

**EFFECT OF SELECTED AEROBIC EXERCISES ON THE
IMPROVEMENT OF CARDIOVASCULAR ENDURANCE FOR
PERFORMANCE OF ATHLETE: THE CASE OF FONKO PREPARATORY
SCHOOL, FONKO, HADIYA ZONE, SNNPR, ETHIOPIA**

MSC THESIS

BY

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ADDIS ABABA UNIVERSITY

ADDIS ABABA, ETHIOPIA

JUNE, 2017

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**BY
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**A Thesis Submitted to the Department of Sport Science
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As research advisors, we hereby certify that we have read and evaluated this Thesis entitled
**Effect Of Selected Aerobic Exercises on the Improvement of Cardiovascular
Endurance for Performance of Athlete: the Case of Fonko Preparatory
School, Fonko, Hadiya Zone, SNNPR, Ethiopia prepared by Arega Jakeiso**

As a member of the Board of Examiners of the MSc Thesis Open Defense Examination, we certify that we have read and evaluated the Thesis prepared by Arega Jakeiso, and examined the Candidate. We recommend that the thesis be accepted as fulfilling the requirements for the Degree of Master of Science in Sport Science (Coaching Athletics).

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ACRONYMS

| | |
|-----------------------|--|
| %-VO ₂ max | Percentage of Maximum Oxygen Consumption |
| ACSM | American college of Sport Medicine |
| ANCOVA | Analysis of Covariance |
| BMI | Body mass index |
| BMR | Basal metabolic rate |
| CVE | Cardiovascular Endurance |
| DQC | Data Quality Control |
| EHR | Exercise Heart Rate |
| GIS | Geographical Information System |
| HDL | High density lipoproteins |
| HZARDD | Hadiya Zone Agriculture and Rural Development Department |
| LBM | Lean body mass |
| LDL | Low density lipoproteins |
| MEED | Microsoft Encarta Encyclopedia Deluxe |
| PSD | Purposive Sampling Design |
| SNNPR | Southern Nations, Nationalities and Peoples' Region |
| SPSS | Statistical Package for Social Science |
| USDHHS | United States Department of Health and Human Services |
| WC | Waist Circumference |
| WHO | World Health organization |
| WHR | Waist-Hip Ratio |
| FPS | Fonko Preparatory School |

ABSTRACT

Cardiovascular endurance is a component of physical fitness which plays great role during exercises. The primary purpose of this study was to evaluate the effects of selected types of aerobic exercise on enhancing cardiovascular endurance of students. The study was conducted to improve cardiovascular endurance performances on 30 male athletes of Fonko preparatory school of Grade 11 students. These thirty male students were assigned as one experimental group and their age ranges 18 and 19 years. All subjects participated in selected aerobic exercises for 8 weeks i.e., three days per week and 60 minutes duration per day. Pre-test, during training test and post training test were conducted on physical fitness variables such as step test and 12 minutes run. The data collected from subjects were analyzed by paired simple t-test to determine the differences between pre-test and post-test mean value results of the participants of the study. According to the findings of the study, step test 26.6 beats per minute mean differences. In twelve minutes run 271.16 meters increments data were observed. Therefore, the results obtained from the study indicate that there were significant improvements within 12 minutes run. However, in the case of steps test, a test result was decreased because of improvement in the performance. So, the findings of the study reveals different responsible bodies like coaches, sport commission office, education office, school principals and sport Science teachers should take considerable actions for the improvement of the Athletics proficiencies of the students as well as others youth.

Key words: Cardiovascular Endurance, Physical Fitness, Aerobic Exercises and Performance

CHAPTER ONE

INTRODUCTION

The introduction part of this study includes background of the study, significant of the study, objectives of the study, statement of the problem, the major research questions that have been answered after the successful completion of this study, and scope of the study are included.

1.1 Background of the Study

Fundamental movements of man, which they have achieved from their pre-human ancestors, are walking, running, jumping, climbing, throwing, pulling, pushing, etc. By permutation and combination of these basic fundamental movements, man has been developing various secondary movements essential for the day-to-day living and for the use in 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 foremost thing to enjoy the life fully with effective exercises Reddy (2012).

Physical activity and training are important for initiating and sustaining cardiovascular health. As such, encouragement from childhood and the possibility to participate in sports activity is a major health issue which must be sustained. At the adolescence age, however, increasing expectations and competitive demands have gradually emerged as an important aspect of recreational sports in the young (Armstrong and McManus, 2010). Regular aerobic exercise will produce beneficial effects for any age group providing the exercise is specific and appropriate to the level of fitness of the individual. Progressive exercises correctly performed would increase the level of fitness and improve health. It will also create a sense of well-being, produce greater energy and reduce the risk of developing many diseases. Exercise makes demands on the body systems over and above normal every day activities and, as result, the systems adapt anatomically and physiologically. Available experience and scientific evidence show that regular physical activity provides people, both male and female, including people with disabilities with a wide range of physical, social and mental health benefits. Physical activity interacts positively strategies to improve diet, discourage the use of tobacco alcohol and drugs, which in turn helps reduce violence, enhances functional capacity and promotes social interaction and integration within among peoples (WHO, 2003). Aerobic exercise stimulates heart, lungs and all working

group of muscles and produces valuable changes in body and mind. Many physiological changes are determined by daily aerobic exercises (Shahana *et al.*,2010).

Many of the researchers sighted in the above, have studied that physical exercises are important for the development of 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 athlete students at Fonko Preparatory School.

As Shemelis (2010) studies, Aerobic activities should be used to develop cardio-respiratory endurance. Basically, aerobic activities are those in which a sufficient amount of oxygen is available to meet the body's demands. Popular aerobic activities including running, walking, rowing, swimming, cycling, aerobic dancing, jogging, tread mill and somewhat continuous in nature the intensity of work load can be easily regulated by controlling the pace for the performance of elevated level for an extended period.

Nowadays, ineffective aerobic exercises training for the developments 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 selected aerobic exercises were used as causes for the improvement of cardiovascular endurance of male athlete students of FPS.

1.2 Statement of the Problem

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 ACSM (2000), physical activity is defined as bodily movement produced by the contraction of striated muscle that substantially increases energy expenditure. This definition 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, household chores) and non-organized, recreational physical activities (Okely, Patterson &Boothet, 1998; ACSM, 2000).

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 musculoskeletal development for male and female.

But the reality in our country as well as at Fonko Preparatory School shows the value of exercise has been known theoretically not practically. So this, it need academics' investigation of effective type of aerobic exercise for the development of cardiovascular endurance. Hence, in this study area there were rare applications of walking, jogging and rope jumping aerobic exercise for the development of cardiovascular endurance. The merely application of the above aerobic exercises catch the attention of researcher to conduct current study for the development of cardiovascular endurance improvement of beginner male athlete of Fonko Preparatory school.

1.3 Research Questions

This research attempted to answer the following questions with the conceptual idea of:-

1. What significant changes could be seen on the cardiovascular endurance of selected male athlete students' of Fonko Preparatory School?
2. What are the main elements of important aerobic exercises for the improvement of cardiovascular endurance of male Athletes at Fonko Preparatory School?
3. What would be the results of cardiovascular endurance and status of FPS male Athletes achieved after selected aerobic exercises has conducted.

