EFFECT OF SELECTED AEROBIC EXERCISES ON MUSCULAR ENDURANCE AND FLEXIBILITY ON GRADE 12TH MALE STUDENTS OF ANKESHA SECONDARY SCHOOL OF AWI ZONE, AMHARA REGIONAL STATE, ETHIOPIA

MEd THESIS

CHALACHEW EWNETU SIMEGN

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Effect of Selected Aerobic Exercises on Muscular Endurance and Flexibility on Grade 12th Male Students of Ankesha Secondary School Awi Zone, Amhara Regional State, Ethiopia

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As thesis research advisors, I hereby certify that I have read and evaluated this thesis entitled "**Effect of Selected Aerobic Exercises on Muscular Endurance and Flexibility on Grade 12th Male Students of Ankesha Secondary School Awi Zone, Amhara Regional State, Ethiopia''** prepared under my guidance by Chalachew Ewnetu Simegn, I recommend that it be submitted as fulfilling the thesis requirement.

AbinetAyalew (PhD)	_____	_____
Major advisor	Signature	Date
ShemelisMekonnen (PhD)	_____	_____
Co-advisor	Signature	Date

As member of the board of examiners of the MEd Thesis Open Defense Examination, I certify that I have read and evaluated the thesis prepared by Chalachew Ewnetu Simegn and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirement for the degree of Master of Education in Physical Education.

_____	_____	_____
Chairperson	Signature	Date
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Internal Examiner	Signature	Date
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DEDICATION

This thesis is dedicated to my family whom they pay tribute at every step in my life.

STATEMENT OF THE AUTHOR

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Name**:** Chalachew Ewnetu Simegn Signature_____

Date of Submission: September 2020

Department: Sport Science

BIOGRAPHICAL SKETCH

The Author Chalachew Ewnetu was born March17, 1983 E.C in Bahir Dar Town, Amhara Regional State. He attended his elementary and secondary school at Bahir Dar. After completing high school education, he joined Bahir Dar University in 2002 E.C and he graduate 1st degree in sport science in 2005 E.C. Then, he joined postgraduate program in Haramaya University in 2009 E.C to pursue his Masters of Education in Teaching Physical Education. The researcher has 6 years of teaching experiences.

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ABBREVIATIONS AND ACRONYMS

ACSM	American College of Sport Medicine
CG	Control Group
EG	Experimental Group
HPE	Health and Physical Education
HR max	Maximum Heart Rate
HRPF	Health Related Physical Fitness
ME	Muscular Endurance
PE	Physical Education
PoT	Post Test
PT	Pre Test
SPSS	Statistical Package for Social Sciences

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Effect of Selected Aerobic Exercises on Muscular Endurance and Flexibility on Grade 12th Male Students of Ankesha Secondary School Awi Zone, Amhara Regional State, Ethiopia

ABSTRACT

The main purpose of this study was to investigate the effect of 12 week aerobic exercise on selected health related physical fitness components. The study design was quasi Experimental method. Random sampling technique were used to select subjects as well as to assign subjects for control group (CG) and experimental group (EG) while purposive sampling were used to select the sample sex and the study place, 60 male sample was taken from a population of 71 male students by Slovin's formula, the selected subjects were divided into 2 equal groups (n=30) CG and (n=30) EG. Their age range was from 18-22 years. EG who performed in 3 days/week for 3-month aerobic exercise training program like as walking, jogging, running, aerobic dance and rope jumping, and a CG did not perform this selected aerobic training unless both groups undergone normal physical education class program. Both groups had taken pre and post-testing. PT of two groups of 30 subjects (ME was measured by 90^0angle push up test, and flexibility was measured by using sit and reach test) were recorded. After three months, posttest measurement on the same parameters was taken. The difference between the tests were analyzed statistically, with paired sample "t" test at the level of significance was P<0.05 to determine the difference between initial and final mean for participant. According to analyzed data the mean difference value after 12 week's aerobic exercise the experimental group boosted in 90^0angle *pushup performance by 1.76, (at p value is 0.00) and in sit and reach test 0.53 (at p value is 0.00) increments were observed throughout the study period. The result obtained in this study indicated that there were significant improvement in ME and flexibility on Experimental Group. Based on this finding, it can be concluded that moderate aerobic exercise has positive effect on improvement of* 90^0*angle pushup and flexibility on male grade 12th students.*

Keywords *- Aerobic exercise, flexibility, muscular endurance.*

1. INTRODUCTION

The introduction part of this Chapter includes background of the study, statement of the problem, research questions (that will answered after the successful completion of this study), scope of the study, significance of the study and objectives of the study.

1.1. Background of the Study

There are many factors which help to develop physical fitness, but regular physical activity is the key aspect to achieve optimal physical fitness. It is a multidimensional state of being that usually refers to two aims: performance, which consists of skill-related fitness components and health that includes five health-related fitness components, each of which contributes to total quality of life Corbin *et al*.(2006). Fitness is the first and foremost thing to enjoy the life fully Reddy (2012).

Fitness is the ability of a person to live a full and balanced existence and it is considered as one of the most important health markers in childhood Ortega *et al*.(2008). Also has long been recognized as one of the primary objectives of physical education and sport. Wuest and Bucher(1995).Further, physical fitness is a set of physical attributes that allows the body to respond or adapt to the demands and stress of physical effort.

That is, to perform moderate to vigorous levels of physical activity without becoming evenly tired. Inseland Roth(2002) and also it is a set of attributes that people have or achieve that relates to the ability to perform physical activity. Physical activity is any bodily movement produced by skeletal muscles that result in energy expenditure. Exercise is a sub category of physical activity; it is planned, structured, repetitive and purposive in the sense that an improvement or maintenance of physical fitness is an objective Hahn *etal. (*2003).

There are two major types of exercises that help to improve physical fitness. Aerobic and anaerobic; aerobic exercise that involves continuous physical activity lasting for at least

10 minutes were as anaerobic exercise is intense physical activity that lasts only a few seconds to a few minutes Physical fitness is a positive quality of life, extending on a scale from death to “abundant life”.

Generally, Fitness is defined as the ability of a person to live a happy, well-balanced life. It embraces the physical, intellectual, social and spiritual aspects of a person’s life. Fitness has health-related components which include; aerobic fitness, muscular strength, muscular endurance, flexibility and body composition Olaitan (2005). And Skill –related components include agility, balance, coordinate, speed, power and reaction time Wilmore and Costill (2002).However proper exercise program, nutrition, adequate rest, good health habits etc. are influencing factors for achieving, maintaining, and improving a considerable level of HRPF. Among the influencing factors the aim of the study want to evaluate the effect of aerobic training on health related physical fitness.

1.2. Statement of the Problem

The unique role that quality physical education programs play is to teach the importance of health-related fitness, as well as to develop physical competence and cognitive understanding about physical activity for all students so that they can adopt healthy and physically active lifestyle, National Association for Sport and Physical Education (2010). Physical activity provides in developing health related physical fitness. Garzón (2009) defined health related physical fitness is the ability of a person to perform daily activities with vigor and by traits and capacities that are associated with a low risk for the development of chronic diseases and premature death. Hippocrates 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. Therefore, Physical activity is an important ingredient in the quality of life Singh(2014) and it is widely acknowledged to children’s growth and development Singapore Ministry of Education(2005).

Many studies believe that regular physical activity can have immediate health benefits by positively affecting cardio respiratory, musculoskeletal, body composition and flexibility improvement. However the opportunities offered in secondary schools have been

decreased in providing physical fitness lessons Pangrazi and Darst(2002). In Ethiopian secondary schools physical education curriculum developed one credit hour per week

(42 minutes) for classroom as well as practical sessions similarly; in Ankesha general secondary school the given credit for PE class is limited. This is too little to improve the physical fitness components required to meet in the grade level with regard to set norms and standards of physical fitness at different age and sex levels.

According to American College of Sports Medicine (2009) participation in at least 30 minutes of moderate physical activity which may consists of aerobics and anaerobic thrice per a week will yield significant health benefits. And among those physical activates. Aerobic exercises are one of important physical activities which improve fitness qualities. And it is supported by Yildirim(2012) that aerobic exercise which consists of walking, jogging, rope skipping and distance running helps to improve physical fitness. Due to this reason the investigator will tries to testify the effect of three months of aerobic exercise which is given three days per a week on some selected health related fitness variables such as muscular endurance cardio vascular endurance, , and flexibility. Based on the above reason the investigator were tried to test the following hypothesis:

1. **H_O:** Aerobic exercise training has no effect on muscular endurance, of grade 12 male students.

   H_A: Aerobic exercise training has an effect on muscular endurance, of grade 12 male students.

2. **H_O:** Aerobic exercise training has no effect on flexibility, of grade 12 male students.

   H_A: Aerobic exercise training has an effect on flexibility, of grade 12 male students.

1.3. Scope of the Study

The study was conducted in Ankesha General Secondary School that is limited only on some selected grade 12 male students. The investigator was focus only on male students that they are

available as sources of data, so easily compared to girl students and disregarded female students since their participation in physical exercise is too little.

1.4 Significance of the Study

The main aim of this study is to analyze the relationship between progressive aerobic training on muscular endurance and flexibility on grade 12th male students in Ankesha secondary school, but it was not mean that the outcome of this research is restricted to only Ankesha secondary school Grade 12th male students; it will also help to other schools male students to understand the effect of aerobic training exercise in increasing their muscular endurance as well as flexibility. In general, the study uses to:

- Show the effect of aerobic exercise on muscular endurance
- Show the effect of aerobic exercise on flexibility
- Aware how aerobic exercise can enhance muscular endurance and flexibility
- Motivate and encourage students to engage in aerobic training to boost their muscular endurance and flexibility level.

