EFFECTS OF ANAEROBIC EXERCISE ON SOME SELECTED SKILL RELATED PHYSICAL FITNESS COMPONENTS OF ABAY MINCH SECONDARY AND PREPARATORY SCHOOL STUDENTS SEKELA WEREDA ETHIOPIA.

MSc. THESIS

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Effects of Anaerobic Exercise on Some Selected Skill Related Physical Fitness Components of Abay Minch Secondary and Preparatory School students Sekela Wereda Ethiopia.

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As a research advisors we hereby certify that we have read and evaluated this thesis entitled **"**Effects of Anaerobic Exercise on Some Selected Skill Related Physical Fitness Components of Abay Minch Secondary And Preparatory School students; Sekela wereda Ethiopia." prepared by Yonas Mebrat Dangaw . We recommend that it can be submitted as fulfilling the thesis requirements.

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DEDICATION

I dedicate this thesis manuscript to my beloved parents. Further to my teachers who thought and shows the secret of wisdom particularly in elementary schools. Generally, to all kind peoples who contribute even a piece of advice though out in my life to reach in this stage**.**

STATEMENT OF THE AUTHOR

First I declare that this thesis is my work and all sources of materials used in this thesis have been duly acknowledged. I declare this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or publication.

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BIOGRAPHICAL SKETCH

The author was born on February 16, 1983 E.C in western part of Gojjam Amhara Regional State specific place Gish Abay. He attended his primary and junior school at Zeleke Desta primary school and he attended secondary school and preparatory school attended in Abay Minch.

Then he joined Hawassa University, department of sport science in 2004 E.C and graduated with Bachelor of Science in sport science (B.Sc.) in 2006 E.C.

Up on completion, he was employed as physical education teacher in south omo zone Goza secondary schools. After three years of service, he joined Haramaya University, Department of Sport Science for perusing his Master of Science in sport medicine in 2010 E.C.

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ACRONYMS AND ABBREVATIONS

AAHPERD	American Alliance for Health Physical Education, Recreation and Dance
ACSM	American College of Sport Medicine
ADP	Adenosine Di Phosphate
ATP	Adenosine Tri-Phosphate
CG	Control Group
CHO	Carbohydrate
D/T	During-Training Test
EG	Experimental Group
IRECE	Institutional Research Ethics Review Committee
P/T	Pre-Test
PO/T	Post-Test
SPSS	Statistical Packages for Social Sciences
Vo2 max	Maximum Volume of Oxygen Uptake max
WHO	World Health Organization

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EFFECTS OF ANAEROBIC EXERCISE ON SOME SELECTED SKILL RELATED PHYSICAL FITNESS COMPONENTS OF ABAY MINCH SECONDARY AND PREPARATORY SCHOOL SEKELA WEREDA ETHIOPIA.

ABSTRACT

The main objective of the present study was to evaluate the effect of anaerobic exercise on some selected skill related physical fitness components. The study design was quasi Experimental method. Simple random sampling technique were used to select subjects as well as to assign subjects for control and experimental groups, while purposive sampling were used to select the sample sex and the study place, the data were analyzed 40 male sample was taken from a population of 340 male students by lottery sampling technique, all subjects had divided randomly into 2 equal groups (n=20) control group (CG) and (n=20) experimental group (EG) was implemented. Their age range was from 16-19 years. EG who performed in 3 days/week for 12weeks anaerobic exercise training program like as speed bonding drills ,agility drills and squats on the other hand a CG did not perform this selected anaerobic training unless both groups undergone normal physical education class program. Both groups had taken pre, during and post-testing. Pretest of two groups of 20 subjects power was measured by explosive leg power vertical jump test for power, speed was measured using 30m run test, and agility was measured Illinois agility test were recorded. Consequently after six weeks of anaerobic exercise training, during test was taken in each parameter and a little improvement in each test results was observed and training was continually given by increasing its intensity and duration. After 12 weeks, posttest measurement on the same parameters was taken. The difference between the tests were analyzed statistically, with paired sample "t" test at P<0.05 to determine the difference between initial and final mean for participant .According to analyzed data The mean difference value boosted in vertical jump performance by 4.8cm. In 30 meter run 0.36 second mean differences was recorded. After 12 weeks anaerobic exercise in Illinois agility test 1.5 second increments were observed throughout the study period. The result obtained in this study indicated that there were significant improvement in power, speed, and agility. Based on this finding, anaerobic exercise has its own advantage on improving student's skill related physical fitness particularly power, speed, and agility.

***Key words**-Anaerobic exercise, skill, physical fitness*

1. INTRODUCTION

1.1. Background of the Study

Regular physical exercise enhance the function of the joints; increase the sense of physical well-being and promotes a sense of feeling good; increases physical working capacity by increasing speed, power, agility, reaction time, coordination and Balance. Physical Education is accepted as a "complete experience". "Physical fitness" is the biggest potentiality of human being .It can only be achieved through day to day physical activity (Cox, 1996).

Skill related physical fitness refers to an individual's athletic ability in sports such as tennis and encompasses skill-related attributes like dynamic balance, power, speed and agility (Walker and Hopkins , 1988).

However, physical education uses physical activity to produce holistic improvements in persons' physical, mental and emotional qualities Freeman. Physical activity has significant physical health benefits; and it appears to improve skill and health-related quality of life by enhancing psychological well-being and by improving physical functioning in persons compromised by poor health and is positively associated with health related quality of life (Faigenbaum, and Berger , 2001).

Physical fitness is a positive quality of life, extending on a scale from death to "abundant life". We living individuals have some degree of physical fitness which varies considerably in different people and in the same individuals at different times. Among the influencing factors the aim of the study want to evaluate the effect of anaerobic training on skill related physical fitness; Among the attributes of physical fitness, speed; agility; power; will belong under this study, skill Related Physical Fitness of grade 11 students.

1.2. Statement of the Problem

Fitness in the human body what fine tuning is to an engine. It enables us to perform up to our potential. Fitness can be described as a condition that helps ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure time activities and meeting emergency demands (Faigenbaum, 2009**).**

The greatest benefits of regular anaerobic exercises are probably well known theoretically. But the problem lies in knowing practically anaerobic is better and effective in improving skill related physical fitness of an individual to develop this fitness it is clear that participating in training program. Physical education is the integral part of the total educational process which enhances and integrates that physical social, and psychological aspects of an individual's life through directed physical activity vary of often the natural relationship between general education and physical education is forgotten (Matron, 1976).

However, Ethiopian school curriculum of physical education class develops one credit hour per week. This is too little to improve the skill related physical fitness components it required to achieve in each grade level with regard to set norms and standards in each grade level of physical education text book including grade 11. Due to this the researcher want to investigate the effect of three month regular anaerobic exercise training on grade 11 students skill related physical fitness. Based on the above reason the investigator was to test the following hypothesis:

1. H_O: Anaerobic exercise training has no effect on power, of grade 11male students.
H_A: Anaerobic exercise training has an effect on power, of grade 11 male students.
2. H_O: Anaerobic exercise training has no effect on speed, of grade 11 male students.
H_A: Anaerobic exercise training has an effect on speed, of grade 11 male students.
3. H_O: Anaerobic exercise training has no effect on agility, of grade 11 male students.
H_A: Anaerobic exercise training has an effect on agility, of grade 11 male students.

1.3. Scope of the Study

To evaluate the effect of anaerobic exercise on selected physical fitness of grade 11 students for Abay Minch secondary and Preparatory School. The study was delimited in the following areas.

1. Skill Related Physical Fitness components i.e. speed-30m running, power-Vertical jump (explosive leg power), agility-Illinois agility, test.

2. Abay Minch secondary and Preparatory School grade 11 male students i.e. healthy have not any physical, mental, and emotional or any disability or deformity and volunteer to participate in the study.

3.The study was collected in the academic year of 2011 E.C/2018-2019G.C;12 weeks of anaerobic exercise training of 20 experimental groups and 20 Control group a total of 40 sample subjects of grade 11male students.

1.4. Significance of the Study

The purpose of this study was to evaluate the effects of anaerobic training on selected skill related physical fitness variables of grade 11 students at Abay Minch secondary and preparatory school. According to (Garn, 2011) this study was help in

- Teaching students to assume responsibility for their personal fitness development. This includes helping students set personal goals that have meaning. It implies an extension of fitness development beyond free time in school, as well as application to the home and community environment.
- Providing an understanding of how Skill related physical fitness is developed.
- Offering the opportunity to participate in a range of fitness activities related to different skills. In general, the researcher believes students, physical education teachers, curriculum developers, policy makers; practitioners and different sport club stake holders will be beneficiaries from this study.

1.5. Objectives of the Study

1.5.1. General Objective

The general objective of the study was to investigate the effects of anaerobic exercise on selected skill related physical fitness variables of grade 11 students of Sekela wereda Abay Minch secondary and Preparatory School.

1.5.2. Specific Objectives

- To examine the effect of anaerobic exercise on power of male students.
- To investigate the effect of anaerobic exercise on speed of male students.
- To evaluate the effect of anaerobic exercise on agility of male students.