1.4 Objectives of the Study

1.4.1. General Objective

The general objective of this study was to examine the effects of selected Aerobic exercises in improving cardiovascular endurance performance of selected grade 11 male athlete students at Fonko Preparatory School.

1.4.2. Specific Objectives

- a) To investigate the significant change of cardiovascular endurance performance of selected male athlete students at Fonko Preparatory School;

- b) to identify effective aerobic exercises for the improvement of cardiovascular endurance on selected grade 11 male athlete students at Fonko Preparatory School, and;
- c) to identify how selected aerobic exercises influences cardiovascular endurance performance of selected male athlete students at Fonko preparatory School.

1.5. Significance of the Study

The findings of this study were to investigate the effects of aerobic exercise in improving cardiovascular endurance performance of selected male students at Fonko Preparatory School in Fonko town of the Hadiya Zone. The outcome of the study has reduced the problems that occur at Fonko preparatory School of selected male students in relation to their abilities to cardiovascular endurance performance. But that does not mean the outcome of this research is limited to the area under study. Moreover, it helped to know the type of training for aerobic exercise given to trainees in order to improve aerobic capacity in cardiovascular endurance abilities of the students. After the findings of the problems the writer would recommend responsible stake holders of the study.

1.6. Scope of the Study

This study was applied at Fonko town, Fonko preparatory School grade 11 male athlete student in Hadiya zone at SNNPR. It was employed on aerobic exercise which can improve cardiovascular endurance performance of the athlete students.

1.7. Limitation of the study

The outcome of this study would be very interesting to conduct the study on selected aerobic exercise on the cardiovascular endurance performance of athlete however; study was limited in one preparatory school site because of the shortage of time and budget.

The experimental research was complex and considering usually as private domain. As a result data collection materials and manpower was very difficult to carry out the study.

3.8. Organization of the Study

This thesis is organized in five chapters. The first chapter of this research discusses the introduction part. In the second chapter, review of related literature from different sources was stated. In this chapter, based on the literature review conceptual framework is designed on components of physical fitness variables comparing enhancing qualities of karate trainees. Chapter three deals with all methodology used for this research. In this part, description of the study area, source of data collection, research design, study population and sampling techniques, instrumentation, inclusion and exclusion criteria, method and procedure of data collection, exercise training protocol, data quality control, method of data analysis, ethical issue and code of conduct. On chapter four the overall collected data were analyzed and presented using tabulation and explicit explanation. Last chapter presents summary of the results, conclusions, and recommendations based on research findings.

CHAPTER TWO

REVIEW LITERATURE

2.1. Aerobic Exercises for Cardiovascular Endurance

2.1.1 Aerobic Exercise

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

And also, Microsoft Encarta Encyclopedia Deluxe (MEED) (2003) classified Exercise into aerobic and anaerobic exercise. Aerobic exercise, which uses oxygen to keep large muscle groups moving continuously at intensity that, can be maintained for at least 20 minutes. Aerobic exercise uses several major muscle groups throughout the body, resulting in greater demands on the cardiovascular and respiratory systems to supply oxygen to the working muscles. Aerobic exercise includes swimming, running, cycling, walking, jogging, and rope jumping and etc. are the form recommended for reducing the risk of heart disease and increasing endurance MEED (2003). Thus, aerobic activity generally has a low to moderate-intensity and long duration.

2.1.2. Studies on Aerobic Exercise

Selvam and Sudha (2008) conducted a study on selected effect 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 Theivannai Ammal College for women, Villupuram. The age group of the subjects ranged between 18 to 20 years. The selected subjects were divided into two groups. The groups

first trained for aerobic exercise. The training group underwent the training for 5 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 effect in the improvement of the physiological variables such as resting pulse rate, breath holding time, vital capacity and respiratory rate.

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

Ozcan and Ozturk , (2011) in Mugale, Turkey conducted the study on the effect of twelve week aerobic exercise programme on health related physical fitness components and blood lipids in obese girls .The aim of the study was to investigate the effects of 12 week aerobic 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 , skin fold 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 triglyceride between pre-test 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 effect 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 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. Although balance and perception of balance were not significantly different between the groups, the experimental group improved their balance by 22.4% from pretest.

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 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 undertaking 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 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 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

Walking: is one of the simplest and most available aerobic exercises. You can vary the intensity to match your fitness level. Other than walking shoes, it does not require any special equipment. You can walk almost anywhere: outdoors or indoors (malls, indoor tracks, or a treadmill). This makes walking easy to continue throughout the year. Walking is a good choice for starting their first exercise program or finds other exercises too hard on their joints. some of the ways a walking habit can improve your health: Better cardiovascular fitness, Stronger leg muscles, Lower blood pressure, Lower risk of heart disease, diabetes, bowel cancer and osteoporosis. It's also a safe, low-impact exercise that most people can do and it's especially good if you're overweight, unused to physical activity or pregnant.

Walking for 30 minutes a day at moderate intensity is great. Walking for a longer period of time is better still. As you get fitter, you will be able to walk more briskly. Walking up and down hills will also help to boost stamina and leg strength. You'll get even more benefits from a walk if you swing your arms as this helps you walk faster and can burn 5 to 10 percent more kilojoules.

Cycling: is another type of aerobic exercise with wide appeal and value. You can use a stationary or regular bike. 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. Cycling is also a good choice for people who are greater than 50 pounds overweight. It helps the heart without the mechanical stress on the back, hips, knees and ankles that walking can cause. One drawback - if you cycle outdoors, exclusively, the weather may limit your activity.

Ski Machines, Stair Climbers, Steppers, Elliptical: These types of machines can provide a good aerobic workout and each has its own unique strengths and drawbacks. First, exercise on these machines may be too strenuous to be enjoyable and provide optimal benefit for the beginner or person of low fitness level, even at the lowest settings. To determine if this type of machine is within your capability, give the machine of your choice a trial run at the store or fitness center. You should be able to pass the "talk test" while exercising at a moderate pace. People with knee or hip problems should avoid stair climbers and steppers as these machines can put extra stress

on these joints. Ski machines require above-average coordination to master. The advantage to the machines is that they are indoor activities that can be pursued regardless of the weather.

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 range with swimming. Therefore, those with heart conditions should address a swimming program with their physician before starting. Water aerobics and water walking are good alternatives for those with joint pain. The buoyancy provided by the water eases stress on the joints.

Jogging, Aerobic Dance: These can be safe and beneficial exercise for the highly fit person. Both can be done indoors, which makes them year-round activities. Anyone with orthopedic problems or who experiences symptoms such as chest pain or shortness of breath should not engage in these activities. Remember to check with your doctor or cardiac rehabilitation instructor before starting any exercise program.

There's more than one way to improve cardiovascular fitness with aerobic or 'cardio' exercise that raises your heart rate. The best activity for you and one you're likely to stick with is one you enjoy and that fits easily into your life.

Running: Like walking, running is an inexpensive exercise you can do anywhere at a time that suits you. It is beneficial in helping to improve heart and bone health. Its advantage over walking is that it improves heart fitness and burns kilojoules at a greater rate. It takes roughly an hour for a walker to burn the same number of kilojoules that a runner burns in 30 minutes.

