis of randomized-controlled and non-controlled trials. *J. Sports Sci.* Ahead-of-p, 1–22.

Clemente FM, Lourenc¸ o FM, and Mendes RS. (2014). developing aerobic and anaerobic fitness using small-sided soccer games: Methodological proposals. Strength Cond J 36: 76–87.

Conte, D., Favero, T. G., Niederhausen, M., Capranica, L., & Tessitore, A. (2016). Effect of different number of players and training regimes on physiological and technical demands of ball-drills in basketball. Journal of sports sciences, 34(8), 780-786.

Davids K, Arau´jo D, Correia V, and Vilar L. (2013). How small-sided and conditioned games enhance acquisition of movement and decision-making skills. Exercise Sport Science Rev 41: 154–161,.

Delextrat A and Kraiem S. (2013). Heart-rate responses by playing position during ball drills in basketball. Int J Sports Physiol Perform 8: 410–418.

Delextrat, A., and Martínez, A. (2013). Small-sided game training improves aerobic capacity and technical skills in basketball players.

Dellal A, Chamari K, Pintus A, Girard O, Cotte T and Keller D. (2008). Heart rate responses during small-sided games and short intermittent running training in elite soccer players: a comparative study. J Strength Cond Res.; 22: 1449-57.

Drust B, Waterhouse J, Atkinson G, Edwards B, Reilly T. (V). Circadian rhythms in sports performance--an update. Chronobiol Int.; 22(1):21-44. doi: 10.1081/cbi-200041039. PMID: 15865319.

Emilija, Stojanović., Nenad, Stojiljković., Ratko, Stanković., Aaron, T., Scanlan., Vincent, J., Dalbo., Zoran, Milanović. (2021). Recreational Basketball Small-Sided Games Elicit High-Intensity Exercise With Low Perceptual Demand. Journal of Strength and Conditioning Research.

Erşan, Arslan., Bülent, Kilit., Filipe, Manuel, Clemente., Eugenia, Murawska-Ciałowicz., Yusuf, Soylu., M., Sogut., Fırat, Akça., M, Gokkaya., Ana, Silva. (2022). Effects of Small-Sided Games Training versus High-Intensity Interval Training Approaches in Young Basketball Players.

Ferraz, R., Pereira, A., & Greco, P. (2012). Effects of small-sided games on physical conditioning and performance in young soccer players. Journal of Sports Science and Medicine, 11(2), 374-380.

Farrow, D., Robertson, S., & Williams, A. M. (2017). The development of a basketball speed test for elite junior players. Journal of Sports Sciences, 35(1), 64-71.

Faude O, Koch T and Meyer T. (2012.). Straight sprinting is the most frequent action in goal situations in professional football. J Sports Sci.; 30: 625-31.

Fernández-Espínola C., Robles M. T. A., Fuentes-Guerra F. J. G. (2020). Small-sided games as a methodological resource for team sports teaching: a systematic review. *Int. J. Environ. Res. Public Health* 17.

Gabbett TJ. (2006). Skill-based conditioning games as an alternative to traditional conditioning for rugby league players. J Strength Cond Res. 20: 309-315.

Gabbett, T.J. (2006). Skill-based conditioning games as an alternative to traditional conditioning for rugby league players. Journal of Strength & Conditioning Research, 20, 306–315.

Gabbett, T.J., Jenkins, D., & Abernethy, B. (2009). Game-based training for improving skill and physical fitness in team sport athletes. International Journal of Sports Science & Coaching, 4, 273–283. Doi: 10.1260/174795409788549553.

Gabbett, T.J., Jenkins, D., & Abernethy, B. (2010). Physiological and skill demands of on-side and off-side games. Journal of Strength & Conditioning Research, 24, 2979–2983.

Gamble, P. (2004). A skill-based conditioning games approach to metabolic conditioning for elite rugby football players. Journal of Strength & Conditioning Research, 18, 491–497.

Gamble, P. (2013). Strength and Conditioning for Team Sports: Sport-Specific Physical Preparation for High Performance. 2nd ed., London and New York, Routledge: Taylor and Francis, pp.291.

Garganta, J. (2009). Trends of tactical performance analysis in team sports: Bridging the gap between research, training and competition. Revista Portuguesa de Ciências do Desporto, 9(1), 81-89

Hammami A., Gabbett T. J., Slimani M., Bouhlel E. (2018). Does small-sided games training improve physical-fitness and specific skills for team sports? A systematic review with meta-analysis. *J. Sports Med. Phys. Fitness* 58, 1446–1455.