1.5 Objectives of the Study

1.5.1 General Objective

The general objectives of the study is to examine the effects of selected aerobic exercise on flexibility and muscular endurance of Grade 12thstudents in Ankesha secondary school

1.5.2 Specific Objectives

Specifically the research has the following objectives:

- To analyze the effects of three month aerobic exercise on muscular endurance, on Grade 12th male students
- To examine the effects of three month aerobic exercise on flexibility, on Grade 12th male students

2. RELATED LITERATURE REVIEW

Different theories, scholar articles component of the chapter brief review of the literature related to the major topic was described. These are the concept of physical Exercise and their types, of aerobic exercise and its benefits, components of health related physical fitness and its contribution to health.

2.1 Physical Activity

According to Caspersen *et al. (*1985) defined physical activity as "any bodily movement produced by skeletal muscles that result in energy expenditure". Total energy expenditure can be divided into three components, which include resting metabolic rate, diet-induced thermo genesis and physical activity. Resting metabolic rate accounts for around 70% of total energy expenditure in sedentary individuals, while diet-induced thermo genesis accounts for around 10% Ravussin and Bogardus (1992).

Training is often further divided into endurance and resistance training, which enhance aerobic capacity and muscle strength, respectively. Exercise is a subcategory of physical activity. Caspersen *et al. (*1985) defined it as "physical activity that is planned, structured, repetitive, and purposive in the sense that improvement or maintenance of physical fitness is an objective." Modern exercise physiology, however, distinguishes between acute and chronic exercise, where acute exercise refers to a single bout of physical activity and chronic exercise to repeated performance of acute exercise. Chronic exercise is also known as habitual physical exercise, physical training or just training Tipton and Franklin (2006).

2.2. The Concept of Physical Fitness

Physical fitness to the human body is 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 us for better look, pleasant feel our best. It is the ability to perform daily tasks vigorously and alertly with energy left over for enjoying leisure time activity and meeting emergency demands. Desta E (2012).

2.3. Contribution of Physical Education to Physical Fitness

Today physical education programs are designed and intended to promote general health and overall fitness. The exact regime of education may vary among programs, but physical education remains critical in achieving an overall healthy society. The main purposes of physical education are the process of becoming peoples physically active for the rest of their lives. Physical education has long and established tradition in schools, being linked to the development of both body and mind. Further it is an important component of the overall school program and integral part of the educational program that contributes, primarily through physical activity experiences, to the total growth and development of all students Pangrazi and Darstn D. (2002).

Physical fitness has long been recognized as one of the primary objectives of physical education and sport. Today the development and promotion of health related fitness is a diversity of populations is an important outcome of many programs in our field. Health related fitness encompasses the development of cardio respiratory efficiency, flexibility, muscular strength and endurance and appropriate body composition. Scientific evidence of the health benefits of exercise continues to grow, maintenance of an adequate level of the health related components of physical fitness; cardio respiratory endurance, muscular strength and muscular endurance, body composition and flexibility can help reduce the risk of heart disease, hypertension, on-insulin dependent diabetes, osteoporosis, obesity and certain mental health problems such as depression.Wuest and Bucher (1995).

2.4. Contribution of Physical Fitness to Health

The health benefits of being physically active in adulthood are well known, the evidence suggests that being a physically active adult can help in both the prevention and treatment of many common but serious, health conditions such as high blood pressure, poor blood lipid profile, insulin resistance, obesity and sometimes of cancer (U.S. Department of Health and Human Services (1996) cited in Winsley and Armstrong. Therefore, regular participation in physical activity has significant positive effects on people’s health and wellbeing that increase strength and endurance, build healthy bones and muscles, control weight, improve blood pressure and cholesterol levels Ayers and Sariscsany (2001).

The benefits of physical fitness are numerous it include better health, greater strength, more flexibility, increased energy, improved appearance, and a more positive attitude and Mood. Regular exercise can lead to both immediate and long-term benefits. Regular physical activity has been shown to reduce the morbidity and mortality from many chronic diseases**.** The benefits of fitness far outweigh the inconveniences of regular exercise. (http://www.healthgalaxy.com/benefits-of-physical-fitness.html).

2.5. Factors Influencing Fitness

According to Sharkey (1990) there are many factors influence our fitness

2.5.1. Heredity

We inherit many factors that contribute to aerobic 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-glycolytic muscle fibers. Mitochondria, the energy producing units of muscle and other cells, are inherited from the maternal side. Recent evidence indicates that the capacity of muscle to respond to training may also be inherited. Other inherited factors such as physique and body composition will also influence fitness and the potential to perform at a high level.

2.5.2. Training

Training improves the function and capacity of the respiratory and cardiovascular systems and boosts blood volume, but the most important changes takes place in the muscle fibers that are used in the training. Aerobic training improves muscles ability to produce energy aerobically and shifts metabolism from carbohydrate to fat, which may produce the single most important health effect of exercise. Burning fat reduces fat storage, blood fat levels, and cardiovascular risk. It also improves insulin sensitivity and reduces the risk of some cancers. Of course, training enhances the ability to perform, but the improvement is limited to the activity used in training.

2.5.3. Gender

Before puberty, boys and girls differ a little in aerobic fitness, but from then on girls fall behind. Young women average 15 to 25% less than young men in aerobic fitness, depending on their level of activity. But highly trained young female endurance athletes are but 10% below male endurance athletes of the same age in vo_2max and performance times.

2.6 Aerobic Exercise and its Benefits

2.6.1 Aerobic Exercise

Aerobic exercise is a physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic means ''with oxygen'', and refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism. Generally light to moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time and it refers to exercise that requires the consumption of substantially more oxygen than at rest and can be undertaken for a prolonged duration without excessive fatigue. (http://www.newllness.com)

The benefit of aerobic exercise is myriad. They include systemic changes such as reduced cholesterol and blood pressure, improved muscular endurance, reduced body fat, increased metabolism. Aerobic activities strengthen the heart and lungs, making them more efficient and durable, improving quality and quantity of life. Exercise not only extends the life, but also gives you more energy to live it to the fullest. Aerobic exercise improves the strength of your bones, ligaments and tendons, allows your body to use fats and sugars more efficiently burns lots of calories and plays an important role in reducing the onset and symptoms of aging and illness. Aerobic exercise reduces your risk of heart disease, vascular disease and diabetes and can help those trying to quit smoking by relieving cravings and improving lung function. Research has confirmed that aerobic exercise reduces stress and combats depression as it raises self-esteem and physical and wellness Kathleen (2006).

Regular exercise causes your body to make adjustments that result in improved health and physical functioning. Continuing with regular exercise enables your body to

maintain these benefits. Regularly doing the right types of aerobic exercise at the correct intensity, and for an appropriate duration, results in the most benefit. The benefit of aerobic exercise can be broadly categorized as either ‘fitness’ (physical capacity) or ‘health’. Fitness and health are linked, and most forms of aerobic exercise will help you achieve both. Regular aerobic exercise improves your cardiovascular fitness by increasing your capacity to use oxygen. Low Impact aerobic exercise such as, swimming is valuable for improving general health and fitness in people who have arthritis or other conditions that limit their ability to do weight bearing exercise. Importantly, whereas fitness tends to be quite specific, many health benefits can be gained from any form of aerobic exercise. Additionally, the health gains can be achieved from relatively moderate of exercise can lead to substantial improvements in health. Thomas *et al*. (2008).

Aerobic activities should be used to develop cardio respiratory endurance. Basically aerobic activities are those in which a sufficient amount of oxygen is available to meet the body’s demands. During the performance of evaluated level for an extended period, this activity typically involves vigorous and repetitive whole body or large muscle and movements that sustained for an extended period. Popular aerobic activities including running, walking, rowing, swimming, cycling aerobic dancing, jogging, treadmill and somewhat continuous in nature the intensity of work load can be easily regulated by controlling the pace Shemelis (2010).

2.7. Effect of Aerobic Exercise on Health Related Physical Fitness

There are many studies done on the effect of aerobic exercise training on health related physical fitness to name a few Vivek (2013) studied on the effect of aerobic exercise on physical fitness and body composition of school boys. It is concluded that Aerobic training contributes significantly for the promotion of abdominal strength, Speed, cardio-vascular endurance, body composition. Another study by Licy (2006) also studied on the effects of aerobic exercise intervention with goals of improving health-related physical fitness among selected adults. The results of analysis of variance with repeated measures of health-related physical fitness showed that the subjects in the exercise group had significantly more improvements in abdominal muscle strength and endurance than the subjects in the control group.

This study indicated that 12-week aerobic exercise program was effective in improving the abdominal muscle strength and endurance among selected adults. Further Toy(2008) also studied on the effect of aerobic dance training on Vo2 Max and Body Composition in early middle aged men. After twelve weeks of aerobic dance training, a significant reduction was noted in body weight, BMI and percentage body fat, and a significant in Vo2 max. This study highlights that systematic aerobic dance training helps to increase the physical and cardio respiratory fitness among middle aged adults. Promoth (2010) also studied on the effect of step aerobics training on selected physical and physiological variables of physical education students. The subjects performed step aerobics apart from their regular physical education workout, five days in a week for a period of sixty minutes. The control groups did not participate any training program expect their regular workout. The data were computed statistically by using ANCOVA to see progressive effects. The result shows step aerobics had significant effects on selected physical and physiological variables improved significantly among the experimental group i.e., flexibility, explosive power, BMI, and Vo2 max and no significant changes were seen in control group. Mahendran (2009) studied the effect of 12 weeks aerobic exercises on selected health related physical fitness and physiological variables among adolescents. Selected health related variables were, muscular strength measured using hand grip dynamometer, muscular endurance measured using bent knee sit ups, cardio-respiratory endurance measured using 12-minutes run/walk, flexibility measured with sit and reach box. Body mass index measured using height and body weight. The results of pre- test and post- test were compared by using Analysis of Covariance.