Jogging: is running at a slower pace which is still a great aerobic exercise. Like walking, running or jogging can be a social activity you can do with a friend or in a group. Many areas have running clubs which welcome runners of all skill levels. University of California Berkeley Foundations of Wellness. A dozen ways to improve you're walking workouts. [Online] Palm Coast, FL: Remedy Health Media. c2010 [accessed 16 January 2016] Available from: <http://www.wellnessletter.com/html/fw/fwFit04Walking.html>

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 cardio respiratory 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 (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. Cardio respiratory 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).

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 is 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 cardio-vascular fitness, and aerobic physical activities are the only means to achieve it. Also, Wuest 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.

Cardio-respiratory endurance, according to Inselet *et al.* (2001), depends on the ability of the lungs to deliver oxygen from the environment to the bloodstream, 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 fitness 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 hypokinetic 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. Good 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 developed through performance of active aerobic activities such as brisk walking, jogging, aerobic 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 active aerobic activity. Activity could be either intermittent or continuous if the amount of exercise is the same, and last at least 10 minutes.

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 2200-2399m for the age 20-29, 1900-2299m for the age 30-39, 1700-2099m for the age 40-49, 1600-1999m for the age 50. For the female 1800-2199m for the age 20-29, 1700-1999m for the age 30-39, 1500-1899m for the age of 40-49, 1400-1699m for the age 50(Cooper, 1968).

2.3.2. Step Test

Step tests have been developed to measure aerobic fitness using a simple test requiring minimal equipment and space. The equipment required will vary on the test being conducted. The step or platform needs to be of solid construction, and will vary in height between 15-50 cm and 6-20 inches. You will also probably need a stopwatch, and you may need a metronome or pre-recorded cadence tape depending on which procedure you are using. The athlete steps up and down on the platform at a given rate for a certain time or until exhaustion. Heart rate may be recorded during the test and/or for some period afterwards. A score can be calculated, which is then compared to normative values to determine a fitness rating. The American College of Sports Medicine (ACSM) also has an equation for determining a person's total gross VO₂ from the stepping rate and step height. <http://www.topendsports.com/testing/tests/step.htm>

2.4. Effect 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 cardiovascular 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 deeper breathing which maximize the oxygen in the blood. There are many studies which prove 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 low percentage of body fat. (Probart *et al.*, 1991)

2.5 Components of Physical Fitness

Physical fitness is a set of attributes that people have or achieve. Being physically fit has been defined as the ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies. (Gutin, 1980).

Fitness is defined as a condition in which an individual has enough energy to avoid fatigue and enjoy life. Physical fitness is divided into five health related (muscular strength, muscular endurance, flexibility, cardiovascular endurance and body composition) and six skill related (agility, balance, coordination, speed, and power and reaction time) components. Skill related fitness components are fitness types which enhances one's performance in athletic or sports settings. Health-related fitness is the ability to become and stay physically healthy. This component focus on factors that promote optimum health and prevent the onset of disease and problems associated with inactivity (NASPE, 2009).

2.6 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. (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 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 O_2 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 VO_2 max and 55% of HR max 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 et al., 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 VO_2 max. 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).

2.7. 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 (<http://www.betterhealth>, 2013).

2.7.1. 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, and the adrenal medulla releases the hormones nor epinephrine and epinephrine. The result is an increase in heartbeat rate. On the other hand, activities such as yoga and meditation lead to activation of the vagus nerve, which slows the heartbeat rate. Other factors affect the heartbeat 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 proportion to the intensity of your exercise. You can track and guide your exercise intensity by calculating your Target Heart Rate (THR) range (<http://www.betterhealth>, 2013). 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 (ACSM, 1995). This maximum rate is based on a person's age. An estimate of a person's maximum heart rate can be calculated as 220 beats per minute (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 while you are exercising or you can take your pulse.

2.8. 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 is closely allied to the lactate threshold 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 or 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 whatever 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's 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).

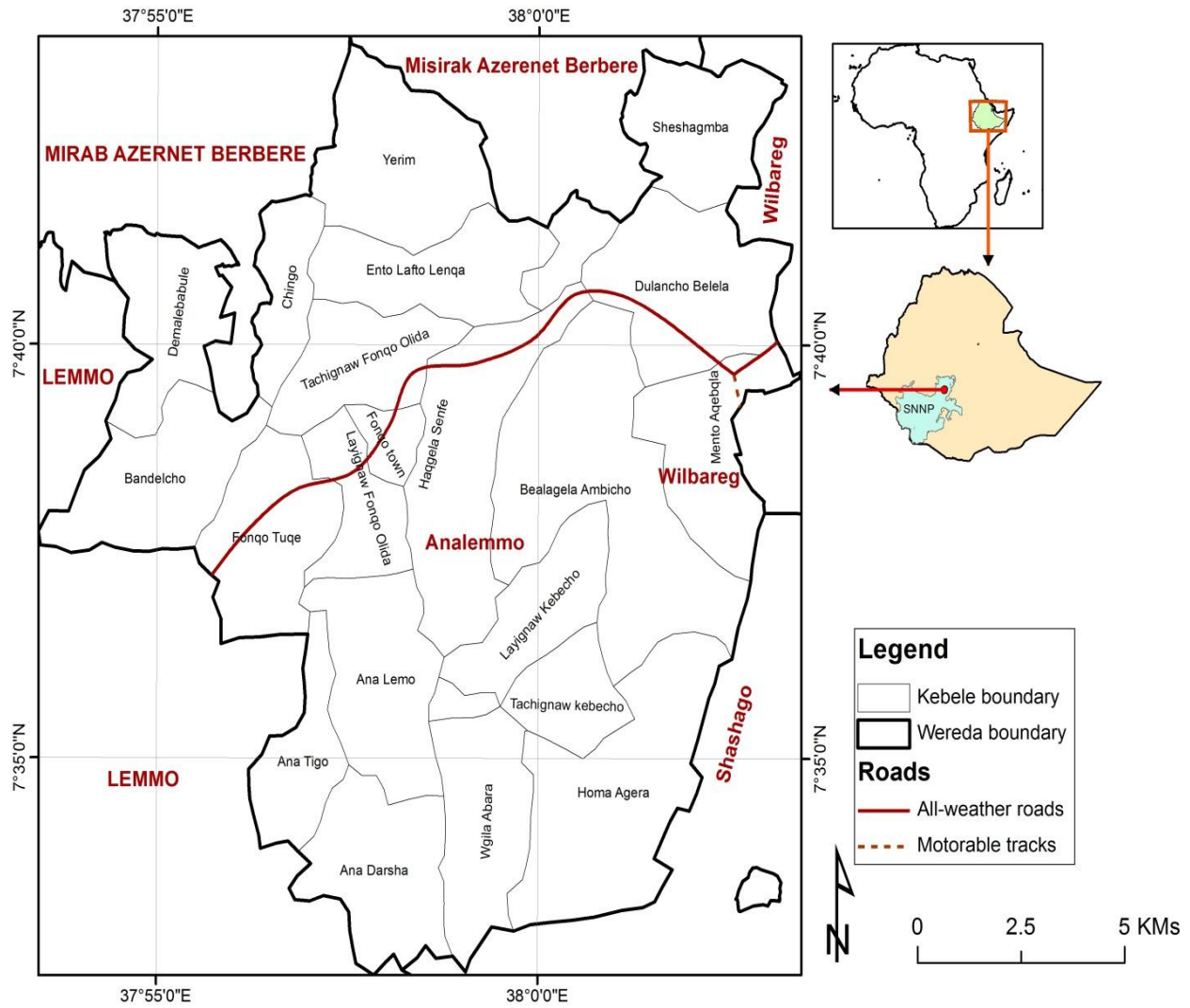
CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This chapter deals with experimental site, target population, sampling techniques and sample size, study design, experimental materials, sources of data, methods and procedures of data collection, inclusion and exclusion criteria, methods of data analysis, data quality control and protocol and ethical consideration of the study participants of research was explained as follows.

