

**EFFECT OF AEROBIC EXERCISE ON SELECTED PERFORMANCE  
RELATED PHYSICAL FITNESS COMPONENT: THE CASE OF  
SHEWAROBIT SECONDARY SCHOOL IN NORTH SHEWA OF  
AMHARA REGIONAL STATE OF ETHIOPIA**

**MEd THESIS**

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**Effect of Aerobic Exercise on Selected Performance Related Physical Fitness  
Components of a Student's: In the Case of Shewarobit Secondary School in  
North Shewa of Amhara Regional State of Ethiopia**

**A Thesis Submitted to the Department of Sport Science, Postgraduate  
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# HARAMAYA UNIVERSITY

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## **DEDICATION**

The researcher enthusiastic his work to his family for their valuable support in my life's overall success. As well as the researcher extended his dedication to my son Hamon.

I dedicate this thesis manuscript to my beloved son and families. As well as the researcher extended his dedication to peoples who contribute even a piece of advice throughout in my life to reach in this stage.

## STATEMENT OF THE AUTHOR

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## **BIOGRAPHICAL SKETCH**

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## **ABBERRATIONS AND ACRONYMS**

AAHPERD:	American Alliance of Health, Physical Education, Recreational and Dance
ACSM	American College of Sport Medicine
ANOVA:	Analysis of Covariance
AT:	Aerobic Training
BMI:	Body Mass Index
COMT:	Combined Aerobic and Strength Training
DHHS:	The Department of health and Human Services
LV:	Left Ventricular
MOE:	Ministry of Education
NT:	No Training
PCPFS:	President Council of Fitness, Sport and Nutrition
PE:	Physical Education
ST:	Strength Training
VO2:	Maximum Aerobic Capacity
VO2peak:	Aerobic Power
WHO:	World Health Organization

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# **EFFECT OF AEROBIC EXERCISE ON SELECTED PERFORMANCE RELATED PHYSICAL FITNESS COMPONENT: THE CASE OF SHEWAROBIT SECONDARY SCHOOL IN NORTH SHEWA OF AMHARA REGIONAL STATE OF ETHIOPIA**

## **ABSTRACT**

Exercise is a good way to develop a healthy heart, mind and body. Healthy hearts are developed when a person performs the recommended daily aerobic exercise routine. People who do daily exercise help keep the mind more alert, and have a positive outlook. The most common practices of these exercises are walking, jogging, dancing, ball games etc. with moderate intensity. The purpose of this study was to examine the effect of aerobic exercise on some selected performance-related physical fitness components of students. Total populations are 52 students from Shewarobit secondary school were selected as study subjects and their age range from 16-19 years. 52 subjects had divided into two groups, 26 an experimental and 26 a control group. 26 experimental group participated in moderate intensity aerobic exercise for 3 months, 3 days per week and 40-60 minutes duration for month one, two and three respectively. Control group (n=26) didn't perform selected variable training, and both groups had taken pre and post-test. The research design was quasi-experimental. The collected data was analyzed by paired sample t-test (SPSS v.20). The result showed that on agility test in control group was MD=0.065, SD=1.678 & P=.844 while experimental MD=8.865, SD=3.465 & P=.000, balance test control MD=.115, SD=3.953 & P=.883 & whereas experimental MD=8.00, SD=6.928 & P=.000, power test control group MD=.038, SD=.239 & p=.423 while experimental group MD=.317, SD=.228 & p=.000. Generally, This indicated that the effect of aerobic exercises on the improvement of performance related fitness components. There was a significant mean difference between post and pretest results of agility, balance, and power in experimental groups but there was no significant mean difference in control groups.

**Key Terms**-Aerobic exercise, Agility, Balance, fitness, physical fitness, Power

# 1. INTRODUCTION

## 1.1 Background of the Study

Education is the process through which students acquire knowledge, skill, change in behavior and shape personality. In addition to this education is an essential and basic investment since it results in the form of human resource development which return contributes the total aspects of country development. To bring country development learners have to follow each curricular instruction on the wall of school. Though each instructional subject, responsible and ethically matured human resource was produced since the finale goal in the study of each instruction is to achieve the objective of the curriculum. (MOE,1999).

Education is a necessary of life, social process of continuing change and reconstruction of the individual experience, being interpreted within the concept of development, education is a process of living and not a preparation for future living. (Dewey,1915).

physical education is a part of schools' curriculum that teachers to the whole child and provides fitness assessments to the children to show their current fitness levels and provide ways to improve those levels and the process by which an individual gains optimal skill through some types of activity (Lumpkin,2005).

Physical fitness means the body's ability to work effectively and efficiently during any working hours and recreational time. A person who, physically fit is someone who will a full of healthy and lead an active life style and safeguard his/her body against disease, and live longer healthier life. Physical education should do more to prepare and motivate children to engage in physical activity outside of school and through their lives. Although a focus on fitness in physical education is not a new idea, current approach to fitness education should be directed at developing lifetime physical activity habits (Lund and Tannen, 2010).

In adults, relationships among physical activity, health related fitness, and health are fairly established. Low level of physical activity and cardio respiratory fitness are both associated with higher risk of all cause and disease specific mortality (Thune &etal1998). Physical fitness is the ability to perform daily activities willingly and actively. Physical fitness includes

not only components of sports but those of health as well as regular physical activity prevent or limit weight gain and gain in body mass index (BMI) (Kyle et al., 2001).

The National College of health Risk Behavior Survey responds that 35 percent of American college students are overweight (Lowry et al., 2000). This is not surprising considering that more than two third of American adult population are classified as overweight (Flegal et al., 2002).

Making weight gains is Americas leading health problem (Mokdad et al., 2001). The expert committee of the World Health Organization (WHO) described physical fitness as “the ability to undertake muscular work satisfactorily”. Every person has a different level of physical fitness which may change with time, place of work, situation, and there is interaction between the daily activities and the fitness of an individual, the point if where to put the level of optimum fitness. From the psychological point of view, physical fitness may say to be the ability of a body to adopt and recover from strenuous exercise.

Many children are not developing fitness habits and they are not understood the value of physical activities for active lifestyle. Sedentary behavior has become common place. Schools have the potential to improve the health of young people by providing the instruction in physical education that promote enjoyable lifelong physical activity. Diseases and health problem resulting from an inactive lifestyle have their origin early in life. This is when an active lifestyle should be established. Fitness begins at birth and should continue throughout a person’s life. Physical activity and fitness behavior should be normal and necessary part of every one’s life. Fitness improves general health and it is essential for full and vigorous living.

Many researcher work including Cabin, et al., (2002), Diamond, (2001) and Hadfield, (2000) have shown that numerous health benefits have been described physical exercise. These are: regular physical activity can lower the risk of disability and death from heart disease, helps to strengthen the cardiovascular system, maintain normal blood pressure, and decrease blood cholesterol, increase toleration of stress and maintain weight, increases energy level of the individual for work and play, leads to improved sleep, and strengthen the body, better

enabling it to cope up with illness or accidents, increase the ability to withstand fatigue, improve concentration and alertness, improve posture and enhance body appearance, improves individuals mental health, reduce anxiety, help to alleviate depression, increase feeling of accomplishment work, increase productivity and decrease health cost etc.

## **1.2. Statement of the Problem**

The goals of physical education for secondary schools are improving physical health and develop a good attitude towards various physical activities that will result in life time participation in physical activities (MOE, 2003).