All variables were significantly improved among experimental group. Promoth, K.G.(2010)also studied on the effect of walking on body composition and cardiovascular function of middle aged men. Substantial improvement occurred in maximum oxygen consumption sub-maximal heart rate and resting diastolic blood pressure and reductions of body weight and percent of fat. According to Demir (2013) investigated the effects of eight-week step aerobic exercise programs on flexibility, body weight, and body fat percentage and body circumference measurements of sedentary women. As a result of the step-aerobic exercises, they found that flexibility and all parameters related with the body composition of the individuals were changed positively. Health Related Physical Fitness is the portion of

physical fitness directed toward the prevention of or rehabilitation from disease, the development of a high level of functional capacity for the necessary and discretionary tasks of life, and the maintenance or enhancement of physiological functions in biological systems that are not involved in performance but are influenced by habitual activity. Polwman (2011) cited in Mathewos (2013). Shahana *et al* (2010) investigated on the effect of a 12-week aerobic exercise program on health-related physical fitness components in middle-aged adults. The experimental group 30 subjects underwent aerobic exercise training thrice a week for 12 weeks.

The control group 30 subjects did not attend any training program. The post-tests were conducted on both groups. They conclude that improved cardio respiratory endurance, flexibility, muscular strength endurance and decreased skin fold thickness (body fat %) among the experimental group after 12 weeks. In the case of control group no significant changes were seen in any of the selected variables. Saygın and Ozturk(2011) also investigated on the effects of 12 week aerobic exercise program on health related fitness components and blood lipids in obese girls. Participants joined sessions for 60 min per day, 3 days per week for 12-week. They concluded that regular aerobic exercise may affect health related fitness components.

Further, Chao-Chien, and Yi-Chun (2012) examined the effect of jumping rope training on the health-related physical fitness in students with intellectual impairment. Their findings on jumping rope training demonstrated significant effects on cardiovascular endurance, flexibility, and muscular strength and endurance. No significant influence on the BMI of students with intellectual impairment. Bagavinar and Kamalakkannan (2013) also examined the effect of aerobic training, aquatic training and combined training on selected physical fitness, variables among obese college men. The mean gains and losses made from pre and posttest were statistically significant showing that aerobic training, aquatic training and combined training produced significant improvement in flexibility, muscular endurance, cardio respiratory endurance, percent body fat, body mass index. Control group produced insignificant at $p<0.05$.

2.7.1 Benefits of Step Aerobics

Take a quick look at the ways aerobic step bench exercise can benefit us:

- It is a fun and low-impact exercise with amazing results.
- It helps burn out a huge amount of calories.
- It tones up quite a few major muscles in our body, including the ones present in the butt and leg areas.
- It increases the flexibility of our body over time.
- It helps in improving our balance as well as endurance.)
- It is a hassle-free workout routine that can be modified as per the requirements and fitness levels of the practitioners.
- It effectively burns calories. For example, if you are a person with a body weight of 150 lbs., practicing step aerobics for 60 minutes a day can help you burn as much as 605 calories.
- It includes lifting the entire body from one foot to another while taking steps on and off the bench rhythmically. It helps in toning up the lower section of the body at a rapid pace.(http://www.stylecraze.com/articles/benefits-of-step-aerobics-for-weight-loss)

2.8. Studies on Aerobic Exercise

According to Selvalakshmi (2007) conducted a study on the effect of varied training programs on obese women working in IT companies for the purpose of the study. For this study, the obese women were grouped into three namely, control, floor aerobic and step aerobics group. The collected data on the cardio respiratory parameters prior to and after 12 weeks of varied aerobics training were statistically analyzed using analysis of covariance (ANCOVA) as recommended by Clarke (1972) and result on vital capacity showed significant improvement due to varied aerobic exercises, as where no significant improvement was found in resting heart rate.

An increase in aerobic capacity (VO2max), can to a great extent reduce morbidity, both among people who do not have or people who are suffering from cardiovascular disease Atwood et al.(2002). Thus, the concept of fitness being defined as good condition or good health, tells us that, while we do not expect the general population to compete with athletes, an above average Vo_2 max score indicates a healthy level of cardio respiratory

fitness and that an individual is fit to cope with the general demands of living Zuluaga (1995).

According to Ozcan and ozturk(2011)in mug ale, turkey conducted the study on the effect of twelve week aerobic exercise program on health related physical fitness components and blood lipids in obese girls. The aim of the study was to investigate the effects of 12 week aerobic program on health related fitness components and blood lipids in obese girls. In this study, a total of 40 girls were recruited as exercise group (n=20) and control group (n=19). Participants joined sessions for 60 min per day, 3 days per week for 12-week. There were significant differences in weight body mass index (BMI), flexibility, sit-ups, hand grip for both hands, skin fold measurements (thigh, triceps, abdomen, super iliac, sup scapula, chest, body fat percent, heart rate, high density lipoproteins, low density lipoproteins, total cholesterol, and triglyceride between pre-test and post scores in the exercise group ($p<0.05$). It was concluded that regular aerobic exercise may affect health related fitness components and blood lipids positively in girls.

2.9. Flexibility

It is the ability to move the joints through their full range of motion and stretching exercises can improve to normal Insel and Roth (2002). Flexibility is specific to each joint of the body, thus there is no general measurement of flexibility as there is for cardiovascular fitness. Flexibility is the degree to which body segments can move or be moved around a Joint. Brown (1986).Flexibility is typically measured in the lab using measurement devices such as a goniometer, flex meter and in the field with test exercises such as the sit and reach, and the zipper test.

2.10. Muscular Endurance

Muscular endurance, which represents multiple muscle contractions or a sustained muscle contraction over a period of time, for example during running, climbing, swimming, jogging, running on tread mill at the gym there will be muscle contraction those muscle contraction can assists the improvements of muscular endurance. During aerobic exercise, minute ventilation increases and an increased load is placed on the respiratory muscles. Both the frequency and the speed of contraction in the muscle are increased, Harms *et al*.(2000).

It is a health-related component of physical fitness that relates to the muscle's ability to continue to perform without fatigue USDHHS(1996) and it is the ability to sustain a given level of muscle tension and to perform repeated movement with sub maximal loads for extended period of time i.e. to hold a muscle contraction for a long period of time, or to contact a muscle over and over again. Muscular endurance is important for good posture and for injury prevention and copes with the physical demands of ever day life and enhances performance in sports and work. Like muscular strength, muscular endurance developed by stressing the muscles with a greater load (weight) than they are used to Insel and Roth (2002).For true assessment of muscular endurance it would be necessary to test each major muscle group of the body. Lab and field tests of muscular endurance are similar and are based on the number of repetitions that can be performed by the specific muscle group being tested (example: repetitions of push-ups or abdominal curls). Muscular endurance can be measured isometric ally (static contractions) or isotonic ally (dynamic contractions). Willardson (2008)

2.11. Aerobic Exercise

Aerobic exercise refers to activities such as walking or jogging with continuous, repetitive movement of large muscle groups for at least 10 minutes at a time Stewart, (2004). Aerobic exercise consists of rhythmic, repeated, and continuous movements of the same large muscle groups for at least 10 minute at a time. Examples include walking, bicycling, jogging, continuous swimming, water aerobics, and many sports. When performed at sufficient intensity and frequency, this types of exercise increases cardio respiratory fitness. Ronald et al.(2004).Aerobic exercise is a physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic means “with oxygen”, and refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism.

2.12. Running

Running is one of the best cardiovascular exercises known to man. It requires no equipment (save a good pair of running shoes), is suitable for all fitness levels, and greatly improves overall health fitness and strengthens the heart, as well as the body. Sunny (2012) Studies have shown the health benefits of running to be tremendous, reducing chances of everything from the common cold to cancer. It is among the best aerobic exercises for physical conditioning of heart and lungs. It helps ensure the efficient flow of blood and oxygen throughout the body, things that are proven to help to decrease the risk of a heart attack. Willardson *et al*. (2008).

2.13. Jogging

Jogging or running is a popular form of physical activity. Both running and jogging are forms of aerobic exercise. The difference between running and jogging is intensity. Running is faster, uses more kilojoules and demands more effort from the heart, lungs and muscles than jogging. Running requires a higher level of overall fitness than jogging. (www.betterhealth.vic.gov.au/running_and_jogging/pdf/).

2.14. Walking

Although nearly all studies indicate that jogging provides slightly more musculoskeletal and aerobic benefits, walking has gained much ground in the last 10 years as a viable exercise to strengthen bones, tone muscles, and enhance heart performance. MHNet(2015)

2.15. Rope Jumping

Rope skipping is a high impact activity that requires coordination, balance, and endurance. Jumping rope is an activity that can increase aerobic endurance, muscular endurance, speed, agility, explosiveness, and dynamic balance. Rope Jump can be an important part of fitness and sports training, providing key advantages in developing dynamic balance, speed, quickness, agility, coordination, concentration, and cardio respiratory efficiency. Lee (2007)

2.16. Effect of Aerobic Exercise on Health Related Physical Fitness

There are many studies done on the effect of aerobic exercise training on health related physical fitness to name a few Vivek (2013) studied on the effect of aerobic exercise on physical fitness and body composition of school boys. It is concluded that Aerobic training contributes significantly for the promotion of abdominal strength, Speed, cardio-vascular endurance, body composition. Another study by Licy (2006) also studied on the effects of aerobic exercise intervention with goals of improving health-related physical fitness among selected adults.

