EFFECTS OF AEROBIC EXERCISES ON CARDIOVASCULAR ENDURANCE OF FEMALE STUDENT ATHLETES: THE CASE OF ANSHO SECONDARY AND PREPARATORY SCHOOL, IN DUNA WOREDA, HADIYA ZONE, SNNPR STATE

MSc THESIS

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Effects of Aerobic Exercises on Cardiovascular Endurance of Female Student Athletes: The Case of Ansho Secondary and Preparatory School in Duna Woreda, Hadiya Zone, SNNPR State

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APPROVAL SHEET OF THESIS

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We hereby certify that we have read and evaluated this thesis entitled "**Effects of Aerobic Exercises on Cardiovascular Endurance of Female Student Athletes: The Case of Ansho Secondary and Preparatory School in Duna Woreda, Hadiya Zone, SNNPR State, Ethiopia."** Prepared by Muhammed Erano Debiso under our guidance and we recommend that it be submitted as fulfilling the thesis requirement.

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As members of the Board of examiners of the Final MSc Thesis Open Defense Examination, we certify that we have read and evaluated the thesis prepared by Muhammed Erano Debiso and examined the candidate. We recommend that this thesis be accepted as fulfilling the Thesis requirements for the degree of Master of Science in Sport Medicine.

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DEDICATION

I dedicate this thesis to my sincere Father Mr. Erano Debiso and my sincere mother Mss. Adenech Kemiso who have scarified a lot to make me who I am today.

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. Any scholarly matter that is included in the thesis has been given recognition through citation.

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BIOGRAPHICAL SKETCH

The name of author is Muhammed Erano. He was born from his father Erano Debiso and his mother Adenech Kemiso on November 22, 1980 in Lemo, Hadiya Zone, Southern Nation Nationality and People Regional State, Ethiopia. He first started his primary education in Shokbira Primary School. He attended his secondary school in Wachemo Secondary and Preparatory School. After completing secondary school, he joined Bahir Dar University College of Sciences, Department of Sport Science in 2000 E.C and graduated with B.Ed. degree in Sport Science in 2002 E.C. Soon after graduation, the author was employed as teacher at education office in Laska Secondary and Preparatory School for two years in Basketo Special Woreda and Ansho Secondary and preparatory School for seven years in Hadiya, Zone, in Duna Woreda. After nine years' service, he joined Haramaya University, College of Sport Science Academy Department of Sport Science to pursue his MSc degree in Sport Medicine under the regular postgraduate program.

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ACRONYMS AND ABBREVIATIONS

ACSM	American College of Sport Medicine
APS	Ansho Secondary and Preparatory School
BMI	Body Mass Index
CVE	Cardio-Vascular Endurance
GIS	Geographical Information System
HER	Exercise Heart Rate
PT	Post Training Test
DT	During Training Test
PT	Pre Training Test
SNNPR	Southern Nations, Nationalities and Peoples Region
SPSS	Statistical Package for Social Science
WHO	World Health Organization
TMR	Twelve Minute Run

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Effects of Aerobic Exercises on Cardiovascular Endurance of Female Student Athletes: The Case of Ansho Secondary and Preparatory School in Duna Woreda, Hadiya Zone, SNNP regional State, Ethiopia

ABSTRACT

This study was aimed at investigating the effects of selected Aerobic exercises on improving cardiovascular endurance female student athletes at Ansho secondary and preparatory school. To achieve the raised objective, the researcher selected 48 female athletes purposively from Ansho Secondary and Preparatory school grade 9^{th}-12^{th} students. They were assigned in to experimental and control group purposively. The proper experimental data was collected for three consecutive months through careful follow up of the researcher. Control group female student athletes did not participate in any aerobic exercise. The data was recorded from aerobic exercise of female student athletes starting from morning twelve o'clock up to one and half o'clock for three days in a week. The data was properly analyzed using t-test, ANOVA, mean analysis and graphical statistical approaches. As the step test record has shown, on average their result has fallen under excellent level according to international norm (<129). Moreover, their mean resting heart rate and exercise heart rate has shown steady declination (148.25 to 122). Before starting the Step Test, their average distance covered was 2621.167m and soon after they started, their average their distance grown up to2868.97m. The t-test analysis has confirmed that there were significant mean cardiovascular endurance difference between control and experimental group female student athlete on both twelve minute run and step test. The average cardiovascular endurance also steadily increased from pretest to post-test. The ANOVA (Analysis of Variance Test) also confirmed insignificant variation of cardiovascular endurance between both groups of students before starting aerobic exercise. However, soon after they started their aerobic exercise the test has shown significant variation between the groups. Having deep statistical analysis, it was concluded that aerobic exercise had significant effect on cardio vascular endurance of the female student athletes in experimental group. Thus, school principals, Woreda sport and youth affairs department office and other stock holders should have to participate in motivating female students for aerobic exercise and they should also facilitate materials for schools and for the society as whole.

Key Words: Effect, experimental group, control group, cardiovascular endurance, aerobic exercise

1. INTRODUCTION

In this section, the investigator were discussed about the background of the study, statement of the problem, scope of the study, significance of the study, general and specific objectives of the study**.**

1.1. Background of the Study

Fundamental movements of man, which they have achieved from their pre human ancestor, are walking, running, rope jumping, climbing, throwing, pulling, and pushing. By permutation and combination of the basic fundamental movements man has been developing various secondary movement essential for the day to day living and for the use games and sports. Physical fitness is important for all human beings, irrespective of their age and sex. A given work may not be carried out if the required physical strength is not available. Fitness is the first and for most thing to enjoy the life fully with effective exercise (Reddy, 2012).

Fitness for living in the house or on the farm or at office or factory or in work places in any service implies freedom from disease, enough strength, endurance and other abilities to meet the demands of daily living. Doing physical activity every day contributes to optimum health and quality of life. Life Styles can be changed to improve health and fitness through daily exercises. Aerobic exercise stimulates heart, lungs and all working group of muscles produces valuable changes in body and mind. Many physiological changes are determined by daily aerobic exercise (Hosiso and Rekoninne, 2013). Many of the researchers sighted in the above, have studied that physical exercises are important for the all physical fitness. Nevertheless, limited researches were done in the area of how much aerobic exercises are effective for the improvement of cardiovascular endurance. Hence, this study is going to examine effective aerobic exercises for the improvement of cardiovascular endurance of female athlete students at Ansho secondary and preparatory School.

According to Shemelis (2010) studies, aerobic activities should be used to develop cardiovascular endurance. Basically, aerobic activities are those in which a sufficient amount of oxygen is to meet the body's demands. Aerobic exercise goes by a few other names, including cardio as vascular exercise, cardio, and cardio-respiratory exercise. The word

aerobic means "with oxygen". Regular aerobic exercise, such as walking, jogging, running, dancing, skiing, roller blading, cycling, swimming, aerobics classes (both land and water), rowing, stair climbing, and more, can strengthen your lungs and heart, improving your health and helping you maintain a healthy weight loss. Now a day, in effective aerobic exercise for the development of cardiovascular endurance seen as a gap for this study in our country in general and in this study area in particular and therefore, effective types of aerobic exercise was used as causes for the improvement of cardiovascular endurance performance for the female athlete students of ASPS.

1.2. Statement of the Problem

Aerobic exercises are considered to be more effective than anaerobic exercise in developing fitness, especially cardio-respiratory endurance. Aerobic exercises may also have more lasting effects on blood composition. Aerobic activities include jogging or slow running, swimming, cycling, rope skipping, aerobic dance and brisk walking. Regular physical activity, fitness, and exercise are critically important for health and wellbeing of all people, whether they participate in vigorous exercise or some type of moderate health enhancing physical activities. Even among frail and very old adults, mobility and functioning can be improved by way of physical activity (Butler *et al.,* 1998).

According to American College of Sport Medicine (2000), physical activity is define as bodily movement produced by the contraction of striated muscle that substantially increases energy expenditure. This definition are includes exercise, which is planned, structured and repetitive physical activity aimed at improving maintaining physical fitness, organized sports or games (football, basketball), transport (walking, cycling), occupational physical activity, manual labor and non-organized, recreational physical activities (Kilpeläinen *et al.,* 2011)

Furthermore, these days, physical exercise is a non-pharmacological treatment of modern and busy lifestyle around the world. Although, many studies believe that regular physical activity can have immediate health benefits by positively affecting body composition and muscular skeletal development for male and female. However, the reality in our country, particularly at Ansho Secondary and preparatory school shows that the value of physical exercise has been

only theoretically framework, but not practically. Therefore, this needs academicals improve or investigation of effective types of aerobic exercise for the development of cardiovascular endurance. Also, in this study area there are poor understand of walking, jogging and rope jumping aerobic exercise for the development of cardiovascular endurance. The merely apply the above aerobic exercises catch the attention of researcher to conduct current study for the development of cardiovascular endurance improvement of beginner female student athletes of Ansho secondary and Preparatory school. Therefore, the research focused on the following basic research hypothesis:

H_1- Aerobic exercise have a significant changes on the cardiovascular endurance of female student athletes at Ansho secondary and preparatory school.

H_0-aerobic exercise have no changes on the cardiovascular endurance of female student athletes at Ansho secondary and preparatory school.

H_1-Cardiovascular endurance have a significant effect on female student athletes at Ansho secondary and preparatory school.

H_0-Cardiovascular endurance have no effect on female student athletes at Ansho secondary and preparatory school.

1.3. Scope of the Study

This study was applied at Ansho town, Ansho secondary and preparatory School female student athletes in Hadiya Zone at SNNPR.This study was employed on aerobic exercise which can improve cardiovascular endurance of the female student athletes.

1.4. Significance of the Study

This study may help to investigate the effect of aerobic exercise in improve cardiovascular endurance of female student athletes at Ansho secondary and preparatory school in Ansho town of the Hadiya Zone. The outcome of the study may help to reduce the problems that female student athletes in relation to their abilities to cardiovascular endurance. Moreover, it may help to know the type of training for aerobic exercise to give for trainers in order to improve aerobic capacity in cardiovascular endurance abilities of the athletes.

1.5. Objectives of the Study

1.5.1. General Objective

The general objective of the study was to investigate the effects of Aerobic exercises in cardiovascular endurance of female student athletes at Ansho secondary and preparatory school.

1.5.2. Specific Objectives

This study was aimed:

- To examine the significant change of cardiovascular endurance of female student athletes at Ansho secondary and preparatory school.
- To identify effective of aerobic exercise for on cardiovascular endurance of female student athletes at Ansho secondary and preparatory school.
- To identify how aerobic exercises influences cardiovascular endurance of female student athletes at Ansho secondary and preparatory school.