3.1. Experimental Site

The study was conducted at Fanko Preparatory School in Ani-lemo Woreda of the Hadiya Zone. The geographical location of the study area is $7^{\circ} 30'$ to $7^{\circ} 45'$ North latitude and $37^{\circ} 54'30''$ to $38^{\circ} 3' 30''$ East longitude (AWFEDO, 2014). As far as its boundaries in relation to its neighboring zones and/or woredas, it bounds with Silte Zone in the north and north-west, Shashogo Woreda in the east, Lemo Woreda in the south-east and south west (ibid). In addition, Ani-lemo Woreda is 18 km far from Hosanna, town of Hadiya Zone in Southern Nation, Nationalities and Peoples Regional State (SNNPRS) and it is about 216 km far from Addis Ababa.



Source; Ethiopian mapping agency

Figure 1. Map of the study area

3.2. Target Population of the Study

The study population was at Fonko Preparatory School of grade 11 male students between the ages of 18 and 19 years, at Fonko Town of Hadiya Zone in SNNPR. Fonko Preparatory School includes grade 11 and 12 students. The writer of this study has got 30 students from total of 300 grade 11 male students.

3.3. Sampling Techniques and Sample Size

To this specific study the writer was followed purposive sampling technique. In this research instances, the writer preferred to use small number of participants on the basis of participant knowledge, its elements and purpose of the study may be members of subjects were easily identified from its larger population (Babbie, 2007).

The selection of population (target group) depends on their grade level, age, health status and on their interest to participate in aerobic exercises training for the improvement of cardiovascular endurance performance for maximizing technical or tactical skills for athletics ability. The sample size of this study was contained 30 selected male athlete students between the ages of 18 and 19years within among 300 grade 11 male students at Fonko Preparatory School of Fonko town, Hadiya zone, SNNPR through purposive selection.

3.4. Design of the Study

In this study, the researcher employed a single experimental group and standard norms. There was no a control group in this study. A single experimental group was used for providing pre-test and post-t

est in order to identify the effect of selected aerobic exercises on improvement of cardiovascular endurance. The training schedule was given three days per week i.e., Monday, Wednesday, and Friday and hence, a total of 24 days was given in a two-month time (December, and January 2016/17) for training sessions in which 60 minutes were allotted for each session.

Table.1.The study design layout

| Treatment | Aerobic exercise program |
|-------------------|---|
| Frequency | 3 days/week |
| Total duration | 2 months (8 weeks) |
| Duration /session | 60min |
| Intensity | moderate (55-69) MHR |
| Exercise days | Monday, Wednesday and Friday |
| Time of training | 1 st day Afternoon, 2 nd day Morning, 3 rd day Morning |

3.5. Experimental Materials

The writer used Fonko Preparatory School football ground for field tests other than conducting the training program of the study subjects. The following materials were used throughout the study. The materials were stopwatch, measuring tape, whistle, mats, marking cones, rope, pen, and score recording sheet.

3.6. Source of Data

The secondary data was collected from different written materials like journals, prior researches, published books and other documented materials. The primary data was collected from the subjects of experimental study group through pre, during and post tests on effects of selected aerobic exercises on cardiovascular endurance.

3.7. Methods of Data Collection

1. 12 minutes run/walk for measuring cardiovascular endurance.

To undertake this test the writer used:-

- Track or area with consistent intervals set up to ensure proper distance to be recorded
- 400 meter track
- Stopwatch
- Whistle
- Assistant
- Pencil/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 **warms up** for 10 minutes
- The assistant gives the command “GO”, starts the stopwatch and the athlete commences the test.
- The assistant keeps the athlete 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.

2. 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)

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** (see: <http://www.webmd.com/heart/taking-a-pulse-heart-rate> - If wearing a heart rate monitor record your heart rate 1 minute from when you sit down.
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 were 18 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 was collected through inducing effective selected aerobic exercises on cardiovascular endurance and analyzed by using computerized Statistical Package for Social Sciences software

(SPSS V. 20). In this study SPSS- software was used to summarize fitness status and their changes observed in their physical fitness by calculating measures of central tendency like mean and calculating measures of dispersion like standard deviation.

3.10. Data Quality Control (DQC)

To ensure quality of the data of cardiovascular endurance, the selected and standardized aerobic exercises were used. To minimize the mistakes that may occur during data collection; and to collect the appropriate endurance test, like 12 minute run and step test, assistant recorder of data was trained among physical education teachers at the school under study.

3.11. Protocol and Ethical Consideration

The study was designed in such a way that ethical issues have properly addressed. Privacy of the subjects and confidentiality was strictly observed and maintained throughout the study. The study was conducted under school rules and code of conduct in governing research activities and ethical issues. The written consent/ agreement form was given and informed to the concerned bodies.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

This chapter dealt with the analysis of data collected from the samples under this study. The purpose of the study was to examine the effects of Aerobic exercises in improving cardiovascular endurance performance of selected Athletes in Fonko preparatory school of grade 11 male students. To achieve the purpose of the study 30 male students from Fonko preparatory school were selected as subjects and their age was 18-19 years. They were assigned in one group and the selected exercises were given for 8 weeks. The variables which were selected for this study were **Step test** and **12 minutes run**. In addition to this (resting heart rate and exercise heart rate) were measured. Pre, during and post tests were conducted for all 30 study subjects and the test results were recorded. The collected data were analyzed by paired sample t-test using SPSS version twenty (V.20). The results for each variable were discussed below.

4.1. Mean and SD Values of Step Test Performance (min)

Table 2. Mean and Standard deviation of step test (Pre-test, during-test and Post-Tests)

| Variable | N | PT | DTT | PoT |
|----------|----|--------------------|-------------------|--------------------|
| ST | 30 | 148.46±4.38 | 136.1±8.01 | 121.86±8.05 |

Values are in the form of mean \pm SD = standard deviation, PT, = pre training test, DTT= during training test, PoT= post training test, ST = step test.