1.6. Operational Definitions of Key Terms

- **Agility**: The ability to change quickly while maintaining control of the body (Pino, 2010).
- **Anaerobic**" means in the absence of oxygen any activity where energy is produced without oxygen (Hall, 1999).
- **Effect-**something brought about by a cause or an agent result (Mifflin,1998).
- **Physical education**: process of learning through physical activities (Pino, 2010).
- **Physical Fitness** is the ability of a person to perform daily activities (Garzón, 2009).
- **Physical:** is refers to human body and body characteristics (Brubaker, 2011).
- **Skill**:The ability of using the correct time, energy efficiently and effectively (Walker, 2008)
- **Skill-related physical fitness** is agility, balance, coordination, power, reaction time and speed (Thomas, 1995).

2. REVIEW OF RELATED LITERATURE

2.1. The Concept of Physical Fitness

Physical fitness is the capacity to do physical work within guaranteed levels of performance quantitatively and qualitatively. The quantitative training parameters are skill related in nature and include the components of; agility, balance, coordination, speed, reaction time and power (Brubaker, 2011).

Generally, fitness is a condition in which an individual has enough energy to avoid fatigue and enjoy life. Physical fitness is divided into health and six skill related components. Skill related fitness components are fitness types, which enhances one's performance in athletic or sports settings (Hopple, 2009).

Physical fitness is usually measured in relation to functional expectations—that is, typically, by periodic tests measuring strength, endurance, agility, coordination, and flexibility. In addition, stress testing, which ascertains the body's accommodation to powerful, sustained physical stimuli, is used to analyze fitness. If individuals are able to accommodate to the stressors, they are assumed to be fit. Health related physical fitness contains; aerobic fitness, muscular strength, muscular endurance, cardiovascular endurance, flexibility and body composition (Ward, 2004).

Physical fitness may be defined as a physiological state of well-being that provide the foundation for the tasks of daily living, regular fitness program protects our body to different hypo kinetic disease, and a basis for participation in sport (Hoger,2010)

2.2. Skill Related Physical Fitness

Skill-related physical fitness is portion of physical fitness which is directed toward optimizing athletic performance. Skill related physical fitness is more related to good different skills and more related to ability to learn sport and other kinds of physical skill (Walker, 2008).

Skill-related physical fitness is needed for success in athletics and lifetime sport and activities. Fitness components important for success in skillful activities and athletic events; encompasses agility, balance, coordination, power, reaction time, and speed (Hoeger, 2010).

Benefits of exercise continue to grow, maintenance of an adequate level of the skill related components of physical fitness (Wuest and Bucher, 1995).

2.2.1. Speed

Speed refers to a person's ability to move fast or to cover a distance in a short period of time. When speed combined with strength it will provide power. Running a fast-break in basketball, moving a racquet fast through the 'hitting zone' to hit a ball harder in racquet games, sprinting in short sprint running and fast reaction in karate needs speed (Cronin, 2005).

It has been shown that to improve speed each athlete needs to work on acceleration, starting ability, stride rate, speed endurance, and stride length. However, the effectiveness of this depends on the state of training and health as well as nutrition of the trainees. In this research, 60m sprinting and 40-yard dash was used to assess speed of the subjects (Mackenzie, 2004).

Speed as how fast a body is moving or the distance that covered divided by the time it takes to cover that distance. Speed is the ability to cover a set distance quickly, and is explosive in nature (Kreighbaum and Barthes, 1996).

Speed as the ability to move the body or body parts through a required range of motion in the fastest possible time. Speed comprises of reaction time, acceleration, maximum speed and speed endurance (Lantin, 1994).

2.2.2. Power

Power can defined as the combination of strength and speed. In any sport, explosive movement is critical for improving performance. In sports like soccer, sprinting and basketball from one side of the court or field to another is an important part of winning and strongly related to strength in conjunction with the speed of movement. Power is the rate at which work can be done, therefore power = work/time**.**

The more work that done in a given amount of time, the greater the power. The sprinter out of the blocks at the start of a race exerts great muscle power to overcome gravity and body inertia in order to reach maximum velocity (Lantin, 1994).

2.2.3. Agility

Agility refers to the ability to change direction quickly without losing balance. It is an important attribute for different sport disciplines. On comparing elite 15–16-year old players with age-matched sub-elite soccer players, found that performance in an agility run test was the best distinguishing feature of the elite individuals. In recent publications, some authors have defined agility to include whole-body change of direction as well as rapid movement and direction change of limbs (Lantin, 1994)

Even more confusing has been the introduction of the term quickness which is seemingly used interchangeably for both agility and change of direction speed. Quickness has been identified as a multi-planar or multidirectional skill that combines acceleration, explosiveness, and reactivates (Wallhead, 2014).

Involving reaction time and velocity, as reaction time is defined as the minimum time from the presentation of a stimulus to the onset of a response, with velocity being defined as the rate of change in position with respect to time (Doherty, 1993).

Movements has classified as simple agility only, in that there is no temporal or spatial involved. Out lined a comprehensive definition of agility as it related to running sports such as football codes (Young, 2001)

2.2.4. Balance

There are several postural control strategies identified in literature to maintain balance in a variety of static and dynamic activity circumstances. The ankle strategy, for example, (based on the restoration of stability through body movement centered on the ankle joint) is mainly used when the equilibrium perturbation is small and the support surface is firm. The hip strategy is used in correspondence to larger perturbations, as the ankle strategy does not provide enough force to maintain postural stability. The movement is focused at the hip joint.

When the perturbation is large enough to displace the center of gravity outside the person’s base of support, the stepping or hopping strategy is used to restore balance. Muscle synergies are used to adapt these postural strategies to a variety of dynamic situations (Johasson, 2003).

2.2.5. Coordination

Hand eye coordination is an essential skill in day to day life and almost in all sports. Mental rehearsal is one of the intervention techniques that can be possibly used to improve hand eye coordination. Since different studies have examined the effects of mental rehearsal with different types of tasks and with different types of subjects, it is very difficult to draw firm conclusions on the effectiveness of mental rehearsal on hand eye coordination. The purpose of this study is to further examine the impact of mental rehearsal on hand eye coordination (Burkhart, 2013).

Hand eye coordination is use of vision to guide movements of the hand for many human activities like eating, sports, and using tools. To aim at a target location or, reach and perform a task, each sequence of events requires a complex integrated coordination of the hand movement and eye (Riera, 2015).

Normal hand eye coordination involves synergistic function of several sensor motor systems vision, touch, motor control, attention, and memory all contribute to even the simplest tasks involving, hand eye coordination (Mekota, 2000).

2.2.6. Reaction Time

Psychologists have named three basic kinds of reaction time experiments. In simple reaction time experiments, there is only one stimulus and one response. X at a known location spot the dot and reaction to sound all measure simple reaction time (Kosinjki, 2008).

In recognition reaction time experiments, there are some stimuli that should be responded to the memory set and others that should get no response the distractor set. There is still only one correct response. 'Symbol recognition' and 'tone recognition' are both recognition experiments. In choice reaction time experiments, the user must give a response that corresponds to the stimulus, such as pressing a key corresponding to a letter if the letter appears on the screen.

Physically fit subjects had faster reaction times fastest reaction times when they were exercising sufficiently to produce a heart rate of 115 beats per minute vigorous exercise did improve choice reaction time, but only for the first 8 minutes after exercise (Wormhoundt, 2017).

2.3. Health Related physical Fitness

Health - related fitness is important to everyone and should be stressed by physical educators and medical people alike. Health related fitness is defined as the ability to perform strenuous activity without excessive fatigue showing evidence of traits that limit the risks of developing diseases and disorders which affect a person's functional capacity. Components of health related physical fitness are identified as muscular strength, endurance, flexibility, cardiorespiratory endurance and body composition (Leary, 2009).

To enjoy an optimum state of health and physical fitness, exercises are quite necessary. Exercises are helpful in maintaining the sound body throughout life. Health and fitness afford the people an opportunity to live longer and they add to the quality of everyday life (Pargnam, 1986).

2.4. Anaerobic Fitness

Aerobic exercise is physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Anaerobic fitness is also the athlete’s body ability to deal with lactic and recover (Walker, 2010).

Better anaerobic fitness means the athletes can sprint, quickly change direction, accelerate and jump more throughout the game .Anaerobic fitness can be explained as the capability of a person to perform maximal anaerobic exercise. Anaerobic fitness declines at a faster rate than aerobic fitness. Likely due to a greater reduction infrequency of anaerobic activities compared to aerobic activities as people age and also to the significant losses of muscle mass associated with aging (Anderson and Ostojic 2006).

Anaerobic fitness refers to the use of oxygen to adequately meet energy demands during). Exercise via aerobic metabolism. The most important benefit of anaerobic training is that it builds muscle mass, muscle strength, and muscle power to a greater extent than aerobic training (Miller, 2012).

2.5. Anaerobic Training

Over all aim of anaerobic training is to increase a player’s potential to perform high-intensity exercise during a game. Anaerobic conditioning (the mechanism in your body responsible for

how fast you can run) is more important than aerobic conditioning (the endurance mechanism) but you need both to be successful. The specific aims of anaerobic training had summarized below (Wallhead, 2014).

- To improve the ability, act quickly and produce power rapidly. Thus, a player reduces the time required to react and elevates performance of a sprint during a game.
- To improve the capacity, produce power and energy continuously via the anaerobic energy-producing pathways.
- To improve the ability recovers after a period of high-intensity exercise. The energy for rapid development of muscle force has provided through anaerobic pathways.
- Anaerobic training has multiple effects, the most important of which are enhancement of neural activation of muscles, increased activity of creatine kinas and the enzymes in the glycol tic pathway and metabolism of CHO.