1.5.3. Operational Definition

Cardiovascular Fitness: a health-related components of physical fitness that relates to ability of the circulatory and respiratory system to supply oxygen during sustained physical activity (USDHHS, 1996).

Exercise: planned, structured, and repetitive physical activity aimed at improving and maintaining physical fitness, organized sports or game, transport, occupational physical activity and non-organized, recreational physical activities (ACSM, 2000).

Aerobic exercise: Exercise which uses oxygen to keep large muscle groups moving continuously at an intensity that can be maintained for long time (Encarta Encyclopedia Deluxe 2003).

2. REVIEW RELATED LITERATURE

2.1. Aerobic Exercise for Cardiovascular Endurance

2.1.1. Aerobic Exercises and Its Benefits

Aerobic exercise goes by a few other names, including cardiovascular exercise, cardio, and cardio respiratory exercise. The word aerobic means "with oxygen". Regular aerobic exercise, such as walking, jogging, running, dancing, skiing, rollerblading, cycling, swimming, aerobics classes (both land and water), rowing, stair climbing, and more, can strengthen your lungs and heart, improving your health and helping you maintain a healthy weight.(Wilmore and Knuttgen, 2003).

According to ACSM (200) defines aerobic exercise as "any activity that uses large muscle groups, can be maintained continuously, and is rhythmic in nature." Aerobic defines as" using the same large muscle group, rhythmically for a period of fifteen to twenty minutes or longer while maintained 60-8o of maximum HR." Many types of exercise are aerobic, and definition are performed at moderate levels of intensity for extended periods of time. (Oxford dictionary of sport medicine, 2007).

What Is Benefits of Aerobic Exercise: are myriad. They include systematic changes such as reduces body fat and improves weight control, reduces resting blood pressure (systolic and diastolic)Increases HDL (good) cholesterol, decreases total cholesterol, improves glucose tolerance and reduces insulin resistance, decreases clinical symptoms of anxiety, tension and depression, increases maximal oxygen consumption improves (VO2max), heart and lung function, increases blood supply to the muscles and enhances your muscles' ability to use oxygen, lowers resting heart rate, increased threshold for muscle fatigue (lactic acid accumulation)Research has confirmed that aerobic exercise reduces and physical and wellness (Kathleen, 2006).

2.1.2. Studies on Aerobic exercise

According to (Rani and Rekoninne, 2013) conducted study on selected effects of aerobic exercise on selected physiological variables among college girls. For this study aerobic exercise uses large muscle groups rhythmically and continuously and elevates the heart rate and breathing for a sustained period. Common examples include walking, jogging/running, swimming, rowing, stair climbing, bicycling, cross country skiing, step and dance exercise classes, roller skating, and the more continuous forms of tennis, racquet ball and squash. To achieve this purpose, 60 girls were selected from the Ivanna Ammal College for women, Villupuram. The age group of the subjects ranged between16 to 19 years. The selected subjects were divided in to two groups. The groups first trained for aerobic exercise. The exercise group underwent the training for five days in a week for eight weeks and group second acted as control group to make adjustments for differences in the initial means and test the adjusted posttest means for significant differences. The researcher used analysis of covariance (ANCOVA) for interpreting the results. The results for the study revealed that aerobic exercise had a significant impact in the improvement of the physiological variables such as resting pulse rate, breath holding time, vital capacity and respiratory rate.

According to (Prankish. 2011) Conducted study on the impact of varied aerobic training programs on obese women working in IT as companies for the purpose of the study. For this study, the obese women were grouped in to three namely, control, floor aerobics and step aerobics groups. The collected data on the cardiorespiratory parameters prior to and after 12 a weeks of varied aerobic straining were statistically analyzed using analysis of covariance (ANCOVA) as recommended by Clarke (1972) and result on vital capacity showed significant improvement due to varied aerobic exercises, as where no significant improvement was found in the resting heart rate.

Ozcan and Ozturk (2011) in Mugale, Turkey conducted the study on the impact of twelve week aerobic exercise program on health related physical fitness components and blood lipids in obese girls. The aim of the study was to investigate the impacts of 12 week aerobic exercise program on health related fitness components and blood lipids in obese girls. In this study, a total of 40 girls were recruited as exercise group (n= 20) and control group (n = 19).

Participants joined sessions for 60 min per day, 3 days per week for 12 week. There were significant differences in weight, body mass index (BMI), flexibility, sit-ups, hand grip for both hands, skinfold measurements (thigh,triceps,biceps, abdomen, super iliac, sub scapula, chest, body fat percent, heart rate, high density lipoproteins (HDL), low density lipoproteins (LDL), total cholesterol, and triglyceen between pretest and post test scores in the exercise group ($p<0.05$). It was concluded that regular aerobic exercise may affect health related fitness components and blood lipids positively in girls. Furthermore, it may result in decreasing obesity in girls.

Mills and Mae (1994) conducted a study on the impact of low intensity aerobic exercise on muscle strength, flexibility and change of balance among sedentary elderly person. The purpose of this study was to determine the effects of a low intensity aerobic exercise program on muscle strength and flexibility of the lower extremities and balance among the sedentary elderly persons. This pre and posttest quasi-experimental study consisted of 47 sedentary elderly Subjects not engaged in regular exercise and living in metropolitan housing in southwestern Ohio. Convenience sampling was used with two apartment complexes randomly assigned to the experimental or comparison groups. To prevent diffusion of treatment, subjects were assigned to these groups depending on their place of residence. The 20 experimental subjects, with a mean age of 75.3, participated in eight weeks with low intensity of aerobic exercise while the comparison group (n=20), with a mean age of 74.8, maintained their usual level of activity for eight weeks. Experimental subjects also did the exercise on their own between classes. The exercise group had significantly greater flexibility of the ankles and knee than the comparison group. No significant differences were found between the groups for muscle strength. However balance and perception of balance were not significantly different between the groups, the experimental group improved their balance by 22.4% from pre-test.

Arslan (2011) conducted the study on the effects of an eight week step aerobic dance exercise program on body composition parameters in middle aged sedentary obese women in Aksaray Turkey. This study were comprised an eight week randomized controlled trial. For this study a total of 49 healthy sedentary obese women participated voluntarily. They were randomly divided into two groups those under taking a step aerobic dance exercise program (n=29) and a

control group (n=20). The subjects took part in a step-aerobic dance exercise program for one hour per day, three days a week for eight weeks. The subjects Body Mass Index (BMI), weight, waist body circumference, waist-hip ratio, four site skin fold thickness, fat percentage, basal metabolic rate and lean body mass were assessed before and after the completion of the step aerobic dance exercise program. After the eight weeks of the step aerobic dance exercise program, significant differences were found in the subjects‟ weight, BMI, body composition parameters, waist-hip ratio (WHR), waist circumference (WC), fat percentage, lean body mass (LBM) and basal metabolic rate (BMR) in the experimental group ($p<0.05$). There were no significant of differences in the control group after the experiment in terms of the same measures ($p>0.05$). The result of this study concluded that the step aerobic dance program proved to be a useful exercise modality for weight loss and in terms of body composition. There was a clear response to the eight week step aerobic dance program in terms of central obesity in sedentary obese Turkish women.

Some of the common types of aerobic exercise:

According to National Heart Foundation of Australia (2009).**Walking** is the basic form and type of aerobic exercise that keeps your overall physical and mental health active and increases your life span up to 30 years. Walking for 30 minutes a day can increase your life longevity up to 10 days. It is completely safe and low cost. All you need is a best pair of shoes and a long walking space is it a jogging park, a field. Walking keeps leg muscles toned and strong, enhances cardiovascular fitness, lowers and controls the blood pressure, reduces the risk of heart attacks, diabetes, osteoporosis and cancer.

Running: Same as walking, running is also an inexpensive and safe form or type of aerobic exercise that rarely affects your joints. Running improves your heart and bone health and is a good way to burn calories and extra fats to lose weight and stay in perfect shape. Running makes your heart work faster and burn calories effectively. It takes roughly an hour for a walker to burn the same number of kilojoules that a runner burns in 30 minutes.

Spot Jogging is another type of aerobic exercise that is a very easy, comfortable and inexpensive form of workout that needs a spacious room or a wise place. Spot jogging is

performed for consecutive 5-10 minutes with 60 seconds resting time. It improves heart rate to regulate fat and calories burning capacity.

Rowing is a low impact alternative to running or cycling that can improve heart fitness and strengthen the muscles of the upper body, back and abdomen. You can enjoy rowing outdoors by joining a rowing club or hiring a rowboat, or indoors using a rowing machine at the gym or at home.

Swimming: is an excellent aerobic exercise, but considerations should be made before starting a program. For the exercise beginner, low fit, or non-swimmer it might be a difficult activity to maintain the appropriate intensity for the recommended 30 to 60 minutes. Also, because the focus of swimming is on the smaller upper body musculature and swimming is a less efficient activity than cycling or walking, one can easily exceed their target heart rate.

Cycling: is another type of aerobic exercise with wide appeal and value. Cycling may be ideal for individuals who, due to arthritic or other orthopedic problems, are unable to walk for an extended period of time without pain or difficulty. A program that combines walking and cycling may provide cardiovascular benefits without inducing the limiting pain as quickly.

Aerobic Dance: One of the most enjoyable forms of aerobic exercises 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 enjoyable music that is not only improves your physical fitness but also improves your mental health by reducing depression and anxiety.

2.2. Physical fitness and components of health related physical fitness

2.2.1. Physical Fitness

Physical fitness refers to “a set of attributes that related to the ability to perform physical activity” (U.S. Department of Health and Human Services [USDHHS], 1996). Physical fitness is the ability of the body systems to work together efficiently to allow people to be healthy and effectively perform activities of daily living (Corbin and Lindsey 2007). Physical fitness can be classified into health-related and skill-related fitness. Health-related fitness consists of five components: cardio respiratory endurance, muscular endurance, muscle strength, flexibility,

and body composition and is determined by a combination of regular activity and genetically inherited ability. The amount of physical fitness ranges is form low to high (Caspersen et al., 1985). On the other hand, skill-related fitness is divided into six components: agility, balance, coordination, power, reaction time, and speed. In terms of prevention of diseases, the main emphasis of any fitness programs should be placed on the health-related fitness as skill-related fitness is crucial for success in sports and athletics, and it also contributes to wellness (Bement and Sluka, 2005).

