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THE EFFECTS OF TEWLVE WEEK AEROBIC EXERCISE ON HEALTH RELATED PHYSICAL FITNESS VARIABLES IN THE CASE OF ADDISALEM GENERAL SECONDARY SCHOOL GRADE TEN MALE STUDENTES

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BY

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AUGUST, 2019 G.C

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DECLARATION

I, hereby that this thesis for the partial fulfillment of the requirement for the Degree of Masters of Education in teaching physical education on the title of "EFFECTS OF TWELVE WEEK AEROBIC EXERCISES ON HEALTH RELATED PHYSICAL FITNESS VARIABLES IN THE CASE OF ADDISALEM GENERAL SECONDARY SCHOOL GRADE TEN MALE STUDENTS' is my real original work and all sources of materials used in this thesis have been acknowledged. It has not previously formed on the basis for the award of any Degree, Diploma of any University, Other Institution of higher learning except where due acknowledgement is made in acknowledgements.

Name; BirhanuTaglo

Place; Bahir Dar University

Signature…….

Date……

DEDICATION

I would like to dedicate this thesis to my family, and who supported the accomplishment of my dream of receiving my degree of master of education in teaching physical education. Without their tolerance, understanding, support and most of all love, the completion of this work would have been impossible. Furthermore, I could not have done this without the support ofAddisalem general secondary schools grade ten male students.

ACKNOWLEDGMENTS

First and foremost, I would like to thanks the Almighty God, who realized my dream and guided me the right way. Then, I express my deepest gratitude to my adviser Zerihun Birhanu(PhD) for all unlimited guidance, support and giving me suggestive and educative comments and In line with this I want to express my thanks to my families and friends for your encouragement and greatly appreciated and will be in my memory. This thesis would not have been possible without consult support from all of you. I would like to express my heartfelt and sincere appreciation to all Addissalem general secondary school grade ten male students for their participation. My heartfelt thanks goes to my teammates HPE department teachers for their material support and who were a source of immense moral and also technical assistance during the testing sessions in order to make this thesis successful.

Table of contents

Contents **Page**

List of Tables

Tables **Page**

List of Figure

Figure **Page**

List of Abbreviation and Acronyms

BMI	Body Mass Index
CG	Control Group
CVE	Cardiovascular endurance
EG-	Experimental Group
FFM	Fat free body
FX	Flexibility
HDL	High density lipoproteins
HPE	Health and Physical Education
LBM	Lean body mass
LDL	Low density lipoproteins
ME-	Muscular endurance
ME	Mean deference
N	Number
POT	post test
PT	Pre test
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
US	United States
VO_2max	Maximum Oxygen Consumption
WHO	World health organization

ABSTRACT

Many studies believe that regular physical activity can have immediate health benefits by positively affecting cardio respiratory, muscular fitness and body composition improvement. The main interest of the present study was to evaluate the effect of aerobic exercise on health related physical fitness variables. The study design was experimental research method. 34 male students of addisalem general secondary school aged17-20 years had divided by simple random sampling method into two equal groups, experimental (n=17) training group who performed aerobic exercise in three days/week for three months and a control (n=17) group however, did not perform this selected aerobic training. Both groups had taken pre and post-testing and all the subjects participated in 4 physical fitness tests: cardio respiratory fitness was measured using 12 minute run test, muscular endurance was measured by 90^0push up test, flexibility was measured using sit and reach test and Body Composition was measured using BMI. The data collected from the study subject was analyzed using SPSS version 23 software. By using paired sample t-test the mean difference changes from with level of significant at 0.05. The results showed health related physical fitness components such as CVE (MD=138.235, p=0.006), ME (MD=8.588, p=0.041), and Flexibility (MD=2.882, p=0.032) were improved significantly following the 12 week fitness Exercise in EG at (p<0.05). Besides, body mass index (MD=-0.702, p=0.004) were significantly improvement was seen, since (p<0.05). But, no significant fitness improvement were found in all selected variables of CG (p>0.05). Furthermore, the results of most health related fitness components of EG such as cardiovascular endurance (MD=-14.706, p=0.557), ME (MD, 1.059,p=0.269) flexibility (MD=-0.176, p=0.772) Generally, the present study concluded that aerobic exercise training had a significant effect on students' physical fitness through selected physical fitness variables. Hence, aerobic exercise is effective and beneficial effect for the enhancement of male students' physical fitness levels.

Key-word=*Aerobic exercise, cardiovascular endurance, muscular endurance, flexibility, body composition.*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In order for the man to succeed in life God provided him with two means education and physical activity. Note separately, one for sole and the other for the body but for healthy life these two together. With this two means, man can attain perfection. (Strobe, 2009)

The pre-human ancestors have achieved the fundamental movements like, walking, running, jumping, climbing, throwing, pulling, pushing etc. By permutation and combination of these basic fundamental movements, man has developed various secondary movements essential for day-to-day living and for the use in games and sports. Physical fitness is important for all human beings, irrespective of their age. A given work may not be carried out if the required physical strength is not available. Fitness is the first and foremost thing to enjoy the life fully (Reddy, 2012).

Regular physical activity produces effects for any age group providing the exercise is specific and appropriate to the level of fitness of the individual. Correctly performed progressive exercise increase the level of fitness improves health. It also creates sense ofwell beings, produce a greater energy and reduce the risk of developing diseases. Exercise makes demand on the body system over and above normal every day activities and as a result the system adept anatomically and physiologically. (Rosser, 2001)

Regular physical activity, fitness and exercise are critically important for the health and wellbeing of all people, whether they participate in vigorous exercise on some type of moderate health enhancing physical activity, even among frail and very old adults mobility and functioning can be improved through physical activity. (Butler etal.1998)

Aerobic exercises areoneof important physical activities which provide the individual with number of benefits in improvement of both physiological capacity and

psychological wellbeing ,enhance work and recreation improvementof healthand preventionof cardiovascular diseases(PattenBarger ,2001.cox2002) .An aerobic exercise performed by moderate intensity produces significantlygreater positive psychologicaloutcomes than does either high intensity aerobic exercise or an aerobic exercise (Cohen and Shamus ,2009) .Regular aerobic exercises will produce beneficial effects for any age group. Providing the exercises specific and appropriate to the levelof fitness of the individual .Progressive exercises correctly performed will increase the levelof fitness and improve health. Appropriate regular daily physical activity is a major component in preventing chronic diseases along with a healthy diet andnot smoking.Forindividuals, it is a powerful meansof preventing chronicdiseases, for nations: it can provide accost effective way of improving public health across the population. Aerobic exercise stimulates heart lungs and all other workinggroupsof muscles and produces valuable changes inbody and mind. Many physiological changesare determinedby daily aerobic exercises (Shahana, 2010)

Schools have the potential to improve the health of young people by providing instruction in physical education that promotes enjoyable lifelong physical activity. Unfortunately, many schools have reduced physical education opportunities in order to educate more class time to meet these academic standards (Lavall, 1984 cited in Ryan, 2011).

Many of the researchers sighted in the above, have studies that physical exercises are important for the development of all physical fitness. According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of muscular endurance, cardiovascular endurance, flexibility, body composition and has significant improvement of health related physical fitness.Nevertheless, limited researches were done in the area of how much aerobic exercise are effective for the improvement of cardiovascular endurance, muscular endurance, flexibility, and body composition of the students at Addisalem general secondary school

The reality of Addisalem general secondary school show low time allotment of physical education than other subject. Because of this students showed limitation on their physical fitness status, when the researcher evaluates in his physical education practical class

particularly in grade ten students. The researcher through that if the number of periods given in one week was increased with contents of aerobic exercise, it would have influence on physical fitness components otherwise the situation made students to have poor physical fitness. Due to this, the aim of the study was to evaluate the effect ofaerobic exercise on selected health related physical fitness variables on grade ten male students.

1.2 Statement of the Study

The main focus of this study was on the effect of twelve week aerobic exercise on selected health related physical fitness variables, cardiovascular endurance, muscular endurance, flexibility, and body composition of Addisalem general secondary school male students.

Aerobic exercise is essential components that seriously addresses and improve the fitness status of students. According to WHO, (2006a) active life style contributes to individual physical and mental health but also to the overall health for being physically active is not limited to sports and organized recreation. They exist everywhere, where people live and work, in neighborhoods and in educational and health establishments.

The different forms of somatotypes and the differences in physical fitness qualities are characteristics received from parents (Claude Bouchared and Eric Hoffman, 2011).But, all these somatotypes can be improved through various intensity physical training.Moderate intensity aerobic exercises are one of the most important means to improve body functions and to improve physical fitness.

According to American College of Sports Medicine (2009) participation in at least 30 minutes of moderate physical activity per day, carried out thrice a week will yield significant health benefits, while the world health organization (2009) suggests that one should take at least 10,000 walking step counts per day for health promotion. As noted by U.S. Department of Health and Human Services, children and teens should be physically active for at least 60 minutes on most, if not all days of the week. But, the reverse is true where the researcher employed and working in guagussa shikudad Woreda addisalem

general secondary school and observed less participation in physical activity and poor status of physical fitness qualities when measuring during their physical education classes.However, the improvement and development of physical fitness quality of students is the responsibility of every physical education teachers in the school. In addition to this, all physical education teachers to create conductive environment for students to participate in aerobic exercise so as to improve their physical fitness quality.

Many research studies says aerobic exercise are important for the development of all physical fitness qualities but no research was done in addisalem general secondary school students on their physical fitness problems.Due to this the researcher wanted to investigate the effects of twelve week aerobic exercise consists of walking, jogging, running, rope jumping continuous running and other aerobic exercise for the development of cardiovascular endurance, muscular endurance, flexibility, and body composition on addisalem general secondary school grade ten male students.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study is to investigate the effect of twelve week aerobic exercise on selected health related physical fitness variables among Addisalem general secondary school grade ten male students.

1.3.2 Specific Objectives

This research addressed the following specific objectives.