This study indicated that 12-week aerobic exercise program was effective in improving the abdominal muscle strength and endurance among selected adults. Further Toy(2008) also studied on the effect of aerobic dance training on Vo2 Max and Body Composition in early middle aged men. After twelve weeks of aerobic dance training, a significant reduction was noted in body weight, BMI and percentage body fat, and a significant in Vo2 max. This study highlights that systematic aerobic dance training helps to increase the physical and cardio respiratory fitness among middle aged adults. Promoth (2010) also studied on the effect of step aerobics training on selected physical and physiological variables of physical education students.

The subjects performed step aerobics apart from their regular physical education workout, five days in a week for a period of sixty minutes. The control groups did not participate any training program expect their regular workout. The data were computed statistically by using ANCOVA to see progressive effects. The result shows step aerobics had significant effects on selected physical and physiological variables improved significantly among the experimental group i.e., flexibility, explosive power, BMI, and Vo2 max and no significant changes were seen in control group. Mahendran (2009) studied the effect of 12 weeks aerobic exercises on selected health related physical fitness and physiological variables among adolescents. Selected health related variables were, muscular strength measured using hand grip dynamometer, muscular endurance measured using bent knee sit ups, cardio-respiratory endurance measured using 12-minutes run/walk, flexibility measured with sit and reach box. The results of pre- test and post- test were compared by using Analysis of Covariance.

All variables were significantly improved among experimental group. Promoth, K.G (2010) also studied on the effect of walking on body composition and cardiovascular function of middle aged men. Substantial improvement occurred in maximum oxygen consumption sub-maximal heart rate and resting diastolic blood pressure and reductions of body weight and percent of fat. According to Demir (2013) investigated the effects of eight-week stepaerobic exercise programs on flexibility, body weight, and body fat percentage and body circumference measurements of sedentary women. As a result of the step-aerobic exercises, they found that flexibility and all parameters related with the body composition of the individuals were changed positively. Polwman (2011) cited in Mathewos(2013). Shahana *et al*.(2010) investigated on the effect of a 12-week aerobic exercise program on health-related physical fitness components in middle-aged adults. The experimental group 30 subjects underwent aerobic exercise training thrice a week for 12 weeks.

The control group 30 subjects did not attend any training program. The post-tests were conducted on both groups. They conclude that improved cardio respiratory endurance, flexibility, muscular strength endurance and decreased skin fold thickness (body fat %) among the experimental group after 12 weeks. In the case of control group no significant changes were seen in any of the selected variables. Saygın and Ozturk(2011) also investigated on the effects of 12 week aerobic exercise program on health related fitness components and blood lipids in obese girls. Participants joined sessions for 60 min per day, 3 days per week for 12-week. They concluded that regular aerobic exercise may affect health related fitness components.

2.16.1. Effect of Aerobic Exercise on Muscular Endurance

Muscular endurance, which represents multiple muscle contractions or a sustained muscle contraction over a period of time, for example during running, climbing, swimming, jogging, running on tread mill at the gym there will be muscle contraction those muscle contraction can assists the improvements of muscular endurance. During aerobic exercise, minute ventilation increases and an increased load is placed on the respiratory muscles. Both the frequency and the speed of contraction in the muscle are increased, Harms et al.(2000). Chia-Lin Li (2005) evaluated on the effects of aerobic exercise intervention with goals of

improving health-related physical fitness conducted as a quasi-experimental design. The study concluded that 12-week aerobic exercise program was effective in improving the abdominal muscle strength and endurance.

2.16.2. Effect of Aerobic Exercise on Flexibility

Poor flexibility can directly affect cardiovascular endurance, muscle strength and muscular endurance. Physiologically flexibility can include extra-muscular (range of motion at a joint) and intramuscular factors such as hyper tonicity within the muscles themselves. Aerobic exercise and strengthening allows muscle to contract and flex. Those muscles also need to be starch to protect them from injury and to improve range of motion in the joints. So, aerobic activities have its own contribution for flexibility and balance. A research of Nagaraj*et al*.(2011) studied effect of stretching exercises and aerobic exercises on flexibility of school boys. The results of pre-test and post-test using sit and reach box were compared with using Analysis of Covariance. The result shows that combined exercises (stretching and aerobics exercises) were significantly better than stretching exercises, aerobics exercises in flexibility. Thus flexibility can be more developed by aerobic and stretching exercising.

2.17. Health Related Physical Fitness Test

2.17.1. Test for Muscular Endurance

90^0angle push-up tests are a test of upper body muscle strength and endurance. Strength and endurance of the muscles of the upper body are important in activities of daily living, maintaining functional health and promoting good posture. A number of assessments of upper arm and shoulder girdle strength/endurance have been used in various youth fitness batteries. The most commonly used assessment is the push up test. The 90° push-up was selected as the recommended test item in the CPFA3P because it has some very practical advantages over the pull-up. The most important advantages are that it requires no equipment and very few zero scores occur. The right-angle, or 90^0, push-up is recommended as a test of upper-body strength and endurance. The objective of the test is to complete as many 90^0angle push-ups as possible at a specified pace Connecticut state department of education (2009). 90^0 angle push up test is one method that is often used in testing, measurement and evaluation of Physical Education and Sports Science to measure the

strength and endurance of the shoulder. This test has also been proposed in FITNESSGRAM® physical fitness test battery to be used for measuring the strength and resilience of the muscles of the arm and shoulder Cooper Institute for Aerobics Research, (2007) cited in Ahmad H. and Gunathevan(2015)

2.17.2. Test for Flexibility

Flexibility of the joints, both in the upper and lower body, is an important component of health related fitness, (American College of Sports Medicine (1995). Flexibility was measured by the sit-and-reach test Clark *et al*.(1989). The sit and reach test is used to determine the joint range of motion and flexibility of the muscles around the hip joint (the test simultaneously examines the flexibility of the lower back and hamstrings). The reliability of the test has been documented previously Johnson and Nelson(1979) cited in Durandt (2009).

After a warm-up, the participants sat on the floor with their legs straight out in front of them, heels touching the side of a box. Their fingertips were positioned on the 0 cm edge of the box that was marked in centimeters towards the opposite edge. They were then asked to bend forward with arms outstretched towards their toes. The farthest test score of the three trials were administrated and the mean value was taken in the analysis. The sit-and-reach test was conducted to measure flexibility of the hamstrings and lower back. The sit and reach measured the distance of the performed stretch to the nearest cm Equipment needed box and a ruler. Before the test, the shoes were removed and the subjects were instructed to slowly reach forward with their knees fully extended as far as possible with palms facing downward. This test represents flexibility in the lower back and upper thighs. The score is recorded to the nearest centimeter as the distance before (negative) or beyond (positive) the toes Willis *et al.*(2012).

3. MATERIALS AND METHODS

3.1 Description of the Study Area

This Study was conducted on Amhara Regional State Awi zone Ankesha Woreda Ankesha Secondary school. The distance from Ankesha Woreda Gimjabet Town to the capital city of the country (Addis Ababa) is 464km and from Addis to Harar is 525km.The total distance from Ankesha woreda that is from Gimjabet to Harar is 989km. The district receives an annual rainfall that varies from 1800-2000mm. The mean temperature ranges from 20-27 degree centigrade. Like the other part of the region, the rainy season (summer) from June-August, (autumn) from September-November, the dry season (winter) from December-February and (spring) from March-May. Except dry season (winter) all of which are equally important for cultivation of crop, availability of water and pasture for livestock. (Source: Awi Zone Communication office).

3.2. Treatment and Study Design

The researcher were use quasi experimental method, since it helps to measure, assess, evaluate and analyze the effect of aerobic exercise on selected health related physical fitness of grade 12^{th} male students at Ankesha Secondary school.

As a result, in this study the investigator were apply aerobic training programs plan for a periods of 12 weeks and administer 3 days per week and for 50-60 min each day on experimental group(EG). An exercise involving the use of large muscles groups that was maintain continuously and aerobic in nature were include in the program. The exercises were includes walking, jogging, push up aerobic dance, rope jumping, and stretching.

The study was carried out for three consecutive months for training aerobic exercise. In the beginning of the first month (October) pre-test was taken and at the end of the 3rd month (December) post- test were also administer.

3.3 Study Materials

The researcher were used the following materials for this study, exercise fields, stopwatch, jumping ropes, record sheets,sit and reach test box or beam, paper, pen, whistle, and ruler.

3.4 Description of Terms

Aerobic Exercise: is physical exercise of low to high intensity that depends primarily on the aerobic energy generating process. Aerobic means relating to involving or requiring free oxygen and refers to the use of oxygen to adequately meet.

(Source: Physical Exercise Sciencedaily)

Frequency: How often we engage in exercises per week, month, or year. (Source: ACSM (2008)

Health: Can be defined as physical, mental, and social wellbeing and as a resource for living a full life.

It refers not only to the absence of disease, but the ability to recover and bounce back from illness and other problem. (Source: Definition of Health Medicine Net)

Health Related Physical Fitness: Involves exercise activity that you do in order to try to improve your physical health and stay healthy, particularly in the categories of cardio vascular endurance, muscular strength, flexibility, muscular endurance, and body composition. Source: LoveToKnowCrope(2018)

Intensity: How hard the exercises should be to achieve the necessary objectives of the participant Source: ACSM (2008)

Principle of Training: The way or guidelines to practice any physical exercise (source: Physical Exercise Sciencedaily)

Time: How long you practice or involve in exercise within the practical program of each day (source: Physical Exercise Sciencedaily)

3.5 Source of Data

For this study primary data were used. The primary data were obtained from experimental variables according to designed parameters.