2.2.2. Cardiovascular Endurance

The efficiency with which the body delivers oxygen and nutrients needed for muscular activity and transports waste products from the cells. Cardiovascular endurance, sometimes called cardiorespiratory fitness, aerobic fitness, or aerobic capacity, is one of the basic components of physical fitness. Cardio respiratory fitness is a condition in which the body's cardiovascular or 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. Cardiorespiratory fitness is needed for prolonged, rhythmic use of the body's large muscle groups. A high level of cardio respiratory fitness permits continuous physical activity without a decline in performance and allows for rapid recovery following fatiguing physical activity (Corbin *et al.,* 2003).

In sports, cardiovascular endurance refers to an athlete's ability to sustain prolonged exercise for minutes, hours, or even days. Endurance testing is a way to measure the efficiency of an athlete's circulatory system and respiratory system in supplying oxygen to the working muscles and support sustained physical activity. Endurance generally refers to aerobic endurance. Aerobic exercise requires oxygen to help supply the energy needed for exercise. The objective of endurance training, then, is to develop and improve the body systems that produce and deliver the energy needed to meet the demands of prolonged activity. Cardiovascular endurance is considered as the most important aspect of health related fitness due to its importance in decreasing risk of heart disease, and promotion of optimum performance. Other names given to cardiovascular endurance are cardio respiratory fitness, cardio respiratory endurance, cardiovascular fitness or aerobic fitness. The name cardio

respiratory fitness as given because it requires the delivery and utilization of oxygen, which is only possible if the circulatory and respiratory systems are capable to perform these functions (USDHHS, 1996).As claimed by Corbin *et al.* (2003), the term "aerobic fitness" has been in use, because aerobic capacity is considered to be the best indicator of cardiovascular fitness, and aerobic physical activities are the only means to achieve it. Also, West and Lombardo (1994), referred cardiovascular endurance as cardio respiratory endurance since it is an ability to exercise vigorously in extended periods of time without too much fatigue.

Cardiorespiratory endurance, according to Insel *et al.* (2001), depends on the ability of the lungs to deliver oxygen from the environment to the blood stream, the hearts capacity to pump blood, ability of the nervous system and blood vessels to regulate blood flow, the muscles capacity to generate power and capability of the body's chemical systems to use oxygen and process fuels for exercise. They have made it clear that improved cardio respiratory fitness helps the heart to function efficiently, resting heart rate slows down, blood volumes increase, improved blood supply to tissues, blood pressure at rest decreases, bio chemical function in muscle and liver are improved, increase in the ability of the body to use energy supplied by food and to do more exercise with less effort from the oxygen transport system.

According to Newport (2001), good cardiovascular endurance requires a fit heart muscle, fit vascular system, fit respiratory system, fit blood with adequate hemoglobin in the red blood Cells and fit muscle tissue capable of using oxygen. These reduce risk of heart disease, other hypo Kinetic conditions and early death. It is now known that appropriate physical activity can build cardiovascular fitness in all types of people and those with excess body fatness. Cardiovascular fitness enhances the ability to perform various tasks, improves the ability to function and is associated with a feeling of well-being. Cardiovascular fitness and endurance could be develop through performance of aerobic such as brisk walking, jogging, aerobic for dancing, cycling, and tennis, playing football, swimming and many others. Hence, for optimal level of development, activities should be done daily, at least, not less than three times a week.

In contrary to the above authors; Walt (2003) claimed, it should be noted that vigorous physical activities have the potentials to increase the risk of orthopedic injury if done too frequently. In view of this, most experts recommend, at least, one day a week off. The

recommended duration of physical activities capable of building cardiovascular fitness is 20 60 minutes of aerobic activity. Activity could be either intermittent or continuous if the amount of exercise is the same, and last at least10 minutes.

Nagaraj (2014) investigated the effect of selected physical exercise and yogic practices on physical fitness performance of college women students. To achieve these stud one hundred and five female subjects were selected by random group design and they were aged from seventeen to twenty five years. The samples were assigned into three groups, group I underwent physical exercise, group II was treated with yogic practice and group III acted control group. The selected physical fitness such as shoulder girdle strength, abdominal muscular strength and cardio respiratory endurance was considered as dependent variables. All the subjects' were tested prior and immediately end of the twelve weeks. The training was given for five days per week. The ANCOVA was applied to examine the significant difference. The scheffe's posttest was applied to find the paired mean difference between the groups. The result concludes that the two experimental groups such as physical group and yogic practices group had significant improvement in all the dependent variables such as shoulder girdle strength, abdominal muscular strength and respiratory endurance. The physical exercise group is found to be better independent variables such as shoulder girdle strength, explosive power, abdominal muscular strength, and cardio respiratory endurance than the yogic practice group.

2.3. Test for Cardiovascular Endurance

2.3.1. Twelve Minute Run / Walk Test

This test objective is to measure the cardiovascular endurance of the participants. For this test the participants will run for 12 minutes, and the total distance covered will be recorded. The participants can walk also, though the participants will encouraged to push's them as hard as they could. The average distance for men is 2200-2399 m for the age 20-29, 1900-2299 m for theage30-39, 1700-2099m for the age 40-49, 1600 1999m for the age 50. For the female 1800-2199 m for the age 20-29, 1700-1999 m for the age 30-39, 1500-1899 m for the age of 40-49, 1400-1699 m for the age 50. (Cooper, 1968).

2.3.2. Step Test

Before start this test the investigator collected essential instruments for this test, such as12 inches bench, stopwatch, and heart rate monitor (optional). By the help of assistant data recorder the investigator took subjects resting heart rate before performing warm-up exercise. Purpose of this steps test will be to measure cardio respiratory fitness. The Subjects stood in front of a step bench. Assistant data record will be order commands to"Go"and then the stop watch will be start count. Subjects were start steps up and down on the flat form at a rate of steps in one minute. The complete of up and down steps were counted as one step of up and down. The subjects stopped up and down immediately on completion of the test, and the heart beats were counted for 15 seconds. Finally we multiplied these 15 seconds by 4 in order to get the beats per minute (McArdle *et al.,* 1972).

2.4. Effects of Aerobic Exercise on Cardiovascular Endurance

Cardiovascular endurance (CVE) is one of the most important measures of overall health. 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 cardio-vascular endurance also indicates an elevated level of physical fitness (Corbett, 2009).

Aerobic exercise use large muscle group to increase heart rate. This causes faster and dipper breathing which maximize the oxygen in the blood. There are many studies which are provide that cardiovascular endurance improved after aerobic exercise. Correctly performed aerobic exercise causes positive change in the body's cardio respiratory system. During maximum 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. Aerobic capacity is the most widely accepted single indicator of one's cardio respiratory fitness level and it is one of the best types of activity for training and maintaining allow the percentage of body fat. (Probart *et al*., 1991)

2.5. Characteristics of Exercise Intensity

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.

Shimosako and Takahashi (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 (%HR max), proportion of maximal heart rate reserve (%HRmax), and blood lactate indices. The following will cover the main principles of 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 O2max 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. According to (American College of Sport Medicine, 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 dehydration hyperthermia, or loss of motivation associated with central fatigue (News holm *et al*., 1992).

Moderate intensity: activity in this statement referred to activities that use approximately150 kilocalories (630 kJ) per day / are equivalent to 55 65% of VO2max.The statement also high lights 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 .lasted, 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, 1996).

2.6. Measurement of Exercise Intensity

There are varying ways to measure your exercise intensity to make sure your body is getting the most out of every workout. You may need to experiment to find out which method of measuring exercise intensity suits you best. Three different measurement methods include: Target heart rate, Talk test, and Exertion rating scale (Lucero, et al., 2014).

2.6.1. Heart Rate

A cardio regulatory center in the medulla oblongata of the brain can alter the heart rate by way of the autonomic nervous system. Parasympathetic motor impulses conducted by the vagus nerve cause the heart rate to slow, and sympathetic motor impulses conducted by sympathetic motor fibers cause the heart rate to increase. The cardio regulatory center receives sensory input from receptors within the cardiovascular system. The cardio regulatory center is under the influence of the cerebrum and the hypothalamus. Therefore, when we feel anxious, the sympathetic motor nerves are activated. The result is an increase in heart beat rate. On the other hand, activities such as yoga and meditation lead to activation of the vagus nerve, which slows the heart beat rate. Other factors affect the heart beat rate as well. For example, a low body temperature slows the rate. Also, the proper electrolyte concentrations are needed to keep the heart rate regular (Vander, 2001).

Target heart rate (THR): The human body has an in built system to measure your exercise intensity your heart. Your heart rate will increase in to the intensity of your exercise. You can track and guide your exercise intensity by calculating your Target Heart Rate (THR) range Lucero, *et al* (2014). For low to high intensity physical activity, a person's Target Heart Rate should be 40 to 85% of his or her maximum heart rate American College of Sport Medicine

(1995). This maximum rate is based on a person's age. An estimate of a person's maximum heartrate can be calculated as 220 beats per minute (bpm) minus your age. Because it is an estimate, use it with caution take your pulse again when you have been exercising for about 5-10 minutes. Continue taking your pulse at regular intervals. A heart rate monitor is an easy way to keep track of your heart rate whiles you where exercising or you can take your pulse.

2.7. Aerobic fitness

Aerobic fitness is a measure of the combined efficiency of the lungs, heart, blood stream and exercising muscles in getting the oxygen to muscles and putting them to work. A larger aerobic capacity increases the body's efficiency to perform daily activities (Stephens *et al.*, 2003) aerobic endurance is the highest proportion of VO2max at which an individual can sustain >20 minutes activity. It closely allied to the lactate thresholds point at which muscular fatigue begins to be hastened. Elite endurance athletes can sustain activity typically at greater than 80% of their aerobic power, whereas sedentary diseased individuals may only be able to sustain activity at 40 50% of aerobic power. This means the inactive or diseased person not only has a reduced capacity but also cannot utilize as much of what ever capacity they possess compared with the more active or fitter individual. Aerobic power, typically described as VO2max. It is the maximal amount of oxygen the body can take in and utilize during physical activity. These are influenced by three factors: the lungs‟ ability to oxygenate the blood, the cardiovascular system is ability to deliver the oxygenated blood to the exercising muscles and the muscles‟ ability to extract and utilize the oxygen to produce energy for sustained contractions (Buckley and Hughes, 2008).

3. MATERIALS AND METHODS

3.1. Description of the Study Area

This research was conducted at Ansho Secondary and Preparatory School in Duna Woreda. Duna Woreda is Located in Hadiya Zone in SNNPR. Duna Woreda is bordered, in the South by Doyogena Woreda, in the west and north by the Kembata-tembaro Zone and in the East by Soro Woreda and on the north East by Limu. Duna was part of Soro Woreda. It consists of 32 Rural Kebeles. Astronomically, the study area is located between 7º10'30"N-7º28'0"N latitude and 37º35'0"E-37º47'30"E longitude. It is found at 274Km South of Addis Ababa, the capital city of the country, 42 Km away from Hosanna which is the capital town of Hadiya Zone.