Hill-Haas, S.V., Dawson, B., Impellizzeri, F.M., & Coutts, A.J. (2011). Physiology of small-sided games training in football: A systematic review. Sports Medicine, 41, 199–220. Doi: 0112- 1642/11/0003-0199.

Hoeger W. W. Hoeger, S. A., Hoeger, C. I., & Fawson, A. L. (2018). Lifetime physical fitness and wellness. Cengage Learning.

Hoff J, Wisløff U, Engen LC, Kemi OJ, Helgerud J. (2002). Soccer specific aerobic endurance training. Brit J Sports Med, 36(3): 218-221.

Hughes, M., & Franks, I. (2004). The essentials of performance analysis: An introduction. Routledge.

Impellizzeri FM, Marcora SM, Castagna C, et al. (2006). Physiological and performance effects of generic versus specific aerobic training in soccer players. Int J Sports Med. 27: 483-92.

Karim, Z., Ghani, M., & Nadzalan, A. (2018) Exploring effective training methods to improve football performance: effects of small-sided games on cardiovascular endurance.

Kelly, D. M., & Drust, B. (2009). The effect of pitch dimensions on heart rate responses and technical demands of small-sided soccer games in elite players. Journal of Science and Medicine in Sport, 12(4), 475-479.

Klusemann MJ, Pyne DB, Foster C, and Drinkwater EJ. (2012). Optimising technical skills and physical loading in small-sided basketball games. J Sports Science 30: 1463–1471.

Kotecki, J. E. (2011). Physical Activity & Health: An Interactive Approach: An Interactive Approach. Jones & Bartlett Publishers.

Laura, Beatriz, Faleiro, Diniz., Laura, Beatriz, Faleiro, Diniz., Sarah, da, Glória, Teles, Bredt., Sarah, da, Glória, Teles, Bredt., Gibson, Moreira, Praça., Gibson, Moreira, Praça. (2021). Influence of non-scorer floater and numerical superiority on novices' tactical behaviour and skill efficacy during basketball small-sided games:. International Journal of Sports Science & Coaching.

Little, T. (2009). Optimizing the use of soccer drills for physiological development. Strength contd J, 31, 1-8.

Mahder, E. (2019). The effect of small-sided games and interval training on physical fitness among female.

Markus, J., Klusemann., David, B., Pyne., Carl, Foster., Eric, J., Drinkwater. (2012). Optimising technical skills and physical loading in small-sided basketball games.. Journal of Sports Sciences.

Mason, M. (2009). Appropriate uses of fitness measurement [Position statement]. National Association for Sport and Physical Education.

McInnes SE, Carlson JS, Jones CJ, and McKenna MJ. (1995). The physiological load imposed on basketball players during competition. J Sports Science 13: 387–397.

Moran J., Blagrove R. C., Drury B., Fernandes J. F. T., Paxton K., Chaabene H., et al.. (2019a). Effects of small-sided games vs. conventional endurance training on endurance performance in male youth soccer players: a meta-analytical comparison. *Sport, Med.* 49, 731–742.

Naicker, M. (2014). Morphological and skillrelated fitness components as possible predictors of injuries in elite female field hockey players (Doctoral dissertation, University of the Free State).

Narazaki, K., Berg, K., & Stergiou, N. (2008). Physiological demands of competitive basketball Scandinavian. Journal of Medicine and Science in Sports, 44(3), 77-97.

Olthof S. B. H., Frencken W. G. P., Lemmink K. A. P. M. (2018). Match-derived relative pitch area changes the physical and team tactical performance of elite soccer players in small-sided soccer games. *J. Sports Sci.* 36, 1557–1563.

Ometto L., Vasconcellos F. V., Cunha F. A., Teoldo I., Souza C. R. B., Dutra M. B., et al.. (2018).How manipulating task constraints in small-sided and conditioned games shapes emergence of individual and collective tactical behaviours in football: a systematic review. *Int. J. Sports Sci. Coach.* 13, 1200–1214.

Práxedes A., Del Villar F., Pizarro D., Moreno A. (2018a). The impact of nonlinear pedagogy on decision-making and execution in youth soccer players according to game actions. *J. Hum. Kinet.* 62, 185–198.