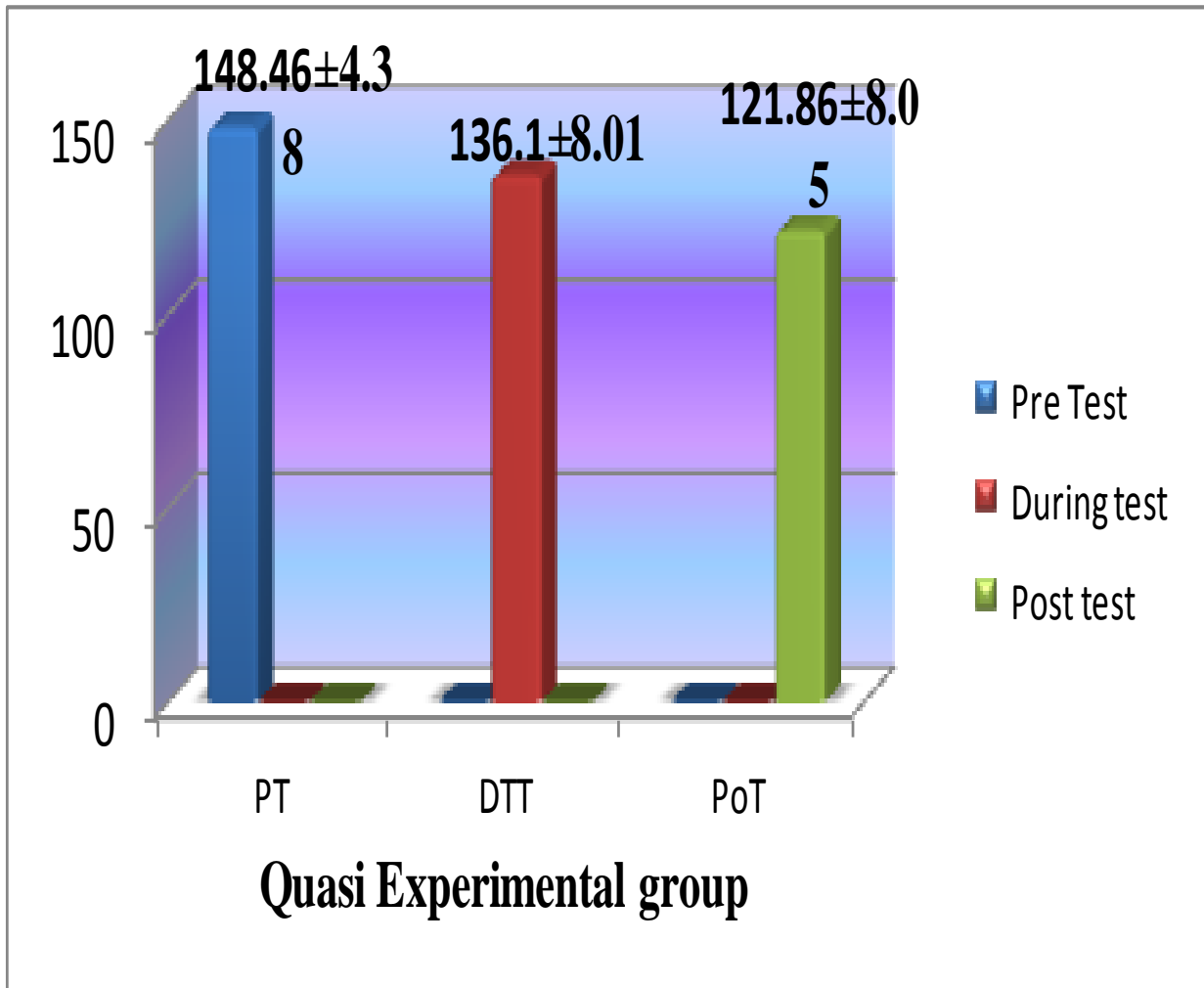


Figure 2. Mean comparison among pre, during and post step test results of the study subjects.

The above table 2 and figure 2 showed that there was significant change in pre-post test results. The improvement was seen on step test mean differences values due to the eight weeks aerobic exercise training, in which the subjects were engaged in. The mean value for step test before training was 148.46 ± 4.38 beats/minutes, during training test results was 136.1 ± 8.01 beats per minutes and post training results mean value of step test was 121.86 ± 8.05 beats/minutes after eight weeks training program. The mean differences value was decreased by **26.6 beats** per minutes. This finding showed that there was a significant improvement on cardiovascular fitness performance of the study subjects after 8 weeks training.

The step test result was compared with an international step test norms among similar age groups that range from 18 and 19 years (www.topendsport.com). The international step test norms is 148- 121 for this age groups while the step test mean value result of this study was 121.86. Hence, the study result has fallen in **above average standard** (norms found on the table 3 below)

Table 3. Normative data for the step test

| Age | Excellent | Above average | Average | Below average | Poor |
|-----------------|-----------------|----------------|----------------|----------------|----------------|
| 16 to 19 | | | | | |
| Male | < 121 | 148-121 | 156-149 | 162-157 | >162 |
| Female | < 129 | 158-129 | 166-159 | 170-167 | >170 |

Source: (www.topendsport.com)

4.2 pair sample t-test result of step test

Table 4. Paired Samples Test

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|--------|-------------------------|--------------------|----------------|-----------------|---|--------|--------|----|--------------------|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test - During-test | 12.067 | 4.472 | .816 | 10.397 | 13.736 | 14.780 | 29 | .000 |
| Pair 2 | Pre-test - Post-test | 26.600 | 5.123 | .935 | 24.687 | 28.513 | 28.438 | 29 | .000 |
| Pair 3 | During-test - Post-test | 14.533 | 3.560 | .650 | 13.204 | 15.863 | 22.362 | 29 | .000 |

The above table 4 showed that paired sample t-test result of step test and paired differences pre-test, during -training and post-test.

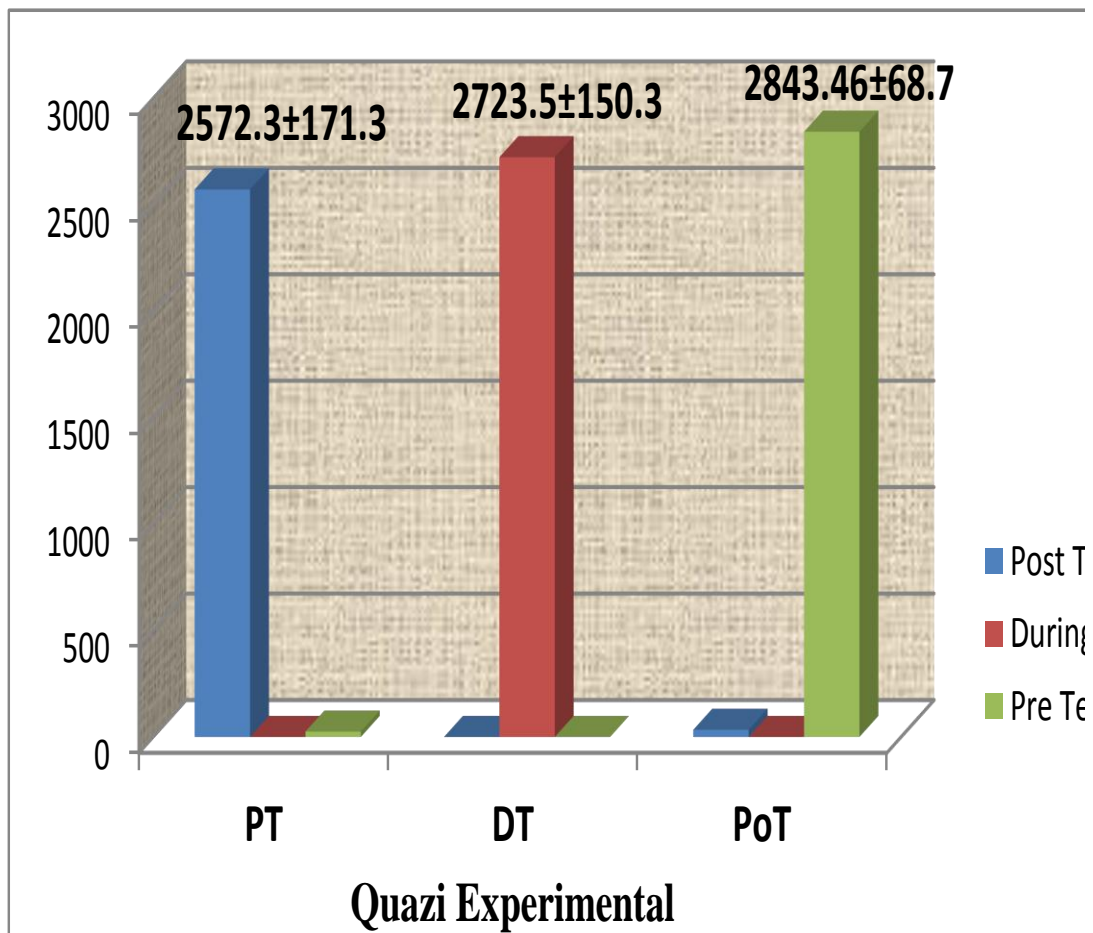
4.3. Mean and Standard deviation of Twelve Minutes run Performance (m)