3.2. Experimental Materials

The researcher used Ansho Secondary and Preparatory School football ground for field tests other than conducting the training program of the study subjects. The following materials were used in this study: stop watch, measuring tapes, recording sheets, paper, pen, whistle, mats, marking cones, rope jumping and chalk for marking wall.

3.3. Treatment and Design of the Study

In this research, quasi-experimental method was applied to test pre, during and post test pattern experimental method on purposive sampling with randomly selected (n=24) control group (CG) and (n=24) experimental group (EG) were implement. An experimental group was used for providing pre-test and posttest in order to identify the effects of selected aerobic exercises on improvement of cardiovascular endurance. The trining schedule was given three days per week i.e., Monday, Wednesday and Friday in the morning 6:30-7:30 am and hence, a total of 36 days was given in a three-month time (December, January and february 2018/19) for trining sessions in which 60 minutes were allotted for each session.

Table.1.The study design layout

Treatment	Aerobic exercise
Frequency	3days/week
Total duration	3months (12 weeks) (36 days)
Duration /session	60minutes
Intensity	55-69% MHR
Exercise days	Monday, Wednesday and Friday
Time of training	Morning/Time

3.4. Source of Data

For this study primary source of data were used. The primary data was collected from the subjects of experimental study group through pre, during and post tests on effects of aerobic exericiece cardiovascular endurance

3.5. Population and Sampling Method

The source of population (target group) depends on their grade level, age, sex, health status and on their interest to participate in aerobic exercises training on the cardiovascular endurance for maximizing technical or tactical skills for athletics ability. The sample size of this study was selected purposively 48 female student athletes between the ages of 17 to 19 years within among 680 grade 9^{th}-12^{th} female students at Ansho secondary and Preparatory School of Ansho town, Hadiya zone, SNNPR through purposive selection. And amongst them the researcher randomly selected 24, CG and 24, EG which a special treatment can be applied.

3.6. Methods and Procedures of Data Collection

To conduct this study, the researcher used quantitative data collection method to collect data from the subjects by using pre, during and post cardiovascular endurance tests including twelve minute run / Walk Test and Step Test. The data were collected and recorded by with the help of assistant who got training for three days regarding to how data is recorded from the

subjects while the test is held. And each test was held at Ansho secondary and preparatory school's sport field training areas.

3.7. Measurement Tools and Applications

3.7.1. Medical Examination

Even if all the participants are already certified and selected based on their and family's interest and consensus as well as medical checkup early, while they join in to the athlete students, the researcher tried to prepare questionnaire for the identification of their current health status and additional consensus format to get their confirmation to involve actively in this study. And the following serious of cardiovascular endurance tests were used to testify the hypothesis.

3.7.2. Twelve minutes run test for measuring cardiovascular endurance.

To undertake this test the writer used (cooper test):

- 400 meter track
- Stopwatch
- Whistle
- Pencil and paper

Procedures (how to conduct the test)

This test requires that the athlete should run a distance that he can for only 12 minute

- The athlete warm-up for 10 minutes
- The assistant to gives the command "GO" starts the stopwatch and the athlete commences the test.
- The assistant keeps the informed of the remaining time at the end of each lap (400m)
- The assistant blows the whistle when the 12 minutes has elapsed and records the distance the athlete covered.

3.7.3. Step test to measure cardiovascular endurance

Materials

- 12-inch tall step, bench, or box (as close to 12 inches as you can find)
- Stopwatch, timer, or clock with a secondhand
- Heart rate monitor (optional)
- Partner to assist with cadence and form (optional)
- 400 meter track and Whistle

Procedures:

1. Stand facing your step.
2. When ready to begin start the stopwatch or timer and begin stepping on and off the step to the metronome beat following a cadence of up, up, down, down.
3. Continue for 3 minutes.
4. As soon as you reach 3 minutes, stop immediately and sit down on your step.
5. Perform a manual pulse reading and count the number of beats for an entire 60 seconds
6. Record your pulse when you have reached 1 minute result. The data recorded by the researcher with the help of one researcher assistant.

3.8. Inclusion and Exclusion Criteria

Subjects who fulfill a questionnaire for history of healthy status and whose age is 17 and 19 years old included in this study. In addition, the subjects who have any recent physical injury and medical condition not participated in this study.

3.9. Methods of Data Analysis

The data which were collected through a serious of effective selected aerobic exercise on cardiovascular endurance was presented as a group mean value and standard deviations. And the effect of selected aerobic exercise on variables were analyzed in separate two pre coded groups experimental (EG) and control group (CG) three times: pre, during and posttests. The difference between each test result was analyzed statically with “t” test at $p<0.05$ through the

use of computerized statically package software (SPSS) version 20.But if $p \geq 0.05$ the investigator would accepted the null hypothesis.

3.10. Data Quality Control

To ensure data quality, all the field test procedures, collection of data's and handling information was carried out in accordance with standard protocols and measurements. And the researcher used assistant to collect data. In order to avoid error, training was given for assistant data collector on how to use data collecting instruments and measurements during data collection. And the researcher created awareness for subjects about test and recommended pre-condition which they tried to do prior to take a test. Moreover, the researcher tried to aware the control groups to not participate in training or exercises beyond to the regular aerobic exercise training so as to control them and increase validity and reliability of the test results. Furthermore, regarding to create awareness about each test for the athlete got additional audio visual lectures beyond field practices and demonstrations.

Standard materials were used to keep the quality of the data. Additionally all the above mentioned tests were recorded and fed in to the software twice with different persons to avoid errors in data feeding.

3.11. Protocol and Ethical Consideration

The study dealt with the ethical issue related to the investigation. It protected the privacy of research participants and made guaranty and confidentiality of the information that was given to the study, and risk harm due to participation. Participation of subjects in this study was purely a voluntary based activity and their right not to participate and could resign at any time of training session would be respected. Therefore, the study was conducted all actions based on the university rule, code of conduct and policies concerning research ethics. Since subjects were volunteers, they were retraining from the situation if they were not ready or not feel comfort at any time they want. The protocol was approved by the university guidelines and write consent or agreement form was given and informed to the concern bodies.

4. RESULT AND DISCUSSION

4.1. Introduction

This chapter is concerned with the presentation, analysis, and interpretation of data. The first part deals with characteristics of respondents while the second part deals with analysis and interpretation of data gathered from respondents on running test and step test both on control and experimental groups.

4.2. Back Ground of the Respondents (Students)

Table 1 class level of the student

Grade	Frequency	Percent (%)
9.00	10	20.8
10.00	8	16.7
11.00	12	25.0
12.00	18	37.5
Total	**48**	**100**

Source: the authors' experimental data

As per table 1, 10% of the students selected in the sample were from grade nine, 10% of them were from grade 10, 11% of them were from grade eleven and the remaining 18% of them were from grade twelve. As the grade data confirms most of the students were purposively selected from grade twelve.

Table 2: the age distribution of the students selected for the sample

Age distribution of the students			
Age	**Frequency**	**Cumulative Percent**	**Percent**
17.00	12		25.0
18.00	14		29.2
19.00	22		45.8
Total	**48**		**100.0**

Source: the authors' experimental data

In table 2, the age distribution of the students selected in the sample was analyzed. As the data confirms, 25% of the students in the sample were seventeen years aged, 29.2% of them were

eighteen year aged and the remaining 45.8% of them were nineteen year aged. As the data indicates, most of the students were in age nineteen.

Table 3: gender distribution of the students selected in the sample

Gender	Frequency	percentage
Female	48	100%
Total	**48**	**100.0**

Source: the authors' experimental data

As it is indicated in table 3, all of the students in the sample (100%) were females. This indicates the researcher selected only female student's school as the data confirms.

Table 4: descriptive analysis of step test data

Variable	Observation	Mean
Step test of control group pretest	24	150 ± 4.086031
Step test of control group during test	24	150±4.086031
Step test of control group post test	24	149.7083 ± 4.185681
Step test of experimental group pretest	24	148.25 ±5.697063
Step test of experimental group during test	24	135.5 ±8.198621
Step test of experimental group post test	24	122 ±9.362274

Source: the authors' experimental data

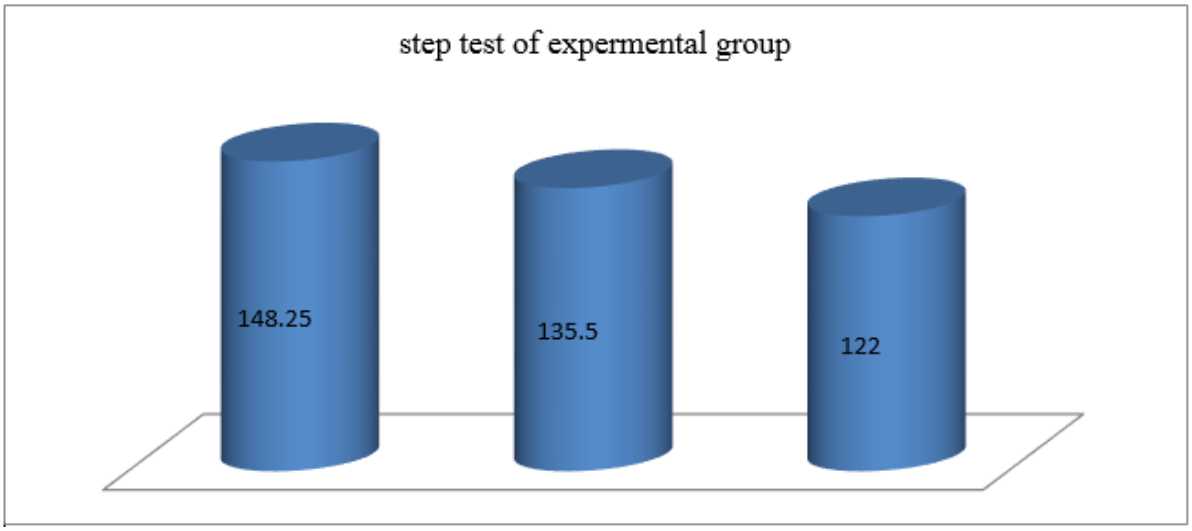
As per table 4, we can see that the mean exercise heart rate and resting heart rate were recorded almost similar values because female athlete students in the control group did not participate in aerobic exercise. However, the female athlete students in experimental group have shown significant mean variation. At the beginning, they recorded on average 148.25 with standard deviation 5.697063. During their aerobic exercise, they recorded on average135.5 with 8.198621 and in post-test the have recorded on average122 with standard deviation 9.362274.