- To indicate the effect of 12 week aerobic exercise on cardio vascular endurance and muscular endurance.
- To assess the effect of aerobic exercise on the students body composition.
- To indicate the effect of 12 week aerobic exercise on the improvement flexibility.

1.4 Hypothesis of the Study

The study was attempted to test the following hypotheses

H1: Twelve weeks aerobic exercises significantly effect on health related physical fitness variables.

H1: Twelve -week aerobic exercise would have significant effects on cardio vascular endurance.

H1: Twelve- weekaerobic exercise would have significant effects on muscular endurance.

H1: Twelve- week aerobic exercise would have significant effects on flexibility.

H1: Twelve- week aerobic exercise would have significant effects on body composition.

1.5 Significance of the Study

This study was:

- Help students to improve their health related physical fitness and would provide information to understand the effect of aerobic exercise on physical fitness of male students.
- Helps to improve cardio respiratory fitness, muscular endurance, flexibility and body composition of students.
- It will be a means for those selected school students to improve their fitness on some selected fitness variables.
- It encourages students to engage in aerobic exercise to boost their physical fitness.
- It provides information for students who involve on aerobic exercise program for the improvement of selected health related physical fitness variables.
- Help PE teachers to know further about the effect of aerobic exercise and the methods of evaluating students' physical fitness and Provide to assess and compare the performance of their students on schools.
- Finally, serve as a starter key for other researcher who might want to study further, were some significances of this study.

1.6 Delimitation of the Study

- This study was conducted only on Awl zone guagussa shikudad woreda Addialem general secondary school with 17 experimental groups and 17 controlgroupgrade ten male student's between the ages of 17-20.
- This study was delimited aerobic exercise and the training program wasfor about three day per week for three months since February, March and May 2011 E.C.
- The dependent variables and fitness tests were also muscular endurance (90^0 push up test), flexibility (sit and reach test), cardio vascular endurance (twelve minute run test) and body composition (body mass index).
- Aerobic exercise trainings were running, cross running, walking, jogging and rope skipping, and other aerobic exercises.

1.7 Limitations of the Study

The major limitation that was undertaken may not have previous knowledge about exercise training in a regular basis. Tests were limited to specific tests that are easily monitored and administered in the students and school context. , and the other limitations were set for this study, lack of internet access, scarcity of sufficient books and reference, the hereditary and environmental factors., metrological variations such as air temperature, relative humidity etc. during testing periods could not be controlled and their possibility influence on the result.

1.8 Definition of Basic Terms

Aerobic: Type of exercise with consumption of oxygen (Dr.kenneth.H, 1960s).

Cardiovascular fitness: the ability of heart and blood vessels to supply blood and oxygen to working muscles.

Exercise: The structured and planned physical activity in order to develop or maintain physical fitness and overall health (David&Larsen.2011).

Fitness: The ability to withstand daily challenges(Clarke, 1975 page 8).

Flexibility: The movement of joints within their full range of motion (Brown, 1986)

Intensity: How hard the given exercise is (http://.www.betterhealth, 2013).

Muscular endurance: The ability of muscles to contract repeatedly without being tired (ACSM, 2003).

1.9 Organization of the Thesis

The study consists of five chapters. The first chapter of this research discusses the introduction part and this includes background of the study; statement of the study; objectives of the study; hypothesis of the study; delimitation of the study; significant of the study and organization of the study and definition of some basic term used in the study. The second chapter deals with review of related literature about the selected physical fitness components. Chapter three deals with all methodology used for this research. In this part research design, study subjects, sampling technique and sample size, inclusion and exclusion criteria; data collection instrument; data collection procedure; and method of data analysis.The fourth chapter deals with result and discussion of the study and the last chapter focuses on the summary of the findings, conclusion and recommendations of the study.

CHAPTER TWO

REVIEW RELATED LITERATURE

2.1 The Concept of Physical Fitness

Physical fitness has defined by many scholars in different literature. Baltimore et al.., (1995), defined physical fitness as, the ability of the body to perform moderate to vigorous levels of physical activity without undue fatigue and capability of maintaining such abilities throughout the life. American College of Sports Medicine has also defined physical fitness as a set of characteristics (i.e. the work capacity of heart and lungs, the strength and endurance of muscles and the flexibility of joints) that relate to the ability to perform physical activities (Singh A. et al., 1999). Physical fitness is associated with a person´s ability to work effectively, enjoy leisure time, be healthy, resist hypo kinetic diseases or conditions, and meet emergency situation (Corbin et al., 2006). So, it is the basic requirement of life, which is achieved through participating in regular movement. The United States President's Council on Physical Fitness and Sports defined the term physical fitness as "the ability to carry out daily tasks with vigor and alertness without undue fatigue, with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies" (Clarke, 1975) [8]. General fitness implies the ability of a person to live most effectively with his/her potential, which depend upon the physical, mental, emotional, social and spiritual components of fitness which are highly interrelated.

There are many factors which help to develop physical fitness, but regular physical activity is the key aspect to achieve optimal physical fitness (Olaitan, 2005). Physical fitness is in part genetically determined, but it can also be greatly influenced by environmental factors. Physical exercise is one of the main determinants (Andersen, 2003). Physical educators also classify physical fitness as skill related (related to sport performance) which includes components such as agility, balance, coordination, power, reaction time, and speed and health related fitness (associated with disease prevention and health promotion) which includes components such as cardio-respiratory endurance, muscular strength and endurance, body composition and flexibility (Hawley, 2001).

2.2 Health Related Physical Fitness

Health-related fitness is the ability to become and stay physically healthy. Muscular strength, muscular endurance and flexibility are some of the health-related physical fitness components (ACSM, 2003). The level of muscular strength, muscular endurance and flexibility affects an individual ability to perform daily functions and various physical activities throughout the entire life of an individual. They also assist in preventing chronic diseases, injuries as well as osteoporosis.This component focus on factors that promote optimum health and prevent the onset of disease and problems associated with inactivity (NASPE, 2009).

There are five components of health related fitness namely muscular strength, muscular endurance, cardio respiratory endurance, flexibility and body composition (Singh, 1991). In addition to improving quality of life, health-related fitness: increases muscle tone and strength, decreases susceptibility to injuries and illness, improves bone mineral density, reduces risk of osteoporosis, improves posture, increases efficiency of the respiratory and circulatory systems, decreases risk of cardiovascular disease and stroke, improves blood pressure, decreases risk of diabetes and some cancers, improves self-esteem and self-confidence, decreases body fat and improves metabolism; and increases energy level and academic achievement (Virginia Department of Education, 2006).

2.2.1 Cardio-Respiratory Fitness

Cardio-respiratory endurance is the ability of the blood vessels, heart and lungs to take in, transport, and utilize oxygen. Cardio-respiratory fitness is one of the most important components of health related physical fitness. It reflects the overall capacity of the cardiovascular and respiratory systems and the ability to carry out prolonged strenuous exercise. Hence, cardio-respiratory fitness has been considered a direct measure of the physiological status of the person. Cardio-respiratory fitness, cardiovascular fitness, cardio-respiratory endurance, aerobic fitness, aerobic capacity, aerobic power, maximal aerobic power, aerobic work capacity, physical work capacity and maximal oxygen

consumption (VO2 max) all refer to the same concept and are used interchangeably in the literature (Jonathan 2006 cited in Tsigabu, 2013).

Further also the efficiency with which the body delivers oxygen and nutrients needed for muscular activity and transports waste products from the cells i.e. is a condition in which the body's cardiovascular (circulatory) and respiratory systems function together, especially during exercise or work, to ensure that adequate oxygen is supplied to the working muscles to produce energy. (Physiology of Exercise: Responses and Adaptations, 2nded).

In general, aerobic endurance is the most critical element of physical fitness. Research indicates that healthy levels of aerobic endurance are associated with reduced risk of high blood pressure, coronary heart disease, obesity, diabetes, some forms of cancer, and other health problems in adults (U.S. Department of Health and Human Services, 1996 cited in Connecticut state department of education, 2009). According to a recent report from the surgeon general lack of regular exercise and physical activity contribute to the development of other coronary heart disease risk factors. Research suggests that by engaging in regular exercise and physical activity that improves the cardiovascular system, the individuals can reduce many risk factors associated with coronary heart diseases. A VO2 max test in the laboratory setting is considered to be the best measure of cardiovascular fitness. Commonly administered field tests include the One mile run/walk, the 12-minute run, step, and treadmill tests.

2.2.2 Muscular Strength

Muscular strength refers to the maximal ability of a muscle to generate force at a single muscle contraction (De Vries&Housh, 1994). This can be measured by how much weight that an individual can lift during one maximal effort. According to (Stone, 1990), muscular strength exercises helps to reduce the occurrence of joint and muscle injuries that may occur during physical activity. Muscular strength is improved by performing strength training. Associated with increased muscular tone and strength, it improves personal appearance and self-esteem. This type of exercise is developed by performing different activity like push-up, sit-up, to lift heavy weight, and others (Stephens, 1988).

2.2.3 Flexibility

As Suresh (2011) define flexibility as the ability to move muscles and joints through their full range of motion. Most people will, at one time or another, suffer back problems. Approximately 80% of these low back problems are due to weak and or tense muscles. Many daily activities place a great deal of strain on these muscles. Physical inactivity can also contribute to the risk factors that promote back problems. This means that these problems can be deducted or limited through improved physical fitness. Physical inactivity contributes to a loss of flexibility for the lower back and the hips flexors, sitting for long periods time promotes a sedentary existence which will result in a loss of flexibility. Individuals with a sedentary life style who perform occasional physical labor are at high risk for developing back problems. Physicians prescribe specific trunk and thigh flexibility exercises, stretching for their patients with lower back problems, supporting the value of stretching exercises to prevent low back problems.Generally, flexibility is specific to each joint of the body, thus there is no general measurement of flexibility as there is for cardiovascular fitness (Arschel., 1991 cited in Tsigabu, 2013). Flexibility is typically measured in the lab using measurement devices such as a goniometry, flexometer and in the field with test exercises such as the sit and reach, and the zipper.