High school Physical Education Program was a primary value achieving active lifestyle. Their potential to contribute to the health goals was enormous in some schools. Physical education is regarded as integral component of comprehensive School Health Program. These programs can reach the mission of students; can help them to develop skills, understandings and habits for a healthy lifestyle. Health Policy Reports call for daily, high quality physical education for all students KG- high school. In addition to improvement in the students' physical skills and wellbeing, the critical condition that it can make to his/her development was becoming more widely recommended and accepted in school psychological health and academic areas in most countries. But currently in Ethiopia, physical education was not considered to be that much significant subject. Since most high schools in Ethiopia, the time allotment reduced to one period per week, the number of student participation in daily education was declining and some researchers show that daily participation in physical education by high school students decreased (Tadesse Gizachew, 2012).

Nowadays, physical exercise is a non-pharmacological treatment of modern busy lifestyle around the world. Thus, many studies believe that regular physical activity can have immediate health benefits by positively affecting body composition and musculoskeletal development for male and female. The reality in our country as well as at Shewarobit secondary School shows on the contrary. The value of improving skill related physical fitness

by aerobic exercise has been theoretically applied, but not practically. Beside this, student's participation in physical activity is situated at minimum level. Consequently, students are not beneficial of the regular physical exercise. Skill related physical fitness are developed through different aerobic exercises such as swimming, cycling, tennis playing, resistance machine aerobic etc. that improve fitness in the gymnasium. This method of developing fitness needs high cost. These methods of training are difficult to implement in high school level. However, active aerobic activities such as brisk walking, jogging, running, aerobic dance, ballgames and other sport exercises could improve fitness in the field and without gymnasium which are easy to implement in high school setting.

With that being said, it was worth mentioning that there have been considerable numbers of researches conducted by different scholars on different topics. Among this, for example, Berihun Ghebreyesus (2015) did conduct a study on the topic The Role of Selected Exercise in Enhancing Performance of the Sport Talent of Children: 11 years old-14 years old Children in focus at Haramaya University. For his research he used T-Test to collect data from the experiment. By doing so, he showed that there was significant improvement on speed, power and agility. Likewise, Huluager Abebe (2017) had also made a research on The Effects of Aerobic Exercise on Selected Motor Fitness Variable at Haramaya University. In this regard, he used Pair T-Test as a data gathering tool and conducted only an experiment on male students. At the end he proved that an aerobic exercise has a significant change in improving motor fitness variable.

However, this study was different from Huluagers' (2017) and Berihuns' (2015) researches in that this research was made on The Effects of Aerobic Exercise on some Selected Performance Related Fitness. In line with this, to gather data quasi experimental and control grouping design together with comparison pair t-test design was applied. Besides, the data was obtained from both male and female healthy 16 years old-19 years-old students.

Regular physical activity, fitness, and exercise are critically important for health and wellbeing of all people, Weather they participate in vigorous exercise or some type of moderate health

enhancing physical exercise. Even among trial and very old adults, mobility and functioning can be improved by way of physical activity (Butler et al. 1998).

Motor skill can be improved by activities in which children could repeatedly practice and develop motor skills in several ways (McKenzie, 2007).

Therefore, the primary intention of this study was to investigate the effect of aerobic exercises on some selected skill related physical fitness on the case of Shewarobit secondary School in North Shewa of Amhara Regional State and the researcher tried to answer the following question.

What is the effect of aerobic exercises on skill related fitness components?

Is there different effect of aerobic exercises on some selected skill related fitness components?

What is the difference between the experimental group and the control group in different aerobic exercise on skill related fitness components?

### **1.3. Scope of the Study**

The scope of the study was limited to the effect of aerobic exercises on some selected performance related fitness components like agility, power, and balance of the students in the case of Shewarobit secondary School. During the study, the researcher was stayed in Shewarobit Administration City of Shewarobit Secondary School and collects the necessary data on this topic. In addition, the study was focus on students of grade 11<sup>th</sup>. Hence, the scope was limited to the topic and the school's students of that grade level.

### **1.4. Significance of the Study**

After the accomplishment of this study, it would become significant for many reasons, which the major was:

It will help to find out the role of aerobic exercise to improve performance related physical fitness components in physical education practical class.

It will be provided to analyze the different effect of aerobic exercises on selected skill related physical fitness components.

It will give base information about the relationships between skill related components and aerobic exercises for physical education teachers as well as for any professional researchers

It will be providing the importance of different aerobic exercise for the improvement of skill related physical fitness.

## **1.5. Objectives of the Study**

### **1.5.1. General objective**

The general objective of the study was to investigate the effect of aerobic exercise on selected skill related physical fitness components in the case of Shewarobit secondary School.

### **1.5.2. Specific Objectives**

In achieving the main objective, the following specific objectives were set. Therefore, the study was aimed to:

To analyze the effect of aerobic exercises on skill related fitness components.

To examine the different effect of aerobic exercises on some selected skill related physical fitness components.

To evaluate the difference between the experimental group and the control groups in different aerobic exercises on skill related fitness compone

## **2. REVIEW OF RELATED LITERATURE**

### **2.1 Aerobic Exercise**

Aerobic exercise is a physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. 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.

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

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

According to (*Braun et al., 2013*), and DHHS (2013), aerobic exercise can help to feel better and enjoy life to the fullest in the following way:

**Keep excess pounds at bay:** Combined with a healthy diet, aerobic exercise helps to lose weight and keep it off.

**Increase stamina:** aerobic exercise may make tired in the short term. But over the long term, you will enjoy increased stamina and reduced fatigue.

**Ward off viral illnesses:** Aerobic exercise may activate immune system. This may leave less susceptible to minor viral illnesses, such as colds and flu.

**Reduce health risks:** Aerobic exercise reduces the risk of many conditions, including obesity, heart disease, high blood pressure, type two diabetes, metabolic syndrome, stroke and certain types of cancer. Weight bearing aerobic exercises, such as walking reduces the risk of osteoporosis.

**Stay active and independent as you age:** Aerobic exercise keeps muscles strong, which can help to maintain mobility as you get older.

**Strengthen heart:** A stronger heart doesn't need to beat as fast. A stronger heart also pumps blood more efficiently, which improves blood flow to all parts of the body.

As cited in <http://www.bupa.com.au>, any activity that uses large muscle groups, can be maintained continuously, and is rhythmical in nature can be regarded as an aerobic exercise. In general, aerobic exercises requiring little skill to perform are more commonly recommended for all adults to improve fitness. Aerobic exercises that require minimal skills and can be easily modified to accommodate individual physical fitness levels include running, rope skipping, rowing, aerobic scatter dancing, brisk walking, leisure cycling, swimming, and aqua-aerobics and slow dancing. Aerobic exercises that are typically performed at a higher intensity and, therefore, are recommended for persons who exercise regularly include jogging, running, aerobics, stepping exercise, fast dancing and elliptical exercise.

These exercises should be performed with the recommended dosage of aerobic exercise which means, (frequency (F), intensity (I) and duration (time, T) of the exercise performed. In combination with the type (T) of exercise performed, these factors constitute the basic components of the core principle of exercise prescription (the FITT principle). It should be noted that even small increases in caloric expenditure with physical activity may improve physical fitness outcomes.

## **2.2 Studies on Aerobic Exercise**

Selvam and Sudha (2008) conducted a study on selected effect of aerobic exercise on selected psychological 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 example includes walking, jogging, running, swimming, rowing, stair climbing, bicycling, cross country skiing, step and dance exercise classes, roller skating, and the more continuous form of tennis, racquet ball and squash. To achieve this purpose, 60 girls were selected from Theivanni Ammal College for women. The age group of subjects ranges between 18 to 20 years. The selected subjects were divided into two groups. The first group was trained aerobic exercises. The training group underwent five days of training for eight hours in the period of two weeks. The second group acted as control group to make adjustments for differences in the initial means and test the adjusted post-test means for

significant differences. The researcher used analysis of covariance (ANOVA) to interpret the results. The result reveals that aerobic exercises hold a significant effect in the improvement of the psychological variables such as testing pulse rate, breath holding time, vital capacity and respiratory rate.