Table1. The Study Design Layout

Treatment	Aerobic exercise program
Exercise days	Monday, Wednesday and Friday
Time of training	Morning(12:00)
Frequency	3days/week
Total duration	12 weeks
Duration /session	50-60 minutes
Intensity	Moderate (60-75HRmax)

3.6. Population of the Study

Participants of the study were grade 12th male students in Ankesha general secondary school. There are 71 Grade 12th male students in Ankesha General Secondary School, for this study the researcher use 60 male students.

3.7 Sample Size and Sampling Technique

From the total 71 Grade 12th male students they are found in Ankesha General Secondary School the researcher were take 60 male students by using Slovin's formula, and the researcher were categorized into two equal (in number) groups randomly. 30 of them are for Control Group (CG) and 30 of them are for Experimental Group (EG).

Slovin's formula

$$n = \frac{N}{1+Ne^2}$$

Where n= the sample size

N= the population size

e =the margin of error

$$n = \frac{71}{1+71(0.05)^2}$$

$$= \frac{71}{1+71(0.0025)}$$

$$= \frac{71}{1+0.1775}$$

$$\frac{\mathbf{71}}{\mathbf{1.1775}}$$

$$= 60.29 \approx 60$$

3.8. Inclusive and Exclusive Criteria

Individuals with cardiac conditions and taking medications were not being admitted to the study. In addition, the subjects who are having any recent physical injury and medical conditions restrict by physicians otherwise the subjects who have healthy, voluntary, free from bad habits, family's interest and they are from grade 12 was admitted. In addition to this the researcher were used some Physical Activity Readiness Questions to select the subjects and the researcher were include subjects those who are answer all the questions by saying only "NO".

3.9. Methods and Procedures of Data Collection

The researcher were use primary data that is obtained from the subjects by using fitness tests, (pre, and post) field works and experimental variables according to the designed procedures, and use quantitative data collection method to collect data from the subjects, by using pre-test, and post-test through the appropriate health related physical fitness tests including measuring, 90^{o}angle push up test(isometric ally) for muscular endurance and sit and reach test for flexibility and the results were collected and recorded by the investigator with the help of assistant who was takes training for two days. Each test was held at a field of Ankesha secondary school. In order to evaluate the effects of aerobic exercise on muscular endurance and flexibility of grade 12^{th} male students the following fitness tests were recorded before, and after 12 week aerobic exercise program.

3.9.1. Sit and Reach Test

The purpose of this test was measure the flexion of trunk and the ability to stretch the lower back and thigh muscles (hamstrings).

The direction is sitting with legs fully extend and bottom of feet flat against box or steps about 20 cm high and extend (stretch) arms and hands forward as far as possible and hold for a count three. Then with a ruler (in mm or cm) the distance before or beyond the edge of the board that reach is measure. Distances before the edge (not able to reach toes) were express as negative scores; those beyond the edge were expressed as positive scores. The participants were performs warming up activities and some stretching activities for 5 minutes before starting test. For this test the participants was remove their shoes and sit on the floor with legs stretched out straight ahead. The soles of the feet are placed flat against the sit and reach box. Both knees are locked and pressed flat to the floor, the tester assists by holding them down with the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Three trails were permitted to the subject and the best one from three trials is taken as their score. The subjects reached out and hold that position for a one-two seconds while the distance is recorded

3.9.2 Ninety Degree (90^0) Angle Pushes Up

The purpose of this test was to evaluate the endurance of the arm and chest muscles. This test was taken in FITNESSGRAM® physical fitness test battery to be used for measuring the endurance, strength and resilience of the muscles of the arm and shoulder Cooper Institute for Aerobics Research (2007). The directions is support the body in a push up position, and then lower the body until the arms bend 90^0angles and the upper arm are parallel to the floor and do push-ups repeatedly by lowering the body until the arms bend 90^0 the upper arms are parallel to the floor. The rhythm should be approximately one push up every three seconds and count the number of pushups able to perform.

3.10 Methods of Data Analysis

The data collected through fitness tests were analyzed, interpreted and tabulated in to a meaningful idea using manually and in computer in order to compare the selected health related physical fitness components changes which observed among participants that undergoing aerobic exercise program. The data was analyzed using computerized statistical package software (SPSS version 20). Paired sample t-test was used to compare the pre and post training data at level of significance is< 0.05.

3.11 Data Quality Control

To ensure data quality, all the field test procedures, collection of data's and handling information was carried out in accordance with standard protocols and measurements. And the investigator was use assistant to collect data. And in order to avoid error, training was given for assistant data collector on how to use data collecting instruments and measurements during data collection. And regarding to create awareness about each test the trainers get additional lectures beyond field practices and demonstrations. Only standardized materials were used to keep the quality of the data. Additionally all the above mentioned tests were recorded and fed in to the software twice with different persons to avoid errors in data feeding

3.12 Ethical Considerations

This study went in line with Haramaya University ethical issues. The privacy of the participant could be protecting.

Generally, this research has been conduct as pre rules, policies and research ethics of Haramaya University.

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 aerobic exercise on selected health related physical fitness components among participants of Ankesha Woreda, Ankesha General Secondary School Grade 12thmale Students. In this study 60 male students were used as subjects. They were divided randomly into two groups equal in number EG (n=30) and CG (n=30) their age was 18-22 years. Aerobic exercise was given for 12 consecutive weeks (three months -October, November, and December). The training program included three days per week; with duration of 50-60 minutes and moderate intensity. Measuring tapes, weight machines, exercise mats, marking cones, stopwatch, jumping ropes, record sheets, paper, pen and whistle were used during training.

The variables selected for this study were health related physical fitness components such as Muscular endurance and flexibility. Pre and posttest were conducted for all the 60 subjects on some selected health related physical fitness components and the scores were recorded. Information of subject's participation in this research project was kept confidential. Records pertaining to this research were coded secretly in numbers and put in a secured storage area. The collected data were analyzed by t-test by using SPSS. The results for each fitness variables are discussed below.

4.1. Characteristics of study participants and physical fitness variables

Table2. Characteristics of the study participants

Group	N	Age		Height
	Mean	S.D	Mean	S.D
EG	30	19.35	.933	1.7310
CG	30	19.80	1.105	1.719

As shown from above table 2 Descriptive characteristics of 60 study participants from Ankesha general secondary school mean of age (EG=19.35, CG=19.80) height (EG=1.73, CG=1.72) and weight (EG=54.03, CG= 55.9). Subjects were relatively had the same age, height and weight at the beginning of exercise.

4.2. Effects of Aerobic Exercise on Muscular Endurance

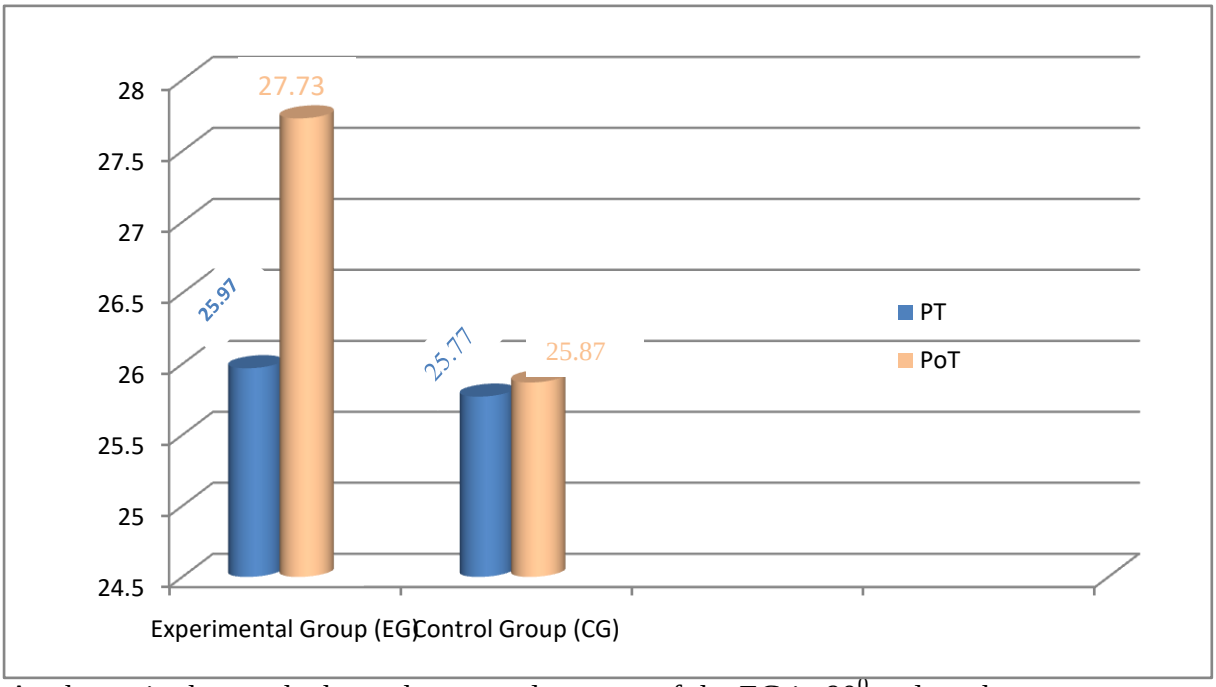
Table3. The mean value of ME (90^0angle push up test) for CG and EG

Group	Test	PT**(X±SD)**	PoT**(X±SD)**	ΔX)PT and PoT	P
EG	90^0 angle pushup test	25.97±6.04	27.73±6.24	1.76	.000
CG	90^0 angle pushup test	25.77±10.00	25.87±9.90	0.1	.676

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

As shown from table 3 the average pretest score of EG (N=30) was found to be 25.97 with a standard deviation of 6.04 and CG (N=30) was found to be 25.77 with an SD of 10.00 from this data we can see that the scores in the pretest for both groups were close. After 12 week aerobic exercise training of EG was found out 27.73 with SD of 6.24 and for CG mean 25.87 with SD of 9.90. From this data we can see that the scores in the posttest for both groups (EG and CG) 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 and PoT results of EG and there is deficient improvement between PT and PoT results of CG.