Table 5: Normative data for the step test

Age	Sex	Excellent	Above average	Average	Below average	Poor
17-19	Female	<129	158-129	166-159	170-167	>170

As the normative data for the step test is presented in table 5 indicate, when the average step test result of this study (122) compared with international Norm for step test, it has fallen under excellent level (<129).

Figure 1: graphical description of experimental group students average score on step test



Source: the authors' experimental data

As it can be seen on the graph, mean resting heart rate and exercise heart rate has shown steady declination because the first vertical line is the tallest of all because it is the average resting heart rate and exercise heart rate was maximum before the students starting their aerobic exercise.

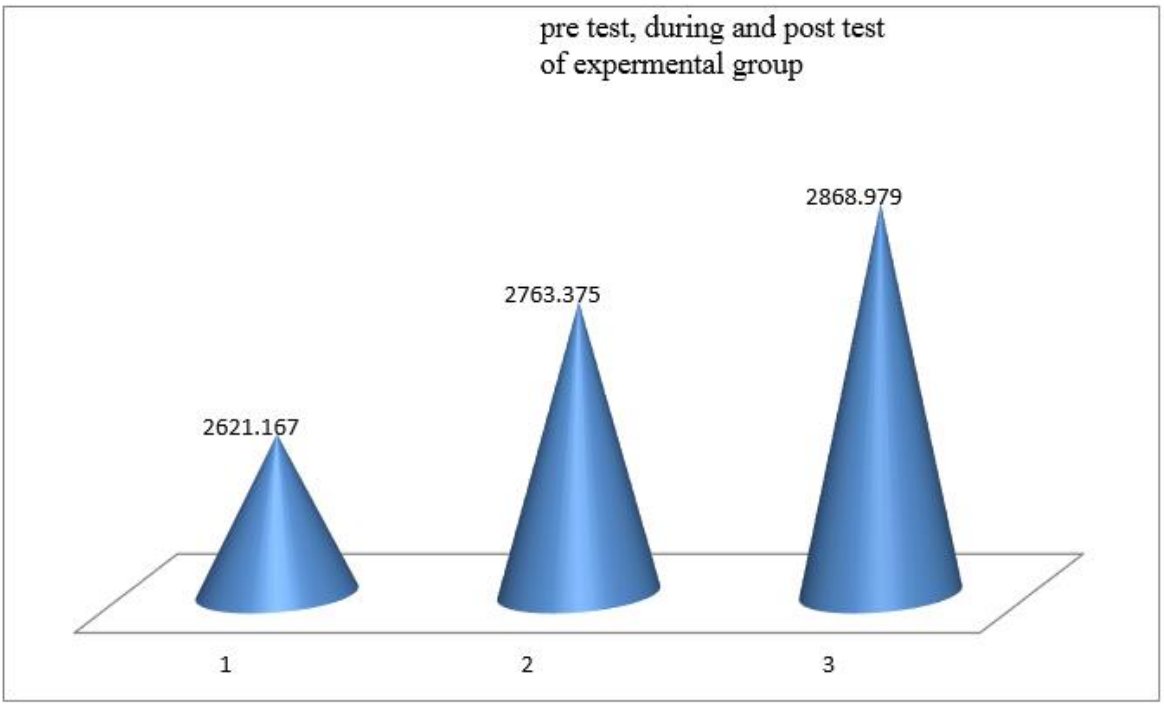
Table 6: Descriptive analysis of TMR (twelve minutes run) test

Variable	Observation	Mean
TMR-test of control group pretest	24	2504.542± 210.8459
TMR-test of control group during test	24	2504.542 ±210.8459
TMR-test of control group post test	24	2504.542 ± 210.8459
TMR-test of experimental group pretest	24	2621.167 ±116.7761
TMR-test of experimental group during test	24	2763.375 ± 131.5102
TMR-test of experimental group post test	24	2868.979 ± 126.3367

Source: the authors' experimental data

As the descriptive data analysis in Table 6 shows, 48 students were selected for both experimental and control group. Moreover, the mean cardiovascular endurance of the students indicates, control group students did not get any change on average because they had not participated in any of the aerobic exercise. Students in the experimental group have recorded significant growth in their cardiovascular endurance as the average value indicates. During their pretest, on average they recorded only 2621.167 with standard deviation 116.7761. Soon after they started their aerobic exercise or in during exercise period they recorded on average 2763.375 with standard deviation 131.5102. After they experienced their aerobic exercise they recorded on average 2868.979 with standard deviation 126.3367.

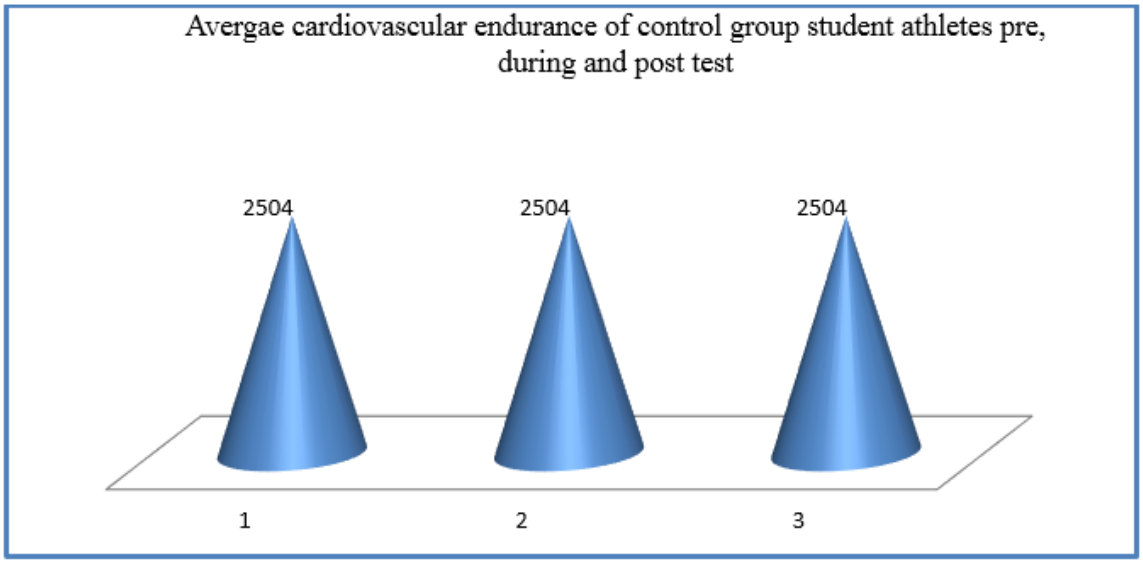
Figure 2: graphical explanation of average cardiovascular endurance of 12 minute running test



Source: the authors' experimental data

As it can be seen on the graph, mean cardiovascular endurance has shown steady growth because the first vertical line is the shortest of all because it is the average cardiovascular endurance was minimum before the students starting their aerobic exercise.

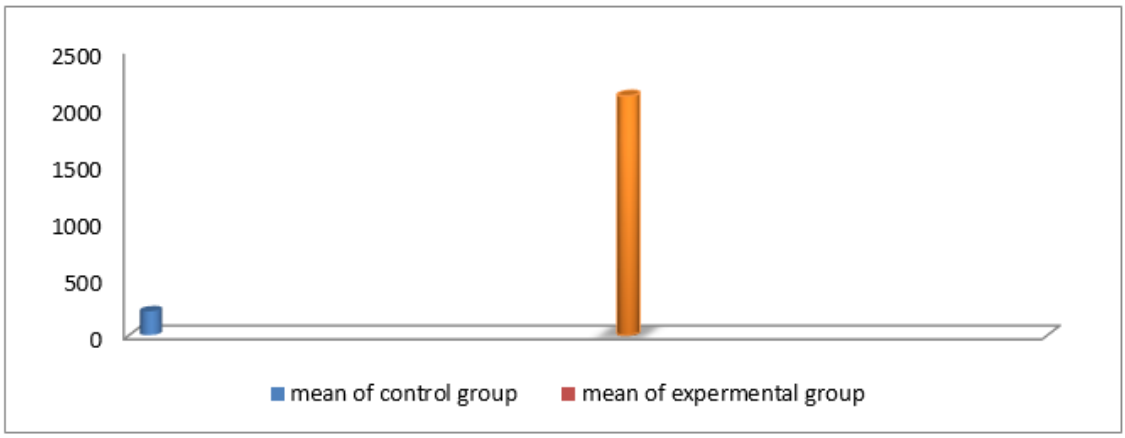
Figure 3: average cardiovascular record of control group students



Source: the authors' experimental data

It can be clearly seen that control group female students had not got any change on their cardiovascular endurance because they had not participated in any of the aerobic exercise. Thus, the average cardiovascular endurance was constant, 2504.

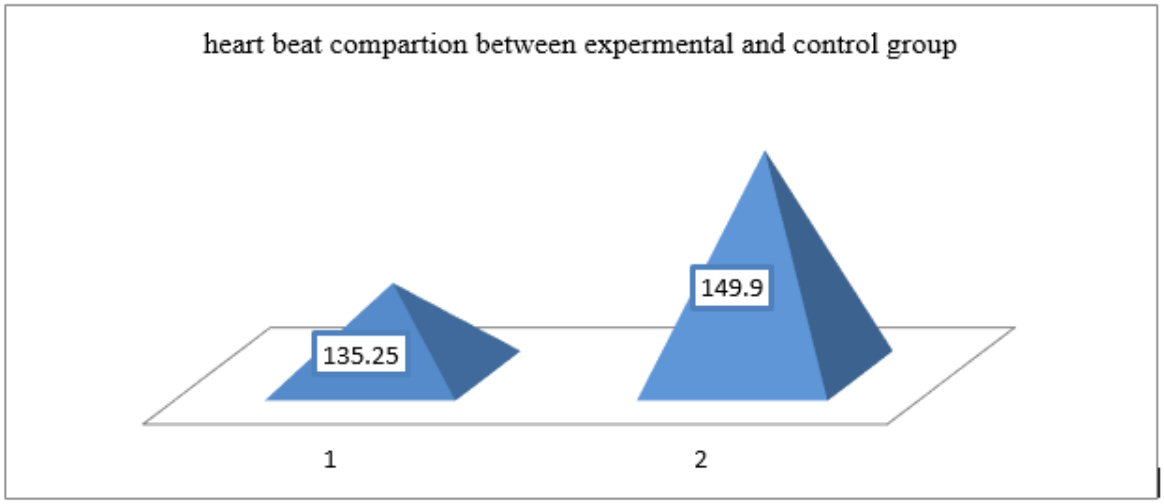
Figure 4: graphical representation of experimental and control group students average cardio vascular endurance on TMR (twelve minute run) test



Source: the authors' experimental data

As it can be seen on the graph, mean cardiovascular endurance is more when it is compared with mean of the control group students' cardiovascular endurance on twelve minute run test.