Anaerobic training can also increase the amount of glycogen stored within the active muscles and enhance their capacity to neutralize the effects of hydrogen ions, thereby delaying or offsetting fatigue. The aims of anaerobic training have expressed as:

- To improve the rate of force development and the peak force achieved during brief, fast movements;
- To improve speed over short distances;
- To enhance the provision of anaerobic energy so that an all-out sprint can be sustained for longer without training;
- To improve the capability of performing repeated sprints by enabling the player to recover quickly from strenuous efforts.

These aims refer to power and acceleration, speed and speed endurance (production and repetition) respectively.

Physical training for preparatory and competitive periods on selected motor ability components, physiological variables, speed parameters and hundred meters run performance of school level boys. Speed parameters finally improve their level of speed (Tamizhappan, 2010).

To find the relationship between agility and flexibility to reaction time, vertical jump and sprinting speed of soccer players The effect of interval training on selected speed parameters such as speed. The criterion variable at prior to and immediately after the training program by using 50 mts run. The results of the study revealed that there was a significant difference between interval running group and control group on selected speed parameter. A significant improvement on selected criterion speed variable was also noticed due to interval running program (Wallhead 1995).

2.6. Contribution of Physical Fitness to Skill and Health

Hippocrates, the father of modern medicine, said that, if all parts of the body are used in moderation it develops and ages slowly. But if left unused, it becomes defective quickly. We know that physical exercise is a prerequisite for a healthy life. Regular physical exercise promotes different skills on different sport disciplines on the other hand it also improves over quality of health (Gines, 2013)

Physical fitness has long been recognized as one of the primary objectives of physical education and sport. Anaerobic exercise improves skill related physical fitness components by improving our level of endurance (Estarijani, 1992).

2.7. Factors Influencing Fitness

According to (Sharkey, 2008) there are factors influence our fitness

I. Heredity

We inherit many factors that contribute to aerobic or anaerobic fitness including the maximal capacity of the respiratory and cardiovascular systems, a larger heart, more red blood cells and hemoglobin and a high percentage of slow oxidative and fast oxidative-glycol tic muscle fibers (Sharkey, 2008).

II .Training

Anaerobic training improves muscles ability to produce energy anaerobically and shifts metabolism from lactic threshold and carbohydrate which may produce the single most important health and skill effect of exercise (Sharkey, 2008).

III. Gender

Before puberty, boys and girls differ a little in aerobic and anaerobic fitness, but from then on girls fall behind. Both gender performs similar exercise until hormonal changes does not occur if hormonal changes began both gender exercise should be give separately (Sharkey, 2008).

2.8. School Physical Education Public Health and Skill

The concept and practice of physical education have existed in lives of people in various countries and cultures since ancient times. From the time primitive to the present, either directly or indirectly, physical activity has played a part in the lives of all people (Connell, 2015).

No country in history has held physical education in such high respect as did the ancient Greeks Physical education has a long and established tradition in schools, being linked with the Aristotelian concept of harmonious development of both body and mind (Nunn, 1976).

School is an important setting for establishing these skills because virtually all children can be reached through it, and existing infrastructures are devoted to physical and health education (Oosthuizen2010).

In fact, the major emphasis has been on competitive sports, beginning as early as the third grade and continuing throughout high school. Until recently, the large-scale fitness testing programs assesses sport-related skill rather than health-related fitness (Simons, 1985).

There is strong evidence that school-based physical education is effective in increasing levels of physical activity and improving physical fitness (Gamble,2013).

2.9. General Principle of Training

Since the practical application often provides the greatest challenge to novice personal trainers. While there are general training principles that apply to everyone, there are a number of factors that affect program design and client motivation. These principles according to (Kohl, 2012) are:

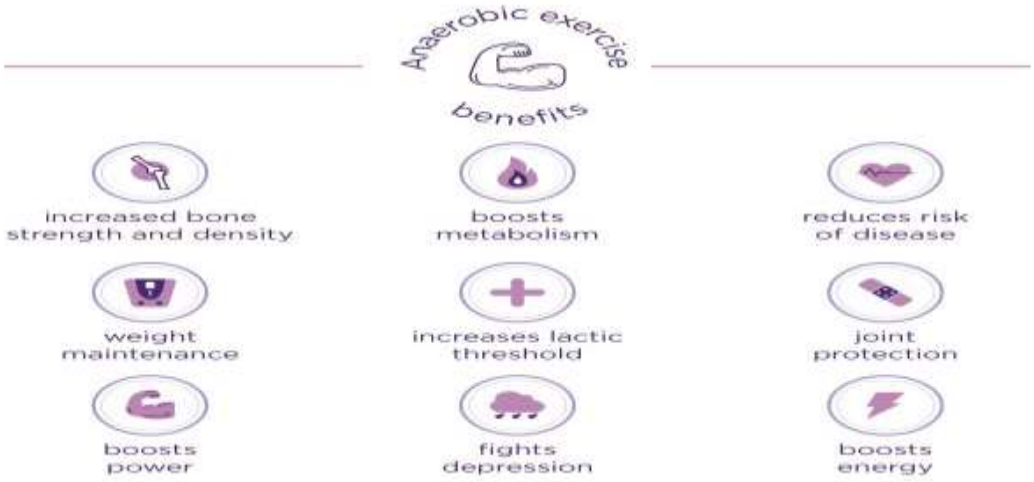
Specificity (individuality): Designing training programs/workouts with a specific goal in mind based on each client's individual needs. Specificity in training can be accomplished by targeting muscle groups, energy systems, speed of movement, movement patterns, and/or muscle action types (Kohl, 2012).

Variation: Variation is considered planned variety in exercise selection and training variables. While other per iodization models exists, a linear model is suggested for beginners (Kohl, 2012)

Progressive Overload: As the body adapts to a given stimulus, an increase in the stimulus is required for further adaptations and improvements. Thus, if the load or volume is not increased over time, progress will be limited (Hass, 2001)

2.10. Benefits of Anaerobic Exercise

Anaerobic exercise sounds like a lot of work, because it is. But the benefits that come with the intense fitness regime are enough to make you want to power through your next workout.



Schuenke (2002)

- **Increased bone strength and density** anaerobic activity like resistance training can increase the strength and density of your bones. Double bonus: You'll also decrease your risk of osteoporosis (schuenke, 2002).
- **Weight maintenance** in addition to helping your body handles lactic acid more effectively; anaerobic exercise can help maintain a healthy weight (schuenke, 2002).
- **Boosts power** it can increase your power (schuenke, 2002).
- **Boosts metabolism** anaerobic exercise helps boost metabolism as it builds and maintains lean muscle. (ACSM,2002)
- **Increased lactic threshold** by continually training above your anaerobic threshold, the body can increase its ability to handle lactic acid (schuenke, 2002).
- **Fights depression** need a pick-me-up Studies show that anaerobic exercise, like strength training, can boost your mood and even fight off depression (schuenke, 2002).
- **Reduces risk of disease** gains in strength and bone density attained by high intensity anaerobic training like bodyweight squats and pushups can reduce your risk for diabetes and cardiovascular disease (schuenke, 2002).
- **Joint protection** by building your muscle strength and muscle mass, your joints will be better protected, meaning you'll have greater protection against injury (schuenke, 2002).
- **Boosts energy** improved energy and sports performance. Consistent anaerobic exercise increases your body's ability to store glycogen (schuenke, 2002).

2.11. Anaerobic Exercise and Skill Related Physical Fitness Qualities

Speed and agility in team sports represent complex psychomotor skills. Agility is most often defined as the ability to change direction rapidly. This can take many forms, from simple footwork actions to moving the entire body in the opposite direction while running at a high speed. Agility to be physical capability which by its essence belongs among mixed physical capabilities (Sporis, 1996).

Correlation between agility, acceleration speed and maximal speed was neither found in the group of Australian soccer players. This diverse character of movement, which is employed above all in sport games and martial arts, can suggest that other running mechanisms than in typical track sprinters, are employed Universal components of agility (Warburton,2007).

3. MATERIAL AND METHODS

3.1. Description of the Study Area

The study were conducted at Abay minch Located in the West Gojjam Zone of the Amhara Region. The town is named after the nearby Mount Gish and the Abay River (Blue Nile) whose source is in the foothills of the mountain. The geographical grid coordinates of the area is 10'59"N to 37'13'E' North latitude and 10'983'N' to37.217'E' East longitude. Elevation of the area is 2.744m. Gish-Abay is the capital town of sekela and it is far from 425 kilometers northwest of Addis Ababa and around 175 kilometers southwest of Bihar Dar, the capital of Amhara Regional State (summary and statistical report of Ethiopia 2005 census results).The map of the study area is attached to appendix H.

3.2. The Study Design

The research approach designed in this study were employ quasi experimental method, since it helps to measure, assess, evaluate and analyze the effect of anaerobic exercise on selected skill related physical fitness components for grade 11 male students with the age of 16-19 at Abay Minch general secondary and preparatory school. As a result, in this study the researcher was apply to experimental (EG=20) Training programs planned for a period of 12 weeks and it was be 3 days a week and for 40 to 60 min each day and normal physical education class training program for control (CG=20) group.

Table 1: The Study Design Layout

Treatment	Anaerobic Exercise program
Frequency	3 days/week
Total duration	3 month
Duration/Session	40- 60 respectively/a month
Intensity	Moderate (55-70)
Exercise days	Monday, Wednesday and Friday morning (10:30-11:30)
Time of Training	Morning

3.3. Source of Data

In this study primary data source were taken according to the nature of the problem. The primary data was obtained from exercise pre, during and posttest.