Figure1.Graphical presentation of 90^0 angle push up test results of EG and CG



As shown in the graph above the pre and posttest of the EG in 90^0anglepush up test was a mean score of 25.97 and 27.73 and also the CG was 25.77 and 25.87 respectively. From this data the investigator compute a pre and posttest mean difference of EG and CG in which in case of the EG repetitions of 90^0angle push up test was significantly improved by a mean difference of 1.76 at P=.000 after three months aerobic exercise training. And also in case of the CG, in which repetition of 90^0angle push up test was poor improvement by a mean difference of 0.1 at P=0.676. The implication therefore is aerobic exercise training had improvement on push up endurance of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses which said that there is a significant improvement of muscular endurance after three consecutive aerobic exercise training and rejected the null hypothesis. But as the data shows there is no significant improvement in muscular endurance of the CG.

The result of this finding was consistent with the finding of shahana and his friends, who conducted the study on the effects of a twelve-week aerobic exercise program on selected health related physical fitness components in adults Shahana*et al.(*2010).

4.3. Effect of Aerobic Exercise on Flexibility

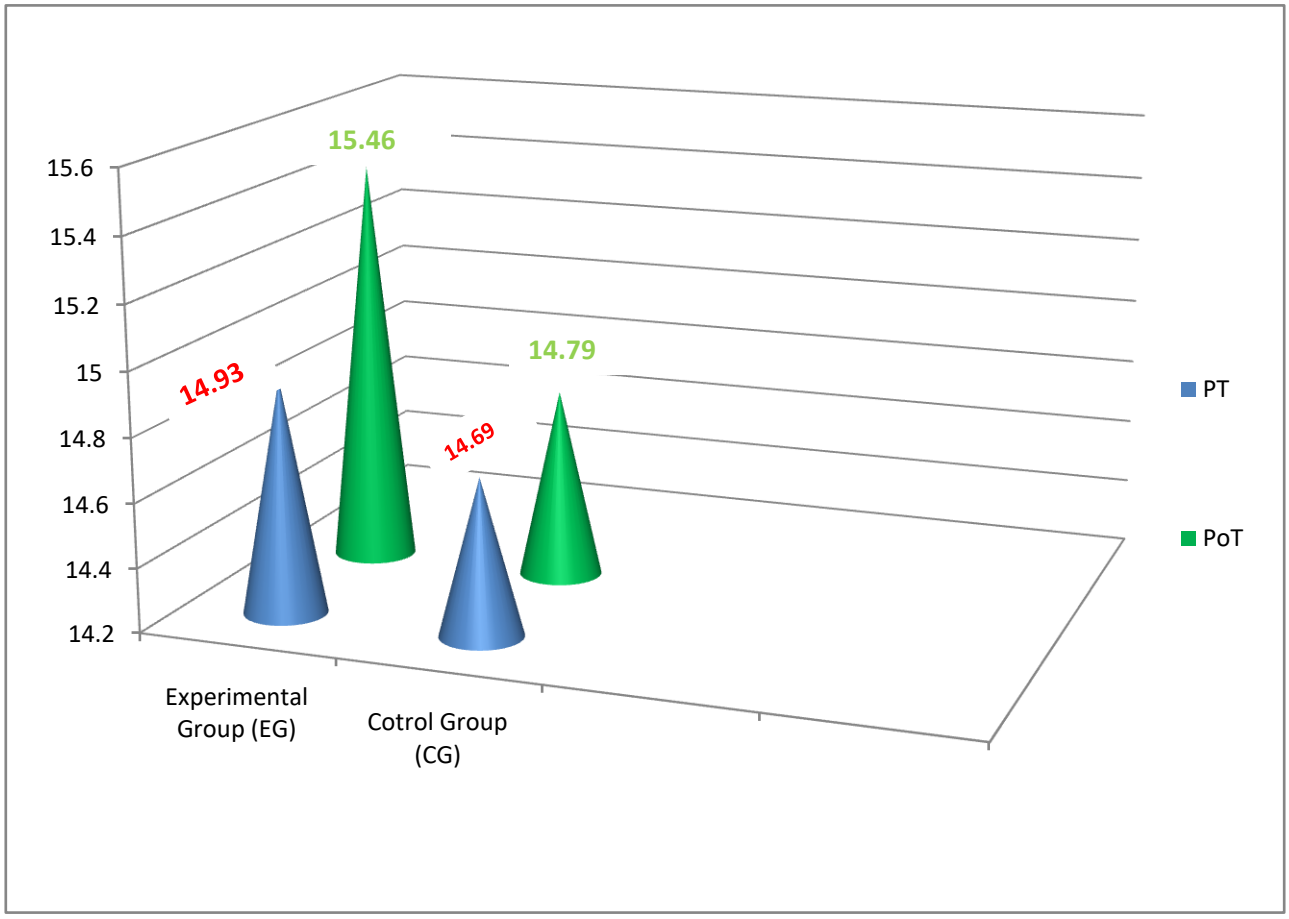
Table4. The mean values of flexibility (sit and reach test) for EG and CG

Group	Test	**PT(X±SD)**	**PoT(X±SD)**	ΔXPT and PoT	P
EG	Flexibility	14.93±5.61	15.46±5.44	0.53	0.000
CG	Flexibility	14.69±5.57	14.79±5.62	0.1	0.212

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

As shown from table 4 the average pretest score of EG (N=30) was found to be 14.93with a SD of 5.61 and CG (N=30) was found to be 14.69 with an SD of 5.57. From this data we can see that the scores in the pretest for both groups were close. After 12 week aerobic exercise training of EG was found out 15.46 with SD of 5.44 and for CG mean 14.79 with SD of 5.62. 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 and PoT test results of EG and there is no improvement between PT and PoT test results of CG.

Figure 2Graphical presentation of sit and reach test result of EG and CG



As shown in the graph above the pre and posttest of the EG in sit and reach test mean score is 14.93 and 15.46 and also the CG is 14.69 and 14.79 respectively. From this data the investigator compute a pre and post mean difference of EG and CG. In which in case of the EG length of sit and reach test was significantly improved by a mean difference of 0.53 at P=0.000 after three months aerobic exercise training. And also in case of the CG in which length of sit and reach test was poor improvement by a mean difference 0.1 at P=0.212, There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is aerobic exercise training had improvement on flexibility of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses which said that there is a significant improvement on flexibility after three consecutive aerobic exercise training and rejected the null hypothesis. But as the data shows there is no significant improvement in flexibility of the CG.

This result is supported by Nagaraj*et al*. (2011) their result shows that combined exercises of stretching and aerobics exercises were significantly in flexibility.

Moreover, Promoth (2010) support the theory that step aerobics had significant effects on flexibility among the experimental group and no significant changes were seen in control group. Also Mahendran (2009) showed flexibility was measured with the reliable equipment sit and reach box.

4.4. Comparison of two tests (90° pushup and sit and reach) results of EG

Table5.Changes of 12 weeks aerobic exercise in the selected health related physical fitness components (Muscular Endurance and Flexibility)

Type of test	PT(X±SD)	PoT(X±SD)	ΔX)PT and PoT	P
ME (90^{0}Push up)	25.97±6.04	27.73±6.24	1.76	0.000
Flexibility(sit and reach test)	14.93±5.61	15.46±5.44	0.53	0.000

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

The above table showed that EG there was significance difference in between the pre and post test score of (90^{0} pushup and sit and reach test) results due to twelve week aerobics exercise in the selected health related physical fitness components (ME, and Flexibility) all test had changes due to aerobic exercises in which they were engaged in the mean score value of ME pretest before training result was (25.97) and posttest after training mean score values was (27.73) The mean difference score of pretest with mean difference score of posttest mean difference value increased by (1.76).

As indicated the tables the mean value of flexibility from pretest 14.93 increased to 15.46 posttest result. Flexibility score of pretest mean to posttest mean difference value of EG increased (0.53) recorded.

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. Summary

The purpose of this study was to evaluate the effect of aerobic exercise on selected health related physical fitness components of grade 12^{th} male students in the case of Ankesha general secondary School and to forward corrective measures to be taken in order to alleviate the encountered problems and advantages. To this end, the following basic objectives were considered.

- To measure the effects of aerobic exercise on muscular endurance using 90^0 push up test.
- To examine the significance of aerobic exercise on flexibility using sit and reach test

In dealing with these basic objectives, the study conducted on grade 12^{th}male students in case of Awi Zone Ankesha Woreda Ankesha general secondary School. Among the total population of 71grade 12^{th} male students the researcher was use 30 students for underwent EG of aerobic exercise training for three months, and the other 30 students for CG were attended one practical physical education lesson per week with experimental group EG by using simple random sampling technique. A pretest and posttest selected health related physical fitness tests were taken to gain the necessary information required. The following findings were obtained from the result. More specifically;

- ❖ The findings of this study indicate that there is improvement in ME. Even if both groups had shown improvement. As a consequence of the training, the EG improvement in muscular endurance is better in mean difference in case of 90^0 angle push up.
- ❖ The finding of this study shows that there is improvement in flexibility. Even if both groups had shown improvement, the EG improvement is better as a consequence of the training in case of sit and reach test.
- ❖ The findings of this study show that there is improvement in selected health related physical fitness (HRPF) components i.e. muscular endurance and flexibility.

5.2. Conclusion

Previous studies have found that aerobic exercise is associated with improved health related physical fitness among students at different age and sex levels. However, it remains unclear whether associations are present in both aerobic exercise and health related physical fitness particularly.