Selvalakshmi (2007) conducted a study on the effects of varied aerobic training programs on obese women working in IT companies. For the purpose of the 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) are recommended by Clarke, (1984) and result on vital capacity showed significant improvement due to varied aerobic exercise, as were no significant improvement was found in resulting heart rate.

## **2.3 Some of the Common Types of Aerobic Exercise**

### **2.3.1 Walking**

Walking is one of the simplest and most available aerobic exercises. You can vary the intensity to much your fitness level. Other than walking shoes, it does not require any special equipment. You can walk almost anywhere, outdoor or indoors (malls, indoor tracking, or a treadmill). This makes walking easy to confine throughout the year. Walking is the good choice for starting their first exercise program or finds other exercises too hard on their joints, stronger leg muscles, lower blood pressure, and lower risk of heart disease, diabetes, bowel cancer, and osteoporosis overweight, unused to physical activity or pregnant.

Walking for 30 minutes a day or 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 will get even more benefit from a walk if you swing your arms as this help you walk faster and burn five to ten percent more calories.

### **2.3.2 Cycling**

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 inducting the limited pain as quickly. Cycling is also a good choice for people who are greater than 50 pounds' overweight. It helps the hearts without the mechanical stress on the back hips, knees and ankles that walking can cause.

Ski machine, stair climbers, and steppers, elliptical: these types of mechanics can provide a good aerobic workout and each has its own unique strengths and drawbacks. First, exercise on these mechanics may be too strenuous to be enjoyable and provide optimal benefit for the beginner and 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 trail 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 machines is that they are indoor activities that can pursued regardless of the weather.

### **2.3.3 Swimming**

Swimming is an excellent aerobic exercise, but consideration 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 fore the recommended 30 to 60 minutes. It also become the focus of swimming is on the smaller upper body muscular and swimming is the less efficient activity than cycling or walking, one can easily exceed their target heart range with swimming. Therefore, those with heart conditions should address a swimming program

with their physical before starting, water aerobics and water walking are good alternatives for those with joint pain. The buoyancies provided by water cases stress on the joints.

### **2.3.4 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 who experience symptoms such as chest pain or shortness of breath should not engage in these activities. Remember to check with your doctor cardiac rehabilitation instructor before starting any exercise program.

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

### **2.3.5 Running**

Like walking, running is an inexpensive exercise you can do anywhere at a time that suits you. It's 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 nunnery burns in 30 minutes.

### **2.3.6 Jogging**

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, Berkley Foundation of Wellness has A dozen ways to improve you are walking workouts (Palm Coast, FL. Remedy Health Media. C,2000).

## **2.4 Effects of Aerobic Exercise**

Laura Williams (2018), participating in a regular aerobic exercise program can help you guard against heart disease while also assisting your efforts to maintain or lose weight. However, you don't have to do spandex and head to a jazzercise class to reap the benefit of aerobic exercise. Aerobic exercise involves the repeated and continuous movements of large muscle groups and includes activities such as walking, cycling and swimming that really primary aerobic energy production. Northahayati Hassan (2019) maximum aerobic capacity increase with aerobic training. The resting  $VO_2$  is stable, as is the  $VO_2$  at a given worked. The changes are specific to trend muscles.

According to Shawn Farrokhi (2015), aerobic exercises are typically moderate intensity exercises involving large muscle groups that are performed over extended periods to improve aerobic vascular function. Regardless what types of exercise used in aerobic program, maintaining an adequate aerobic dose of 40 percent to 60 percent of maximal aerobic capacity maximum heart rate or  $VO_2$  max is necessary?

### **2.4.1 Effects of Aerobic Exercise on Agility**

According to Alpert B, (1990) a health psychologist, he was investigated the effects of aerobic exercise on sample of 24 pre-scholars, 30 minutes of aerobic exercises were provided daily for a period of eight weeks for a group of 20 children while the remaining 12 children engaged in free play on the school playground. The children were given pretests and posttests on the following measures a sub maximal exercise test on a pediatric bicycle (baseline and three workloads), an agility test, a health knowledge test, self-esteem scale, and an observational measure of their gross motor activity. Despite comparability on pretest a significant group x repeated measures effects suggested that the aerobic exercise group showed decrease the heart rate at all three-work load as well as increases in agility and self-esteem following the exercise program. These findings suggest that cardiovascular fitness, agility and self-esteem can be facilitated in preschools by an aerobic exercise program.

### **2.4.2 Effects of Aerobic Exercise on Power**

According to Mark Haykousky and Jonathan Mc Gavock (2005), the effect of aerobic training (AT) and strength training (ST) has on altering peak aerobic power ( $VO_2$  peak), muscle strength, left ventricular (LV) morphology, and diastolic filling in health older women is not known. We assessed the effect of 12 weeks of AT, ST, combined aerobic and strength training (COMT), or not training (NT) on  $VO_2$  peak, muscle strength, LV morphology, and diastolic filling in 31 health women ( $68 \pm 4$  year). Relative oxygen  $VO_2$  peak was significantly greater after twelve weeks of AT, ST or COMT. Upper and lower extremity strength were significantly higher after 12 weeks of ST or COMT with no change after AT or NT.

LV morphology and diastolic filling were not altered after 12 weeks of AT, ST, COMT, or NT, 12 weeks of AT for increasing relative  $VO_2$  peak, however, ST and COMT are more effective than AT for improving overall muscle strength.

### **2.4.3 Effects of Aerobic Exercise on Balance**

(Shweta, Kulkarni (2018), musculoskeletal changes have seen during aging this leads to reduction in the muscle strength which is more reduce in the lower limbs than the upper limbs. This leads to improper balance and get which results to falls in the elderly. The aim of aerobic exercises to check whether aerobic exercises helps in improving balance and get in geriatric. Total 30 elderly individuals were included in the study. According to the individuals included to the inclusion criteria a three-week program was selected were ten minutes warm up and cool down was done followed by 20 minutes stationary cycling daily. Pre and post-test berg balance scale and dynamic gait index were noted, then after significant improvement in balance and gait. Also, the P value showed that the intervention is extremely significant. Therefore, aerobic exercises are effective on balance and geriatric population.

## **2.5 Components of Physical Fitness**

According to National Association for Sport and Physical Education (2004), physical fitness most easily understood by examining its components, or parts. There are two main components of physical fitness. There are health related fitness components such as cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition and skill related fitness components such as agility, power, coordination, balance, reaction time and speed. As the president Council of Fitness, sports and nutrition (PCPFS) notes, there is a cause and effect relationship between physical activity and health. Plainly said, with increased level of activity, we improve our levels of physical fitness and enjoy better health, afforded the benefits of exercises.

### **2.5.1 Health Related Fitness Components**

#### **2.5.1.1 Cardio respiratory Endurance**

The efficiency with which the body delivers oxygen and nutrients needed for muscular activity and transports waste products from the cells. The best way to improve cardio respiratory fitness is to participate regularly in demanding aerobic exercise program. Muscular fitness has two components. These are Muscular Strength and muscular endurance. Although muscular strength and muscular endurance are a separate fitness component, they are closely related. Progressively working against resistance will produce gains in both of these components. According to Shepherd, (2001), young adulthood typically covers the period from 20 to 35 years of age, when both biological function and physical performance reach their peaks. During young middle age 35-45 years, physical activity usually wanes, with a 5-10-kilogram accumulation of the body fat.