3.4. Study Population

The sources of population were Abay Minch secondary and preparatory school grade 11 male students. The total population of the study is 340 students. The investigator is interested to conduct research on grade 11 male students; all students were selected by using purposive random sampling technique with age of 16-19 years for this study.

3.5. Sample and Sampling Techniques

Simple random sampling techniques were used to select subjects as well as to assign subjects for control and experimental groups, while purposive samplings were used to select the sample sex and the study place. The study were conduct in grade 11students, since the research is quasi experimental to monitor in training as well as manageable in test administrations in this grade level 40 male sample subjects were taken from a population of 340 grade 11 male students using purposive sampling technique.

Lottery sampling technique were used Among taken samples 20 students was undergo experimental groups (EG) of anaerobic exercise training for three months, the other 20 students control groups (CG) was attend one practical physical education lesson per week with intervention groups (EG).

3.6. Inclusion and Exclusion Criteria

3.6.1. Inclusion Criteria

All grade 11 male Abay Minch general secondary and preparatory school students with the age of 16-19 years were included as the study population after completing their health history and fitness status questionnaire that were help the researcher to obtain information on the health and fitness status of the subjects participating for the research study.

3.6.2. Exclusion Criteria

Subjects according to their health history questionnaire result subjects who have a medical condition restricted by the physician and recent physical injury and Subjects with any known cardiovascular disease, taking regular medication or psychiatric disorder and also any recent physical injury were excluded from this experimental trial.

3.7. Method and procedures Data collection

The type of data source in this study was use pretest, during and posttests. The stated problem need to measure skill related physical fitness of students to evaluate the effect of anaerobic exercise. Field based fitness tests are easy to administer; involve minimal equipment, low cost and a larger number of participants can be evaluated in a relatively short period of time. The field tests was speed (30m test), power(vertical jump), agility(Illinois agility).In the procedure of the study pretest and posttest were taken before and after 3 months anaerobic exercise training for experimental (EG) and one normal practical class for control groups (CG).

3.8. Fitness Test Protocol

The following fitness tests as the parameter of skill related fitness variables was record for pre-test, during and post-tests of the study.

3.8.1. Explosive Leg Power (Vertical Jump Test)

The Vertical Jump test is a very common test for measuring explosive leg power. There are many variations and technique for conducting this test. The expected results had affected by these test variations - the norms used as just a guide, and has based on the vertical jump off two legs, no run-up, no pause, and with full arm movements (Sergeant, 1921).

Objective

To monitor the development of the subject’s elastic leg strength:

Required Resources:

To undertake the test you were required, (Sergeant, 1921)

- Wall
- Tape measure
- Chalk Assistant

How to conduct the test:

- The subjects warms up for 9 minutes
- The chalks the end of her finger tips
- The subjects stands side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips.
- The subjects from a static position jump as high as possible and mark the wall with the chalk.
- The subjects should perform three trials.
- The assistant calculate and recording the highest jump from the three trials.

3.8.2. Speed Test (30-Meter Sprint)

Objective

The objective of this test is to monitor the development of the subjects ability effectively builds up acceleration from a starting blocks to maximum speed until end (Conger, 1988).

Required Resources

To undertake this test you was require:

- Flat non-slip surface
- Measuring tape
- 2 Cones
- Stopwatch
- An assistant

How to conduct the test

This test had required the subjects to sprint as fast as possible over 30 meters

- The subjects warms up for 9 minutes
- The assistant marks out a 30 meters straight section with cones
- On a signal of “Marks – Set – GO” sprint to the other cone as quickly as possible.

- The subjects starts in their own time and sprints as fast as possible over the 30 meters
- The assistant starts the stopwatch on the subjects 1st foot strike after starting and stopping the stopwatch as the subject's torso crosses the finishing line
- The test is conducted 3 times
- Perform 3 trials and take the best time.

3.8.3. Illinois Agility Run Test

Objective

The objective of the Illinois Agility Run Test is to monitor the development of the subjects' agility (Haywood, 2014).

Required Resources

To undertake this test you was require:

- Flat non-slip surface
- Measuring tape
- 8 cones
- Stopwatch
- Assistant

How to conduct the test

This test requires the subjects to run the lines route in the diagram below as fast as possible.

- The subjects warms up for 9 minutes
- The assistance sets up the course as detailed in the diagram
- The subjects lies face down on the floor at the "Start" cone
- The assistant gives the command "GO" and starts the stopwatch.
- The subjects jumps to her feet and negotiates the course around the cones following the line route shown in the diagram to the finish
- The assistant stops the stopwatch and records the time when the subjects passes the "Finish" cone.
- Three successful trials were completed
- Finally, the assistant uses the fastest recorded time.

3.9. Method of Data Analysis

The data collected through tests was analyzed interpreted and tabulated into a meaningful idea using manually and in a computer in order to evaluate the changes observed among participants that will be the physical trainings. At the end of data collection data analyzing using computerized statistical package software (SPSS) version 20. The paired T-test was used to compare the pre training and post training data and the level of significance was < 0.05%

3.10. Parameters to Be Measured By Physical Fitness Tests

The parameter was measured in speed, power, and agility, using the selected skill related physical fitness tests and with carefully selected tools or materials. To reduce the mistakes which can be occurred during data collection and to collect the appropriate data the assistant fitness test recorder was trained among technical assistance of physical education teachers was used to minimize mistakes during data collection.

3.11. Ethical Considerations

The study went in line with ethical issues are properly addressed. Privacy of the participants could be protected and confidentiality will strictly observed and maintained throughout the study. Generally this research was conducted as pre rule and regulation research ethics of Haramaya University. The protocol has been approved by the university guidelines. The participant could be informed earlier and was give a signed agreement to participate in this study with a written consent/ agreement letter. This research has been approved by Institutional Research Ethics Review Committee (IRERC) of the Haramaya University to make sure it is not resulting to any risk or harm to the participants of this study.

4. RESULTS AND DISCUSSION

This chapter discussed the analysis of data collected from the samples of study and its results. The purpose of this study was to investigate the effect of three months of anaerobic exercise on selected skill related physical fitness components among participants of sekela wereda abay Minch general secondary and preparatory school grade 11 male students.

4.1. Characteristics of study participants and physical fitness variables

Table 2. Characteristics of the study participants

Group	N	Age		Weight	
		Mean	S.D	Mean	S.D
EG	20	18.35	0.75	55.50	4.63
CG	20	18.20	0.77	54.30	4.66

As shown from above Table2 Descriptive characteristics of 40 study participants from Abay Minch preparatory school mean of age (EG=18.35, CG=18.20) and weight (EG=55.50, CG= 54.30). Subjects were relatively had the same age, and weight at the beginning of exercise.

Table 3.Dependent Variables and Tests

No	Variables	Methods/Tests	Equipment	Unit of Measurement
1	Power	Explosive leg power (vertical jump test)	Measuring tape and marking powder	Centimeter
2	Speed	30m run test	Sport field, Stopwatch, Whistle and cones	Second
3	Agility	Illinois' agility Test	Sport field, Stopwatch, Whistle and cones	Second

As it can be seen in above table 3 illustrated that the types of variables, methods, test items and its measurement units which designed to do this experimental research. The results of selected physical fitness variables of experimental and control groups pre, during and post-test data were analyzed. Its results had showed under these tables.

4.2. Effects of Anaerobic Exercise on power

Table 4.The mean values of power (explosive leg power vertical test) for EG and CG

Group	**Test**	**PT**(X±SD)	**DT**(X±SD)	**PoT**(X±SD)	**MD**	**P-value**
EG	Vertical jump test	22.80±3.38	24.80±3.35	27.60±3.55	-4.8	.000
CG	Vertical jump test	23.85±2.62	23.35±2.56	23.90±2.36	-0.04	.900

EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results, p=significance level.

As shown from table4 the average pretest score of EG (N=20) was found to be 22.80 with a standard deviation of 3.38 and CG (N=20) was found to be 23.85 with an SD of 2.62 from this data we can see that the scores in the pretest for both groups were close. After six weeks experimental mean score was 24.80 with SD 3.35 and control groups mean score of 23.35 with SD score 2.56. In contrast, the average post test score after 12 week anaerobic exercise training of experimental group was found out 27.60 with SD of 3.55 and for control groups mean 23.90 with SD of 2.36. From this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores achievement levels are different. Hence, these data indicated that there is a significant difference and gradual improvement between PT, DT and PoT test results of EG and there is deficient improvement between PT, DT and PoT test results of CG.