The purpose of this study was to evaluate the associations between aerobic exercises with selected health related physical fitness components in grade twelve students in case of Awi Zone Ankesha Woreda Ankesha General Secondary School. The data was drawn from a pre and posttest after 12 weeks of aerobic exercise training within selected physical fitness tests i.e. 90^0 angle push up to assess ME, and sit and reach test to assess flexibility administered properly to the selected sample male subjects (N=60). As a result, the following conclusion was made. This study indicate that aerobic exercise has its own advantage on improving students health related physical fitness particularly Muscular Endurance, and Flexibility on the aerobic exercise EGs 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:

- HPE teachers should set different aerobic exercise trainings and aware them to engage, so as to endured, well and fit enough their students

- Aerobic exercise programs should be incorporated and encouraged into the grade 12^{th} students physical education lessons at school. This will help to improve the students: health status, energy level, endurance, productivity, study hard to score best and also their flexibility level, avoid unnecessary injuries that they face in their life routines.

- Students should be active participant at least 3 days per week aerobic exercise training to improve their physical fitness status specially their muscular endurance and flexibility (health related physical fitness components). Thus, physical education class per week should be increased and contents should emphasis on aerobic exercises.

- As a professional we, physical education teachers also must be a means to; improve the general fitness status of all students through preparing aerobic exercise training programs and practicing with in it. Further, we should be serious on students' practical session plan, implementation and taking an attendance properly so as to minimize students who miss physical education practical classes, so as to be strong and well enough.

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7. APPENDDICES

Appendices A:Contact Address

If there is any questions or enquires any time about the study or the procedures, please contact in the following address:

Institutional research ethics review committee (IRERC) at +251256661899

Abinet Ayalew (PhD) (Major-Advisor)

Phone No. +251911827322

Email Address amenab2012@yahoo.com

Shemelis Mekonnen (PhD) (Co-Advisor)

Phone No. +251913893850

Email Address shemelisMM@gmail.com

Chalachew Ewnetu Simegn (Investigator)

Phone No. +251924516228

Email Address:kbew1771@gmail.com

Appendices B: Physical activity readiness question (PARQ) for students

For Students; Dear students the purpose of this questionnaires is only to know your status and to engage you to aerobic exercise please read the following questions carefully and indicate your correct responses to each question by putting **"√"**mark in the box provided like ☐ "√" is which is have two alternatives**("YES" or "NO")** respectively.

NO Questions Yes No

THANK YOU

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

If yes indicate the type of injury that you had_____

2. Do you have suffered with heart condition? ☐ ☐

3. Do you have any of the following risk for heart disease: for example High blood pressure, High blood cholesterol and any close relatives (father, mother, brother etc.?) ☐ ☐

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

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

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

7. Do you ever feel feint; have spells of dizziness or have you ever lost consciousness? ☐ ☐

8. Are you taking any prescription medicines recently? ☐ ☐

9. Do you currently smoke? ☐ ☐

10. Do you know your current level of physical fitness? ☐ ☐

11. Have you taken any health related physical fitness skill tests before? ☐ ☐

12. Do you know any other reason why you should not participate in a program of physical Activity? ☐ ☐

If yes explain your Reasonhere_____
_____
_____
_____

I have read and understand the form and have given accurate information regarding to my current health status.
Signed (participant player) _____date_____
Signed (examiner) _____date_____
Source: htt://www.Barnes fitness.co.uk

If you have answered **YES** to any of the above questions please give details information about yourself like name, age , sex, weight, height, and other necessary information:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name: ----------

date: ----------

Sign ----------

Appendices C Table 1: Name, Weight, Height and Age of participant

Experimental Group			**Control Group**		
Code	**Height**	**Weight**	**Code**	**Height**	**Weight**
1	1.77	55	1	1.66	58.5
2	1.75	50.75	2	1.82	52.75
3	1.69	52.5	3	1.79	51
4	1.63	51	4	1.66	58
5	1.69	58	5	1.65	70.5
6	1.89	70.5	6	1.69	57
7	1.79	57	7	1.89	46.5
8	1.85	46.5	8	1.79	51
9	1.72	51	9	1.85	54
10	1.70	54	10	1.72	56
11	1.77	56	11	1.78	48
12	1.82	48	12	1.69	60.5
13	1.79	60.5	13	1.77	57.5
14	1.66	57.5	14	1.70	53
15	1.65	53	15	1.68	63
16	1.78	60	16	1.68	58
17	1.69	46.5	17	1.77	69
18	1.66	62.5	18	1.75	57
19	1.70	57	19	1.69	61
20	1.68	56	20	1.63	50
21	1.75	47.5	21	1.79	60
22	1.64	69	22	1.69	46.5
23	1.77	57	23	1.74	65
24	1.65	61	24	1.78	57
25	1.72	50	25	1.76	56
26	1.79	58	26	1.75	47.5
27	1.63	52	27	1.82	50
28	1.72	50	28	1.66	66
29	1.67	66	29	1.50	67.5
30	1.68	63	30	1.76	55

Appendices D Table 2Pre & Post Test results of both Experimental & Control Group

EG	PT		PoT		CG	PT		PoT	
Subjects code	ME	Flexibility	ME	Flexibility	Subjects code	ME	Flexibility	ME	Flexibility
1	26	15	29	15.5	1	25	15	26	15.3
2	26	16.2	29	16.7	2	26	14.25	26	14.3
3	26	14	28	15	3	25	13.5	25	13.6
4	25	13.5	26	14.9	4	25	13.75	26	14
5	26	14	28	15.8	5	25	13.6	25	13.75
6	27	16	28	16.5	6	26	15.3	26	15.5
7	26	15.8	29	16.1	7	26	15	26	15
8	27	14.5	28	15	8	26	15	26	15.25
9	25	16.5	28	17	9	27	16	27	16
10	26	16	27	16.3	10	25	15	25	15
11	25	13.75	27	14.5	11	26	14	26	14.3
12	26	16	28	16.2	12	26	15	26	15
13	25	13.6	26	14	13	26	15.5	27	15.75
14	25	15	28	15.7	14	25	14.5	25	14.75
15	25	16	27	16.1	15	25	15	26	15
16	26	15.5	28	16	16	26	14	26	14..25
17	25	15	27	1.5	17	26	15.3	26	16
18	26	14	27	14.5	18	26	14	26	14.25
19	27	14.25	28	14.9	19	26	15	26	15
20	26	15	27	15.5	20	27	14	27	14
21	26	14.5	27	15	21	25	15	25	15
22	26	15	28	15.5	22	26	14	26	14.4
23	27	14	29	14.5	23	25	16	26	16
24	27	15.5	28	16	24	25	16	25	16
25	26	14.5	30	15	25	25	14	25	14.25
26	26	14.4	27	14.5	26	27	14.4	27	14.5
27	26	15.5	27	15.8	27	26	14	26	14
28	26	14.2	27	14.5	28	26	14.5	26	15
29	26	15.8	27	16	29	25	15.3	25	15.5
30	27	15	29	15.5	30	25	15	26	15.25

Appendices F Table 3: The mean values of Selected Aerobic Exercise

				EG		CG	
				PT	PoT	PT	PoT
Test code	**Parameters**	**Type of Test**	**unit**				
T1	ME	90^{o} angle push up	Repetition	25.97	27.73	25.77	25.87
T2	Flexibility	Sit and reach	Cm	14.93	15.46	14.69	14.79

Appendices G Description of the Training Schedule

In sport training it needs well designed and prepared plan. The purpose of a training plan is to identify the work to be carried out to achieve agreed objectives and to be effective in the training program out comes. It should follow the training principles and it should be well adjusted to the participant's fitness level and to the weather condition. Training plan can be a short term or it can be a long term plan.

Basically, some fitness components needs short term training and the others need to train for a long period of time. Due to this reason, the investigator will concentrate on a short term training plan (three months). One of the most important rules of training for results comes back to the principles of Arnold's book (Arnold's encyclopedia of Body building) state that, the intensity of the work out and the frequency of the training session play an important in stimulating muscle growth and performance improvement. (Department of Health & Human Service. State Government of Victoria Australia 2008)

Planning the session and the training weeks

Based on the above mentioned reasons and others the researcher uses the training principles. So, this training session was designed for three months, based on the principles of frequency, intensity & time. The training was given for three months with moderate intensity, 50-60 minutes.

Training frequency

Frequency refers to the number of training sessions per a specific period of time such as week, month or year following any form of fitness training, the body goes through a Process of rebuild to replenish its energy reserves consumed by the exercise. For this research the training frequency is 3days per week Monday, Wednesday and Friday.