2.2.4 Muscular Endurance

It is the ability to sustain a given level of muscle tension 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&Roth, 2002). Further Hoffman, 2006 describes muscular endurance is an important health related component of physical component and prevents undue fatigue from work and other daily activities, and allows greater success and enjoyment in athletic and recreational endeavors.

Muscular endurance is specific in nature. 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 (static contractions) or isotonic (dynamic contractions).

2.2.5 Body Composition

It is the amount of fat versus lean mass (bone, muscle, connective tissue, and fluids).This component of fitness is considered important because excessive fat content is associated with health problems, such as coronary heart disease, stroke, and diabetes (Arschelet al., 1991 cited in Tsigabu, 2013). There are standards to determine the levels of body fat that individuals should possess. It is essential to maintain a minimal amount of body fat (percent body fat) for good health, but an excess level as well as a very low body fat level can cause serious health risk. The proper way to determine recommended weight is by finding out what percent of total body weight is fat and what amount is lean tissue. Body composition can be accessed through several techniques (Hoeger, 1999). Fitness Gram provides three test options to estimate body composition: Skin folds Measurements, Bioelectric Impedance Analyzer, and Body Mass Index (California department of education, 2012).

BMI is commonly used method of determining an individual's weight is whether underweight, normal or overweight in relation to their particular body type (Lacy &Hastad, 2006). BMI is calculated as body weight in kilograms divided by height in meters squared (kg/m2) or is an indicator of weight-for-height. It is considered as one of the most commonly anthropometric measures to assess total body adiposity, because of its simplicity as a measure and its global acceptance (Cornier et al., 2011). Although BMI is more accurate than body weight, there are limitations to the use of BMI alone to assess adiposity, including poor sensitivity in diagnosing excess body fatness. At the extremes of heaviness, BMI is probably a reasonable youth, 2012)

Whole-body composition is of interest in the contexts of control of body weight, assessment of obesity, and sport and exercise. It comprises total body fat (essential fat plus storage fat) and fatfree body mass (FFM) (includes muscle, water and bone). From body density measurements, using established corrections and equations, the ratio of fat mass to fat-free mass can be calculated, based on the much lower density of the fat compartment. However, within the FFM, bone is denser than muscle, so if there is either relative loss of bone density (osteoporosis) or increase in muscle mass (with training), fat percentage may be overestimated. Densitometry techniques include underwater (hydrostatic) weighing and air displacement plethysmography. Estimates can be made of lean body mass (LBM), body mass devoid of storage fat, but LBM does not exclude essential fat, so it is slightly higher than the FFM. See alsobody fat, body fluids(Dictionary of Sport and Exercise Science and Medicine by Churchill Livingstone © 2008).

2.3 Aerobic Exercise

Aerobic exercise is physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic literally means “living in air”, 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. Aerobic exercises are a wonderful way to burn your fat and tone your body muscles, leaving you healthy and in a good shape. Finding the perfect Workout Routines takes time and effort. These best workout routines is a great place to start if a person is interested in flat abs. All these activities are healthy, easier to perform and inexpensive. Aerobic exercises are beneficial in so many ways like strengthening the respiratory muscles, strengthening and enlarge the heart muscle and improve its pumping, improving blood circulation and red blood cells, reducing stress and depression, increasing your stamina and endurance of your muscles. In short it reduces the risk of heart attacks. (International Journal of Physical Education, Sports and Health, 2015)

Aerobic exercise is any activity that uses large muscle groups, can be maintained continuously for a long period of time and is rhythmic in nature. Aerobic activity trains

the heart, lungs and cardiovascular system to process and deliver oxygen more quickly and efficiently to every part of the body. As the heart muscle becomes stronger and more efficient, a larger amount of blood can be pumped with each stroke. Fewer strokes are then required to rapidly transport oxygen to all parts of the body. An aerobically fit individual can work longer, more vigorously and achieve a quicker recovery at the end of the aerobic session. Regardless of age, weight or athletic ability, aerobic activity is good for human being. As the body adapts to regular aerobic exercise, we will get stronger and fitter (American College of Sports Medicine, 2010).

2.4 Characteristics of Exercise Intensity

Exercise intensity is a measure of how hard is the exercise? The exercise intensity lies somewhere a continuum between rest and maximal oxygen up take for that activity. The intensity should vary with the type of exercise being done .exercise to cardio respiratory development must strenuous enough to elevate the heart rate between 60 and 90 present of the heart rate reserve (HRR). Those with low fitness levels should start exercising at lower training heart rate (THR) of about 60% of HRR. exercise can be monitored by measuring sub maximal oxygen consumption (Daniels, 1985).heart rate (Lambert et al,1989).the weight lifted during exercise (sweet et al,2004).athletes are advised to incorporate high intensity training in to their training programs after they have developed a sufficient base (Lauresen and Jenkins 2002).If too much high intensity training is carried out the athlete at risk of developing symptoms of fatigue associated over etching (Meeusen et al 2006).over training affects athletes performance not doing well ,lose of interest and will face psychological and physical risk. Over training will increase the risk of getting injured (noakes, 2001).

Exercise intensity refers to how hard your body is working during physical activity. Your health and fitness goals, as well as your current level of fitness, will determine your ideal exercise intensity. The goal is work hard, but not too hard. Typically, exercise intensity is described as low, moderate, or vigorous. For maximum health benefits, the goal is to work hard, but not too hard, described as moderate-intensity by the (National Physical Activity Guidelines for Australians). These guidelines recommend that for good health, you should aim for at least 30 minutes of moderate-intensity physical activity on most

days. This is the same for women and men (http://www.betterhealth, 2013). The process of determining and controlling appropriate exercise intensity presents a challenge, which has implications related to both physiological changes and to individual compliance within an exercise program. (K and EPLM 2001)

Several measurements for gauging exercise intensity for various exercise modalities have been devised and applied. These include proportion of maximal oxygen uptake (%VO2 max), proportion of maximal heart rate (%HRmax), proportion of maximal heart rate reserve (%HRRmax), and blood lactate indices. The following will cover the main principles predicting and controlling exercise intensity by extrapolation from the relationships between oxygen uptakes, heart rate, and power output and running speed. Ideally, proportions of the O2 max are used to specify exercise intensity levels. The recommended intensity range is normally between 40% and 85% depending on the health and training status of the individual (ACSM, 1995).

Low- intensity -The decrease in the minimal intensity to 40% of VO2max and 55% of HRmax represents a change in the ACSM recommendation and more clearly recognizes that the Minimal threshold for improving fitness/health is quite variable at the lower end of the intensity scale. For low-intensity sub maximal exercise, fatigue may result from substrate depletion, dehydration, hyperthermia, or loss of motivation associated with central fatigue (Newsholme, 1992).

Moderate-intensity- activity in this statement referred to activities that use Approximately 150 kilocalories (630 kJ) per day or are equivalent to 55-65% of VO2max. The statement also highlights that many health benefits may be accrued by accumulating short bouts of activity throughout the daytime. This recommendation should be seen as the minimal recommendation for health benefit as not all diseases respond to moderate-intensity activity. Indeed, the Surgeon General of the United States later updated the recommendation to state that: „Additional health benefits can be gained through greater amounts of physical activity. People who can maintain a regular regimen of activity that is of longer duration or of more vigorous intensity are likely to derive greater benefit" (Montoye.H, 1996).

2.5 Types of Aerobic Exercise

Any activity that uses large muscle groups, can be maintained continuously, and is rhythmical in nature can be regarded as an aerobic exercise. In general, aerobic exercises requiring little skill to perform are more commonly recommended for all adults to improve fitness. Aerobic exercises that require minimal skills and can be easily modified to accommodate individual physical fitness levels include brisk walking, leisure cycling, swimming, and aqua-aerobics and slow dancing. Aerobic exercises that are typically performed at a higher intensity and, therefore, are recommended for persons who exercise regularly include jogging, running, aerobics, stepping exercise, fast dancing and elliptical exercise. These exercises should be performed with the recommended dosage of aerobic exercise which means, (frequency (F), intensity (I) and duration (time, T) of the exercise performed. In combination with the type (T) of exercise performed, these factors constitute the basic components of the core principle of exercise prescription (the FITT principle). It should be noted that even small increases in caloric expenditure with physical activity may improve physical fitness outcomes. (General principles of exercise prescription 4thed)

A: 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. (about.com)

B: 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 theheart,lungs and muscles than jogging. Running requires higher level of overall fitness than jogging. (www.betterhealth.vic.gov.au/running_and_joggimg/pdf/)

C: 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)

D: Rope skipping: Jumping rope 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 (Lee, 2003 cited in (www.jump rope.pdf). Jump rope 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)

E: Cycling:A very inexpensive and ecofriendly type of aerobic exercise that works effectively for your cardio fitness as well as your mental fitness is cycling. All you need is a bicycle with a cycling helmet and fitness suit with perfect sport shoes. It tones leg muscles and increases your limbs strength and also keeps buttock muscles in shape. The best part of cycling is it puts less stress on joints for those who have joint issues as compared to running and stair climbing. The aerobic classes and gyms have also stationary cycles for indoor cycling which is also a great option if you want to stay away from sun. (PramodKerkar.MD.FFARCSI, 2018)

F: Aerobic Dance: One of the most enjoyable forms of aerobic exercise that can be performed with no risk factors and is highly beneficial as well as entertaining is aerobic dancing. These types of aerobic exercises are usually performed at aerobic dance classes or general aerobic classes and some gyms. Aerobic dances include ballet, disco, jazz and samba that tone up your entire body with a enjoyable music that not only improves your physical fitness but also improves your mental health by reducing depression and anxiety.(PramodKerkar.MD.FFARCSI, 2018)

2.6 Benefits of Aerobic Exercise

Simply put, aerobic exercise is also known as cardio exercise. This is because it works out your cardiovascular system, that being your heart and lungs. Cardio or aerobic exercise involves sustained activity that causes your heart and breathing rate to work at an increased rate for a prolonged period of time. Aerobic exercise also involves the pumping of oxygenated blood to the muscles that are working. This kind of exercise includes things like spinning, cycling, jogging, swimming, dancing, and other such activities. (Https/www.zone fitness.co.za/ the-20 benefits of aerobic exercise).