Práxedes A., Moreno A., Gil-Arias A., Claver F., Del Villar F. (2018b). The effect of small-sided games with different levels of opposition on the tactical behaviour of young footballers with different levels of sport expertise..

Rampinini E, Impellizzeri FM, Castagna C, Abt G, Chamari K, Sassi A, and Marcora SM. (2007). Factors influencing physiological responses to small-sided soccer games. J Sports Sci 25: 659–666.

Rani R. (2021).Physical Fitness and Wellness.Friends Publications (India).

Rui, Zhao., Hailin, Wu. (2021). The Development Status and Extension Research of Small Basketball in Nanchong City. International Journal of Frontiers in Sociology.

Sampaio J, Abrantes C, and Leite N. Power,(2009). Heart rate and perceived exertion responses to 3x3 and 4x4 basketball smallsided games. Rev Psicol Del Deport 18: 463–467.

Sampaio, J., Abrantes, C., & Leite, N. (2009). Power, heart rate and perceived exertion responses to 3x3 and 4x4 basketball small-sided games. Revista de Psicologı´a Del Deporte, 18, 463–467.

Sampaio, J., Ibañez, S. J., Lorenzo, A., & Gómez, M. A. (2015). Discriminant analysis of game-related statistics between basketball guards, forwards, and centers in three professional leagues. European Journal of Sport Science, 15(6), 551-556.

Sarah, da, Glória, Teles, Bredt., Daniel, de, Souza, Camargo., Juliana, O, Torres., Gibson, Moreira, Praça., André, Gustavo, Pereira, de, Andrade., L., Paolucci., Israel, Teoldo, da, Costa., Mauro, Heleno, Chagas. (2022). Multidimensional analysis of

players' responses in basketball small-sided games: The impact of changing game rules.

Sarah, da, Glória, Teles, Bredt., Juan, Carlos, Pérez, Morales., André, Gustavo, Pereira, de, Andrade., Juliana, O, Torres., Gustavo, H., C., Peixoto., Pablo, Juan, Greco., Gibson, Moreira, Praça., Mauro, Heleno, Chagas. (2018). Space Creation Dynamics in Basketball Small-Sided Games.. Perceptual and Motor Skills.

Sarmento, H., Figueiredo, A., Lago-Penas, C., Milanovic, Z., Barbosa, A., & Tadeu, P. (2014). Influence of the opposition team on the physical and technical variables of elite basketball games. Journal of Strength and Conditioning Research, 28(12), 3502-3508.

Scanlan, A. T., Wen, N., & Tucker, P. S. (2015). Defensive performance affects winning and losing in basketball. International Journal of Performance Analysis in Sport, 15(2), 452-461.

Sheppard, J. M., & Young, W. B. (2006). Agility literature review: Classifications, training and testing. Journal of Sports Sciences, 24, 919-932.

Sogand, Poureghbali., Jorge, Arede., Kathrin, Rehfeld., Wolfgang, I., Schöllhorn., Nuno, Leite. (2020). Want to Impact Physical, Technical, and Tactical Performance during Basketball Small-Sided Games in Youth Athletes? Try Differential Learning Beforehand.

Somashakar, R, &Sudhakara, G. (2019).selected physical fitness variables and basketball performance.6 (4), 141-142

Stone, N.M., & Kilding, A.E. (2009). Aerobic conditioning for team sport athletes. Sports Medicine, 39, 615–642.

Sudha, P. (2015). Prediction of basketball playing ability from selected fundamental skills, physical, physiological and anthropometric variables among university basketball women players. Asian Journal of Information and Technology, 11(4), 131-134.

Tomlin D.L, Wenger H.A. (2001). The Relationship between Aerobic Fitness and Recovery from High Intensity Intermittent Exercise. Sports Med; 31:1-11.

Torres-Unda, J., Zarrazquin, I., Gil, J., Ruiz, F., Irazusta, A., Kortajarena, M., & Irazusta, J. (2013). Anthropometric, physiological and maturational characteristics in selected elite and non-elite male adolescent basketball players. Journal of Sport Sciences, 31(2), 196-203.

Vaquera, A., García, J., Santos, M. A., García-Manso, J. M., & Sánchez-Medina, L. (2016). Relationship between offensive patterns and game success in elite women's basketball. Journal of Human Kinetics, 51(1), 229-238.