Exercise intensity

Exercise intensity refers to how hard the body is working during physical activity. Exercise intensity is described as low, moderate, or vigorous. Department of Health & Human Service. State Government of Victoria Australia (2008)

The ranges of exercise intensity

- Low(light) is about 40-54%MaxHR
- Moderate is 55-69%
- High (Vigorous) is ≥ 70%

For moderate intensity physical activity, a person's THR should be 50-70 per cent of their maximum heart rate. The maximum heart rate is based on a person's age. An estimate of a person's maximum heart rate can be calculated as 220 beats per minute minus your age (American College of Cardiology). For this research the researcher uses moderate intensity (55-69% of MHR)

Appendices H Aerobic training schedule for three months

Table 4: First Month training schedule (October, 2019)

Days per week	Types of Exercise	Week (1-4)				Intensity
		Duration	Repetition	Rest	Total time	
Monday	Warming up	7min	1x7min	30sec active rest b/n each aerobic exercise	50 minute	Moderate intensity (55-69% of HR max)
	Stretching exe	3min	1x3min			
	Walking	4min	1x4min			
	Jogging	4min	1x4min			
	Push up	4min	1x4min			
	Rope jumping	4min	2x4min			
	Aerobic dance	4min	2x4min			
	Cooling down	3min	1x3min			
Wednesday	Warming up	5min	1x5min	30sec active rest b/n each aerobic exercise	50 minute	Moderate intensity (55-69% of HR max)
	Stretching exe	5min	1x5min			
	Walking	4min	1x4min			
	Jogging	4min	1x4min			
	Push up	4min	1x4min			
	Rope jumping	8min	1x8min			
	Aerobic dance	4min	2x4min			
	Cooling down	3min	1x3min			
Friday	Warming up	5min	1x5min	30sec active rest b/n each aerobic exercise	50 minute	Moderate intensity (55-69% of HR max)
	Stretching exe	5min	1x5min			
	Walking	4min	1x4min			
	Jogging	4min	1x4min			
	Push up	4min	1x4min			
	Rope jumping	4min	2x4min			
	Aerobic dance	4min	2x4min			
	Cooling down	3min	1x3min			

Table 5.Second Month training schedule(November, 2019)

Day per week	Types of Exercise	Week (5-8)				Intensity
		Duration	Repetition	Rest	Total time	
Monday	Warming up Stretching exe Walking Jogging Push up Rope jumping Aerobic dance Cooling down	6min 6min 6min 3min 7min 6min 6min 3min	1x6min 1x6min 1x6min 1x3min 1x7min 2x6min 2x6min 1x3min	30second active rest b/n each exercise	60minute	Moderate intensity (55-69% of HR max)
Wednesday	Warming up Stretching exe Walking Jogging Push up Rope jumping Aerobic dance Cooling down	6min 6min 6min 3min 7min 6min 6min 3min	1x6min 1x6min 1x6min 1x3min 1x7min 2x6min 2x6min 1x3min	30second active rest b/n each exercise	60minute	Moderate intensity (55-69% of HR max)
Friday	Warming up Stretching exe Walking Jogging Push up Rope jumping Aerobic dance Cooling down	6min 6min 6min 3min 7min 6min 6min 3min	1x6min 1x6min 1x6min 1x3min 1x7min 2x6min 2x6min 1x3min	30second active rest b/n each exercise	60minute	Moderate intensity (55-69% of HR max)

Table 6.Third Month training schedule(December, 2019)

Day	Types of Exercise	Week (9-12)				Intensity
		Duration	Repetition	Rest	Total time	
Monday	Warming up Stretching exe Walking Jogging Push ups Rope jumping Aerobic dance Cooling down	6min 6min 6min 3min 7min 6min 6min 3min	1x6min 1x6min 1x6min 1x3min 1x7min 2x6min 2x6min 1x3min	30second active rest b/n each exercise	60 minute	Moderate intensity (55-69% of HR max)
Wednesday	Warming up Stretching exe Walking Jogging Push up Rope jumping Aerobic dance Cooling down	6min 6min 6min 3min 7min 6min 6min 3min	1x6min 1x6min 1x6min 1x3min 1x7min 2x6min 2x6min 1x3min	30second active rest b/n each exercise	60 minute	Moderate intensity (55-69% of HR max)
Friday	Warming up Stretching exe Walking Jogging Push up Rope jumping Aerobic dance Cooling down	6min 6min 6min 3min 7min 6min 6min 3min	1x6min 1x6min 1x6min 1x3min 1x7min 2x6min 2x6min 1x3min	30second active rest b/n each exercise	60 minute	Moderate intensity (55-69% of HR max)

Appendices I Paired sample T- tests of parameters

Table7: 90^0 angle push up test for EG (pre and post test result)

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig.(2taiied
				Lower	upper			
Pair 1 Pre	-0.833	.592	.108	-1.054	-.612	-7.709	29	000
Pair 2 Post	-1.767	.679	.124	-2.020	-1.513	-14.253	29	000

Table8: 90^0angle push up test for CG (pre and post test result)

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig.(2taiied
				lower	upper			
Pair 1 Pre	-.067	1.015	.185	-.446	.312	-.360	29	.722
Pair 2 Post	-.100	1.296	.237	-.584	.384	-.423	29	.676

Appendices J Sit and Reach Test Result

Table 9: Sit and reach test for EG (pre and post test result)

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig.(2taiied
				lower	upper			
Pair 1 Pre	-.20167	.25922	.04733	-.29846	-.10487	-4.261	29	000
Pair 2Post	-.53000	.55036	.10048	-.73551	-.32449	-5.275	29	000

Table 10: Sit and reach test for CG (pre and post test result)

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig.(2taiied
				lower	upper			
Pair 1 Pre	-.04200	.20682	.03776	-.11923	.03523	-1.112	29	.275
Pair 2 Post	-.09900	.42526	.07764	-.25779	.05979	-1.275	29	.212

Appendices K Test protocols/ norms

Table11: Test Protocols of Ninety Degree Push up

Men (age)	17-19	27-39
Classification	**Number of repetition**	**Number of repetition**
High performance zone	29^{+}	27^{+}
Good fitness zone	20-28	18-26
Marginal zone	16-19	15-17
Low zone	<16	<15

SOURCE: Robert Wood, "push up test: Home fitness tests" Topend Sports Website, 2008, http://WWW.topendsports .com/testing/tests/home-pushup.htm,

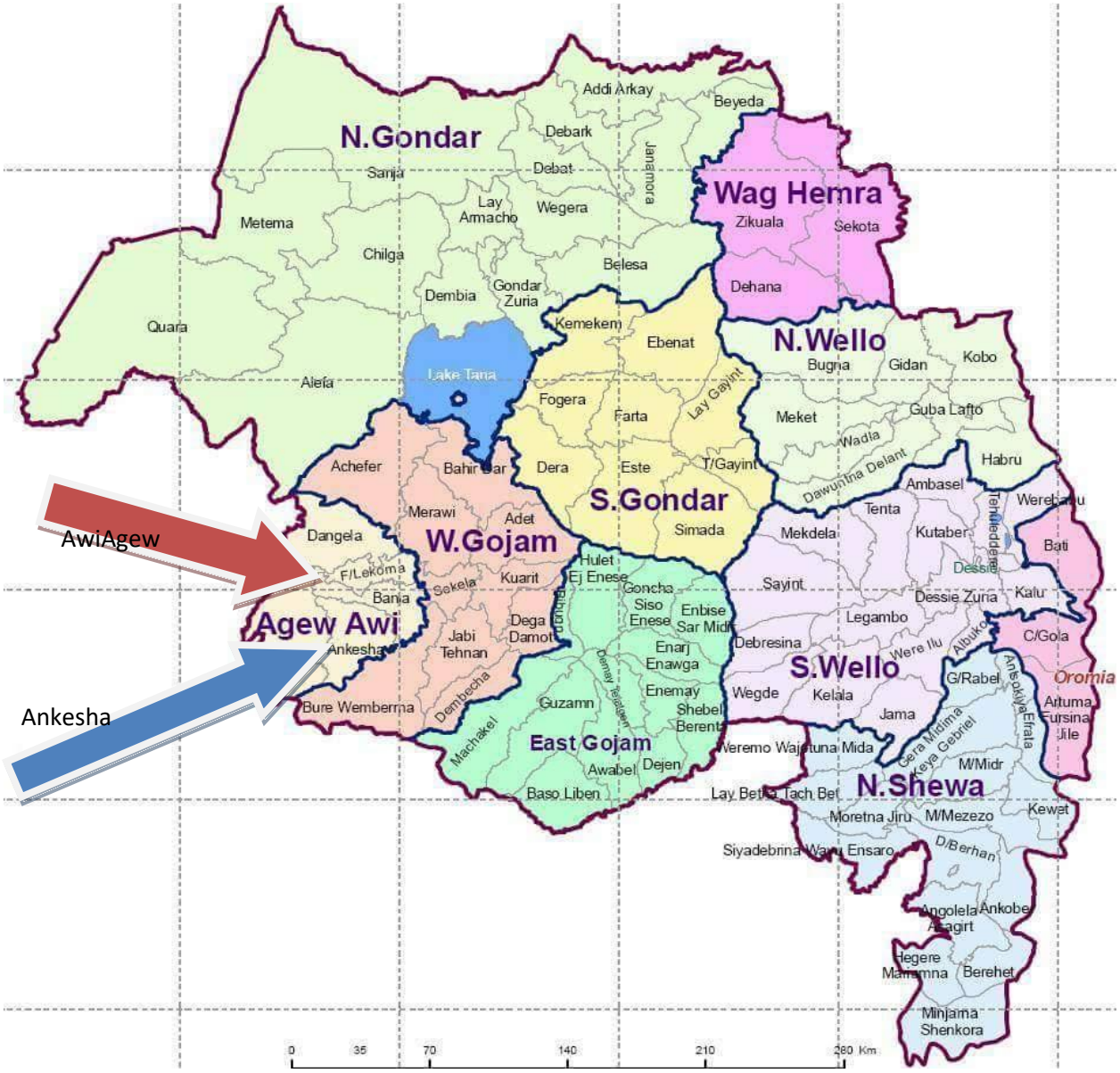
Appendices L Test Protocol of Sit and Reach

Table 12: Test Protocols of sit and reach test

Classification	Men
Normal range	17 to 27cm
Average /mean/	6 to 16cm
Desired range	0 to 5cm

SOURCE: Robert Wood, "push up test: Home fitness tests" Topend Sports Website, 2008, http://WWW.topendsports .com/testing/tests/home-pushup.htm,

Appendices M Map of the Study Site



Source; htt://www.gogle map/Awi/AgewGimjabet/ Ankesha.com.et/search?q=goggle+map+picture