One of the things that you may not have known about aerobic exercise is that it can greatly affect your mental health. There is a large percentage of the population that suffers from things like anxiety, depression, and even low self-confidence. It was previously thought that all of these things could only be fixed with drugs or psychiatric help, but that does not seem to be the case. Regular exercise can actually be quite an effective tool when it comes to curing anxiety or depression. Studies have shown that this has something to do with a phenomenon that we call the runner's high. The runner's high is a feeling of elation and happiness that runners get after having exercised for a prolonged period of time. It is shown that aerobic exercise causes the brain to release chemicals called dopamine. Dopamine plus a few other brain chemicals are feel-happy chemicals. When released by the brain they make you feel happy and satisfied. Therefore people who suffer from depression and anxiety can reduce their symptoms through some simple aerobic exercise. Of course, the fact that exercise helps to boost self-confidence has to do with the fact that you feel fitter and probably look better too.

It is shown that aerobic exercise is one of the most effective ways of controlling your weight. In fact, it may be the very best way to lose weight. Daily aerobic exercise at a slightly increased heart rate or energy exertion level, for a period of 30 to 60 minutes per day, will burn a significant number of calories. Combinedwith a good diet this can go a very long way in helping you lose weight, weight that can be the cause of various health issues. If you are overweight and are tired of looking the way you look and feeling the way you do, aerobic exercise is definitely a great option to go with. High blood pressure is most often caused by a weak heart. A weak heart has to pump and work much harder to

deliver the same amount of blood around your body when compared to a stronger heart. This puts a lot of undue strain on the walls of your arteries, thus causing high blood pressure. The less your heart has to work to pump blood, the lower your blood pressure will be. Overtime aerobic exercise will strengthen your heart. After all the heart is a muscle, therefore doing aerobics activities will train that muscle. Just like with any other muscle, the more you train it, the stronger it becomes. As we mentioned before, the stronger your heart is, generally speaking, the lower your blood pressure will be. It is shown that you need to engage in at least 150 minutes of aerobic activity per week for at least 6 weeks before seeing results in terms of your blood pressure. It should also be noted that the effects will only last as long as you do aerobic activities for. Of course, high blood pressure can cause severe heart problems such as heart attacks as you age, something which you can help avoid with a little bit of aerobic exercise.

There are very many benefits of aerobic exercise when it comes to reducing the chance of developing several different health conditions. As mentioned before, heart attacks, strokes, and other heart problems can be caused by high blood pressure, but that's not all. Diabetes, respiratory illnesses, and problems with your joints can all be caused by being overweight. Therefore losing weight is a great way to deal with these problems from an early age. As you may know, aerobic exercise is one of the best things that you can do to lose weight. Furthermore, it is shown that walking and running on a regular basis greatly reduces the risk of developing osteoporosis in the future. Even better is the fact that swimming and water aerobics can actually relieve the symptoms and pain caused by arthritis. The bottom line is that aerobic exercise helps you lose weight and being obese is the cause of many different diseases that can be fatal.

The next advantage to be gained from regular aerobic exercise is an improvement in your cholesterol level Of course; the human body contains 2 different types of cholesterol. One of these types is known as LDL, which is the bad cholesterol. The other type is known as HDL, which is the good kind of cholesterol.Good cholesterol helps your heart function better and it helps to keep your arteries clean. On the other hand, bad cholesterol will clog up your arteries and can cause major conditions such as heart attacks and strokes. Regular

aerobic exercise is proven to be an effective way of managing cholesterol levels and thus increasing your overall health.(David, 2018 © Fit&Me).

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: According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of cardio vascular endurance and has significant improvement of health related physical fitness. Another study by Licl et.al (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. Another finding by Toy, (2008) conducted on the effect of aerobic dance training on Vo2 Max and Body Composition in early middle aged Women. The result of this finding showed that there were significant reductions in body weight, BMI, body fat percentage, and in vo2 max. This study indicates that aerobic dance training increases the physical and cardio respiratory fitness among middle aged women.

Further, Mahendran (2009) conducted a research on 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. This finding proved that all variables were significantly improved among experimental group.

Shahana et al., (2010) investigated on the effect of a 12-week aerobic exercise program on health-related physical fitness components in middle-aged women. 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&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.

2.7.1 Effects of Aerobic Exercise on Cardio Respiratory Fitness

Aerobic exercise the trained individual has increased maximum oxygen consumption and is better able to process oxygen and fuel can provide more energy to working muscle. (Probartet al., 1991)As Corbett, (2009) wrote, a person's level of cardiovascular endurance helps predict probability of disease, quality of life, and ability to react to acute physical and mental stress. For healthy individuals, higher cardiovascular endurance also indicates an elevated level of physical fitness. According to the international journal of physical education, sport and health, 2016, 42 days aerobic exercise are showed significant improvement at the planned training program shows significant effect in cardiovascular endurance for experimental group but in control group there is no significant improvement. Similar study Chao-Chien, & Yi-Chun, (2012) also showed on their findings of jumping rope training demonstrated significant effects on cardiovascular endurance. Toy, (2008) also after twelve weeks of aerobic dance training a significant in vo2 max cardio respiratory fitness among middle aged women. In the case of control group no significant changes were seen in any of the selected studies. Similarly according to Arega, 2017 the result showed that significant improvement in cardiovascular endurance for eight week aerobic exercise.

2.7.2 Effects of Aerobic Exercise on Body Composition

Aerobic exercise including walking, running, and swimming has been proven to be an effective way to lose weight; Body Composition Changes for over fat or borderline over

fat people, regular aerobic exercise reduces body mass and body fat. Increases in fat free body mass also accompany a regular program of resistance training. Katchet al.(2011). Exercise can improve body composition in several ways. Regular aerobic exercises reduce the body fat percentage without the loss of the muscle as well as important effect on anthropometric and hematologic level of obese and overweight women (Evrimet al., 2010).According to the finding of Mahendran, (2009) his results on body mass index pre and posttestwere compared using Analysis of Covariance; was significantly improved among experimental group. Toy, (2008) also after twelve weeks of aerobic dance training, a significant reduction was noted in body weight and BMI. Moreover, Arslan, (2011) describes as one of the major benefits of aerobic exercise that reducing risk of obesity by ensuring healthy body composition. Body mass index and body weight of individuals was highly reduced by 12 weeks aerobic exercises.

2.7.3 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). Many of the studies referenced in this study supported that there was a positive correlation between aerobic exercise and muscular endurance (Shahana et al., 2010; Chia-Lin Li, et al, 2005; Licl et.al, 2006). According toHoeger WK et al., (2013) found a significant improvement in the abdominal and upper body muscular endurance. Habtamu, (2014) also showed an improvement on different intensity of aerobic exercise on muscular endurance.According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of muscular endurance and has significant improvement of health related physical fitness.

2.7.4 Effect of Aerobic Exercise on Flexibility

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) According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of flexibility and has significant improvement of health related physical fitness. 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.

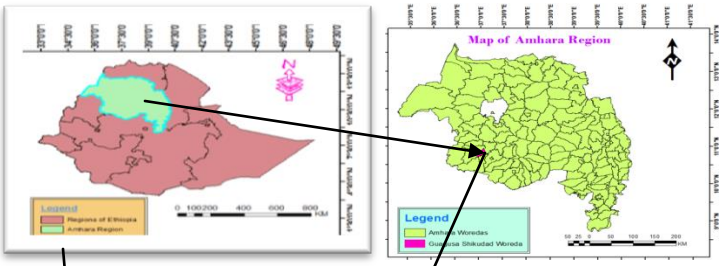
According to Nagaraj et al, (2011) studied effect of stretching exercises and aerobic exercises on flexibility of school boys. The results of pre-test and post-test using sit and reach box were compared with using Analysis of Covariance. The result shows that combined exercises (stretching and aerobics exercises) were significantly better than stretching exercises, aerobics exercises in flexibility. Thus flexibility can be more developed by aerobic and stretching exercising.

CHAPTER THREE

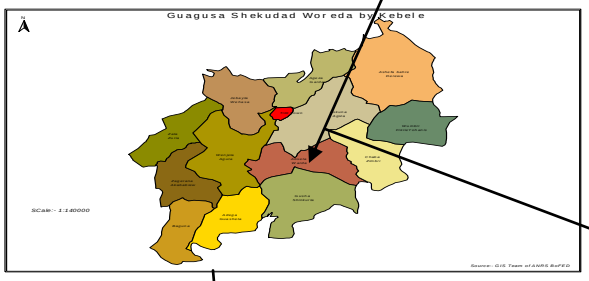
RESEARCH METHODOLOGY

3.1 Study Area

The study wasconducts at Addisalem general secondary school in guagussa shikudad woreda of Awl zone Amhara National Regional State which lies 152km far from BahirDar (the capital city of Amhara national regional state). The school which the study was under taken located in Absila warda samueal kebele and established in 2006E.C and serving 9-10 grade students with two shifts(morning and afternoon) with 592 students has been attending this year.



Map of Ethiopia



addisalemkebele

Map of GuagussaShikudadWoreda

Figure 1: Map of the Study Area Sources (Guagusa Shikudad Woreda Economic and Development Office 2018).

3.2 Study Design

To conduct the study experimental research design was used. This method had selected because it is helpful to identify the students health related physical fitness variables level with pre-test and post-test of cardiovascular endurance, muscular endurance, flexibility, and body composition with the average score result. The training scheduled for twelve weeks, and the intensity for exercise are aerobic exercise for three days per week (Monday, Wednesday and Friday) before their regular class for experimental group. There was no exercise treatment for control group but both the pre and posttestwere taken from them.