During later middle age 45-65 years, women reach the menopause, and men also subsistent reduce their output of sex hormones. In early old ages above 65 years, there may be a modest increase of physical activity, in an attempt to fill a free time because initial fitness is quite low, the aerobic condition of a senior can be improved by low intensity of training, gains are

greatest, if a heart rate of 130-140 beats per minute can be sustained, but useful if slower progress is seen with regular training at heart rates of 110-120 beats per minutes. In the frail elderly, heart rates rarely exceed 85 beats per minute, and some training responses may then be anticipated even with activities including a heart rate of only 100 beats per minutes. There is only an increase in heart rate during exercise because the heart needs to pump more blood to the different muscle. This increase is directly proportional to the increase of intensity of exercise. Average heart rate is 60-70 beats per minute, and during exercise it increases to 165-190 beats per minute. Aerobic activity as being long in duration yet low in intensity, heart rate at rest decrease as a result endurance training. Heart rate during some maximal exercise also decrease, often by about 20-40 beats per minute following six months of moderate training using some large muscle group, rhythmically, for a period of 15-20 minutes or longer while maintaining 60-80 percent of your maximum heart rate, maximum heart rate either remains unchanged or decrease slightly with training.

#### **2.5.1.2 Muscular Strength**

The greatest amount of a muscle group can exert in a single effort, the greater the muscle strength of an individual, the greater the amount of force he/ she will be able to generate. Depending on the amount of weight you use to perform the exercise, this weight be anywhere from three to twelve repetitions.

According to World Health Organization, WHO, (2005), women have smaller amount of the aerobic hormone testosterone and therefore have less muscle mass and size than men. Because of this, women typically have 60 to 80 percent of the absolute strength of men and have relative strength similar to men. Muscle strength peaks around 25 years of age, plateau through 35 to 40 years of age and then shows an accelerating decline with 25 percent of less peak force by the age of 65 years. The male and female strength ratio is unchanged, so that women are limited by the loss of strength at an earlier age than men.

#### **2.5.1.3 Muscular Endurance**

The ability of a muscle or muscle group is important to perform repeated movements with a sub maximal force for extended period of time. Greer, F. and Gilbert, J.N (2006), stated that if you are tested an absolute endurance measured by the maximum number of repetition or muscle contractions, one can perform against a given resistance. A stronger person has an advantage, however if you are tested on relative muscular endurance (the number of times you can move a designed percentage of your maximum strength, the stronger person does not have an advantage. For this reason, men and women can compete more evenly in relative muscular endurance activities. In fact, on some endurance tasks women have done as well or better than men. If your goal is to build muscular endurance, you will decrease the amount of weight you use so that you can continue to perform repetitions over the course of a work out without failure, continuing exercise for 30 minutes or more. However, no decrease in endurance was s in an older age. Though muscular endurance with age, it is not dramatic as decrease in absolute strength.

#### **2.5.1.4 Flexibility**

The ability to move the joints for example, elbows knees or any group of joints through an entire normal range of motion. Flexibility is highly specific and varies for each joints or joint group. Thus, the flexibility of certain joints cannot be used to generalize the flexibility of other areas of the body. There is also a relationship between flexibility measures and differences in sex and age.

A study by (Kars H. 1982) done on 100 adults who had complaints of chronic lower back problems revealed that approximately 80 percent had severe muscle weakness and joint flexibility diagnosed as the cause, while only 20 percent had a specific.

#### **2.5.1.5 Body Composition**

Body composition refers to the makeup of the body in terms of lean mass (muscle, bone, vital tissue and organs) and fat mass. In terms of health, fat is the main points of interest and

everything else is termed lean body tissue. The amount of fat we carry varies from person to person and healthy average varies with gender and age

### **2.5.2 Performance Related Fitness**

Being over fat and under fat can result in health concerns. Although amount of fat for a person is between 15 and 18 percent and for women is higher at 20-25 percent. An optimal ratio of fat to lean mass is an indication of fitness, and the right types of exercises will help you decrease body fat and increase muscle mass (Headquarters Department of the US army, 1998).

The components of skill related physical fitness are agility, balance, coordination, power, reaction time and speed. They are called performance-related because people who possess them find it easy to achieve high level of performance in motor skills, such as those required in sports and in specific types of jobs. Skill related fitness is sometimes called sport fitness or motor fitness. There are little doubts that there are other abilities that could be classified as skill related fitness components. Also, each part of skill related fitness components is multi-dimensional. For example, coordination could be hand-eye coordination such as batting a ball, foot-eye coordination such as kicking a ball, or any other possibilities. Measurement are provided to help the reader to understand in the nature of the total physical fitness and help the reader make important decisions about lifetime physical activity (ibid.)

Fitness is the broad term that means different things to different people. Fitness denotes dynamic qualities that allow one to satisfy needs regarding mental and emotional stability, social consciousness, adaptability, spirituality and physical health (Shahan, 2010). American Alliance for Health, Physical Education, Recreation and Dance (AAHPERO) defines physical fitness as a physical state of well-being that allows people to perform and establish a fitness base for participation in a variety of activities (Auxter et al 1997).

Physical fitness is also defined as having that energy and strength to perform daily activities vigorously and actively without getting “rundown” and having energy left over the enjoy leisure time activities and meet emergency demands (Shahan, 2010).

According to Shahan (2010), when you are physically fit, your heart, lungs and muscles are strong and your body is uniform and flexible, your weight and percentage of body fat are within a desirable range.

#### **2.5.2.1 Power**

Power is the ability to transfer energy into force at a fast rate, and throwing discus, and putting the shot are activities that require considerable power.

#### **2.5.2.2 Speed**

Speed is the ability to perform a movement in a short period of time. A runner on a track team or a wide receiver on a football team needs good foot and leg speed.

#### **2.5.2.3 Coordination**

Coordination is the ability to use the students with the body part to perform motor tasks smoothly and accurately. Juggling, hitting a golf ball, batting a baseball, or kicking a ball are examples of activities requiring coordination.

#### **2.5.2.4 Balance**

Balance is the ability to establish and maintain one's balance, and has long recognized as an important element of skillful movement behavior (Clark and Watkins, 1984). Indeed, balance has been identified as one of the many activities underlying the motor skill performance of both young population and young group.

Furthermore, the complex quality called balance involves reflex vision, the inner ear, the cerebellum, and the skeletal muscular systems which forms are specific kind of coordination. Balance is defining to be the ability to maintain some degree of equilibrium while moving a standing still (Shahana, 2010)

Balance is the ability to maintain the equilibrium in a held position (static) or in moving position (dynamic). The ability to maintain the equilibrium of the body manifests itself in two types: static and dynamic balance. Static balance involves the maintenance of equilibrium in a fixed position such as while standing on one foot on a narrow stick for a period of time. Dynamic balance on the other hand is when the equilibrium must be maintained while moving. Walking on a balance beam is an example of dynamic balance. (Auxter et al 1997)

#### **2.2.5.5 Agility**

Agility is defined as the ability and accurate change of the direction of movement of the entire body mass in space (carbine et al., 2000). Agility also means a quick and efficient upward and downward motion in ballet, modern dancing and some folk dancing. According to Prentice (1999), agility to large extent depends on neuromuscular coordination and reaction time. In such sports like basketball, badminton, handball, and tennis, the ability to stop and start, and to change direction, is a prerequisite to success. People are less accident prone. Because of their ability they can make quick adjustments in body movements. The motor ability is difficult to develop. However, it can be improved through participation in activities which develop strength, coordination and speed. If strength increases, agility will increase in movements involving the force of inertia, which keeps the body in motion in the same direction.

#### **2.2.5.6 Reaction Time**

Reaction time is a time elapsed between stimulation and the beginning of reaction to that stimulation. Driving a racing car and starting a sprint race require good reaction time ([www.mhhe.com/hyper/physed/clw/student/corb.pdf](http://www.mhhe.com/hyper/physed/clw/student/corb.pdf), retrieved on: Sep. 21, 2016).