Williams K and Owen A. (2007). The impact of player numbers on the physiological responses to small sided games. J Sports Science Med Suppl 10: 99–102.

Young W and Rogers N. (2014).Effects of small-sided game and change-of-direction training on reactive agility and change-of-direction speed. J Sports Sci.; 32: 307-14.

APPENDIX- A

Medical History Check-up

The questionnaire prepare for research entitled. Effects of SSG training on some selected physical fitness variables in the case of Worksite city male U-17 basketball project players.Wolkite, Ethiopia. So you are kindly requested to give appropriate information for the following questions regarding to health status. Thank you!!!

Participant information Name: _____telephone number _____

Sex: _____your typical food _____

Age_____ time gap b/n meals_____

Emergency Contact information

Name_____ address _____

Relationship _____telephone number _____

Personal health history (answer YES or NO and description if it is necessary)

Is this your first visit to the exercise program? ----------if not please brief description of what lead to the administration ----------

Have you ever been treated for internal organs? If yes, when and give details problems----------

Have you ever appeared irregular heart beat on your heart? If yes when and give details----------

Have you ever fainted or bad concussion? ----------If yes kindly write when and how you fainted out ----------

Do you have any allergies? If yes kindly list them----------

Are currently undergoing any medical treatment or under observation? ----------

Have you fallen sick in the past 6 month? ----------If problem---------- Have you had any injury in the past 5 years? ----------If yes write the problem ----------

Have you ever had major surgery performed on you in the last year? ----------If yes when write the problem ----------

Does your family have a history of any genetic disease? ---------- If yes write the problem----------

Do you have any of the following disease? Asthma ---------- cancer ---------- Heart disease ---------- stroke ---------- Diabetes--- ---------- skin infection---------- Would you expect that this exercise program service will address satisfactory?

I have read and understand the form and have given accurate information in regard to any my health

Signed ----------date----------

Signed----------date ----------

Thank you for taking your respond

Adapted (THOMAS; 2000) USC, Accessed on January, 21, 2012

APPENDIX- B

Informed Consent form filled and signed by parents

You will be involved in an small sided game trainings 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 physical fitness in sports competition and in evaluating the type of training that will be needed to improve physical fitness 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 small sided game training 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- C

Budget and time schedule

Resources and budget

No	Item description	Unit	Quantity	Unit cost(birr)	Total cost(birr)
1	Stationery Costs				
2	Transportation	…….	……	3000	3000
3	Document holding bag	Pieces	1	1500	1500
4	Paper	Packets	1	700	700
5	Flash	Eight GB	1	800	800
6	Pen	Packets	1	500	500
7	Internet and telephone			4000	4000
8	Writing, Printing, Photocopy	Page and pieces			5000
9	binding expense of the final thesis			1000	1000
10	Household survey and data collection	…….	……..	4000	4000
11	Stop watch				500
12	Water and light meal for trainees during training				5000
13	Total coast			26000	
14	Contingency			2000	
15	Grand coast			28000	

APPENDIX- D

Research time frame work

No	Activities will be carried(working activities)	**SEP**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**jul**	**Aug**
1	Literature Review	*	*										
2	Arrangement and Write in the proposal			*	*								
3	Defending the Proposal					*	*						
4	Data collection and processing						*		*				
5	Data analysis and interpretation								*	*			
6	Preparing a research report									*	*	*	
7	Public defence									As the university schedule			

APPENDIX- E

Description of the training schedule

Sport training requires a carefully thought-out approach. The goal of the training plan is to specify the tasks that must be completed in order to meet predetermined goals and produce successful training programme outcomes. The tactics for obtaining peak performance are sport fitness training programmes. Prior to, during, and after training, participants' fitness levels should be evaluated. Exercise should be chosen and specific to the chosen physical fitness components that need to develop. It should also follow the training principle and be well-adjusted to the participant's fitness level and the weather conditions. A training plan may be long-term or short-term in nature. Some fitness components require short-term training, while others require long-term training. This is why the researcher will focus on a short-term training programme (ten weeks). In order to boost performance and raise physical fitness levels, it is vital to consider the intensity of the workout and the frequency of training sessions. Exercise brings about change and is physically taxing. A client's ability to reach their fitness goals may be severely hampered by overuse injuries or overtraining if they train too frequently, too intensely, or without adequate recovery time in between sessions.