Table 1: Study Design Layout

Treatment	Aerobic exercise program
Frequency	3 day per week
Total duration	3 month/ twelve week
Duration of time	40-60 minutes
Intensity	Moderate (55-69HR.max)
Exercise day	Monday, Wednesday, Friday
Time of training	Morning, afternoon, morning

3.3 Population Sample and Sampling Technique

The selection of population or target group depends on their grade level, health status, and on their interest of participant in aerobic exercise training. From Addisalem general secondary school two gradelevels (9-10) grade ten were selected by using simple random sampling. The total number of population of grade ten male students were 120 since the research is experimental to properly administer the test and manage the sample during aerobic training only 34 samples were selected by using simple random sampling technique sample random sampling technique were also used again toassign control group and experimental group from the total 34 sample 17 subjects experimental group and 17 subject is control group by using simple random sampling method.

3.4 Inclusive and Exclusive Criteria

The health status of the subjects was be assessed by their medical history. The subject who doesn't have health problems and free from visible physical or other impairments was be included, unless excluded. Individuals with cardiac conditions such as hypertension or uncontrolled diabetes or other conditions that would be contraindicated for exercise testing and training were not admitted to the study. Individuals having bone and joint problem, diabetes mellitus, bad habits and those taking medications were not included into the study.

3.5 Source of Data

The data for the study were collected from the results of test given from pre to post test of both Experimental and control group. The data were collected through the appropriate Physical fitness test measures such as, twelve- minute run/walk test for cardio respiratory fitness, body mass index for body composition 90^0 push up test for muscular endurance and sit and reach test for flexibility. Before the experimental groups were going to aerobic training, the pretest was taken from both control and experimental groups. Posttest was also taken from both groups after 12 week aerobic training programs for experimental groups completed.

3.6 Data Collection Instruments

In order to collect the data necessary for analysis, the researcher was used physical fitness testpretest and posttests. The use of appropriate tests helped to collect data from selected physical fitness variables. For the success of the study necessary materials and facilities such as cones, corner flags, stop watch, whistle, record sheets, weight measuring, mats, meters ruler. The detail of each data collecting tests and procedures are discussed as follows.

3.7 Selection of Variables

Components of physical fitness are the major dependent variables. Obviously, Physical fitness is divided into five health related physical fitness components and six skill related physical fitness components. From those components the study was focus health related

physical fitness components; flexibility, muscular endurance, cardio respiratory fitness and body composition are selected variables.

3.8 Procedure of Test Administration

3.8.1 Tests of Cardio Vascular Endurance

Cooper's 12 Minute Run Test

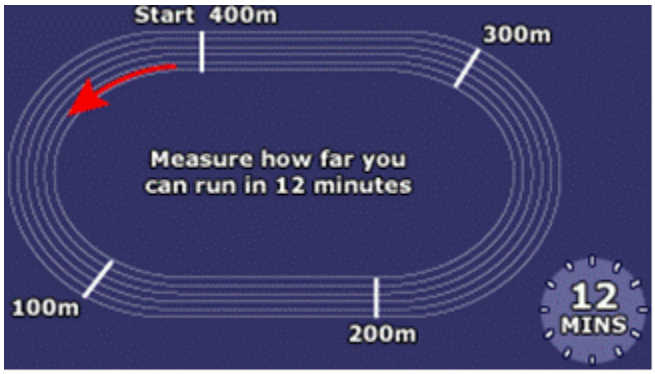


Figure 2: Twelve minute run test track

Cooper's 12 minute run test (Cooper, 1968) is a popular field test used for measuring aerobic fitness. This fitness test will initially use to estimate the VO2 max. Dr. Cooper found that there is a very high correlation between the distance someone can run (or walk) in 12 minutes and their VO2 max value, which measure the efficiency with which someone can use oxygen while exercising. Students were familiar with the 12 minute run/walk test protocol prior to the pre-testing date. This is measuring the distance covered in twelve minutes, involves running for twelve minutes around the 400 meter track marked out area and register how far covered in that time with the nearest 50 meters.

The purpose of the distance runs is to measure maximal functional capacity and endurance of the cardio respiratory system. Subjectswere instructed to run as far as possible in twelve minutes.

- ✓ The students were conducted a warm up for five minutes.
- ✓ The students began on the signal, "Ready, start."

- ✓ Participants were continued to run until a whistle was blown at twelve minutes. Walking was permitted, but the objective was to cover as much distance as possible during the twelve minutes.
- ✓ After completing the test the distance covered was registered near to 50m. Required equipment includes stopwatch or wrist watch, 400m track marked every 50m, assistance and data recording forms.

3.8.2Tests of Muscular Endurance

One Minute 90^0 Push up Test

Purpose: This test measures muscular endurance of the upper body muscles (anterior deltoid, pectoral is major, triceps). Muscular endurance is defined as the ability to contract the muscle repeatedly over a specific period of time without undue fatigue.

Test procedure:

- ✓ Your hands should be placed slightly wider than shoulder width apart, with fingers pointing forward. Your feet should be together. Do not cross them.
- ✓ Starting from the up position (front leaning rest), lower your body until your upper arms+ are parallel to the ground in the down position. You will then return to the up position. In the up position your elbows must be extended, in order to count. This is one repetition.
- ✓ Resting should be done in the up (front leaning rest position). Both hands must remain in contact with the floor at all times.
- ✓ The total number of correct pushups in one minute is recorded as the score

Figure 3: 90^0 push up test pictureSource (https:www.verywellfit.com/push up test).

3.8.3 Tests of flexibility

Sit-and-Reach Test

The sit-and-reach test measures your flexibility, specifically your hamstring flexibility. You will need a ruler and a step for this test. JODY BRAVERMAN April 17, 2018

Test procedures**:** thesit and reach test had conducted as follows:

- ✓ Warm up for this test by going for a quick jog and doing some light stretching.
- ✓ When you return, take off your shoes and sit down on the floor facing the bottom step of a stairway with your legs extended out in front of you, feet flexed and legs slightly apart.
- ✓ Keep your legs straight throughout the exercise.
- ✓ Place your ruler on the top of the step, extending out over your feet.
- ✓ As you inhale and lengthen your spine toward the ceiling, reach your arms out in front of you, with one hand on top of the other.
- ✓ Exhale completely as you reach your fingers forward as far as you can.
- ✓ When you have reached as far as you can, touch your fingertips to the ruler and make note of the distance between your toes and your fingers.
- ✓ Good flexibility for men ranges from 2.5 to 6 inches past the toes, and for women, 11 to 20 inches past the toes.(JODY BRAVERMAN April 17, 2018)

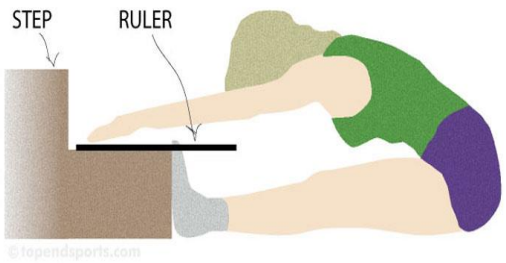


Figure 4: pictures of sit and reach test

Source (https://www.topendsports.com/testing/tests/sit-and-reach.htm,)

3.8.4 Test of Body Composition

Body Mass Index (BMI)

The objective of this test is to monitor the student's weight. Body mass index is a measure of body weight that is useful for classifying the health risk of body weight. It is also based on the concept that weight should be proportional to height. BMI is a fairly accurate measure of the health risks of body weight for average (non athletic) people, and it is easily to calculate and rate. However athletes who weight train have more muscle mass than average people and may be classified as overweight by the body mass index scale; because their "excess" weight is in the form of muscle, however it is healthy.

Advantages of BMI:It is easy to use and measured by most doctors. And also doesn't require especial equipment and coasty for measure BMI.

Disadvantage of BMI:It is not a measure of body fatness; very muscular individuals often fall into overweight category, body mass index may place individual who have lost muscle into health weight category.

Measuring BMI for very short people or pregnant women is not appropriate. It is believed that excessively abdominal fat is more health threatening than hip or thigh fat.

Determination of desirable body weight: Once you have calculated the percentage of your total body weight that is made up of fat tissue, lose to achieve a normal percentage of body fat. A relatively easy way to determine the extent of overweight or obesity is to use

a person's body weight and height. The formula to calculating body mass index BMI is weight in kilograms divided by height in meter square. Obesity and overweight are commonly defined in terms of the body mass index (BMI). **BMI is calculated using a person's height and weight. I.e. examines weight in proportion to height in an index. **BMI = weight /height squared (kg/m ^{2}).

Required equipment's: To undertake this test you will require, Weight scale, Tape meter, Partner to take measurements.

Test procedure:

1. Measure the student's body weight in kilograms.
2. Measure the student's height in meter.
3. To determine BMI divide the weight value by the height squared:
   BMI = weight/ (height x height)

For example, if an individual weighs 64.5 kg and is 1.72 m tall, the BMI would be computed as follows: 64.5 kg/(1.72 m)2 = 64.5/2.96 = 21.8

NOTE:-The concept behind the BMI is that individuals with low percent body fat will have a low BMI. For example, men and women with a BMI of less than 25 are classified as being non-obese. In contrast, men and women with a BMI of greater than 25 are considered to be extremely obese.

Figure 5: pictures of weight and height measurements

Source (https://www.dreamstime.com)

3.9 Method of Data Analysis

The Data was analyzed by using computerized statistical package software (SPSS) version 23 statistical software. After collectingthe data oncardiovascular endurance, muscular endurance, flexibility, and body composition from the study subjects and it is analyzed with paired t-test. Moreover, the level of significance shall be set at 0.05%.

3.10 Ethical Considerations

This study wasbeing conducted in line with ethical issues. The privacy of the participants will be protected. The entire participant washaving clear information about the purpose of the study and the procedure to be explained to the subjects. The participant was not at risk of any harm, and has an opportunity to leave the study at any time when they feel they need to do so.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter deals about the analysis of data that are collected pre and posttest from randomly selected experimental (n=17) and control (n=17) groups under the study. The purpose of this study was to investigate the effect of 12 week aerobic exercise on selected health related physical fitness variables of grade ten male students at addisalem general secondary school. Aerobic training was given for 12 consecutive weeks and attendance was taken for experimental throughout the training. The physical fitness components selected for this study were cardio respiratory fitness, muscular endurance, flexibility, and body composition. Pre-test and post-tests were taken from both experimental and control groups before and after 12 weeks of aerobic exercise intervention, and the scores were recorded. The collected data were analyzed using paired t-test to analyze pre-test and post-test results of experimental and control groups.