Figure 5: graphical representation of experimental and control group students average cardio vascular endurance on step test



Source: the authors' experimental data

As it can be seen on the graph, mean resting and exercise heart rate is more for control group when it is compared with mean of the experimental group students' on step test.

Table 7: t-test for the mean difference between control and experimental group on twelve minute run test

	Variables	t-value	Probability value	Decision
TMR-test	Pre-test of control group versus experimental group	1.2228	0.2276	Insignificant
	During test of control group versus experimental group	7.7546	0.000	Significant
	Posttest of control group versus experimental group	13.2363	0.000	Significant

Source: the authors' experimental data

As per table 6, t-test for twelve minute run test was clearly shown that there was significant mean cardiovascular endurance difference between experimental and control after they started their physical exercise because the probability value of t- test was highly significant (<0.05) except for pre-test. Thus, the null hypotheses of no significant mean difference between experimental and control group can be rejected at 95% confidence interval for both during and posttest. This clearly shows, students in experimental group had got significant change on their cardiovascular endurance because there were no mean differences before they started their physical exercise.

Table 8: t-test for the mean difference between control and experimental group on step test

Variables		t-value	Probability value	Decision
Step-test	Pre-test of control group versus experimental group	1.2228	0.2276	Insignificant
	During test of control group versus experimental group	7.7546	0.0000	Significant
	Posttest of control group versus experimental group	13.2363	0.0000	Significant

Source: the authors' experimental data

As per table 7, t-test for step test was clearly shown that there was significant mean physical endurance difference between experimental and control after they started their physical exercise (step test) because the probability value of t- test was highly significant (<0.05) except for pre-test. Thus the null hypotheses of no significant mean difference between experimental and control group can be rejected at 95% confidence interval for both during and posttest. This clearly shows, students in experimental group had got significant change on their physical activities because there were no mean differences before they started their physical exercise (step test).

Table 9: ANOVA for within variation of experimental and control group students on TMR run test

Test type	Source of variation		Sum of Squares	Df	Mean Square	F	Sig.
TMR-test	during test	Between Groups	1022487.958	5	204497.592	0.851	0.000
		Within Groups	4567.221	18	69797.31		
		Total	**1022487.958**	**23**		.	
	post test	Between Groups	1022487.958	5	204497.592	0.154	0.000
		Within Groups	1332.23	18	56799.14		
		Total	**1022487.958**	**23**		.	.
	Pre-test	Between Groups	22487.65	5	6565.654	0.087	0.08
		Within Groups	2487.024	18	5466.54		
		Total	**87995.68**	**23**	**25476.074**		

Source: the authors' experimental data

According to table 7, there were significant variation between control group and experimental group students' data after they started their physical exercise because the probability value of the F-test was less than 0.05. Thus, the null hypothesis of no significant variation between two groups regarding the cardiovascular endurance cannot be rejected at 95% confidence interval.

As the F-test confirms, there were no significant variation between experimental and control group students because the probability value of the F-test was greater than 0.05. Thus, the null hypothesis of no variation regarding the cardiovascular endurance between control and

experimental group students cannot be rejected at 95% confidence interval. This confirms an aerobic exercise had significant effect on female students' cardiovascular endurance.

Table 10: ANOVA for variation of experimental and control group students during step test

Test type	Source of variation	Sum of square	Df	Mean square	F-statistic	p-value
test before exercise	Between Groups	146.167	5	29.233	0.877	.056
	Within Groups	600.333	18	33.352		
	Total	**746.500**	**23**			
test during exercise	Between Groups	341.467	5	68.293	1.021	.035
	Within Groups	1204.533	18	66.919		
	Total	**1546.000**	**23**			
test after exercise	Between Groups	493.067	5	98.613	1.166	.0364
	Within Groups	1522.933	18	84.607	0.789	
	Total	**2016.000**	**23**			

Source: the authors' experimental data

In Table 8, the data of both group students during their step test experiment were analyzed using analysis of variance or ANOVA. As the Table confirms, there were significant variation between control group and experimental group students' data after they started their physical exercise because the probability value of the F-test was less than 0.05. Thus, the null hypothesis of no significant variation between two groups regarding the cardiovascular endurance cannot be rejected at 95% confidence interval.

As the F-test confirms, there were no significant variation between experimental and control group students because the probability value of the F-test was greater than 0.05. Thus, the null

hypothesis of no variation regarding the cardiovascular endurance between control and experimental group students during their step test cannot be rejected 95% confidence interval. This confirms an aerobic exercise had significant effect on female students' cardiovascular endurance.

4.3. Results and Discussion

The purpose of this study was investigating the effects of Aerobic exercises on improving cardiovascular endurance of female student athlete at Ansho secondary and preparatory school.to gather data for the study, step test and twelve minute run test were employed by the researcher to see students' cardiovascular endurance performances before, during and after the students had taken the types of aerobic exercise. The results of pretest of both tests indicated that there were no significant difference between the control group and the experimental groups' performances before they started doing the aerobic exercises. However, the results of posttests of both tests indicated that there were significant differences between the control group and the experimental groups' performances after they had done the aerobic exercises. In line with these findings, Mathewos, *et al*. (2013) have concluded that, moderate aerobic exercise has positive effect on improvement of cardiovascular endurance, muscular strength, muscular endurance and flexibility of sedentary aerobic exercise significantly reduced the body mass index and body weight of sedentary female. They also concluded that moderate aerobic exercise has significant effect on improvement of health related physical fitness components. Besides, Kusum, L. and Rakesh, D. (2016) conducted the research on effect of selected physical fitness exercise on cardiovascular and muscular endurance of 16-19 years male students and they have concluded that selected physical fitness exercise has positive effect on improvement of cardiovascular and muscular endurances of students.

Thus, the current research findings have similar findings with the above researches conducted and the results of these researches show that aerobic exercise has positive effects on the improvement of cardiovascular endurance of female athletes.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

The purpose of this study was to analyze the effects of aerobic exercise on cardiovascular endurance of female student athletes in Ansho secondary and preparatory school. The variable for the study were cardiovascular endurance, (RHR and HER). Experimental group measurement (parameter) used were step test and twelve minute run test three time intervals (pre, during training test and posttest) each. To achieve the raised objective, the researcher selected 48 female student athletes were purposively from ansho secondary and preparatory school grade 9^{th} -12^{th} students between the age group of 17-19 years. They were assigned in to experimental and control group purposively. The proper experimental data was collected for three consecutive months through careful follow up of the researcher. Control group athlete female students did not participate in any aerobic exercise.

The exercise program was designed for three month (12 weeks, 36 days) three day per week with 60 minute duration and moderate intensity (55%-69% MHR) was applied. (I.e. the data was recorded from aerobic exercise of female athlete students starting from morning twelve o'clock up one and half o'clock for three days in a week. The data was properly analyzed using t-test, ANOVA, mean analysis and graphical statistical approaches. The t-test analysis has confirmed that there were significant mean cardiovascular endurance difference between control and experimental group female students on both twelve minute run and step test. The ANOVA (Analysis of Variance Test) also confirmed insignificant variation of cardiovascular endurance between both groups of students before them starting aerobic exercise.

5.2. Conclusions

After the deep quantitative analyses that were described in the above chapter, the researcher came to the conclusion to touch the specific and general objectives of this study and the major findings are described as follows.

After appropriate follow up of the researcher to collect relevant data for this study, different statistical tools were applied to analyze the available data. T-test was used to compare data from both experimental and control group students on step test and it had shown that there was average cardiovascular endurance difference between experimental and control group after they started their physical exercise (step test). The data from both group students had not any cardio vascular endurance difference before starting their Aerobic exercise. This clearly shows step-test experiment has significant effect on physical endurance of the students.

Relevant experimental data was also collected and analyzed in the previous chapter and t-test was used to compare the average difference between experimental and control group on TMR-test. T-statistic has clearly shown that was clear mean difference between experimental and control group students on physical endurance. Surprisingly, there were no any significant mean differences between both group data before starting their physical exercise (running). Soon after they started their running experiment, the statistic confirmed significant mean difference between data from both groups.

In addition to t-test, ANOVA (Analysis of Variance) test was also applied on the students' data after testing with t-statistic. The ANOVA test was also clearly shown that, there were significant variation between both experimental and control group students' data. Thus, the running test had significant effect on student' cardiovascular endurance.

As the t-test analysis in chapter four clearly shown, the twelve minutes running test data showed significant mean variation after the selected students started the aerobic exercise. As the test result showed there were no any significant mean difference between both groups of athlete students before starting the twelve minute running. However, soon after they started running the test had shown significant mean variation. Thus, twelve minute running has positive effect on improvement of cardiovascular endurance

5.3. Recommendations

After deep quantitative analysis of the experimental data, the researcher recommended school principals, Woreda Youth and Sport Affairs Department Office and other stockholders

- Sport science instructors (teachers) in the schools should have to participate their female students in aerobic exercise to change the bad attitude of the society towards their female students.
- School principals should participate on facilitation of suitable environment in their schools to initiate their students.
- Woreda Youth and Sport Affairs Department Office and other stockholders should also participate in facilitation relevant materials in their Town as well as in school level to initiate students and the whole society.
- Since this study focused only on small sample size of female students the result of which could not allow the researcher to forward a general conclusion, further research should be conducted with large sample size and sample duration.

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7. APPENDIXS

APPEDDIX I-PARQ

Many health benefits are associated with regular exercise, and the completion of the PAR-Q is a sensible first step to take if you are planning to increase the amount of physical exercise in your life. For most people, physical activity should not pose any problem or hazard. The PAR-Q is designed to identify the small number of adults for whom physical activity might be in appropriate or those who should seek medical advice concerning the type of activity most suitable for them.

For Athletes; please read the following questions carefully and indicate your correct responses to each question by encircle "YES"or"NO"options.

Source: Canadian Society for Exercise Physiology. Revised 1994.

Client's full Name: _____Trainer's Name: _____

Client's Signature: _____Trainer's Signature:__ _____

Date: _____Date:_____

1. Do you have a bone or joint problem such as arthritis, which has been aggravated by exercise or might be made worse with exercise?