Planning the session and the training weeks

The researcher will apply the training principle in light of the above-mentioned factor as well as others. In accordance with the principles of frequency, intensity, rest and recovery, this training programme was created to continue for ten weeks. It consisted of three days of training per week, with one day set aside for rest in between each session. The experimental group received 40–60 minutes of additional training time in addition of their regular training period. The training session will begin with a warm-up exercise and last until the cool-down.

APPENDIX-FI

10 week Training schedule for the small sided game group

Week 1-3 1vs1, 2vs2 and 3vs 3 Intensity-Low

Dates	Activities	Duration	Recovery	Court .D	Coaches' role	Players role
Monday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 2min B/n rep 30sec	7.5*14 15*14 And 15*18	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying
Wednesday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 2min B/n rep 30sec	7.5*14 15*14 And 15*18	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying
Friday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 2min B/n rep 30sec	7.5*14 15*14 And 15*18	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying

- Warming up=10 min
- Serious active exercise time=3m(per activity)*2(rep)*2(set)=18
- Cooling down=10min
- Recovery time=b/n set=2min*3=6m+B/n rep 30sec*6=3min=9min
- Total training time=18+10+10+9m=47m
- Pitch size=7.5*14,15*14 and 15*18

APPENDIX-FII

10 week Training schedule for the small sided game group

Week 4-6 **1vs1, 2vs2 and 3vs 3** **Intensity-Moderate**

Dates	Activities	Duration	Recovery	Court .D	Coaches' role	Players role
Monday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 1min &30 sec B/n rep 30sec	7.5*14 15*16 And 15*20	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying
Wednesday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 1min &30 sec B/n rep 30sec	7.5*14 15*16 And 15*20	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying
Friday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 1min &30 sec B/n rep 30sec	7.5*14 15*16 And 15*20	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying

- Warming up=10 min
- Serious active exercise time=3m(per activity)*2(rep)*2(set)=18
- Cooling down=10min
- Recovery time=b/n set=1min&30sec*3=4 min and 30 sec B/n rep 30sec*6=3min=9min
- Total training time=18+10+10+7min&30 sec=45min &30sec
- Pitch size=7.5*14,15*16 and 15*20

APPENDIX-FIII

10 week Training schedule for the small sided game group

Week 7-10 **1vs1, 2vs2 and 3vs 3** **Intensity-High**

Dates	Activities	Duration	Recovery	Court .D	Coaches' role	Players role
Monday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 1min B/n rep 30sec	7.5*14 15*18 And 15*22	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying
Wednesday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 1min B/n rep 30sec	7.5*14 15*18 And 15*22	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying
Friday	-Warming up -1vs1 Basketball game -2vs2 Basketball game -3vs3 Basketball game with two players take active recovery time -Cooling down	10min 6 min 6min 6min 10min	B/n sets 1min B/n rep 30sec	7.5*14 15*18 And 15*22	-Encourage players to play without delaying -Facilitate balls and materials	Playing without delaying

- Warming up=10 min
- Serious active exercise time=3m(per activity)*2(rep)*2(set)=18
- Cooling down=10min
- Recovery time=b/n set=1min*3=3min+B/n rep 30sec*6=3min=9min
- Total training time=18+10+10+6min=44min
- Pitch size=7.5*14,15*18 and 15*22
- Rule modify(permitted only two dribble) for only 2on2 and 3on3 ssgs.

APPENDIX G

Experimental Procedures

The training sessions took place on the court of the Wolkite City Basketball Club. The SSG was played on the court size and lasted between 44 and 47 minutes without player substitutions. On the basis of earlier investigations, this drill (SSG) training type and court dimension were selected (Markus et al., 2012). For a high work rate to be achieved, the coach must consistently encourage the player verbally (Rampinini et al., 2007). Three experimental sessions per week were held for the course of the study's ten-week duration. To prevent any impact of daily rhythms on the measured variables, all experimental sessions were scheduled at the same time of day (on a Monday, Wednesday, and Friday during a regular training session in the afternoon from 11:00 p.m. to 12:00 p.m. local time) from the start of the program until the end (Drust, Waterhouse, Atkinson, Edwards, & Reilly, 2005). Every player was practiced in this manner for 2 repetitions 2sets, and 3 minutes in duration, with a 2-1 minute rest in between sets and a 30-second break between repetitions on the experimental court size. The athletes were encouraged by the coaches to participate in high-intensity activities. 1vs1, 2v2, and 3v3 SSGs were used in this training at high intensity on a basketball court.To play with high intensity and maximize exercise load, the researcher simplified basketball rules in order to prevent game interruptions. After three weeks, the exercise's duration and intensity increased (increasing court size and deacreasing recovery time). The workout will begin with a 10-minute warm-up and close with a 10-minute cool-down.