4.2 Characteristics of Study Participants

Table 2: Demographic characteristics of the participants (age, height and weight)

	N	Age(in year)		Height (in meter)		Weight (in kg)	
		Mean	Std.deviation	Mean	Std.deviation	Mean	Std.deviation
Experimental group	17	18.53	1.007	1.68	0.079	53.14	6.845
Control group	17	18.24	0.970	1.67	0.065	53.34	5.241

The above table reveals that the general characteristics of the study participants regarding to age, height and weight. The mean of the experimental group's age, height and weight were 18.53 years, 1.68m and 53.14kg, and their standard deviation were 1.007, 0.079 and 6.845 respectively, this shows that they were homogenous group in terms of age, height, and weight. The table also shows that the mean of the control groups age, height and weight were 18.24 years, 1.67m and 53.34kg, and the standard deviation were 0.970, 0.65 and 5.241 respectively. This showed that the selected samples of the two groups (EG and CG) were homogenous.

4.3 Results of the Study

Table 3: Paired sample statistics of twelve minute run test (distance in meter) pre and post test results of both EG and CG:

Subjects								
Test	Experimental group				Control group			
12-minutes run	Mean		Std .deviation		Mean		Std .deviation	
	PT	POT	PT	POT	PT	POT	PT	POT
	2791.18	2929.41	218.11	256.82	2714.706	2700	293.15	288.19

PT- Pre-Test POT- post-Test

The above table shows that the mean and standard deviation of the experimental and control groups of the 12-minute run test. The mean values of the 12-minutes run Pre-test and Post-test results of the experimental groups were 2791.18m and 2929.41m, and the standard deviation was 218.11m and 256.82m respectively. Whereas the mean values of the control group 12-minutes run test were 2714.706m and 2700m, while their standard deviation were 293.15 m and 288.19 m respectively, this reveals that improvement were observed in the EG cardiovascular endurance after the 12 weeks aerobic exercise training, but improvements were not seen on the control group side.

Table 4: Paired sample statistics of Body Mass Index (kg/m^2) pre and post test results of both EG and CG:

Subjects								
Test	Experimental group				Control group			
BMI	Mean		Std .deviation		Mean		Std .deviation	
	PT	POT	PT	POT	PT	POT	PT	POT
	18.95	18.25	1.508	1.441	19.09	19.04	1.542	1.748

PT-Pre-Test, POT-Post-Test, BMI-Body Mass Index

The above table indicates that the mean and standard deviation of the body mass index of both the EG and CG. The mean values of the EG BMI pre and post-test result were 18.95 kg/m^2 and 18.25 kg/m^2, while their standard deviation were 1.508 kg/m^2 and 1.441 kg/m^2 respectively. On the other hand, the mean values of the CG of the BMI pre and post-test were 19.09 kg/m^2 and 19.04 kg/m^2, while their standard deviations were 1.542 kg/m^2 and 1.748 kg/m^2 respectively. This shows that the EG BMI was significantly reduced the body mass index from pre to post test, but in case of the CG no changes were observed from pre to post test results of BMI values.

Table 5: Paired sample statistics of Flexibility (in centimeter) pre and post test results of both EG and CG:

Subjects								
Test	Experimental group				Control group			
Sit and reach	Mean		Std .deviation		Mean		Std .deviation	
	PT	POT	PT	POT	PT	POT	PT	POT
	14.24	17.12	5.056	5.278	13.41	13.235	5.275	5.368

PT- Pre-Test, POT-Post Test

The above table indicates that the mean and standard deviation of the sit and reach pre and post-test results of both experimental and control groups. The mean values of the experimental group's pre and post- test result sit and reach test were 14.24cm and 17.12cm, and their standard deviations were 5.056cm and 5.278cm respectively. On the other hand the mean values of the pre and post-test results CG sit and reach test were 13.41cm and 13.235cm, while their standard deviations were 5.275cm and 5.368cm respectively. This indicates that there were an increment in the mean values of experimental groups' sit and reach test results from pre to post-test (14.24 to 17.12 cm). On the other hand, the mean values of the control group were reducing from pre to post-test result (13.41 to 13.235 cm).

Table 6: Paired sample statistics of Muscular endurance (push up in one munities') pre and post -test results of both EG and CG:

Subjects								
Test	Experimental group				Control group			
Ninety degree push-up	Mean		Std .deviation		Mean		Std .deviation	
	PT	POT	PT	POT	PT	POT	PT	POT
	23.94	32.53	6.562	7.763	21.76	22.82	6.870	6.589

PT- Pre Test, POT- Post Test

The above table reveals that, the mean and standard deviation of the EG and CG of muscular endurance. The mean values of the EG muscular endurance ninety degree pushup pre and post-test result were 23.94 and 32.53, while the standard deviation was 6.562 and 7.763 respectively. On the other hand the mean values of the CG of muscular endurance pre and post-test result were 21.76 and 22.82, while their standard deviation was 6.870 and 6.589 respectively. This shows that improvement were seen in the EG of 90^0 pushup test from pre to post test. But, the CG 90^0 pushup test shows that no significant improvement from pre to post test results.

Table 7: Paired sample t-test result of health related physical fitness variables, and the pre and post- test results of both EG & CG.

Variables	Subjects		Paired difference				T	D.f	Sig.(2-tailed)
					95% confidence interval				
			Mean	Std .d	Lower	Upper			
CVE	EG	POT-PT	138.235	113.921	79.663	196.808	5.003	16	**0.006**
	CG	POT-PT	-14.706	101.188	-66.732	37.320	-0.599	16	**0.557**
BMI	EG	POT-PT	-0.702	0.650	-1.036	-0.368	-4.451	16	**0.004**
	CG	POT-PT	-0.049	0.490	-0.301	0.202	-0.416	16	**0.683**
FX	EG	POT-PT	2.882	2.088	1.809	3.956	5.691	16	**0.032**
	CG	POT-PT	-0.176	2.007	-1.209	0.856	-0.362	16	**0.722**
ME	EG	POT-PT	8.588	3.906	6.580	10.597	9.065	16	**0.041**
	CG	POT-PT	1.059	3.816	-0.903	3.021	1.144	16	**0.269**

CVE=Cardiovascular Endurance, BMI=Body Mass Index, ME= Muscular Endurance, MS=Muscular Strength, FX=Flexibility, PT=Pre-test, POT=Post-test, EG=Experimental Group, CG=Control Group, DF- Degree of Freedom& MD=mean difference

The above table shows that the comparison of both the experimental and control group's pre and post-test results of the health related physical fitness variables and it also indicate whether this change/ difference was statistically significant or not.

According to the result presented in the table above, A paired sample t-test result to be conducted of the experimental group(EG) of 12-minutes run test result shows a statistically significant improvement from pre to post test result (MD =138.235, SD = 113.921, t=5.003 p = 0.006) when exposed to 12 weeks aerobic exercise. But there were

no statistically significant improvement in the 12-minutes run test result of the CG (MD = -14.706, SD = 101.188, t=-0.599 p=0.557), hence p>0.05.This value indicates that, a statistically significant improvement were seen from pre to posttests results in 12-minutes run test of EG, but statistically significant improvement were not observed in the CG.

The above table 7 also displays the comparison of pre and post test results of Body Mass Index tests of the two groups (EG and CG). According to the data presented in the table, A paired sample t-test result to be conducted of the pre and post test result of Body Mass Index test of the EG showed a statistically significant change or significantly reduction (MD = -0.702, SD = 0.650, t=-4.451 p = 0.004). But, statistically significant difference was not observed in Body Mass Index of CG from pre to post test results (MD = 0.049, SD = 0.490, t=-0.416 p = 0.683), since p>0.05.This implies that a statistically significant change were seen from pre to post test results of the EG in BMI test result, but no significance change were observed in the CG BMI pre to post test results.

Table 7 above also reveals that the statistical significance difference values of pre and post-test sit and reach test results of the two groups (EG and CG). According to the result presented in the table EG shows statistically significant improvement in sit and reach test results (MD = 2.882, SD = 2.088, t=5.691 p = 0.032) when exposed to 12 weeks aerobic exercise, since P <0.05. But, no statistically significant difference were found between pre and post test results of the CG in sit and reach test (MD = -0.176, SD = 2.007, t=-0.362 p=0.722), hence p >0.05. This implies that aerobic exercise is a useful modality to improve Flexibility.

Table 7 above also displays that the significance differences values of the pre and posttest ninety degree push-up test results of the two groups (EG and CG). According to the data presented in the table, statistically significance improvement were observed in the EG in 90^0 push-up test result (MD =8.588, SD =3.906, t=9.065 p = 0.041) when exposed to 12 weeks aerobic exercise. But there were no statistically significant improvement in the CG (MD =1.059, SD =3.816, t=1.144 p=0.269), hence (p >0.05).

4.4 Discussions

The purpose of this study was to investigate the effect of twelve weeks aerobics exercise on same selected health related physical fitness variables of Addis Alem general secondary school grade ten male students. Participating in aerobics exercise regularly has

significant positive effects on the overall health and wellbeing of individuals which improves the student's health related physical fitness variables level (Hall and Kramer, 2009).

In this study aerobic exercise training shows improvements on student's health related physical fitness variables level. The following findings of this study suggest the effects of aerobic exercise on same selected health related fitness variable of the students.