### **3. RESEARCH DESIGN AND METHODOLOGY**

#### **3.1. Description of Research Area**

The study was conducted in Shewarobit Secondary school. The school, which was located in Amhara region North ShewaZone. It is the only secondary school which is found in Shewarobit City administrative. The town is located in North Showa zone, north central Ethiopia. It is 225 km to North of Addis Ababa along Dessie road 95 km away from Debr Berhane. Geographically, the town is situated  $95^{\circ}50'16''$  and  $10^{\circ}01'32''$  North latitude and  $39^{\circ}52'58''$  and  $39^{\circ}54'9''$  East longitude with an area of 992.5 hectare under the Great Rift Valley. Most parts of the area found at 1280 meter above sea level. (Source: Town Vital Event Registration office 2018).

#### **3.2 Study Materials**

The researcher was used a material that are reliable for the designed tests with an appropriate exercise. So, for power to test standing long jump on the way to implement it the following materials was used. Long jump pit, 30m tape measurement, Assistant, and Normative values

For balance stock balance test (one leg stands test) the researcher was used materials like Flat non-slip surface, Stopwatch, Paper and pencil and normative values. And for Agility Illinois test the following materials was used Flat non-slip surface, making cones, measuring tape and Normative values.

#### **3.3. Research Design**

This study was conducted based on pre and post-test experimental design. (Quasi experimental design) Thus, it was conducted by using quantitative research method. It was helps to measure, assess, evaluate and analyze the effect of aerobic exercise on some selected performances related fitness on the dependent variables.

This method was selected because it helps to describe the data accurately and shows the description of the comparison of the study methods, and also it helps to make detailed analysis of existing phenomenon with the data to justify current condition. The other method was practical observation in the field to see the student's practice, such as Power, Balance and Agility with an appropriate time schedule and moderate intensity.

The study was investigating the effect of aerobic exercise on some selected performance related physical fitness component of students in *Shewarobit* secondary school. In this design, the plan of the experiment takes place in three phases

=Phase I - pre-test

= Phase II -training or treatment and

= Phase III -Post test

The study was designed in the following layout method

Table3.1 Description of the layout.

Treatment	Physical fitness variables such as aerobic exercise
Frequency	3 day /week
Total duration	12 weeks
Duration /session	40-60 minutes
Intensity	Moderate
Time of training	Morning and afternoon

The following table was normative value for male students (adapted from Head, et al, 200

**Table3.2** Male normative values for standing long jump

Age	Excellent	Above average	Average	Below average	Poor
14	>2.11 m	2.11-1.95	1.95-1.68	1.84-1.68	<1.68
15	>2.26 m	1.26-2.11	2.10-1.98	1.97-1.85	<1.85
16	>2.36 m	2.36-2.21	2.20-2.11	2.10-1.98	<1.98
>16	> 2.44 m	2.44-2.29	2.28-2.16	2.15-1.98	<1.98

**Table3.3** Female normative values for standing jump

Age	Excellent	Above average	Average	Below average	Poor
14	>1.91 m	1.91-1.73	1.72-1.60	1.59-1.47	<1.47
15	>1.85 m	1.84-1.73	1.72-1.60	1.59-1.50	<1.50
16	>1.83 m	1.83-1.68	1.67-1.58	1.57-1.45	<1.45
>16	> 1.91m	1.98-1.78	1.77-1.63	1.62-1.50	<1.50

### 3.8.1.2 Stock Balance Stand Test

This simple balance test can be modified to suit your situation. In this test, the person stands on one leg for as long as possible.

\* **Purpose:** To assess the ability to balance on the ball of the foot

\* **Equipment required:** Flat non- slip surface, stopwatch, paper and pencil.

\***Procedures:** Remove the shoes and place the hands on the hips, then position the non-supporting leg. The subject is given one minute to practice the balance on the ball of the foot. The stopwatch started as the heel is raised from the floor.

The stopwatch is stop if any of the following occur.

- > The heads come off the hips.
- > The supporting foot swivels or moves (hops) in any direction.
- > The non-supporting foot loses contact with the knee.
- > The heels of the supporting foot touch the floor

Table3.4 Stock Balance Stand Test

Rating	Score /Seconds
Excellent	> 50
Good	40-50
Average	25-39
Fair	10-24
Poor	< 10

**Scoring:** The best total time in second is recorded. The score was the best of three attempts.

### 3.8.1.3 Illinois Agility Test Norms

The Illinois Agility test is a commonly used test of agility in sport and there are many other such norms available.

\* **Purpose:** To test running agility.

\* **Equipment Required:** Flat non-slip surface, marking, stopwatch, measuring tape.

\* **Procedures:** The length of the cones is 10 meters and, width (distance between the start and finish points) is 5 meters, four cones s used to make the start, finish and the two turning points. Other cones placed down the center on equal distance apart.

\* **An excellent score:** is less than 15.2 seconds for a male, less than 17 seconds for females. The target group was national level 16 to 19 years old.

Table3.5 Illinois Agility Test Norms

Rating	Male (second)	Female (Second)
Excellent	< 15.2	< 17.0
Above Average	15.2 - 16.1	17.0 - 17.9
Average	16.2 - 18.1	18.0 - 21.7
Below Average	18.2-19.3	21.7 -23.0
Poor	>19.3	> 23.0

## 3.9 Data Quality Control (DQC)

The study was designed to promote quality of the data of selected aerobic exercises. To reduce the mistakes that may occur during data collection, the researcher was train two teachers among physical education teachers at the department and explain to them how the appropriate

data on the performance test in relation to power, Agility and Balance tests should be collected and organized.

### **3.10 Protocol and Ethical Consideration**

Research ethics refers to the types of agreement that the researchers' agreement with his or her research participants. Ethical consideration plays a role in all research studies and all research must be aware of and attend to the ethical considerations related to their students. Therefore, the researcher was handled students' communities' legally and smoothly

## 4. DATA ANALYSIS AND EVALUATION

### 4.1 Data Display

This part deals with the analysis of pre and post test data collected from some selected performance related physical fitness component (n-26) were experimental and control(non-treatment) were (n-26) groups under the study. The purpose of the study was to investigate the effect of aerobic exercise on some selected performance related physical fitness components on Shewarobit Secondary School Students. The treatment was given for 12 consecutive weeks. The data were obtained from Power, Balance and Agility. Pre and post tests were taken from all experimental and control groups before and after 12 weeks treatments of exercise intervention, and the scores were recorded. The collected data were analyzed by using arithmetic mean, standard deviation, and t-test for comparison pre and post test result, SPSS used for analyzing data. The results for each fitness variables were discussed in each table below. It also presents a summary of finding and discussion of the results.

### 4.2 Result and Discussion of the Data Analysis

In order to make analysis and presentations, the following key terms used as guiding concepts.

**Mean:** is the average you are used to, where you add up all the numbers and then divide by the numbers.

**Standard deviation:** is a summary measure of the difference of observation from the mean.

**Sig (2-tailed):** it also known as p-value that indicates the significant digit or the precision level of the calculated static and how much it approaches to the hypothesis or the research question.

The p- value is  $<0.05$

Based on the above terms stated and the data were presented for both the pre-intervention and post intervention measured, analyzed and interpreted.

The dependent variables were skill related physical fitness like Agility, Balance and Power

The independents variables were aerobic exercise like; Running, Jogging, Woking, Skipping rob, Lunges, push up, Squats, sit up, leg swing, stretching and relaxation exercise etc,

#### 4.2.1 Demographic of the Study subjects

**Table 8** Demographic of the study subjects (N=52)

Variables	Responses	Experimental Groups		Control Groups	
		N	%	N	%
Sex	Male	16	61	14	53.8
	Female	10	39	12	46.15
	Total	26	100.0	26	100.0
Age	16-19	26	100.0	26	100.0
	Above 19	-----	-----	-----	-----
	Total	26	100.0	26	100.0

As it can be indicated on table8 the total respondents (52) grouped in to two groups. Thus, are experimental and control groups. From 26 students of experimental group, 16(61%) were male and 10(39%) were females. According to their age, 26 (100%) were in the age category of 16-19 years.