   A. Yes B. No

2. Do you have high blood pressure?

   A. Yes B. No

3. Do you have low blood pressure?

   A. Yes B. No

4. Do you have diabetes mellitus or any other metabolic disorder?

   A. Yes B. No

5. Do have you have ever suffered a heart condition?

   A. Yes B. No

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

   A. Yes B. No

7. Is your **doctor** currently prescribing you drugs or medication?

   A. Yes B. No

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

   A. Yes B. No

9. Is there any ever feel feint, have spells of dizziness or have ever lost consciousness?

   A. Yes B. No

11. Do you **not** currently exercise regularly (at least three times per week) and/or work in a job that is physically demanding.

    A. Yes B. No

12. Are you, or is there any possibility that you might be pregnant? (For female student)

    A. Yes B. No

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

    A. Yes B. No

APPENDIX II-Athletes fitness Assortment Record Sheet

Code_____ Height_____

Weight_____ Age_____

No Types of test	Parametre	1. (Pre Training)	2(During Training)	3(Post Training)	
		RHR	HER	RHR	EHR
1. Twelve Minute run Test	Cardiovascular Endurance				
2. Step Test	Cardiovascular Endurance				

Raw data on step- test for Experimental Group

Sample of subjects	**Pre-test** (12minute run test,step-test,RHR,and EHR rate)				**During – test** (12minute run test,step test, RHR,and EHR rate)				**Post – test** (12minute run test,step-test,RHR,and EHR rate)				Time	Remark
Sample 2														
Sample 4														
Sample 6														
Sample 8														
Sample 10														
Sample 12														
Sample 14														
Sample 16														
Sample 18														
Sample 20														
Sample 22														
Sample 24														
Sample 26														
Sample 28														
Sample 30														
Sample 32														
Sample 34														
Sample 36														
Sample 38														
Sample 40														

Raw data on step- test for Control Group

Sample of subjects	**Pre-test** (12minute run test,step-test,RHR,and EHR rate)				**During – test** (12minute run test,step test, RHR,and EHR rate)				**Post – test** (12minute run test,step-test,RHR,and EHR rate)				Time	Remark
Sample 01														
Sample 03														
Sample 05														
Sample 07														
Sample 09														
Sample 011														
Sample 013														
Sample 015														
Sample 017														
Sample 019														
Sample 021														
Sample 023														
Sample 025														
Sample 027														
Sample 029														
Sample 031														
Sample 033														
Sample 035														
Sample 037														
Sample 039														
Sample 041														
Sample0 45														
Sample 047														
Sample 049														

APPENDIX III-CONSENT FORM

My name is Muhammed Erano. I worked as a data collector for the study which was conducted in this community and for the purpose of partial fulfillment of masters ‘degree at Haramaya University, the college of Sport Sciences Academy. I kindly requisite you to lend me your attention to explain about the study and being selected as the study participant.

The Study Title:

Effects of Aerobic Exercise on Cardiovascular Endurance of female student Athletes: the case of Ansho secondary and preparatory school. Ansho in Duna, Hadiya Zone, SNNPR State

Purpose of the Study

To investigate the effect of cardiovascular endurance ability of student athletes on the selected aerobic fitness variables. The subjects involved in this study were 48 female student athletes. In this study Experimental Group N=24 (EG) participation to perform a certain tests in measuring the aerobic fitness variables and control group N= 24 (CG) is not measuring the aerobic fitness test

Procedure and duration:

The training program lasts three months with three days in a week and 60 minutes in each session.

Risks and benefits:

The risks of this research study are small. While administering the tests and during training sessions you may experience localized muscle fatigue in your thighs i.e. cardiac muscle. You might feel some muscle soreness and fatigue during and after the cessations of the training exercises and tests. But we do not expect any unusual risks as a direct result of this study. If any unexpected physical injury occurs, appropriate first aid was provided, but no financial compensations was given.

Confidentiality:

The information obtained about you would kept in confidence. However you are free to release it to your own physician. The information would be used only for scientific purposes without identifying you as an individual.

Contact address

If there is any question or requires any time about the study or the procedures, please contact:

Muhammed Erano, at (+251916670771) or E-mail:muherano2017@gmail.com

Major Adviser_____ (PhD) E-mail: eyasumerha@gmail.com

Co-Adviser _____ (PhD) E-mail: amenab2012@yahoo.com

I certify that I have read and fully understood the above project; therefore, I consent to participate in this study.

Name of subject: _____

Signature: _____

Address: _____

Date: _____

I certify that I clearly explained the nature of the study, Purpose of potential benefits and that may be possible risks involved in this research Study.

Signature of Investigator: _____

Date: _____

APPENDIX IV- Description of the Study Design

Gender and age groups of the participants: on selected of female students the investigator based on their social expectation and cultural influences because in our environment the society expect sport activities more attention male athletes, for this reason the society understood Poorly females to participate in sport activities. The researcher based on the above reason, he selected female athlete students only. The selection of ages were based on the average age groups of the school. The average age in Ansho Secondary and Preparatory School students was between 16-20 years old. The investigator for his study purposively was selected the average age groups of 17 and 19 years old. Three months of training schedule (December, January and February):

In the periodization of the exercise schedule, 3 months or 12 weeks were taken. In the selection the investigator depending on exercise program that includes annual, monthly plan, weekly and training lesson/unit plans (Jail, 2008) explained. According to Jail 8 to 12 weeks of training program is essential to improve individual's abilities. Based on this idea, the investigator purposively taken 12 weeks training program.

Training days per week: Three days per week were selected because internationally 3 to 4 days a week for aerobic activities are recommended. The investigator take the minimum 3 days and after 5 weeks of training the investigator was evaluate the performance of the subjects (treatment test or during training test).

In the selection of training days, the investigator fixed the days based on the rule and regulation of the school. The school days from were Monday up to Friday. Therefore, the selected first day up to third day exercise was fixed time Morning at 6:30 up to 7:30pm.The duration of exercise time for each session of this study was 60 minutes.

APPENDIX V- Training Schedule

The main objectives of this training schedule was to examine the effects of aerobic exercises on cardiovascular enduranceof student athletes.The actual training time foreach session is 60 minu tes (one hour).

The following training schedules were performed every week of the month.

First Month training schedule (December, 2018)

Days per week	Types of Exercises	Duration (60min)	Frequency (Repetitions per sets)	Rest/Recovery time	Intensity of exercises
(6:30 pm to 7:30am)	Warming up exercises: Different types of exercise for General warming up and Specificwarming upwas employed with in this warmingup exercise sessions.	10min	1x10min		Moderate intensity (55-69% MHR)
	Jogging	10	2x5min		
	Rope jumping	14	2x7min		
	Mini football game	14min	1x12min		
	Cooling down: different types of stretching exercises	8min	1x8min		
(6:30 pm to 7:30am)	Warming up exercises Different types of exercise for general and specific warming up were em	10min	1x10min	30second Active rest b/n each exercise	Moderate intensity (55-69% MHR)
	Rope jumping	15min	3x5min		
	Track workout	12min	1x12min		
	Mini football games	11min	1x11min		
	Cooling down: different types of	8min	1x8min		
(6:30 pm to 7:30am)	Warming up Exercises Different types of exercise for gener al warming up and specific warming up	10min	1x10min		Moderate intensity (55-69% MHR)
	Aerobic Conditioning with jogging	10min	2x5min		
	Rope jumping	10min	2x5min		
	Mini football games	16min	1x16min		
	Cooling down: different types of	10min	1x10min		

Second Month training schedule (January, 2018)

Days per Week	Types of Exercises	Duration (60min)	Frequency (Repetitions per sets)	Rest/Recovery time	Intensity of exercises	
Monday (6:30 pm to 7:30am)	Warning up exercises Different types of exercise for General warming up and specific warming up was employed with in this warming up exercise sessions.	10min	1x10min	5min	Moderate intensity (55-69% MHR)	10min
	12 minutes run (on running track)	12min	1x12min			
	Jogging	6min	1x3min			10
	Rope jumping	10min	30x4			14
	Track work out	10min	1x10min			14min
	Cooling down: different types of stretching exercises	8min	1x8min			8min
Wednesday (6:30 pm to 7:30am)	Warming up exercises Different types of exercise for General warming up and specific warming up was employed with in this warming up exercise sessions.	10min	1x10min	5min	Moderate intensity (55-69% MHR).	10min
	Rope jump	15min	3x5min			15min
	Aerobic conditioning with Jogging	13min	1x13min			12min
	Track work out	10min	1x10min			11min
	Cooling down: different types of stretching exercises	8min	1x8min			8min
Friday (6:30 pm to 7:30am)	Warming up exercises: Different types of exercise for General warming up and specific warming up was employed with in this warming up exercise sessions.	10min	1x10min	5min	Moderate intensity (55-69% MHR)	10min
	Rope jumping	10min	2x5min			10min
	Jogging	10min	2x5min			16min
	Track workout	6min	2x3min			10min
	Aerobic training	12min	1x12min			
	Cooling down: different types of stretching exercises	8min	1x8min			

Thrid Month training schedule (February, 2018)

Days per Week	Types of Exercises	Duration (60min)	Frequency (Repetitions per sets)	Rest/Recovery time	Intensity of exercises
(6:30 pm to 7:30am)	Warming up exercises: Different types of exercise for General warming up and Specificwarming upwas employed with in this warmingup exercise sessions.	10min	1x10min		Moderate intensity (55-69% MHR)
	Jogging	10	2x5min		
	Rope jumping	14	2x7min		
	Mini football game	14min	1x12min		
	Cooling down: different types of stretching exercises	8min	1x8min		
(6:30 pm to 7:30am)	Warming up exercises Different types of exercise for general and specific warming up were em	10min	1x10min	30second Active rest b/n each exercise	Moderate intensity (55-69% MHR)
	Rope jumping	15min	3x5min		
	Track workout	12min	1x12min		
	Mini football games	11min	1x11min		
	Cooling down: different types of	8min	1x8min		
(6:30 pm to 7:30am)	Warming up Exercises Different types of exercise for gener al warming up and specific warming up	10min	1x10min		Moderate intensity (55-69% MHR)
	Aerobic Conditioning with jogging	10min	2x5min		
	Rope jumping	10min	2x5min		
	Mini football games	16min	1x16min		
	Cooling down: different types of	10min	1x10min		

APPENDIX VI-List of subjects participant in this study (Code List)