APPENDIX H

Profile of research participants

No	Name of the subject	Age	Weight (in kg)	Height	BMI
1	Natnael Temesgen	16	60	1.90	16.6
2	Elias gelaye	15	68	1.77	21.7
3	Abas Shemsu	16	63	1.75	20.5
4	Tamrat Fikadu	14	58	1.57	23.5
5	Menano Bedewi	14	65	1.70	22.4
6	A/shikur Shemsu	16	61	1.73	20.3
7	Selemon Desta	14	56	1.56	23
8	Riyad Kedir	15	66	1.62	25
9	Biruk Fekede	14	59	1.55	24.5
10	Siyum Habte	10	65	1.74	21.4
11	Lidetu Selemon	15	60	1.66	21.7
12	Daniel Abebe	16	63	1.77	20.1
13	Eyob Mulugeta	14	57	1.69	19.9
14	Robel Dagnew	15	63	1.80	19.4
15	Adnan Feysel	15	60	1.72	20.2
16	Hossam Eliyas	16	62	1.73	20.7

APPENDIX I

Record sheet of physical fitness test for experimental group.

No	Code	Independent variables					
		CVE(min)		Agility(sec)		Speed(sec)	
		Test results		Test results		Test results	
		Pre	Post	Pre	post	Pre	Post
1	SSG01	16.24	15.25	11.54	10.77	3.55	3.54
2	SSG02	13.41	12.31	10.83	10.01	3.75	3.69
3	SSG03	14.31	13.52	12.14	11.25	3.21	3.18
4	SSG04	12.48	11.56	10.47	9.09	3.46	3.46
5	SSG05	11.51	10.11	11.12	10.01	3.65	3.66
6	SSG06	14.17	12.77	12.07	10.75	3.81	3.79
7	SSG07	13.48	12.35	12.33	11.21	3.74	3.71
8	SSG08	16.04	15.01	10.34	9.05	3.19	3.17