From 26 students of control groups, 14(53.8%) were male and 12(46.15%) were females. According to their age 26 (100%) were in the age category of 16-19 year

### 4.3 Analysis of Physical Fitness (Performance) Parameter Tests

#### 4.3.1 Result of the study Comparison of agility measure of the group

**Table 9** Paired sample statistics on Illinois agility run

Paired Samples Statistics					
Illinois agility run		Mean	N	Std. Deviation	Std. Error Mean
E. G	pre-Test	20.87	26	2.613	.512
	Post-Test	12.00	26	2.763	.542
C.G	Pre-Test	20.36	26	3.265	.640
	Post-Test	20.42	26	4.108	.806

E.G = experimental group, C.G = control group, N = number of participants

As shown in the above table the paired samples statistics in table9 shows that the pre-test score of the control group was found to be mean of 20.36with SD = 3.265. In the same manner the average post-test score mean of control group was found to be 20.42with SD = 4.108. From the data we can see that the scores in the pre and post-test for control group were very close. One can see that there was still a difference. However, we cannot determine here if this difference was statically significant.

The paired samples statistic in table 8 shows that the results of pre and post-test of experimental group under comparison the experimental group after 12-week aerobic exercise training program the pre-test and post-test were compared the level of Illinois agility run performance. Accordingly, the mean score of pre-tests was 20.87 second with SD = 2.613. On the other hand, the outcome of post-test mean was found to be with12.00 second SD = 2.763. This implies that there was mean difference between the pre and post-test, yet it is possible to say there is significant difference of Illinois agility run between pre and post-test of Illinois test. Hence a paired sample t-test comparing the pre and post-test score of the groups and which was computed to examine whether this number shows statistical difference between Illinois agility run performance level of the aerobic exercises with in groups the t-test results presented in the table below.

**Table10** Paired sample T-test of Illinois agility run

Paired Samples Test									
Illinois agility run		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
E.	Post-Test - Pre-Test	8.865	3.465	.680	7.466	10.265	13.046	2	.000
C.	Post-Test - Pre-Test	-.065	1.678	.329	-.743	.612	-.199	2	.844

E. G= experimental group, C. G= control group

Table10 in the above displays the test of significance difference between the pre and post-test of control group. According to the data presented in the table above, there was no significance difference between the pre and post-test of control group because the MD = .065 second .SD=1.678 and  $p = .844$  so  $p > 0.05$ . This implies that pre and post-test of control group was about the same level. In the other words Illinois agility run performance level of the group within pre and post-test did not show any difference which indicates that comparison at the experimental groups could be possible. Thus, one can understand that Illinois agility run performance of aerobic exercise was displayed in the t-test at the same level.

Table10 in the above display the statically test for the variance of the experimental group in the pre and post-test, shows a statically significance difference (MD = 8.865.SD=3.465 and  $p = 0.000$  so  $p < 0.05$ ) which indicated that the group members who had 12 week aerobic exercise training program for experimental group were significantly outperformed better than the control group who had participated in their general aerobics exercise without 12 week aerobic exercise program in the former table 8 it was seen that the mean score of pre-test for

experimental group was 20.87 and post-test 12.00. There is a huge gap between these two figures. The mean difference as can be seen table10 above is 8.865 implying that which existed this much difference between the Illinois agility run test performances level of the experimental group pre and post-test. So, the post-test had high mean score than the pre-test.

This implies that there is a significance mean difference between the experimental groups and control groups in post test results. This pared sampling t-test is statically significant so, based on the posttest means of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of agility. Whereas, the pretest mean of experimental and control groups were almost the same. The paired samples statistic shows no significance difference between groups. This insignificance value is due to the lack of treatment (aerobic exercises) during pretest.

Here we can conclude that teaching aerobic exercises for more than 12 weeks has a significance effect on the improvement of agility because the mean difference is significant at post test results but not significance in pretest results

### 4.3.2 Comparison of balance measure of the group

**Table11** paired samples statics one leg stand

Paired Samples Statistics					
one leg stand		Mean	N	Std. Deviation	Std. Error Mean
E. G	pre-Test	8.00	26	2.561	.502
	Post –Test	16.00	26	7.864	1.542
C.G	pre-Test	7.92	26	2.591	.508
	Post –Test	8.04	26	2.645	.519

E.G = experimental group, C.G = control group, N = number of participants

The paired sample statistics in table11 shows that the pre-test score of control group those who didn't take aerobic exercise 12 week was found to be mean of 7.92 sec with a SD = 2.561. In the same manner the average post-test score of control group was found to be a mean 8.04sec with SD = 2.645. From the data we can see that the scores in the pre and post-test for control

groups were almost similar. One can see that there was still difference. However, we cannot determine here if this difference was statically significant.

As shown in the table11above the paired sample statistics results of post and pre-test experimental group under comparison after aerobic exercise 12-week program the post-test were compared the level of one leg stand performance of aerobic exercise trainers. Accordingly, the outcome was the mean post-test 16.00 sec SD = 7.864. On the other hand, the mean score of pre-tests was found to be 8.00 sec SD = 2.561. This implies that, there was mean difference between post and pre-tests, yet it is impossible to tell here if the differences are statistically significant. Hence a paired sample t-test comparing the pre-test and post-test scores of the experimental group and which was computed to examine whether this number show statistical difference aerobic exercise training on selected fitness components performance levels of the aerobic exercise trainers within pre and post-test of groups the t-test results presented in the following tables.

**Table12** Paired sample T-test of standing stork

Paired Samples Test										
one leg stand		Paired Differences					T	D	Sig.	(
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
E.	Post-Test - Pre-Test	8.000	6.928	1.359	10.798	5.202	5.888	2	.000	
C.	Post-Test - Pre-Test	.115	3.953	.775	1.712	1.481	.149	2	.883	

E. G= experimental group, C. G= control group

Table 12 In the above displays the test of significant difference between the pre and post-test of the control groups. According to the data presented in the table above, there was significance difference between pre and post-test because the  $MD = .115$  sec  $SD = 3.953$  and  $p = .883$  so,  $p > 0.05$ . This implies that the pre and post-test of control group was almost about very closely the same level. In the other words one leg stand performance level of the group within pre and post-test almost the same which indicates the comparison at the experimental groups could be possible. Thus, one can understand that one leg stands performance of 12-week aerobics exercise was displayed in the t-test.

This implies that the mean difference between the two groups of posttest result of one leg stand test is significance. Generally, there is a significance mean difference between the experimental groups and control groups in post test results.

This statically significant so, based on the posttest means of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of balance. Whereas, the pretest mean of experimental and control groups were almost the same. Paired samples t-test statistics shows no significance difference between the groups.

Here we can conclude that teaching aerobic exercises for more than 12 weeks has a significance effect on the improvement of balance because the mean difference is significant at post test results but not significance in pretest results.

### 4.3.3 Comparison of power measure of the group

**Table 13** Paired samples statistics on standing long Jump

Paired Samples Statistics					
Standing long Jump		Mean	N	Std. Deviation	Std. Error Mean
E.G	pre-Test	1.20	26	.193	.038
	Post-Test	1.51	26	.174	.034
C.G	pre-Test	1.21	26	.184	.036
	Post-Test	1.24	26	.146	.029

E.G = experimental group, C.G = control group, N = number of participants

The paired sample statistics in table 13 shows that the pre-test score of control group those who didn't take aerobic exercise 12 week was found to be mean of 1.21 with a SD = 0.184. In the same manner the average post-test score of control group was found to be a mean 1.24 with SD = 0.146. From the data we can see that the scores in the pre and post-test for control groups were almost similar. One can see that there was still difference. However, we cannot determine here if this difference was statically significant.