Table 5. Mean value + SD of Twelve minutes Run (meter) of the participants' (pre, during and post-tests)

| Variable | N | Quasi Experimental group | | |
|----------|----|--------------------------|----------------------|---------------------|
| | | PT | DTT | PoT |
| TMR | 30 | 2572.3±171.3 | 2723.9±150.32 | 2843.46±68.7 |

Values are in the form of mean \pm SD, SD = are standard deviation, PT, = pre training test, DTT= during training test, PoT= post training test, min = minute and TMR = twelve minutes run.

Figure 3. Mean comparison among Pre, during and post test results of Twelve



As depicted on the above table 5 and Figure 3 that there was a significant improvement observed in twelve minutes run (in meter) pre-post training tests mean values score of 8 weeks exercise. The mean value of pre training tests results of twelve minutes run was 2572.3 ± 171.3 , during training test mean value result was 2723.9 ± 150.32 and post training test mean value result of twelve minutes run were 2843.46 ± 68.7 . From these results the researcher were observed the significant improvements in their performance of the subjects due to aerobic exercises. When we compare 12 minutes run of pre and post test result of the participants after 8 weeks of exercises program. It showed the significant increments on the performance of the subjects within **271.16** meters mean differences. This result showed there was significant improvement in the performance of the participants' cardiovascular abilities.

The standard norms for 12 minutes run test for male athletes whose age ranges from 17 to 19 was compared with the study result. Standard norms for this test ranges from 2700 – 3000 meters (Cooper, 1968) while the study result was found to be 2843.46 meters in 12 minutes run. Hence, the result of this finding is **above average standard** (Norms found in the table 6.below).

Table 6. Norms for 12 Minute run tests of male athletes

| Age | Excellent | Above Average | Average | Below Average | Poor |
|--------------|-----------|-------------------|------------|---------------|--------|
| 13-14 | >2700m | 2400-2700m | 2200-2399m | 2100-2199m | <2100m |
| 15-16 | >2800m | 2500-2800m | 2300-2499m | 2200-2299m | <2200m |
| 17-19 | >3000m | 2700-3000m | 2500-2699m | 2300-2499m | <2300m |
| 20-29 | >2800 | 2400-2800m | 2200-2399m | 1600-2199m | <1600m |
| 30-39 | >2700 | 2300-2700m | 1900-2299m | 1500-1999m | <1500m |
| 40-49 | >2500 | 2100-2500m | 1700-2099m | 1400-1699m | <1400m |
| >50 | >2400 | 2000-2400m | 1600-1999m | 1300-1599m | <1300m |

Sources (Cooper,1968).

4.4. The Mean Difference Value and Significance Level of Each Tests

Table 7. The Mean Differences Value and Significance Level of Each Test Results of the Parameters

| Variables | Para (I) | Para (II) | MD (I-II) | Sig |
|-----------|----------|-----------|---------------|-------|
| Step test | PoT | PT | 26.6 | 0.000 |
| | | DTT | 12.36 | 0.000 |
| | | DTT | 3.5 | 0.000 |
| TMR | PoT | PT | 271.16 | 0.000 |
| | | DTT | 151.63 | 0.000 |

Para = parameter I and II, PT = pre training test, DTT= during training test, PoT= post training test, MD= mean differences, Sig= significances, TMR = Twelve minutes run.

As depicted on the above table 7, the table showed results of step test, and twelve minutes run. The mean difference value of step test from pre-test and post test result was **26.6** beats per minute as compared pre test to during test 12.36 beats / minute. These indicate the mean differences value varies from one test to another. When we compare pre-post test results of the 12 minutes run after the exercise program of 8weeks, there was an increased mean difference within **271.16** meter distances.

The findings of this study results showed there were significant improvements on two months aerobic exercises parameters in athletic performances.

The results of these findings were compared with that of international standard norms. According to standard norms the test result of Step test and 12 minutes run were in the **above average standard** level with the norms.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

Some individuals breathe so efficiently that they supply with oxygen every part of their body where the food is stored and produce energy abundantly. In other individuals, however, the oxygen is not supplied sufficiently to all places. They are easily fatigued and cannot endure for a long time. In simple terms, they are physically incapable in comparison to aerobically capable individuals. During aerobic training, the cardiovascular system (the heart, lungs and blood vessels) reacts on the increased level of physical activity by the increased intake and usage of the oxygen for the purpose of releasing the energy. There had been proficiency problems which had resulted from Cardiovascular Endurance of Athletes at the school under study.

Therefore, to achieve the purpose of current study, it was examined Aerobic exercises in order to improve Cardiovascular Endurance performance of Athletes' abilities in the case of grade-11 students at Fonko Preparatory School.

To achieve the purpose of this study, 30 male Athletes were selected between the age group of 18 and 19 years. All of them were grouped in one experimental group. In order to attain the objective of the research, the study subjects of sport proficiencies were measured through fitness parameters based on their cardiovascular endurance exercises. The parameters used to measure cardiovascular endurance were: Step test and twelve minutes run was applied on the study subjects. In addition, parameters like: resting heart rate and exercises heart rate was used in this study. The exercise schedule was designed for 2 months. At which three days exercise session per week with 60 minutes durations and low to moderate intensity was applied. Each 60 minute sessions were divided in to three phases: warming up, main parts (exercises for fitness) and cooling down phases. The data was collected from the study subjects; and analyses was done through using SPSS version (V20)software based on the test results, which collected from the study subjects.

The paired sample t-test was used in this study. Based on the result analysis made, at the end of the study it was observed that resting heart rate of the participants were reduced significantly due to

the exercise program and significant change were observed in improvement of cardiovascular endurance (exercise heart rate) measurements.

5.2. Conclusions

Based on the major findings of the study to examine aerobic exercises in improving cardiovascular endurance performance of athletes the following points were stated as conclusions as follows.