Serial codes of Subjects	Date of birth	Age	Class Level	Name of the School
Subject-1				
Subject-2				
Subject-3				
Subject-4				
Subject-5				
Subject-6				
Subject-7				
Subject-8				
Subject-9				
Subject-10				
Subject-11				
Subject-12				
Subject-13				
Subject-14				
Subject-15				
Subject-16				
Subject-17				
Subject-18				
Subject-19				
Subject-20				
Subject-21				
Subject-22				
Subject-23				
Subject-24				
Subject 25				
Subject 26				
Subject 27				

Subject-28				
Subject-29				
Subject-30				
Subject-31				
Subject-32				
Subject-33				
Subject-34				
Subject-35				
Subject-36				
Subject-37				
Subject-38				
Subject-39				
Subject-40				
Subject-41				
Subject-42				
Subject-43				
Subject-44				
Subject-45				
Subject 46				
Subject 47				
Subject 48				

APPENDIX VII: The result of statistical software for data studied

ANOVA test for the variation between control and experimental group on step test

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	153.591667	6	25.5986111	1.75	0.1710
Within groups	249.366667	17	14.6686275		
Total	**402.958333**	**23**	**17.5199275**		

One way ANOVA test for posttest of control and experimental groups on step test and run test

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	153.591667	6	25.5986111	1.75	0.1710
Within groups	249.366667	17	14.6686275		
Total	402.958333	23	17.5199275		

STATA OUTPUT FOR t-TEST OF RUN TEST

. t test pretest == pretest experiment, unpaired	
Two-sample t test with equal variances	
Variable Obs Mean Std. Err. Std. Dev.	[95% Conf. Interval]
pretest 24 150 .8340577 4.086031	148.2746 151.7254
prete~nt 24 148.25 1.162908 5.697063	145.8443 150.6557
combined 48 149.125 .7193039 4.983483	147.6779 150.5721
diff 1.75 1.431086	-1.130627 4.630627
diff = mean(pretest) - mean(pretest experiment)	t = 1.2228
Ho: diff = 0 degrees	of freedom = 46
Ha: diff < 0 Ha: diff != 0	Ha: diff > 0
Pr (T < t) = 0.8862 Pr (T > t) = 0.2276	Pr(T > t) = 0.1138

t-test during test == during test experimental , unpaired Two-sample t test with equal variances	
Variable Obs Mean Std. Err. Std. Dev.	[95% Conf. Interval]
durin~st 24 150 .8340577 4.086031	148.2746 151.7254
durin~nt 24 135.5 1.673537 8.198621	132.038 138.962
combined 48 142.75 1.404937 9.733688	139.9236 145.5764
diff 14.5 1.86986	10.73617 18.26383
diff = mean(during test) - mean(duringtestexpe~t)	t = 7.7546

Ho: diff = 0 degrees	of freedom = 46
Ha: diff < 0 Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 1.0000 Pr(T > t) = 0.0000	Pr(T > t) = 0.0000

. t-test posttest == posttest experimental, unpaired		
Two-sample t test with equal variances		
Variable Obs Mean Std. Err. Std. Dev.	[95% Conf. Interval]	
posttest 24 149.7083 .8543986 4.185681	147.9409 151.4758	
postte~l 24 122 1.911066 9.362274	118.0467 125.9533	
combined 48 135.8542 2.270687 15.73178	131.2861 140.4222	
diff 27.70833 2.093364	23.49461 31.92206	
diff = mean(posttest) - mean(posttestexperm~l)	t = 13.2363	
Ho: diff = 0 degrees	of freedom = 46	
Ha: diff < 0 Ha: diff != 0	Ha: diff > 0	
Pr(T < t) = 1.0000 Pr(T > t) = 0.0000	Pr(T > t) = 0.0000	
.		

t-test result of step test between experimental and control group

t-test pretest == pretest experiment, unpaired	
Two-sample t test with equal variances	
Variable Obs Mean Std. Err. Std. Dev.	[95% Conf. Interval]
pretest 24 150 .8340577 4.086031	148.2746 151.7254
prete~nt 24 148.25 1.162908 5.697063	145.8443 150.6557
combined 48 149.125 .7193039 4.983483	147.6779 150.5721
diff 1.75 1.431086	-1.130627 4.630627
diff = mean(pretest) - mean(pretest experiment)	t = 1.2228
Ho: diff = 0 degrees	of freedom = 46
Ha: diff < 0 Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 0.8862 Pr(T > t) = 0.2276	Pr(T > t) = 0.1138
t test during test == during test experiment, unpaired	
Two-sample t test with equal variances	
Variable Obs Mean Std. Err. Std. Dev.	[95% Conf. Interval]
durin~st 24 150 .8340577 4.086031	148.2746 151.7254
durin~nt 24 135.5 1.673537 8.198621	132.038 138.962
combined 48 142.75 1.404937 9.733688	139.9236 145.5764
diff 14.5 1.86986	10.73617 18.26383
diff = mean(during test) - mean(duringtestexpe~t)	t = 7.7546
Ho: diff = 0 degrees	of freedom = 46
Ha: diff < 0 Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 1.0000 Pr(T > t) = 0.0000	Pr(T > t) = 0.0000

t-test posttest == posttest experimental, unpaired	
Two-sample t test with equal variances	
Variable Obs Mean Std. Err. Std. Dev.	[95% Conf. Interval]
posttest 24 149.7083 .8543986 4.185681	147.9409 151.4758
postte~l 24 122 1.911066 9.362274	118.0467 125.9533
combined 48 135.8542 2.270687 15.73178	131.2861 140.4222
diff 27.70833 2.093364	23.49461 31.92206
diff = mean(posttest) - mean(posttestexperm~l)	t = 13.2363
Ho: diff = 0 degrees	of freedom = 46
Ha: diff < 0 Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 1.0000 Pr(T > t) = 0.0000	Pr(T > t) = 0.0000

ANOVA STATA RESULT

One way pretest experiment

Analysis of Variance

Source	SS	Df	MS	F	Prob > F
Between groups	119.238095	5	23.847619	1.62	0.2050
Within groups	264.761905	18	14.7089947		
Total	384	23	16.6956522		

Bartlett's test for equal variances: chi2 (3) = 6.0187 Prob>chi2 = 0.111

note: Bartlett's test performed on cells with positive variance:
1 single-observation cells not used
1 multiple-observation cells not used

. One way during test experimental

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	183.466667	5	36.6933333	3.29	0.0276
Within groups	200.533333	18	11.1407407		
Total	384	23	16.6956522		

Bartlett's test for equal variances: chi2 (4) = 3.5485 Prob>chi2 = 0.471

note: Bartlett's test performed on cells with positive variance:
1 single-observation cells not used

. **one way posttest experimental**

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	153.591667	6	25.5986111	1.75	0.1710
Within groups	249.366667	17	14.6686275		
Total	402.958333	23	17.5199275		

Bartlett's test for equal variances: chi2 (4) = 2.7744 Prob>chi2 = 0.596

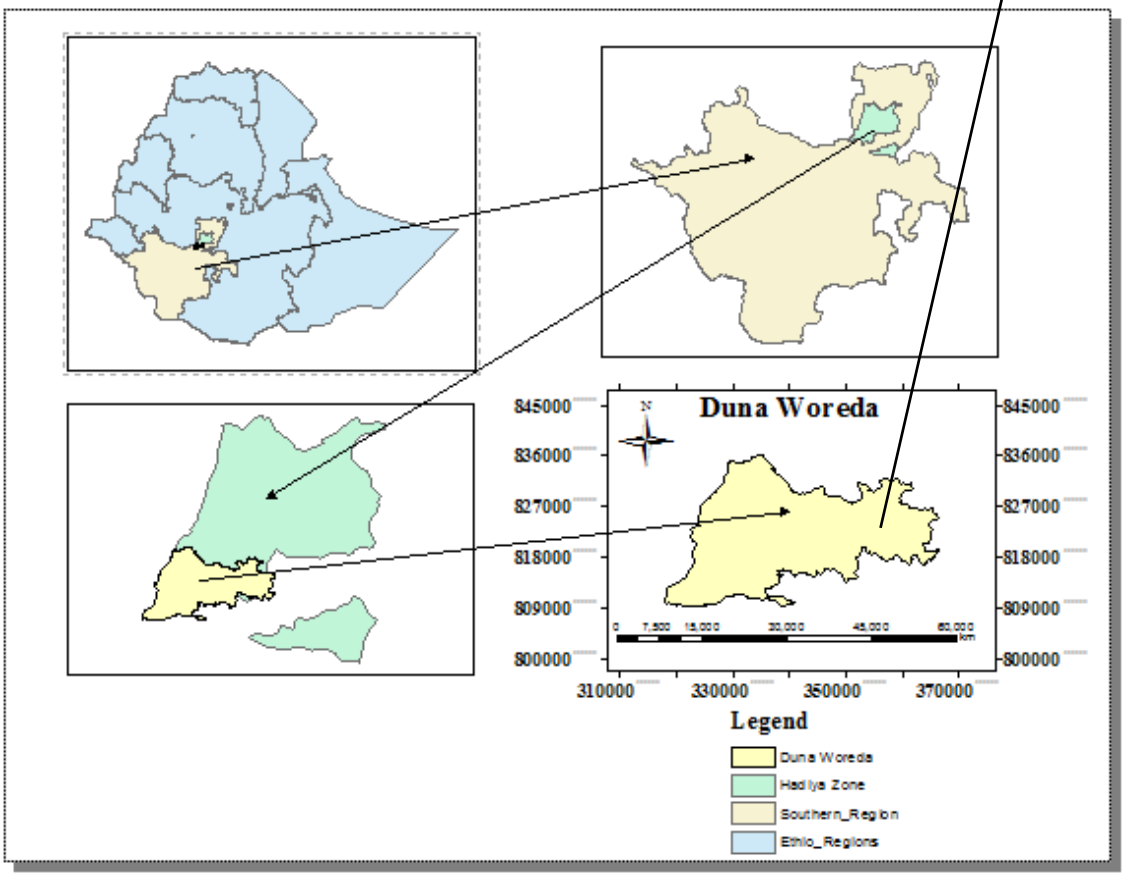
note: Bartlett's test performed on cells with positive variance:
1 single-observation cells not used
1 multiple-observation cells not used

```
. summarize pretest duringtest posttest pretestexperment duringtestexperment pos
```

Variable	Obs	Mean	Std. Dev.	Min	Max
pretest	24	150	4.086031	144	160
duringtest	24	150	4.086031	144	160
posttest	24	149.7083	4.185681	144	160
pretestexp~t	24	148.25	5.697063	142	160
duringtest~t	24	135.5	8.198621	128	152
posttestex~l	24	122	9.362274	112	140

APPENDIX VIII -Map of the study site

Figure1.Map of the study site



Source: https://www.google.map.com retrieved from 27/10/2018