In Case of Cardiovascular Endurance: When we compare the mean score values of EG 12-minutes run test result before aerobics exercise which was 2791.18 m with the mean score after 12 weeks aerobic exercise 2929.41 m, improvement were observed from pre to post test result (MD = 138.235m), While we compare the mean score values of CG 12-minutes run test before aerobic exercise (2714.71 m) with after aerobic exercises was given (2700 m) a slight reduction were seen (MD= -14.706m) from pre to post test result. The result suggests that the EG shows statistically significant improvement in 12-minutes run test (MD = 138.238, SD = 113.921, t=5.003 p = 0.006) from pre to post test result. To the contrary in the case of CG a slight reduction were found from pre to post test (MD = -14.706, SD = 101.188, t=-0.599 p=0.557), but this change were not statistically significant at 0.05 level of confidence. Therefore, since improvement were observed in the cardiovascular endurance fitness level of EG the alternative hypothesis that say twelve weeks aerobic exercise has significance effect on students Cardiovascular endurance fitness variables was accepted at 0.05 level of confidence. According to the international journal of physical education, sport and health, 2016, 42 days aerobic exercise are showed significant improvement at the planned training program shows significant effect in cardiovascular endurance for experimental group but in control group there is no significant improvement. Similar study Chao-Chien, & Yi-Chun, (2012) also showed on their findings of jumping rope training demonstrated significant effects on cardiovascular endurance. Toy, (2008) also after twelve weeks of aerobic dance training a significant in vo2 max cardio respiratory fitness among middle aged women. In the case of control group no significant changes were seen in any of the selected studies. Similarly according to Arega, 2017the result showed that significant improvement in

cardiovascular endurance for eight week aerobic exercise. According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of cardio vascular endurance and has significant improvement of health related physical fitness.

In Case of Body Mass Index: When we compare the mean score of the experimental group BMI values before aerobic exercise (18.95) with the mean score of BMI after 12 weeks aerobic exercise (19.25), moderate change were observed (MD = -0.702), whereas the mean score values of the CG shows almost relatively the same result from pre to post test (19.09 to 19.03) of BMI with MD= 0.049. The result suggests that EG shows a statistically significant change in BMI (MD = -0.702, SD= 0.650, t=-4.451 p= 0.004), hence $p < 0.05$. Even though, a slight difference in the CG BMI mean values were observed (MD = 0.049, SD =0.490, t=-0.416 p=0.683) the changes were not statistically significant. Therefore, the alternative hypothesis which say twelve weeks moderate intensity aerobic exercise have a significance effect on students Body composition fitness variables level were accepted at 0.05 level of confidence.According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement or significantly reduces the body mass index and body weight of sedentary female communities and has significant improvement of health related physical fitness. According to the finding of Mahendran, (2009) his results on body mass index pre and post-testwere compared using Analysis of Covariance; was significantly improved among experimental group. Katchet al., (2011) also describe aerobic exercise including walking, running, and swimming has been proven to be an effective way to lose weight.Toy, (2008) also after twelve weeks of aerobic dance training, a significant reduction was noted in body weight and BMI. Moreover, Arslan, (2011) describes as one of the major benefits of aerobic exercise that reducing risk of obesity by ensuring healthy body composition. Body mass index and body weight of individuals was highly reduced by 12 weeks aerobic exercises.

In Case of Flexibility: When we compare the mean score of sit and reach test results of the EG before aerobic exercise was (14.24 cm) with the mean score of after 12 weeksaerobic exercise (17.12 cm) improvement were seen (MD =2.882), whereas the CG

pre-test mean score value were 13.41 cm and the post- test mean values were also 13.41 cm, so no change were observed from pre to post test results (MD= -0.176cm). This result proved that statistically significant change were found in sit and reach test/flexibility from pre to post test scores of the EG (MD =2.882, SD = 2.088, t=5.691 p = 0.032), since $p < 0.05$. But in the case of CG no statistically significant difference were found on flexibility fitness levels of the students (MD = -0.176, SD = 2.007, t=-0.416 p=0.722), hence $p > 0.05$. Therefore, the proposed alternative hypothesis which was twelve weeks aerobics exercise have significance effect on student Flexibility fitness variables level was accept at 0.05 level of confidence.This result is supported by Nagaraj et al, (2011) their result shows that combined exercises of stretching and aerobics exercises were significantly in flexibility.According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of flexibility and has significant improvement of health related physical fitness. 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.

In Case of Muscular Endurance: When we compare the mean score of the ninety degree pushup test result of the EG before aerobic exercise was (23.94) with the mean score after 12 weeks aerobic exercise (32.94) moderate increments were observed (MD =8.588), whereas the mean score values of pre- test CG 90^0push up test was 21.76 and post-test 22.82 a slight increment were seen with the MD =1.059. The result suggests that EG shows a statistically significant improvement in ninety degree push-up (MD =8.588, SD=3.903, t=9.065 p= 0.041), which is significant at 0.05 level of confidence. But no significant difference were observed on the CG muscular endurance fitness level (MD = 1.059, SD =3.816, t=1.144 p=0.269), since $p > 0.05$. Therefore, the proposed alternative hypothesis that say twelve weeks moderate intensity aerobic exercise would have significant effect on students Muscular endurance fitness variable level was rejectedat 0.05 level of confidence, since $p < 0.05$. Many of the studies referenced in this study supported that there was a positive correlation between aerobic exercise and muscular endurance (Shahana et al., 2010; Chia-Lin Li, et al, 2005; Licl et.al, 2006). According to

Hoeger WK et al., (2013) found a significant improvement in the abdominal and upper body muscular endurance. Habtamu, (2014) also showed an improvement on different intensity of aerobic exercise on muscular endurance.According to International journal of scientific and research publication 2013, moderate aerobic exercise has positive effect on improvement of muscular endurance and has significant improvement of health related physical fitness.

CHAPTER FIVE

SUMMARY, CONCLUSSIONS AND RECOMMENDATIONS

5.1 Summary

The purpose of this study was to evaluate the effect of twelve week aerobic exercise on some selected health related physical fitness variables in case of Addisalem general secondary school grade ten male students. For this purpose, the researcher reviewed the available literatures in order to decide the focus of the study and methodologies. In order to attain the general objective of the study, the following specific objectives were to examine the effect of twelve week aerobic exercise on cardio vascular endurance, muscular endurance, flexibility, and body composition.

Based on the above specific objectives, the hypotheses were formulated. In dealing with these basic objectives, the study conducted on grade ten male students at Addisalem general secondary school. Among a population of 120 grade ten male students using simple random sampling system 17 students were underwent experimental of moderate intensity aerobic exercise training for three months and 3 days per week, and 17 students serve as control group were attended one practical academic physical education lesson per week with experimental groups. A pre-test and post- test of selected physical fitness tests, cardiovascular endurance (12 minute run test), muscular endurance(90^0 degree push up test), flexibility(sit and reach test), and body composition(body mass index) were taken to gain the necessary information required.

Through pairedt-test, the data was analyzed. Hence, the following findings were investigated.

- The finding of this study revealed that there was improvement in cardio respiratory fitness. Experimental groups had shown improvement as a consequence of the aerobic exercise training, Cardio respiratory fitness were

better improvement in mean difference between groups and higher mean gains with in groups than control groups.

- The finding of this study show that there was improvement in muscular endurance there is a mean difference between groups and therefore, there were improvements aerobic exercise training in case of muscular endurance.
- The findings of this study indicate that there was improvement in flexibility. Experimental groups had shown improvement as a consequence of aerobic exercise training. Flexibility is better improvement in mean difference between groups and higher mean gains than control groups.
- The finding of this study show that there was significant reduction of body composition changes in weight and body mass index (BMI). Experimental group show significant reduction with the consequence of aerobic exercise training in a reduction of weight and body mass index was the same for pre-test and post -test results of in control groups.

5.2 Conclusions

As a result, the purpose of this study was to evaluate the associations between selected aerobic exercises with selected health related physical fitness variables in grade ten male students at Addisalem general secondary school grade ten male students. Data was drawn from a pre- test and post-test after 12 week aerobic exercise training within selected physical fitness tests; that were 12 minute run test to assess cardio respiratory fitness, 90^0 push up to assess muscular endurance, sit and reach test to assess flexibility and Body Mass Index to assess Body Composition those administered to selected sample male subjects (EG=17, CG=17). Based on the major finding of this study, the following points were stated as a conclusion.

- Twelve weeks aerobic exercise has positive effect on improvement of cardio respiratory fitness.
- aerobic exercise significantly reduced the body mass index of the students
- Aerobic exercise has positive effect on muscular endurance.
- Aerobic exercises significantly improvement of flexibility.

- Aerobic exercise has significant effects on improvement of health related physical fitness components.

5.3 Recommendations

The finding of this research proved that twelve weeks of aerobic exercise training significantly improved selected health related physicalfitnessvariables of the participants. Based on results, discussions and findings of the study, the following suggestions are forwarded:

- The result of this study shows aerobic exercise significantly improve to health related physical fitness. So Students interested who want to improve their physical fitness can engage in at least 3 days per week aerobic exercise training. Thus, physical education class per week should be increased and contents should emphasis on aerobic exercises.

- Aerobic exercise had a positive effect on cardio respiratory fitness. So for the better improvement students should participate in aerobic exercise.
- Physical education teachers as a means to improve the physical fitness status of all students' should encourage aerobic exercises among various classes and grade levels.
- The result of this study shows that aerobic exercise improves health related physical fitness components. Therefore the school principal, families, and Woreda education office would work cooperatively to fulfill the required equipment'sfor fitness exercise at school, and it is better if the Ministry of Education would rearrange the time allotment for physical education class.
- For the finding of this study only field tests were used, therefore it is better if the future researcher uses laboratory test.
- This study was conducted to examine the effect of aerobic exercise on male student's health related physical fitness improvement such as cardio respiratory fitness, muscular endurance, flexibility, and body composition only. So it is recommended for other researchers to evaluate the effect of these training methods on other fitness elements like muscular strength, coordination, balance,

speed, agility etc.

- ❖ Studies should be conducted in the same area on different samples of age and sex.