As shown in the table 13 above the paired sample statistics results of post and pre-test experimental group under comparison after 12-week aerobic exercise the post-test were compared the level of Standing long Jump performance of aerobic exercise trainers. Accordingly, the outcome was the mean post-test 1.51, SD = 0.174. On the other hand, the mean score of pre-tests was found to be 1.20, SD = 0.174. This implies that, there was mean difference between post and pre-tests, yet it is impossible to tell here if the differences are statistically significant. Hence a paired sample t-test comparing the pre-test and post-test scores of the experimental group and which was computed to examine whether this number show statistical difference between aerobic exercise trainers on selected skill fitness components performance levels of the 12-week aerobic exercise within pre and post-test of groups the t-test results presented in the following tables.

**Table 14** Paired sample T-test of standing long Jump

Paired Samples Test		Paired Differences					T	Df	Sig. (2-tailed)
Standing long Jump		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
E. G	Post-Test - Pre-Test	.317	.228	.045	.408	-.225	7.093	25	.000
C. G	Post-Test - Pre-Test	.038	.239	.047	.134	.058	.814	25	.423

E. G= experimental group, C. G= control group

Table 14. In the above displays the test of significant difference between the pre and post-test of the control groups. According to the data presented in the table above, there was significance difference between pre and post-test because the MD = .038 SD=0.239 and  $p = .0423$  so,  $p > 0.05$ . This implies that the pre and post-test of control group was almost about very closely the same level. In the other words standing long Jump performance level of the group within pre and post-test almost the same which indicates the comparison at the experimental groups could be possible. Thus, one can understand that standing long Jump performance of 12-week aerobics exercise was displayed in the t-test.

Table 14 on the above displays the statistical test for the variance of the experimental group in the post-test and pre-test. According to the data presented in the table, the post-test and pre-test of standing long Jump performance level of the group shows a statistically significant difference which is the MD = 0.317, SD=0.228,  $p = 0.00$  so,  $p < 0.05$  which indicates that the group members who had 12 week aerobic exercise program for experimental group were significantly outperformed than the control group who had participated in their regular 12 week aerobic exercise training program because there was a huge gap between the pre and post-test result of experimental group which is the mean of pre-test was 1.20 and the mean of post-test was 1.51. The MD = 0.317 implying that which existed this much difference between standing long Jump performance level of the experimental group of pre and post-test. This implies that there is a significance mean difference between the pretest and post test results in experimental groups. This t is statically significant so, based on the pre-posttest means of

experimental groups, we can say that aerobic exercises have a great effect on the improvement of power.

Here we can conclude that teaching aerobic exercises for more than 12 weeks has a significance effect on the improvement of power because the mean difference is significant at  $p\text{-value} < 0.05$ .

#### **4.4 Discussions**

The purpose of this study was to investigate the effects of Aerobic Exercise on some Selected Performance Related Physical Fitness Components of Students: on the Case of Shewarobit Secondary school. Involvement in aerobic exercise regularly has significant positive effects on the overall health and wellbeing of individuals which improves cardio respiratory fitness and body composition (American College of Sport medicine 2010). Regular aerobic exercise will also produce beneficial effects for any age group providing the exercise is specific and appropriate to the level of fitness of the individual (Rosser, 2001). In this study aerobic exercise training showed improvements in physical fitness variables of agility, balance, power and speed. The finding of this study in each variable are discussed as follows.

**In Case of agility:** there After the intervention of 12 weeks aerobic exercise program it has been found that there would be a significant difference among the experimental and control-group. Because As it can be seen on table: 8 which stated that the pre-test mean score of control group is 20.36second,  $SD= 3.265$  and post-test mean 20.42 second,  $SD= 4.108$ . From this results of the study showed that there was a no significant change of control groups for agility (Illinois run) performance because  $MD= 0.065, SD=1.678, p= 0.844$  so  $p > 0.05$ , and also on the experimental group the mean pre-test was 20.87 with  $SD = 2.613$  and the post-test mean of experimental group was 12.00, with  $SD= 2.763$  from this results of the study showed that there was a significant change of experimental group for agility (Illinois run) performance because  $MD= 8.865, SD=3.465, p=0.000$  so  $p < 0.05$ .

This paired samples test statically significant so, based on the deviation mean difference of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of agility. So, the formulated suggestion that teaching aerobic exercises for more than 12 weeks has a significance effect on the improvement of agility because the deviations mean difference between the two groups is significant. This result was in agreement with the findings of Mahendran, (2009) that conducted with selected skill related variable agility was measured using Illinois run test. The variable was significantly ( $p < 0.05$ ) improved among experimental group. This finding is also in accordance with Lexie, D Williams, et al. (2008) who's finding on the effects of a 12-week aerobic dance program on agility response showed significantly improved after aerobic exercise. The result also supported by Partav, (2013) who discovered that after seven weeks of rope jumping training a significant ( $p < 0.05$ ) improvement in cardio respiratory fitness was observed among experimental groups of middle school student boys. In the case of control group, no significant changes were seen in any of the selected studies. This finding is also in accordance (Auxter et al, 1997) who's finding on the effects of a 12-week aerobic dance program on agility response showed significantly improved after aerobic exercise.

**In Case of balance:** In this study carried out to investigate the teaching aerobic exercises for 12 weeks on selected motor fitness components on balance (one leg stand) technique performance. As it can be seen on table10 which stated that the pre-test mean score of control group is 7.92 second SD= 2.591 and post-test mean 8.04second, SD= 2.645. From this result of the study showed that there was a no significant change of control groups for balance (standing stock) performance because MD= .115second, SD=3.953  $p= 0.883$  so  $p > 0.05$ , and also on the experimental group the mean pre-test was 8.00second with SD = 2.561 and the post-test mean of experimental group was 16.00second, with SD= 7.864. From this result of the study showed that there was a significant change of experimental group for balance (one leg stand) performance because MD= 8.00second, SD=6.928,  $p=0.000$  so  $p < 0.05$ .

These paired samples are statically significant so, based on the post-pre-deviation means of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of balance.

So, the formulated suggestion that teaching aerobic exercises for 12 weeks has a significance effect on the improvement of balance because the mean difference is significant at p-value < 0.05

**In Case of power:** the finding of this study on results presented in Table13 proved the mean of post-pretest deviation of standing long jump (power) result in the pre-test mean score of control group is 1.21 cm SD= 0.184 and post-test mean 1.24cm , SD= 0.146 from this results of the study showed that there was a no significant change of control groups for power (standing long jump) performance because MD= .115 and SD=3.953 p= 0.883 so  $p > 0.05$ , and also on the experimental group the mean pre-test was 1.20cm with SD = 0.193 and the post-test mean of experimental group was 1.51cm , with SD= 0.174. From this result of the study showed that there was a significant change of experimental group for power (standing long jump) performance because MD= 0.317cm, SD=0.228=0.000 so  $p < 0.05$  This t is statically significant so, based on the post-pre-deviation means difference of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of power.

The study of Singh (2007) also support the result of study he concluded in his study that players of trained were found significantly better on all physical fitness variables i.e. strength, speed, power, flexibility, agility and endurance that of non- trained one.

Here we can conclude that teaching aerobic exercises for 12 weeks has a significance effect on the improvement of power because the mean difference between the two groups is significant at p-value < 0.05.

## **5. SUMMARY, CONCLUSION AND RECOMMENDATION**

The purpose of the study was to investigating the effect of aerobic exercises on some selected skill related physical fitness components the case of Shewarobit Secondary School in North Showa Zone Amhara Regional State.