Figure 1. Graphical presentation of vertical jump test result of both groups

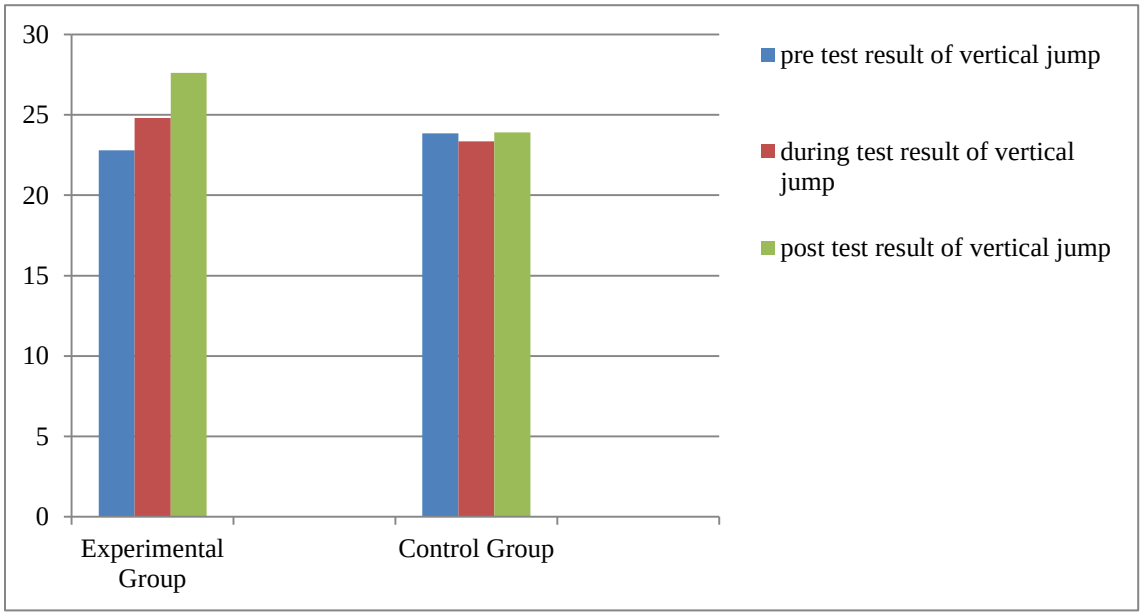


Fig1.As shown in the graph above the pre and posttest of the EG in vertical jump test was a mean score of 22.80 and 27.60 and also the CG was 23.85 and 23.90 respectively. From this data the investigator compute a pre and post mean difference of EG and CG in which in case of the EG repetitions of vertical jump test was significantly improved by a mean difference of -4.8 at P=.000

After three months anaerobic exercise training. And also in case of the CG, in which repetition of vertical jump test was poor improvement by a mean difference of -0.04 at P=0.900. The implication therefore is anaerobic exercise training had improvement on vertical jump test of students when compared with CGs. As a result the investigator testified and accepted alternate hypotheses one *and* rejected the null hypothesis which said that there is a significant improvement of power after three consecutive anaerobic exercise training. But as the data shows there is no significant improvement in power of the CG who only has a single 42 minutes of physical education practical class.

As a result some research has pointed out that anaerobic exercise leads to increased power. This differed from our results since we didn't offer evidence of a statistical difference in effect of anaerobic exercise between our control and experimental groups. A possible reason was that

anaerobic exercises mainly use short movement in relation with active response of muscle glycogen.

However while our result had a statistically insignificant in power compared to our control groups, a study of Miller (2012) found a significant improvement in the explosive leg power. Wallhead (2014) also showed an improvement on different intensity of anaerobic exercise on power, however, many of the studies referenced in this study supported that there was a positive correlation between anaerobic exercise and power (Anderson 2006).

4.3. Effect of Anaerobic Exercise on speed

Table 5.The mean values of 30 meter run test for EG and CG

Group	**Test**	PT (X±SD)	**DT** (X±SD)	**PoT** (X±SD)	**MD**	**P-value**
EG	30 meter run	5.33±0.26	5.24±0.25	4.97±0.30	0.36	.000
CG	30 meter un	5.31±0.31	5.33±0.41	5.25±0.29	0.05	.007

EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.

As shown from table 5 the average pretest score of EG (N=20) was found to be 5.33 with a SD of 0.26 and CG (N=20) was found to be 5.31 with an SD of 0.31 from this data we can see that the scores in the pretest for both groups were near.

After six weeks EG score was 5.24 with SD 0.25 and CG mean score of 5.33 with SD score 0.41. In contrast, the average post test score after 12 week anaerobic exercise training of EG was found out 4.97 with SD of 0.30 and for CG mean 5.25 with SD of 0.29 from this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores achievement levels are different. Hence, these data indicated that there is a significant difference and gradual improvement between PT, DT and

PoT test results of EG and there is no sufficient improvement between PT,DT and PoT test results and there is no improvement between PT,DT and PoT test results of CG.

Figure 2. Graphical presentation 30 meter run test result of both groups

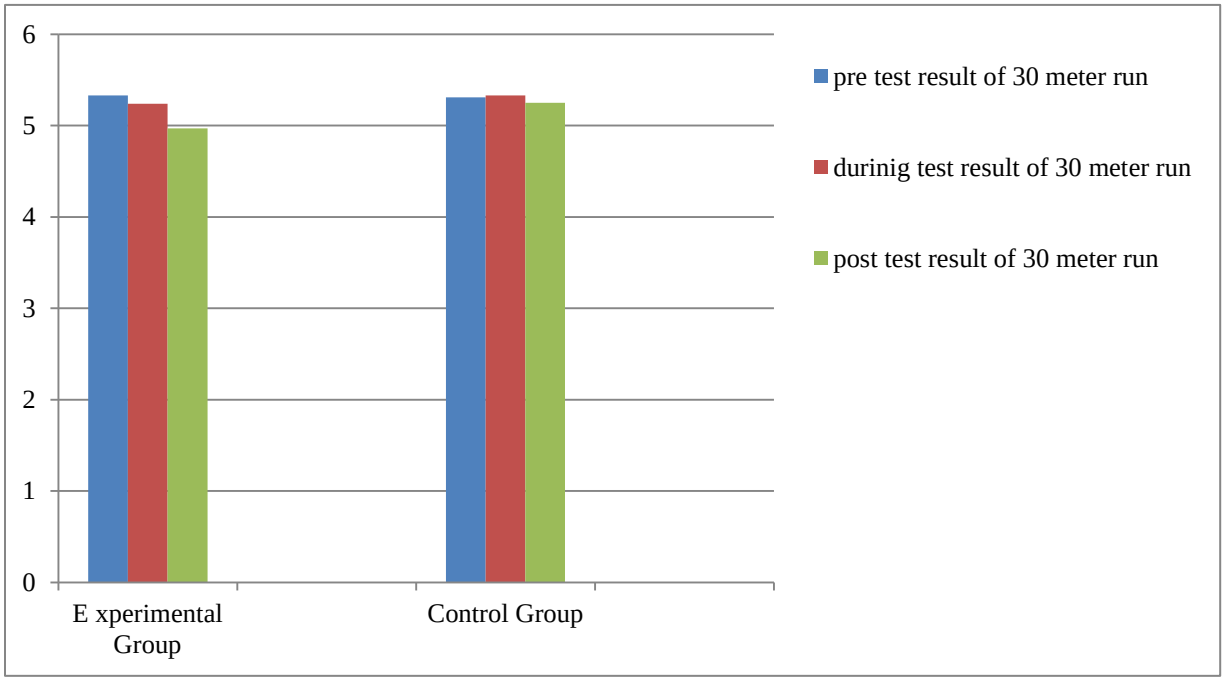


Fig 2. As shown in the graph above the pre and posttest of the EG in 30 meter test was a mean score of 5.33 and 4.97 and also the CG was 5.31 and 5.25 respectively. From this data the investigator compute a pre and post mean difference of EG and CG.

In which in case of the EG distance of 30 meter run test was significantly improved by a mean difference of 0.36 at P=0.000 after three months anaerobic exercise training. And also in case of the CG, in which distance of 30 meter run test was poor improvement by a mean difference 0.05 at P=0.007,There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is anaerobic exercise training had improvement on speed of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses two and rejected the null hypothesis which said that there is a significant improvement of speed after three consecutive anaerobic exercise training. But as the data shows there is no significant improvement in speed of the CG who only has a single 42 minutes of physical education practical class.

As a result this study consistent with findings of Walker, (2010) that conducted with selected skill related variable speed was measured using 30meter**.** The results of pre and posttest were compared by using Analysis of Covariance. The variable was significantly improved among experimental group. Similar study Warburton (2007) also showed on their findings of Anaerobic training demonstrated significant effects on speed.

4.4. Effect of Anaerobic Exercise on Agility

Table 6.The mean values of agility test for EG and CG

Group	**Test**	PT (X±SD)	DT (X±SD)	PoT (X±SD)	**MD**	**p-value**
EG	Illinois agility run	20.13±1.52	19.82±1.51	18.63±1.48	-1.5	0.000
CG	Illinois agility run	20.76±1.20	20.60±1.37	20.74±1.55	-0.02	0.931

EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ∆X= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.

As shown from table 6 the average pretest score of EG (N=20) was found to be 20.13with a SD of 1.52 and CG (N=20) was found to be 20.76 with an SD of 1.20. From this data we can see that the scores in the pretest for both groups were close.

After six weeks EG mean score was 19.82 with SD 1.51 and CG mean score of 20.60 with SD of 1.37 In contrast, the average post test score after 12 week anaerobic exercise training of EG was found out 18.63 with SD of 1.48 and for CG mean 20.74 with SD of 1.55. From this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores achievement levels are different. Hence, these data indicated that there is a significant difference and improvement between PT, DT and PoT test results of EG and there is no improvement between PT,DT and PoT test results of CG.