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APPENDIXS

Appendix: A Profile of the participants.

a. Age, sex, weight, and heights of the experimental group

Code	Grade/sec	Sex	Age	Height	Weight
1	10A	M	19	1.83	67.8
2	10A	M	18	1.61	43.8
3	10A	M	19	1.69	57.6
4	10A	M	20	1.72	57.7
5	10B	M	20	1.75	60.5
6	10B	M	19	1.75	57
7	10B	M	18	1.62	51.8
8	10B	M	19	1.66	47.2
9	10B	M	18	1.55	40
10	10C	M	18	1.57	44.2
11	10C	M	18	1.70	56.5
12	10C	M	17	1.78	53
13	10C	M	17	1.72	50
14	10D	M	19	1.58	52
15	10D	M	19	1.64	53
16	10D	M	20	1.70	58.2
17	10D	M	17	1.74	53.1

b. **Age, sex, weight, and heights of the control group**

Code	Grade/sec	Sex	Age	Height	Weight
A	10B	M	19	1.60	57.4
B	10B	M	20	1.75	61.9
C	10B	M	20	1.70	56.1
D	10B	M	18	1.68	57
E	10C	M	19	1.73	62.2
F	10C	M	18	1.71	54.5
G	10C	M	19	1.73	54.5
H	10C	M	18	1.69	56.2
I	10A	M	18	1.68	51.9
J	10A	M	17	1.70	53.3
K	10A	M	17	1.65	49.3
L	10A	M	17	1.74	53.4
M	10D	M	18	1.69	53.8
N	10D	M	17	1.61	47.5
O	10D	M	19	1.64	42.6
P	10D	M	18	1.55	49
Q	10D	M	18	1.53	46.1

Appendix B: Characteristics of study participants

Demographic characteristics of the participants (age, height and weight)

	N	Age(in year)		Height (in meter)		Weight (in kg)	
		Mean	Std.deviation	Mean	Std.deviation	Mean	Std.deviation
Experimental group	17	18.53	1.007	1.68	0.079	53.14	6.845
Control group	17	18.24	0.970	1.67	0.065	53.34	5.241

Appendix C: selection of physical fitness variables

Variables	Test
Cardio vascular endurance	Twelve minute run test
Muscular endurance	90^0Push up test
Flexibility	Sit and reach test
Body composition	BMI(body mass index)

Appendix D: Selected physical fitness variables parameters pre, post test and difference result of both experimental and control group

CVE 12 m run pre, post test and deference results in meter							
Code	Experimental group			Code		Control group	
	Pre	post	change		Pre	Post	Change
1	3000	3150	150	A	3100	3200	100
2	2750	2800	50	B	3250	3150	-100
3	2800	2750	-50	C	2450	2400	-50
4	2800	2950	150	D	2950	2800	-50
5	2750	3050	300	E	2950	2750	-200
6	3200	3400	200	F	3000	3050	50
7	2850	3100	250	G	2850	2900	50
8	2750	2950	150	H	2400	2300	-100
9	2650	2700	50	I	2800	2650	-150
10	2750	3000	250	J	2700	2700	0
11	2700	2800	100	K	2600	2650	50
12	2400	2550	150	L	2250	2200	-50
13	2900	3150	250	M	2300	2400	100
14	3150	3100	-50	N	2550	2500	-50
15	2550	2500	-50	O	2450	2500	-50
16	3000	3250	250	P	2750	2800	50
17	2450	2600	150	Q	2800	2950	150

Body mass index (BMI) pre, post test and deference results in kg/m^2							
code	Experimental group			Code	Control group		
	Pre	Post	Change		Pre	Post	Change
1	20.24	19.4	-0.84	A	22.42	23.16	0.74
2	17.1	16.6	-0.5	B	20.22	20.26	0.04
3	20.6	20.35	-0.25	C	19.4	19.45	0.05
4	19.76	18.6	-1.16	D	20.21	19.86	-0.35
5	20.3	19.08	-1.22	E	20.93	20.4	-0.53
6	18.69	18.2	-0.49	F	18.66	18.9	0.24
7	19.77	20.6	0.83	G	18.22	18.59	0.37
8	17.4	17.09	-0.31	H	19.65	19.18	-0.47
9	17.09	16.75	-0.34	I	18.04	17.5	-0.54
10	17.97	17.1	-0.87	J	18.44	19.03	0.59
11	20.03	17.93	-2.1	K	18.12	18.1	-0.02
12	16.77	16.93	0.16	L	17.49	17.6	0.11
13	17.3	16.55	-0.75	M	18.6	18.68	0.08
14	21.39	20.16	-0.79	N	18.34	18.9	0.56
15	19.7	18.95	-0.75	O	15.66	14.53	-1.13
16	20.35	19.5	-0.85	P	20.4	20.32	-0.08
17	17.76	16.5	-1.26	Q	19.7	19.2	-0.5

Muscular endurance (90^0 push up pre, post test and deference results							
code	Experimental group			Code	Control group		
	Pre	post	change		Pre	Post	Change
1	36	45	9	A	35	38	3
2	22	28	6	B	27	29	2
3	17	20	3	C	20	18	-2
4	25	35	10	D	21	27	6
5	21	30	9	E	15	14	-1
6	32	41	9	F	24	22	-2
7	33	38	5	G	25	27	2
8	21	29	8	H	17	20	3
9	13	20	7	I	15	18	3
10	22	21	-1	J	17	26	-1
11	28	36	8	K	10	16	6
12	15	27	13	L	13	12	-1
13	19	32	13	M	19	21	3
14	28	37	9	N	26	23	-3
15	24	39	14	O	26	20	-6
16	31	43	12	P	31	30	-1
17	20	32	12	Q	29	27	-2

Flexibility (sit and reach pre, post test and deference results in cm							
code	Experimental group			Code	Control group		
	Pre	post	change		Pre	Post	Change
1	19	22	3	A	15	14	-1
2	7	8	1	B	14	16	2
3	6	9	3	C	7	8	1
4	20	21	-1	D	15	15	0
5	17	22	5	E	16	13	-3
6	17	17	0	F	12	14	2
7	9	13	4	G	23	21	2
8	14	16	2	H	17	20	3
9	14	13	-1	I	13	14	1
10	13	19	6	J	5	4	-1
11	18	21	3	K	9	9	0
12	12	18	6	L	13	10	-3
13	14	20	6	M	6	4	-2
14	24	26	2	N	15	17	2
15	6	8	2	O	15	12	-3
16	16	20	4	P	24	23	-1
17	16	18	2	Q	9	11	2

Appendix E: Twelve Week Aerobic Exercise Training Program for Experimental Groups

Day	Time	Week 1	Week 2	Week 3
Monday, Wednesday, and Friday	10’ 30 10’	**Warm up exercise** -jogging & Synchronized movement of hands and leg, arm, stretching exercise **Main part** walking2x100m jogging,2x100m running rope jumping 2x20repititions, - running on truck 2x400m **Cooling down** -Lower body stretching exercise and with breathing meditation	**Warm up exercise** -jogging & Synchronized movement of hands and leg, arm, stretching exercise **Main part** -walking 2x100m, jogging 2x100metres,rope jumping 3x20jumping rope-running on truck 3x400metres **Cooling down** -Lower body stretching exercise and with breathing meditation	**Warm up exercise** - jogging and Synchronized movement of hands & leg, arm, stretching exercise **Main part** -walking 2x100m, jogging 2x100,rope jumping 3x20repetitions-running on truck 4x400metres **Cooling down** -Lower body stretching exercise and with breathing meditation
Day	Time (min)	Week 4	Week 5	Week 6

Monday, Wednesday, and Friday	10 35 10	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 2x100mtrs,rope jumping 3x20rep - running on truck 4x400 meters. **Cooling down** -Lower and upper body stretching exercise	**Warm up exercise** -Jogging and Synchronized movement of hands and leg, arm, stretching exercise **Main part** -walking 2x100metres, jogging 2x100mtrs, rope jumping 3x20rep - running on trucks 5x400 meters. **Cooling down** -Lower and upper body stretching exercise	**Warm up exercise** Jogging and Synchronized movement of hands and leg, arm, stretching exercise **Main part** -walking 2x100m, jogging 2x100,rope jumping 3x20 rep - running on truck 5x400 meters. **Cooling down** -Lower and upper body stretching exercise
Day	Time (min)	Week 7	Week 8	Week 9

Monday, Wednesday, and Friday	10 40 10	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 3x100mtrs,rope jumping 4x20rep - running on truck 5x400 meters **Cooling down** -Lower and upper body stretching exercise	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 3x100mtrs,rope jumping 4x20rep - running on truck 6x400 meters **Cooling down** -Lower and upper body stretching exercise	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 3x100mtrs,rope jumping 4x20rep - running on truck 6x400 meters **Cooling down** -Lower and upper body stretching exercise
Day	Time (min)	Week 10	Week 11	Week 12

Monday, Wednesday, and Friday	10 40 10	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 3x300,rope jumping 5x20rep - running on truck 6x400 meters **Cooling down** -Lower and upper body stretching exercise	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 3x100mtrs,rope jumping 5x20rep - running on truck 7x400meters **Cooling down** -Lower and upper body stretching exercise	**Warming up exercise** -Jogging and Synchronized movement of hands and leg,arm,stretching exercise **Main part** -walking 2x100meteres, jogging 3x100mtrs,rope jumping 5x20repsx100m, - running on truck 8x400 meters **Cooling down** -Lower and upper body stretching exercise

APPENDIX –F: Daily Practical Lesson Plan

Date	Time	Content	Set and repetition	Intensity	Recovery time
Monday	10	Walking, Jogging Exercise & Synchronized movement of hands and leg, arm, and dynamic stretching exercise			
	40	walking2x100m jogging,3x400m running rope jumping 3x20repititions, - running on truck 6x200m	2x100m 3x400m 3x20repititions 6x200m	Moderate intensity	30sec. b/n sets and 10sec b/n different exercise
	10	- Trainees perform Rehydrate, light body movement with breathing meditation, and, static stretching exercise at the end of the session			

Appendix G: Pictures during Physical Fitness Tests

Figure a: Picture on 12 Minute Run Test

Figure b: Sit and Reach Test Picture

FigureC: Picture on 90^0Push up Test