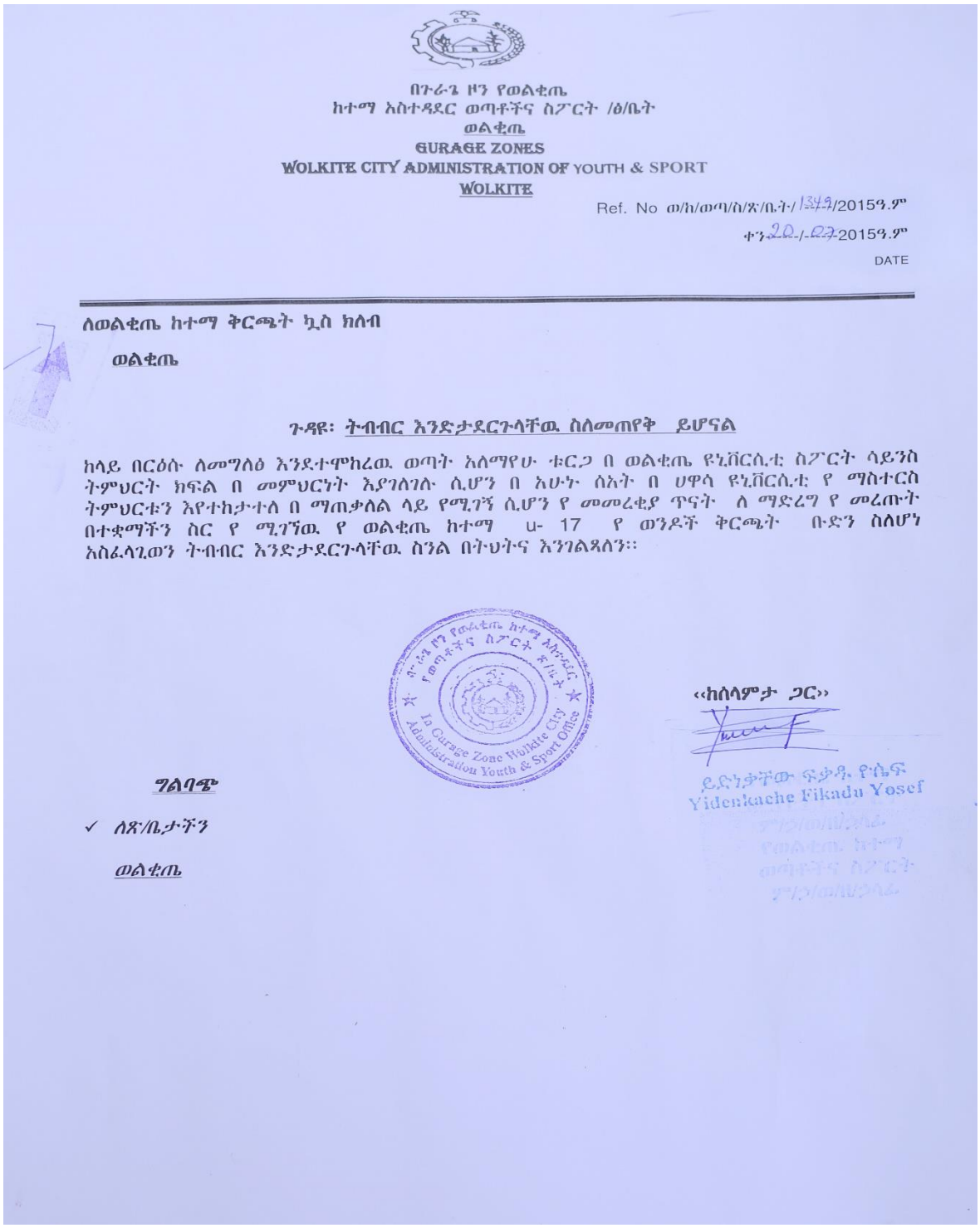
APPENDIX J

Record sheet of physical fitness test for control group.

No	Code	Independent variables					
		CVE(min)		Agility(sec)		Speed(sec)	
		Test results		Test results		Test results	
		Pre	Post	Pre	post	Pre	Post
1	CG01	15.16	14.49	11.56	11.54	3.54	3.49
2	CG02	15.01	14.55	10.47	10.39	3.76	3.71
3	CG03	16.49	16.33	11.52	11.49	3.42	3.41
4	CG04	14.24	14.11	12.09	12.09	3.87	3.88
5	CG05	15.21	14.56	11.54	11.55	3.27	3.25
6	CG06	16.29	16.28	11.07	11.03	3.68	3.55
7	CG07	11.33	11.27	10.59	10.05	3.37	3.35
8	CG08	14.09	14.07	12.21	12.18	3.77	3.69

APPENDIX K

Ethical approval from Wolkite City Sport Office



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GURAGE ZONES
WOLKITE CITY ADMINISTRATION OF YOUTH & SPORT
WOLKITE

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ወልቂጤ

ጉዳዩ፡ ትብብር እንድታደርጉላቸዉ ስለመጠየቅ ይሆናል

ከላይ በርዕሱ ለመግለፅ እንደተሞከረዉ ወጣት አለማየሁ ቱርጋ በ ወልቂጤ ዩኒቨርሲቲ ስፖርት ሳይንስ ትምህርት ክፍል በ መምህርነት እያገለገሉ ሲሆን በ አሁኑ ሰአት በ ሀዋሳ ዩኒቨርሲቲ የ ማስተርስ ትምህርቱን እየተከታተለ በ ማጠቃለል ላይ የሚገኝ ሲሆን የ መመረቂያ ጥናት ለ ማድረግ የ መረጡት በተቋማችን ስር የ ሚገኘዉ የ ወልቂጤ ከተማ ሀ- 17 የ ወንዶች ቅርጫት ቡድን ስለሆነ አስፈላጊወን ትብብር እንድታደርጉላቸዉ ስንል በትህትና እንገልጻለን፡፡

In Gurage Zone Wolkite City Administration Youth & Sport Office

‹‹ክብሳምታ ጋር››

ይድነቃቸው ፍቃዱ ዩሴፍ
Yidenkache Fikadu Yosef

ግልባጭ

✓ ለጽ/ቤታችን

ወልቂጤ

APPENDIX L

Picture of participants while recording fitness tests