Figure 3.Graphical presentation of Illinois agility test result of both groups

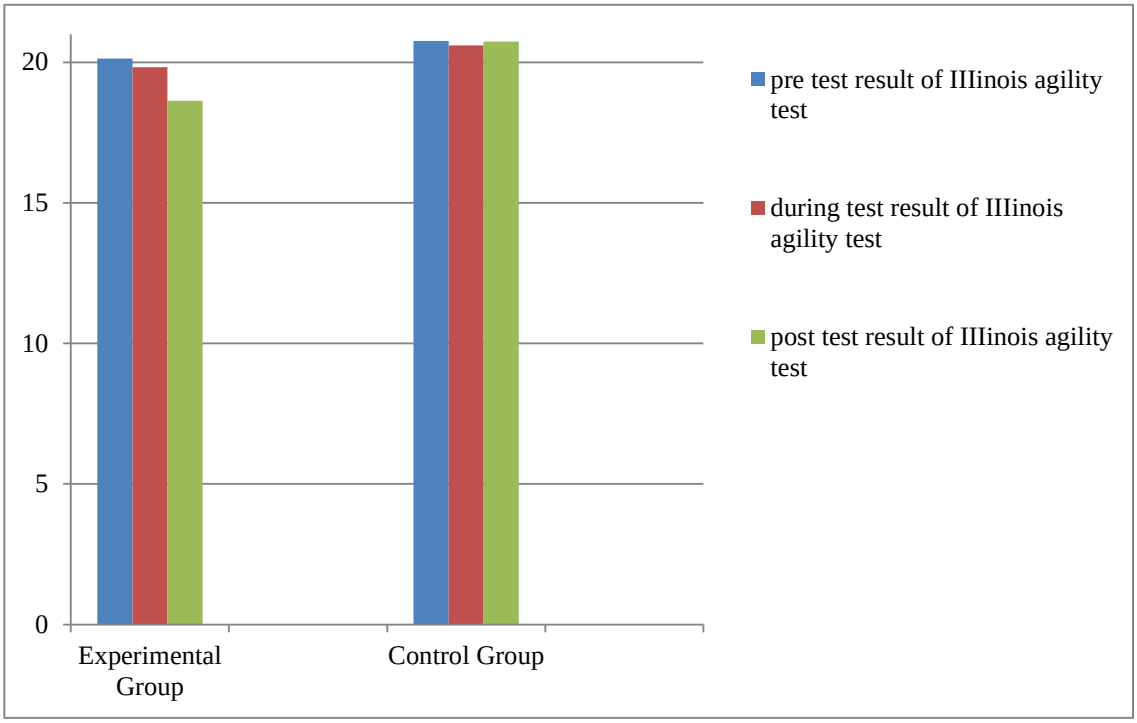


Fig 3. As shown in the graph above the pre and posttest of the EG in Illinois agility test was a mean score of 20.13 and 18.63 and also the CG was 20.76 and 20.74 respectively. From this data the investigator compute a pre and post mean difference of EG and CG. In which in case of the EG Illinois agility was significantly improved by a mean difference of -1.5 at P=0.000

After three months anaerobic exercise training. And also in case of the CG in Illinois agility test was poor improvement by a mean difference -0.02 at P=0.931, There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is anaerobic exercise training had improvement on agility of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses three and rejected the null hypothesis which said that there is a significant improvement on agility after three consecutive anaerobic exercise training. But as the data shows there is no significant improvement in agility of the CG who only has a single 42 minutes of physical education practical class.

This result is supported by Lantin (1994) their result shows that combined exercises of stretching and anaerobic exercises were significantly in agility. Moreover, wallhead, (1995) support the theory that step anaerobic exercise had significant effects on agility among the experimental group and no significant changes were seen in control group. Also Sporis, (1996) showed agility was measured with the effective change of direction.

4.5. Comparison of three tests (vertical jump, 30meter run, and Illinois agility) results of EG

Table 7.Changes of 12 week anaerobic exercise in the selected skill related physical fitness components (power, speed and agility)

Type of test	PT (X±SD)	DT (X±SD)	PoT (X±SD)	MD	P-value
Power (vertical jump)	22.80±3.29	24.80±3.26	27.60±3.46	-4.8	0.000
Speed(30m run)	5.33±0.26	5.24±0.24	4.97±0.29	0.36	0.000
agility(Illinois' agility test)	20.13±1.48	19.82±1.47	18.63±4.26	-1.5	0.000

X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.

The above table showed that EG there was significance difference in between the pre to post test score of (vertical jump test, 30 meter run test, Illinois agility test) results due to twelve week anaerobic exercise in the selected skill related physical fitness components (power, speed and agility).All test had changes was due to Anaerobic exercises in which they were engaged in. the mean score value of power pretest before training result was (22.80) and posttest after training mean score values was (27.60)

The mean difference score of pretest with mean difference score of posttest mean difference value increased by (-4.8).

As indicated the tables mean value of speed from pretest 5.33 increased to 4.97 post test. Speed score of pretest to posttest mean difference value of EG increased 0.36 recorded. The mean value of agility from pretest 20.13 increased to 18.63 posttest result. Agility score of pretest mean to posttest mean difference value of EG increased -1.5 recorded.

When we compare the pretest and posttest of mean difference value score in each test of 12 weeks Anaerobic exercise intervention experimental groups. change observed on Power (vertical jump test),Speed (30 meter test) and Agility (Illinois agility test) The improvement rate of this data was one indicator of the great Anaerobic exercise training effect on some selected skill related physical fitness components. Therefore, anaerobic exercise training was important for increment of power, speed and agility according to the result on this study.

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. SUMMARY

The purpose of this study was to evaluate the effect of anaerobic exercise on selected skill related physical fitness components of grade 11 students in case of Sekela wereda Abay Minch general secondary and Preparatory School and to forward corrective measures to be taken in order to alleviate the encountered problems and advantages.

In dealing with these basic objectives, the study were conducted on grade 11 male students sekela Wereda abay minch secondary and Preparatory School. Among a population of 340 male students using Simple random sampling system 20 students were undergoes EG of anaerobic exercise training for three months, the other 20 students CG were attended one practical physical education lesson per week with experimental group EG. A pretest, during training test and posttest selected skill related physical fitness tests were taken to gain the necessary information required. The following findings were obtained from the result. More specifically;

- Pre, during and posttest was used through some selected skill related physical fitness components power, speed and agility variables were assessed.
- Subjects were divided into 2 groups as EG group (n=20) and CG group (n=20).
- Anaerobic physical fitness training programs were performed 3 days per week for 12 weeks
- The collected data were analyzed through descriptive statistics, paired sample T test to analyze and compare the statistical difference between the results of CG and EG.

5.2. CONCLUSIONS

- Training of selected anaerobic exercise was found to be effective tool of improving skill related physical fitness components for Abay minch secondary and preparatory school grade 11 male students'.
- The purpose of this study was to evaluate the associations between anaerobic exercises with selected skill related physical fitness components in grade 11 students of sekela Wereda abay minch secondary and preparatory school.
- Data was drawn from a pre and posttest after 12 weeks of anaerobic exercise training within selected physical fitness tests i.e. vertical jump to assess power,30 meter run to assess speed ,and Illinois agility test to assess agility administered to selected sample male subjects (N=40).
- This study indicate that anaerobic exercise has its own advantage on improving students skill related physical fitness particularly power, speed, and agility on the anaerobic exercise experimental groups showed a significant difference ($p<0.05$) on the above components compared with control group.

5.3. RECOMMENDATIONS

Based on the findings of the study, the following suggestions are forwarded:

- Power, speed and agility Skill related physical fitness components incorporated into grade 11 physical education lessons at school.
- Students who want improve his skill should train properly designed and supervised anaerobic exercise program.
- In order to increase skill physical education teachers should be properly designed and supervised anaerobic exercise program.
- School administrator should encourage and finance students' sport club in order to have more participation of students and to monitor their fitness status.

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7. APPENDICES

APPENDIX A
Health History and Physical Readiness Questionnaire of the Participants

This questionnaire is designed to obtain information on the health status and physical readiness of the subjects participating for the research study. The information will be kept strictly confidential.

For subjects: please read the following question carefully and indicate your correct response to each question by encircling it on the choice letter given.

1. Do you have a recent physical injury such as bone, muscle and joint which will be aggravated by physical exercise? A. Yes B. No

If yes indicate the type of injury that you had_____

2. Do you have suffered with heart condition? A. Yes B. No

3. Identify any medical problems that you had

A. Cardiovascular C. respiratory E. None

B. neuromuscular D. metabolic

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

A. Yes B. No

5. Are you taking any prescription medicines recently?

A. Yes B. No

If yes, name them below: _

Name of drug Dosage

_____ _____

_____ _____

_____ _____

6. Have you ever suffered from shortness of breath at rest or with mild exercise?

A. Yes B. No

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

A. Yes B. No

8. Do you ever feel feint, have spells of dizziness or have you ever lost consciousness?

A. Yes B. No

9. Do you know of any other reason why you should not participate in a program of physical activity?

A. Yes B. No

If yes explain your reason here

_____

_____

I hereby state that I have read, understood and answered honestly the questions above. I also state that I wish to participate in activities, which may include aerobic exercise and anaerobic exercises.

Coach's full Name: _____subjects' Name: _____

Coach's Signature: _____ subjects' Signature: _____

Date: _____Date:_____

American College of Sport medicine, 1997

APPENDIX B

Physical Activity Questionnaires

Investigator's Name _____

Subject's Name _____ Age_____

1) What type of physical activity/activities do you participate in? Please check the activities that you compete in.

a) Running c) Endurance or Short

b) Walking d) Distance Training

e) Others (please specify) _____

2) Do you have any experience to participate in any sport activities? Yes/No,

If you say yes, State the number of years/months/ you have been training in sport activities? _____

(Years and months)

3). How many hours per week do you train or participate in your sport?