- It was observed that an intimate difference between pre and post physical fitness performances of the subjects of the study. Thus, the finding of this study showed that, there were improvements on cardio respiratory endurance performance of the participants after 8 weeks exercises of 12 minutes run. There was the decrement that had on the heart beats of the subjects after 8 weeks exercise program on endurance, when we compared the heart beats of pre and post test of the subjects.
- From the results of the research findings it was shown that decreased on the resting heart rate and increased on exercise heart rate of the participants after 8 weeks exercises. For the results decreasing and increasing the main reason was aerobic exercise training also found by the current study.
- When we compared 12 minutes run of pre and post test results of the participants after 8 weeks exercise program, it was found significant increments on the performance of the subjects within 271.16meters mean differences. The result showed that significant improvement in the performance of participants' had cardiovascular endurance.

5.3. Recommendations

Considering the major findings and conclusions of the study, it is important to put (state) the following points as recommendations for investigate more effects of selected aerobic exercise training in improving cardiovascular endurance performance of Athletes.

- To empower the cardiovascular endurance performance of Athletes, it was good if the responsible bodies provide financial, material, motivational and physical fitness support to those students.
- As effects of aerobic exercises on cardiovascular endurance performance of Athletes was crucial; any football, athletics and other sport coaches or concerned bodies may consider exercise as a part of main work for all Athletes.
- Responsible bodies like education office have to collaborate with Woreda Sport Commission Office Athletics Project so that develop Athletes proficiencies of Fonko preparatory school as well as other youth's center offices.
- Further researches may follow the methodology in more sophisticated manner; while this study used as a spring-board for the improvement of cardiovascular performance of Athletes by using longer training period.
- Further researchers may conduct their studies on more different types of strength and endurance exercises that could improve Athletes' performances.

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APPENDICES

APPENDIX I

Participant's Information Sheet and a Consent Form

Researcher's name: **Arega Jakeiso**

Supervisor's name: **Mebratu Belay (Asst.Piro)**

Thesis Title:

**Effect of Selected Aerobic Exercises on improvement of Cardiovascular Endurance for
Performance of athlete: the case of Fonko Preparatory School.**

You are being asked to participate in this research study as described below. All research studies carried out like this one are governed by the regulations for research on human beings. These regulations require that the researcher should obtain a signed agreement (consent) from you to participate in this research project.

The researcher will explain to you in detail the purpose of the project, the procedures to be used, the potential benefits and the possible risks of participation in this study. You can ask the researcher any questions that you may have about the study, and expect to receive satisfactory answers regarding the same. A basic explanation of the project is summarized below.

After discussion, if you agree to participate in the study, please sign this form in the presence of the researcher. You may discontinue at any time from the study if you choose to do so.

1. Purpose and Procedures:

The purpose of this research project is to improve cardiovascular endurance ability of athlete students on the selected Aerobic fitness variables. The subjects to be involved in this study were being 30 male students. This study requires your participation to perform a certain tests in measuring the aerobic fitness variables.

2. Risks and the Safeguards:

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 will be provided, but no financial compensations will be given.

3. Confidentiality:

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

4. Contact address

- **Arega Jakeiso** → +251-913476499
- **E-mail Address** → arjama2002@gmail.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 II

Health History and Physical Readiness Questionnaire of the Participants this questionnaire is designed to obtain information on the health status and physical readiness of the subjects participating for the research study. The information was kept strictly confidential. **For students:** please read the following question carefully and indicate your correct response to each question by encircling it on the choice letter given.

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

If yes indicate the type of injury that you had _____

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

3. Identify any medical problems that you had

A. Cardiovascular C. Respiratory E. None

B. Neuromuscular D. Metabolic

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

A. Yes B. No

5. Are you taking any prescription medicines recently?

A. Yes B. No

If yes, name them below:-

Name of drug

Dosage

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

A. Yes B. No

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

A. Yes B. No

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

A. Yes B. No

9. Do you currently drink more than the average amount of alcohol per week (21units for men and 14 units for women (1 unit = ½ pint of beer/cidr/larger or 1small glass of wine)

A. yes B. No

10. Do you currently smoke?

A. Yes B. No

11. Do you NOT currently exercise regularly (at least 2 times per week) and/or work in a job that is physically demanding.

A. Yes B. No

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

A. Yes B. No

If yes explain your reason here

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

Client's full Name: _____ Trainer's Name: _____

Client's Signature: _____ Trainer's Signature: _____

Date: _____ Date: _____

APPENDIX III

Fitness Test Assessment Record Sheet

Name _____ code _____

- Height _____
- Weight _____
- Age _____

Paired Sample T-test Result of each parameters

Test Result of Step test

Paired samples t- Test Result of Step Test

| | Paired Differences | | | | | t | df | Sig. |
|---------------|--------------------|--------|--------|---|----------|--------|----|------|
| | MD | SD | SE | 95% confidence interval of the difference | | | | |
| | | | | Lower | Upper | | | |
| Step PT – DTT | 12.3666 | 4.6718 | .85296 | 10.62216 | 14.111 | 14.498 | 29 | .000 |
| Step PT – PoT | 26.6 | 4.3039 | .78579 | 24.99287 | 28.20713 | 33.851 | 29 | .000 |

Paired Samples T- test results 12 min run.

| | Paired Differences | | | | | T | Df | Sig. |
|--------------------|--------------------|--------|---------|---|-----------|--------|----|------|
| | MD | SD | SE | 95% confidence interval of the difference | | | | |
| | | | | Lower | Upper | | | |
| 12min run PT - DTT | -151.63 | .6871 | 12.5453 | -177.29 | -125.9754 | -12.08 | 29 | .000 |
| 12minrun PT - PoT | -271.13 | 73.941 | 13.499 | -298.73 | -243.523 | -20.08 | 29 | .000 |

APPENDIX VI

Description of the Study Design

Gender and age groups of the subjects: on selection of male students the investigator based on their social expectation and cultural influences because in our environment the society expected sport activities for male only, for this reason the society does not permit females to participate in sport activities. The researcher based on the above reason he was select male students only. The selection of ages are based on the average age groups of the school; the average age in Fonko Preparatory School students are between 17-20 years old, the investigator for his study purposively was select the average age groups of 18 and 19 years old.

Two months of training schedule (January and February): In the periodization of the exercise schedule, 3 months or 12 weeks will be selected. In the selection the investigator depending on exercise program that includes annual plan, monthly plan, weekly plan and training lesson/unit plan (Jakl, 2008). According to Jakl 8 to 12 weeks of training program is essential to improve individuals' abilities. Based on this idea the investigator purposively was take 12 weeks training program.

Training days per week: Three days per week was selected because internationally 3-4 days a week for aerobic activities are recommended. The investigator was take the minimum 3days 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 are from Monday to Friday. Therefore, the selected first day exercise were on Monday afternoon at 5:10 to 6:20pm, second day of exercise on Wednesday afternoon 5:10 to 6:20pm and third day exercise on Friday morning 7:00 to 8:10am.

Duration of time for each session: The duration of exercise time for each session of this study is 70 minutes.

APPENDIX V

Training Schedule

The main objectives of this training schedule was to examine the effects of aerobic exercises on cardiovascular endurance for performances of student athletes. The actual training time for each session is 60 minutes (one hour).