_____ (hours per week)

4) Have your recently stopped your training due to an injury or for any other reason(s)? Yes / No.

If yes, for how long? _____

I, _____ certify that the information given above is correct.

_____ _____

Date Signature of the subject

Source:-Tamil Nadu Physical Education and Sports University Chennai 600006

APPENDIX C

Record Test of Experimental Group of students

Table 6.Record sheet for Experimental Group

No	Group	He	We	Age	Variables								
					Explosive leg power			30-meter run			Illinois agility run		
					Test			Test			Test		
					Pre	Dre	Post	Pre	dre	Post	Pre	dre	Post
1	EG	1.68	57	18	20	24	29	5.5	5.4	5.1	22.4	22.3	20.1
2	EG	1.70	62	18	25	27	30	5.4	5.5	5.3	21.0	20.9	20.3
3	EG	1.67	66	17	27	32	35	5.3	5.2	5.4	21.4	21.2	19.5
4	EG	1.70	51	18	21	23	27	5.1	5.1	4.9	20.0	19.9	18.9
5	EG	1.66	49	19	20	23	26	5.6	5.5	4.9	19.6	19.1	20.5
6	EG	1.69	51	18	25	25	30	5.5	5.4	4.9	20.6	20.1	19.1
7	EG	1.64	58	19	26	28	29	5.7	5.5	5.0	21.9	20.0	18.2
8	EG	1.70	52	18	23	22	20	5.4	5.6	4.8	22.2	22.0	19.6
9	EG	1.67	54	17	18	20	23	5.3	5.1	5.0	19.7	19.9	18.3
10	EG	1.69	51	19	19	22	25	4.9	4.9	4.7	19.8	20.5	19.0
11	EG	1.69	49	19	27	27	31	5.2	5.2	5.0	18.0	17.1	16.9
12	EG	1.66	62	18	18	20	24	5.2	5.1	5.0	18.9	18.0	17.8
13	EG	1.71	60	19	19	22	28	5.2	5.1	4.8	18.4	16.9	16.7
14	EG	1.69	57	19	30	28	33	5.1	5.1	4.9	19.6	18.2	20.7
15	EG	1.67	58	18	21	26	26	5.4	4.9	4.5	20.7	21.7	18.6
16	EG	1.68	56	19	26	28	30	5.5	5.4	4.9	19.2	20.0	17.6
17	EG	1.70	55	19	22	25	25	5.0	5.2	4.8	22.7	21.0	20.0
18	EG	1.71	52	19	22	22	26	5.5	5.1	5.7	18.0	19.0	16.9
19	EG	1.71	54	17	23	22	25	5.9	5.7	5.3	20.7	19.6	18.9
20	EG	1.68	56	19	24	30	29	4.9	4.8	4.4	17.7	18.9	15.0

Record Test of control Group of students

Table 7.Record sheet for Control Group

No	Group	He	We	Age	Variables								
					Explosive leg power			30-meter run			Illinois agility run		
					Test			Test			Test		
					Pre	Dre	Post	Pre	Dre	Post	Pre	Dre	Post
1	CG	1.72	58	18	27	28	24	5.6	5.6	5.5	22.8	22.4	22.2
2	CG	1.66	61	18	24	21	25	5.1	4.9	5.0	21.8	20.9	22.6
3	CG	1.68	65	17	26	27	25	5.3	5.2	5.2	20.2	19.0	19.8
4	CG	1.72	49	18	25	26	26	5.1	5.0	5.0	22.9	21.0	23.1
5	CG	1.68	51	19	22	20	21	5.0	4.9	5.1	21.9	22.0	21.5
6	CG	1.65	52	18	26	27	25	5.2	5.0	5.2	20.3	21.6	23.6
7	CG	1.75	57	17	27	25	26	4.9	5.1	5.0	21.7	19.7	21.1
8	CG	1.68	50	18	24	22	26	5.5	5.3	5.4	22.9	23.0	22.4
9	CG	1.69	49	19	24	23	22	5.2	5.1	5.1	21.5	21.4	22.2
10	CG	1.68	49	18	22	21	23	4.9	5.0	4.9	20.7	21.1	20.4
11	CG	1.71	50	19	27	25	28	5.5	5.4	5.3	19.5	19.4	18.7
12	CG	1.65	60	19	25	26	24	5.4	5.3	5.2	19.9	20.0	19.4
13	CG	1.70	58	17	24	23	23	4.9	5.0	4.8	19.9	19.5	20.3
14	CG	1.70	50	19	25	23	28	5.2	5.0	5.1	20.4	20.4	19.5
15	CG	1.69	59	18	27	24	25	5.2	5.1	5.2	20.1	22.0	20.5
16	CG	1.64	54	19	20	21	23	5.4	5.5	5.3	19.8	19.5	19.3
17	CG	1.74	54	17	18	19	20	5.7	6.0	5.6	20.1	20.0	19.5
18	CG	1.69	52	19	20	23	21	5.7	5.9	5.7	19.7	18.9	18.1
19	CG	1.73	55	19	22	22	20	6.1	6.4	6.0	18.9	18.0	19.7
20	CG	1.67	53	18	22	21	23	5.3	5.4	5.4	20.2	22.3	20.9

APPENDIX D

The International Skill Related Physical Fitness Awards or Qualifying Standards /Norms/

Table 8: Parameters Used to Test power

Normative Data of Vertical Jump Test for 16 to 19 Years Old

Gender	Excellent	Above average	Average	Below average	Poor
Male	>65cm	50 – 65cm	40-49cm	30 – 39cm	<30cm
Female	>58cm	47 – 58cm	30– 46cm	26 – 35cm	<26cm

National norms for 16-19 year olds (Davis)

Table 9: Parameters Used to Test Speed

Normative Data of the 30 Meter Test For 16 to 19 Years Old

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

Source: Davis B. et al; Physical Education and the study of sport; 200

Table 10: Parameters Used to Test Agility

Normative Data of Illinois Agility Run Test for 16 to 19 Years 0ld

Gender	Excellent	Above average	Average	Below average	Poor
Male	<15.2 sec	15.2 - 16.1 sec	16.2 - 18.1 sec	18.2 - 19.3 sec	>19.3 sec
Female	<17.0 sec	17.0 - 17.9 sec	18.0 - 21.7 sec	21.8 - 23.0 sec	>23.0 sec

Source: Davis et al. 2000

APPENDIX E
Description of the Study Design

The research was done at Abay Minch secondary and preparatory school male student, for this study Students with age of 16-19 are selected by purposive sampling technique. The subject was undergo12 week training program in order to see the change.

Gender and Age of The Subject- the researcher selects male students only, due to the problem of the skill related fitness variables (speed, agility, power, reaction time, coordination, balance) The selection of age is based on the average age of the students i.e. the average age of Abay Minch secondary and preparatory school male student is 18 so; the investigator was select purposively students with age of 16-19.

By selecting the age, gender and sample size of the study subject they underwent 3 months (12weeks) per year that is, December, January and February 2019. The training days per week are 3days that are Monday, Wednesday and Friday morning 10:30am-11:30am.

The researcher was take pre and posttest to know the change to know the progress of training and the dependent variables for this study are speed; power, and agility, independent variable is also anaerobic training. The tests used for the study are 30m sprint test, explosive leg power vertical jump and Illinois agility run test respectively.

APPENDIX F

Table 11 Paired sample T-test of parameters

Vertical jump test for EG (pre-during and pre-post result)

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - during test	-2.00000	2.15211	.48123	-3.00722	-.99278	-4.156	19	.001
Pair 2	pretest - posttest	-4.75000	2.63329	.58882	-5.98242	-3.51758	-8.067	19	.000

Vertical jump test for CG (pre-during and pre-post result)

	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 pre-during test	.50000	1.67017	.37346	-.28166	1.28166	1.339	19	.196
Pair 2 pre test-post test	-.05000	1.76143	.39387	-.87437	.77437	-.127	19	.900

30 Meter run test for EG (pre-during and pre-post result)

		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - during test	.09000	.16827	.03763	.01125	.16875	2.392	19	.027
Pair 2	pretest - posttest	.36500	.28335	.06336	.23239	.49761	5.761	19	.000

30 Meter run test for CG (pre-during and pre-post result)

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - during test	.00500	.16694	.03733	-.07313	.08313	.134	19	.895
Pair 2	pretest - posttest	.06000	.08826	.01974	.01869	.10131	3.040	19	.007

Illinois agility test for EG (pre-during and pre-post result)

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - during test	.31000	.94139	.21050	-.13058	.75058	1.473	19	.157
Pair 2	pretest - posttest	1.49500	1.13623	.25407	.96323	2.02677	5.884	19	.000

Illinois agility test for CG (pre-during and pre-post result)

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - during test	-.45500	.93947	.21007	-.89469	-.01531	-2.166	19	.043
Pair 2	pretest - posttest	.02000	1.01960	.22799	-.45719	.49719	.088	19	.931

APPENDIX G
Description of Training Schedule for the Three Months

The main goal of this study training plan schedule is to develop anaerobic exercise on skill related physical fitness variables of male Abay Minch secondary and preparatory school grade 11 male students through 12weeks training intervention. The schedule is prepared with time frame, intensity and frequency of exercises.

The following table includes different types of anaerobic exercise which was performed by the subjects within 12 weeks in order to improve their skill related fitness variables.

The exercises involve in this study was warming up exercise, sprint Running, squat jump, speed bounding drills ,Illinois agility drills and cooling down exercise which will help to develop students anaerobic exercise capacity fitness level. Also FITT (Frequency, Intensity, Time and Type of Exercise) principle of training is applied in the schedule (Booth, 2012)

1. **Frequency of Training**: the reptition of exercise in one set. The training schedule was completed 3 days per week that is Monday, Wendsday and Friday.
2. **Intensity of Training**: is how hard the body exerciscing or how much energy is expended when exercisicng. In this study the researcher use low intensity to high intensity for increasing load in the consecutive three months.There are ways to measure intensity of training;
3. **Duration of Training**: the subjects perform the exercise for 40-60 min per day in this study. Duration is dependent on the intensity of the activity, thus activity intensity contains,low moderate and High intensity activity was conducted over a longer period of time. Below the next page it contain 12 week anaerobic exercise training paln from the first month to the third month. These levels include low,moderate,and vigorous and are measured by metabolic equivalent of metabolic equivalent.The effectes of exercise are different at each intensity level recommendations to lead ahealthy lifestyle vary for individuales based on age,weight,and existing activity leveles (Wallhead, 2014).Below these page three month training schedule is prepared based on considering training principles.

1. First Month Training Schedule (December 2018)

The main objectives of this training schedule is to improve anaerobic exercise on skill related physical fitness Components of Abay Minch general secondary and preparatory school grade 11 male students**.**

Days per week	Types of Exercise	Week one to four(1-4)			
		Time 40 minute	Repetition	Rest	Low-Intensity
Monday	**Warming up**	9min	1x9min	1minitue	(40-55 MHR)
	Stretching exercises	4min	1x4min		
	Main part				
	Squat jump	2min	2x3min		
	Speed drill bounding	3min	2x3min		
	Illinois agility drill	4min	2x4min		
	Cooling down	5min	1x5min		
Wednesday	**Warming up**	9min	1x9min	1 minute	(40-55MHR)
	Stretching exercises	4min	1x4min		
	Main part				
	Squat jump	2min	2x3min		
	Speed drill bounding	3min	2x3min		
	Illinois agility drill	4min	2x4min		
	Cooling down	5min	1x5min		
Friday	**Warming up**	10min	1x10min	1minute	(40-55 MHR)
	Stretching exercises	4min	1x4min		
	Main part				
	Squat jump	2min	2x3min		
	Speed drill bounding	3min	2x3min		
	Illinois agility drill	4min	2x4min		
	Cool down	5min	1x5min		

The above training schedule was performed every week of the month of December 2018

2. Second Month Training Schedule January (2019)

The main objectives of this training schedule is to improve anaerobic exercise on skill related physical fitness Components of Abay Minch general secondary and preparatory school grade 11 male students.

Days	Types of Exercise	Week five to eight(5-8)			
		Time 50 minute	Repetition	Rest	Medium-Intensity
	Warming up	8min	1x8min	40 second	(50-70 MHR)
	Stretching exercises	4min	2x4min		
Monday	**Main part**				
	Squat jump	3min	2x3min		
	Speed drill bounding	6min	2x6min		
	Illinois agility drill	4min	2x4min		
	Cooling down	5min	1x5min		
Wednesday	**Warming up**	8min	1x8min	40 second	(50-70 MHR)
	Stretching exercises	4min	2x4min		
	Main part				
	Squat jump	3min	2x3min		
	Speed drill bounding	6min	2x6min		
	Illinois agility drill	4min	2x4min		
	Cooling down	5min	1x5min		
Friday	**Warming up**	8min	1x8min	40 second	(55-70 MHR)
	Stretching exercises	4min	2x4min		
	Main part				
	Squat jump	3min	2x3min		
	Speed drill bounding	6min	2x6min		
	Illinois agility drill	5min	2x5min		
	Cooling down	5min	1x5min		

The above training schedule was performed every week of the month of January 2019.

3. Third Month Training Schedule (February 2019)

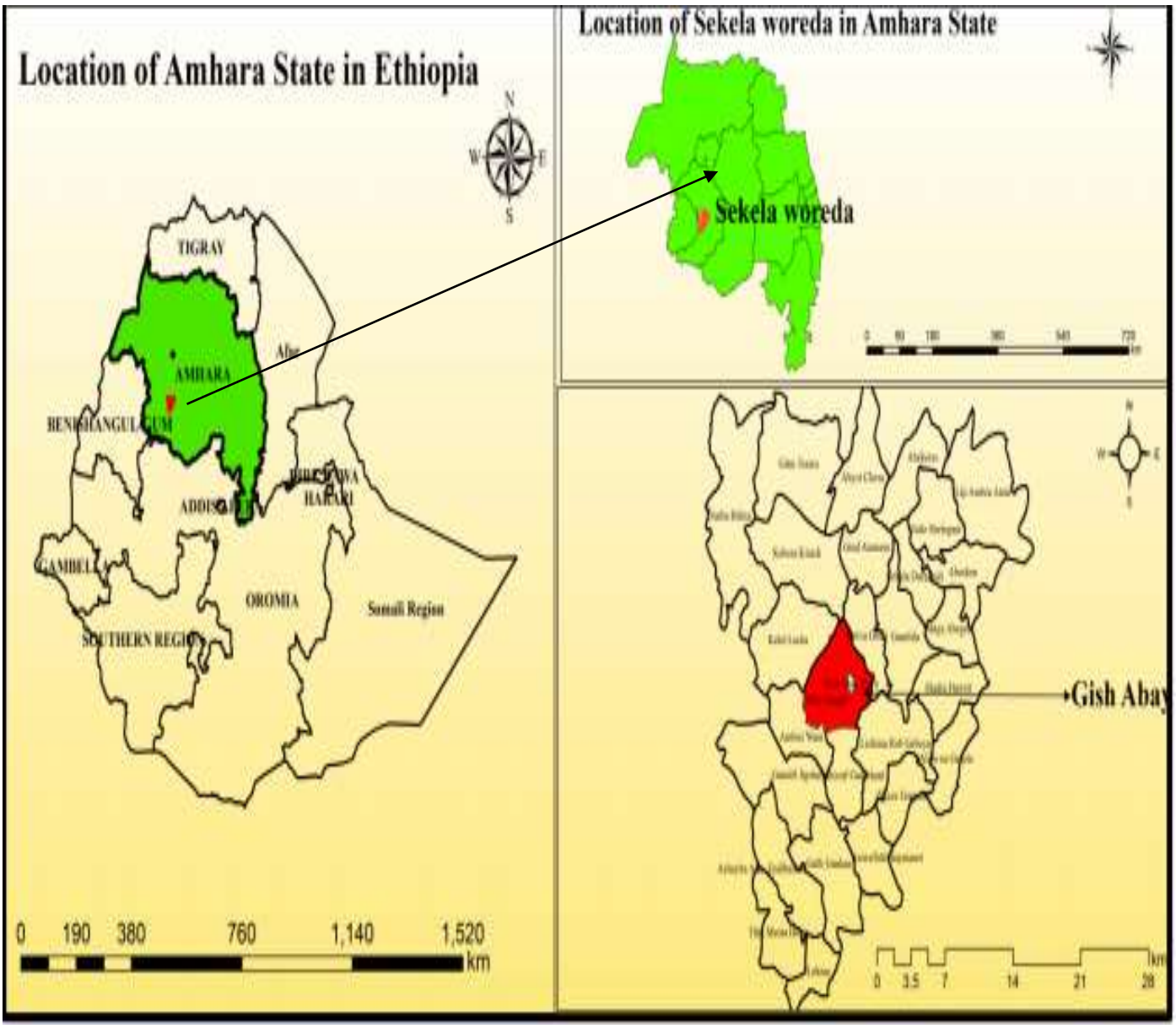
The main objectives of this training schedule is to improve anaerobic exercise on selected skill related physical fitness Components of Abay Minch General Secondary and Preparatory School Grade 11 male students.

Days	Types of Exercise	Week nine to twelve(9-12)			
		Time 60 minute	Repletion	Rest	High-Intensity
Monday	**Warming up** Stretching exercises	7min 6min	1x7min 1x6min	30 second	(70-80 MHR)
	Main part Squat jump Speed drill bounding Illinois agility drill	6min 7min 6min	2x6min 2x7min 2x6min		
	Cooling down	5min	1x5min		
Wednesday	**Warming up** Stretching exercises	7min 6min	1x7min 1x6min	30 second	(70-80 MHR)
	Main part Squat jump Speed drill bounding Illinois agility drill	5min 5min 6min	2x5min 2x5min 2x6min		
	Cooling down	5min	1x5min		
Friday	**Warming up** Stretching exercises	7min 6min	1x7min 1x6min	30 second	(70-80 MHR)
	Main part Squat jump Speed drill bounding Illinois agility drill	5min 5min 6min	2x5min 2x5min 2x6min		
	Cooling down	5min	1x5min		

The above training schedule was performed every week of the month of February 2019 **Source**: www.mindtomuscle.ca

APPENDIX H

Figure1. Map of the study site sekela wereda



Source; https://www.bing.com/images/search?view