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

First Month training schedule (January, 2017)

| Days per week | Types of Exercises | Duration (60min) | Frequency (Repetitions per sets) | Rest/Recovery time | Intensity of exercises |
|----------------------------------|---|------------------|----------------------------------|--|--------------------------------|
| Monday (5:10 pm to 6:10pm) | 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 | | 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 | | |
| Wednesday (5:10 pm to 6:10pm) | Warming up exercises Different types of exercise for general and specific warming up were employed with in this session. | 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 stretching exercises | 8min | 1x8min | | |
| Friday (7:00am to 8:00am) | Warming up Exercises Different types of exercise for general warming up and specific warming up was performed within this warming up exercise sessions. | 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 stretching exercises | 10min | 1x10min | | |

APPENDIX VI

Second Month training schedule (February, 2017)

| Days per week | Types of Exercises | Duration (60min) | Frequency (Repetitions per sets) | Rest/Recovery time | Intensity of exercises |
|----------------------------------|--|------------------|----------------------------------|--------------------|---------------------------------|
| Monday (5:10 pm to 6:10pm) | 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 | 5 min | Moderate intensity (55-69%MHR) |
| | 12 minutes run (on running track) | 12min | 1x12min | | |
| | Jogging | 6min | 1x3min | | |
| | Rope jumping | 10min | 30x4 | | |
| | Track work out | 10min | 1x10min | | |
| | Cooling down: different types of stretching exercises | 8min | 1x8min | | |
| Wednesday (5:10 pm to 6:10pm) | Warning up exercises Different types of exercise for <u>General</u> warming up and <u>specific</u> warming up was employed with in this warming up exercise sessions. | 10 | 1x10min | 5 min | Moderate intensity (55-69%MHR). |
| | Rope jump | 15min | 3x5min | | |
| | Aerobic conditioning with Jogging | 13min | 1x13min | | |
| | Track work out | 10min | 1x10min | | |
| | Cooling down: different types of stretching exercises | 8min | 1x8min | | |
| Friday (7: 00am to 8:00am) | 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 | 5 min | Moderate intensity (55-69%MHR) |
| | Rope jumping | 10min | 2x5min | | |
| | Jogging | 10min | 2x5min | | |
| | Track workout | 6min | 2x3min | | |
| | Aerobic training | 12min | 1x12min | | |
| | Cooling down: different types of stretching exercises | 8min | 1x8min | | |

APPENDIX VII

List of Subjects Participated in the Study (CODE LIST)

| Serial codes of Subjects | Date of birth | Age | Class Level | Name of the School |
|--------------------------|---------------|-----|-------------|--------------------|
| Subject-1 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-2 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-3 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-4 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-5 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-6 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-7 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-8 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-9 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-10 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-11 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-12 | 1990E.C | 19 | 11 | Fonko preparatory |
| Subject-13 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-14 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-15 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-16 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-17 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-18 | 1991E.C | 19 | 11 | Fonko preparatory |
| Subject-19 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-20 | 1990E.C | 19 | 11 | Fonko preparatory |
| Subject-21 | 1991E.C | 19 | 11 | Fonko preparatory |
| Subject-22 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-23 | 1991E.C | 19 | 11 | Fonko preparatory |
| Subject-24 | 1990 E.C | 19 | 11 | Fonko Preparatory |
| Subject-25 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-26 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-27 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-28 | 1991E.C | 18 | 11 | Fonko preparatory |
| Subject-29 | 1990 E.C | 19 | 11 | Fonko preparatory |
| Subject-30 | 1991E.C | 18 | 11 | Fonko preparatory |

APPENDIX VIII

Raw data on step- test

| Serial no of subjects | Pre-test | During - test | Post – test |
|-----------------------|---------------|---------------|---------------|
| 1 | 160 | 152 | 140 |
| 2 | 148 | 132 | 120 |
| 3 | 148 | 136 | 124 |
| 4 | 148 | 132 | 116 |
| 5 | 148 | 136 | 124 |
| 6 | 144 | 128 | 112 |
| 7 | 156 | 140 | 124 |
| 8 | 148 | 132 | 116 |
| 9 | 148 | 140 | 136 |
| 10 | 144 | 128 | 120 |
| 11 | 144 | 128 | 112 |
| 12 | 160 | 152 | 140 |
| 13 | 148 | 140 | 124 |
| 14 | 152 | 140 | 128 |
| 15 | 144 | 128 | 112 |
| 16 | 148 | 136 | 124 |
| 17 | 148 | 136 | 124 |
| 18 | 144 | 128 | 112 |
| 19 | 148 | 132 | 116 |
| 20 | 142 | 128 | 112 |
| 21 | 152 | 148 | 128 |
| 22 | 144 | 132 | 116 |
| 23 | 152 | 148 | 128 |
| 24 | 144 | 128 | 112 |
| 25 | 152 | 148 | 128 |
| 26 | 148 | 136 | 124 |
| 27 | 148 | 132 | 116 |
| 28 | 152 | 148 | 128 |
| 29 | 148 | 132 | 116 |
| 30 | 148 | 136 | 124 |
| Mean Value | 148.46 | 136.1 | 121.86 |

APPENDIX IX

Raw data on twelve minutes run- tests

| Serial no of subjects | Pre-test | During - test | Post – test |
|-----------------------|---------------|---------------|----------------|
| 1 | 2100m | 2450m | 2625m |
| 2 | 2712m | 2800m | 2975m |
| 3 | 2537m | 2712m | 2800m |
| 4 | 2625m | 2800m | 2887m |
| 5 | 2537m | 2712m | 2800m |
| 6 | 2537m | 2712m | 2800m |
| 7 | 2450m | 2537m | 2712m |
| 8 | 2625m | 2800m | 2887m |
| 9 | 2450m | 2625m | 2712m |
| 10 | 2800m | 2975m | 3062m |
| 11 | 2800m | 2975m | 3062m |
| 12 | 2537m | 2712m | 2800m |
| 13 | 2537m | 2625m | 2712m |
| 14 | 2625m | 2800m | 2887m |
| 15 | 2712m | 2800m | 2975m |
| 16 | 2450m | 2537m | 2712m |
| 17 | 2450m | 2537m | 2712m |
| 18 | 2800m | 2975m | 3062m |
| 19 | 2625m | 2712 | 2800m |
| 20 | 2712m | 2800m | 2975m |
| 21 | 2450m | 2537m | 2712m |
| 22 | 2625m | 2712m | 2800m |
| 23 | 2450m | 2537m | 2712m |
| 24 | 2712m | 2800m | 2975m |
| 25 | 2625m | 2800m | 2887m |
| 26 | 2537m | 2712m | 2800m |
| 27 | 2100m | 2450m | 2625m |
| 28 | 2625m | 2800m | 2887m |
| 29 | 2625m | 2800m | 2887m |
| 30 | 2800m | 2975m | 3062m |
| Mean Value | 2572.3 | 2723.9 | 2843.46 |

Declaration

I, the undersigned declare that this Thesis is my original work and it has not been presented in other universities, colleges or institutes for a degree or other purpose. All sources of the materials used have been duly acknowledged.

Name: _____ Signature: _____ Date: _____

This work has been done under my supervision.

Name: _____ Signature: _____ Date: _____