This part deals with summery, conclusion and recommendations. In this section first, a summary of the study and major findings are made. Second, conclusions of the fundamental findings are drawn. Finally, some possible recommendations forwarded based on the findings of the study.

### **5.1 Summary**

The purpose of the study was to investigating the effect of aerobic exercises on some selected skill related physical fitness components: on the case of Shewarobit Secondary School in North Showa Zone Amhara Regional State. The sample size was 52 grade 11 students at Shewarobit Secondary school. Thus, were divided in to 26 experimental and 26 control groups. For the purpose of data analysis, paired t-test and descriptive statics were used. To address the research objectives the following research test result were raised, the possible finding was summarized as follows.

Based on the above result, the agility (Illinois run) test of experimental group had 20.87second results of mean for pre-test and 12.00 second for post-test however, control group had 20.36second pre-test and 20.42 second post-test recorded and the level of significance was set at 0.05. Experimental and control group of pre and post test score difference of mean value was 8.865, .065 and P-Value of pre and post-test were .000, .883 respectively. Therefore, the experimental group had a high level of fitness improvement than control group.

This implies that there is a significance mean difference between the experimental groups and control groups in post test results. This t is statically significant so, based on the posttest

means of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of agility. Whereas, the pretest mean of experimental and control groups were almost the same. The paired samples t-test shows no significance difference between the groups. This insignificance value is due to the lack of treatment (aerobic exercises) during pretest. Here we can conclude that teaching aerobic exercises for more than 12 weeks has a significance effect on the improvement of agility because the mean difference is significant at post test results but not significance in pretest results.

As shown in the study result, the balance (one leg stand) test of experimental group had 8.00 results of mean for pre-test and 16.00 for post-test however, control group had 7.92 pre-test and 8.04 post-test recorded and the level of significance was set at 0.05. Experimental and control group of pre and post test score difference of mean value was 8.00 second, .0.115 second and P-Value of pre and post-test were .000, .883 respectively. Therefore, the experimental group had a high level of improvement than control group.

This implies that the mean difference between the two groups of posttest result of one leg stand test is significance. This paired samples t-test is statically significant so, based on the posttest means of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of balance. Whereas, the pretest mean of experimental and control groups were almost the same. The paired samples t-test shows that no significance difference between the groups this is due to lack of treatment. Here we can conclude that teaching aerobic exercises for more than 12 weeks has a significance effect on the improvement of balance because the mean difference is significant at post test results but not significance in pretest results.

Based on, the standing long jump test (power) of experimental group had 1.20 cm results of mean for pre-test and 1.51 cm for post-test however, control group had 1.21 cm pre-test and 1.24 cm post-test recorded and the level of significance was set at 0.05. Experimental and control group of pre and post test score difference of mean value was 0.317 cm, .038 cm and P-

Value of pre and post-test were .000, .423 respectively. Therefore, the experimental group had a high level of improvement than control group.

This implies that there is a significance mean difference between the experimental groups and control groups in post test results. This paired samples t-test is statically significant so, based on the posttest means of experimental and control groups, we can say that in experimental groups aerobic exercises have a great effect on the improvement of power. Whereas, the pretest mean of experimental and control groups were almost the same. The paired samples t-test shows that no significance difference between the groups which was before getting aerobic exercise training.

Here we can conclude that teaching aerobic exercises for 12 weeks has a significance effect on the improvement of power because the mean difference is significant at post test results but not significance in pretest results.

## **5.2 Conclusion**

The major finding of this research was to investigating the effect of aerobic exercises on some selected skill related physical fitness components: on the case of Shewarobit Secondary School in North showa Zone Amhara Regional State the findings of the study identify and conclude the following.

As the results of the study discovered, within limitation of this study based on the data analysis, the conclusion was made that there is a positive effect of aerobic exercises on selected performance related fitness components such as agility, balance, and power. This effect was checked by comparing the posttest and pretest results of the two groups.

The mean difference between the post and pretest results of the three performance related fitness components was significant in experimental groups but this difference is not significant in control groups. This shows that the effect of aerobic exercises on the improvement of performance related fitness components.

There are different effects of aerobic exercises on skill related fitness components. This difference was checked by pairing the post-pretest of the three skill related fitness components in both groups. There is a significant mean difference between post and pretest results of agility, balance and, power in experimental groups but there is no significant mean difference in control groups. This shows that the positive effect of aerobic exercises in each skill related fitness components.

The student's skill related fitness level differs between the experimental group and the control group in different aerobic exercises. This difference was checked by taking the post-pre-deviation scores of the three skill related fitness components and comparing by using paired samples t-test the result shows that, there is a significant mean difference between the experimental and control groups of the three skill related fitness components. This difference is due to the 12-month aerobic exercises in experimental groups. Together with this the researcher showed that students result in terms of the given normative scales concluded as follows.

In table 8.the mean difference of agility (agility run test) was 12.00 second and the normative value indicated that  $< 15.2$  so students those involved in treatment training period was achieved excellent result.

In case of power the mean difference of the experimental group of post test result was 1.50 cm. but the normative scale was 1.67 to 1.50 so it indicated that students score an excellent grade.

In case of balance the mean difference of the experimental group was 8.00 second but the normative scale showed that  $< 10$  second so, the comparison normative valu indicated that students achieve an excellent results.

### **5.3 Recommendation**

The findings of this research provide that twelve weeks of low, moderate and high intensity aerobic exercise programs significantly changed a selected skill related fitness variable of the participants. Based on these results, discussions and findings of the research, the following recommendations are made.

According to the research finding aerobic exercises have a positive effect on agility, balance, and power. And Students have a positive attitude when they were in practical session. So, Students, athletes and other sport men's, who want to improve skill related fitness components focused more on aerobic exercises.

Physical education teachers, sport science professionals, and coaches who wants to improve students or trainer's skill related physical fitness should focuses on aerobic exercises.

In this study, the sample size is not large enough which may affect the reliability of study in expressing the differences in student performance of fitness level. The sample sizes of further study should be larger so that the study can be more representative.

In this study the extraneous variables like student's health status, nutritional habit, rest time and other factors were not controlled during the experiment. So, anybody who wants to research on the same area is better to control the extraneous variables because these variables may alter the result of the study.

he students being examined in the study were the 16-19 years old; there for, the findings may not be applicable to other age groups. So other researchers can do on other age categories.

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## **7. APPENDICES**

**APPENDIX A-**

## Physical Activity Readiness Questionnaire (PAR-Q)

. Please read the questions carefully and answer each one honestly

YES, NO

1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?

2. Do you feel pain in your chest when you do physical activity?

3. In the past month; have you had chest pain when you were not doing physical activity?

4. Do you lose your balance because of dizziness or do you ever lose consciousness?

5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?

6. Is your doctor currently prescribing drugs (for example, water pills) for your blood Pressure or heart condition?

7. Do you know of any other reason why you should not do physical activity?

I certify that the above statements are true and correct. I understand that Doctor's note may be requested. If a doctor's note is requested, I should not proceed with this program until the note is received.

Name Asfaw Tadesse

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

## APPENDIX B.

Norm reference /Standards

The following formant will be used to assess, evaluate the student's performance with the norm standard in the following order.

**Table1** Male normative value for standing long jump it indicate Power

Age	Excellent	Above average	Average	Below average	Poor
14	>2.11 m	2.11-1.95	1.95-1.68	1.84-1.68	<1.68
15	>2.26 m	1.26-2.11	2.10-1.98	1.97-1.85	<1.85
16	>2.36 m	2.36-2.21	2.20-2.11	2.10-1.98	<1.98
>16	> 2.44 m	2.44-2.29	2.28-2.16	2.15-1.98	<1.98

**Source:** Normative value for standing jump in power (Heae et al., 2001)

**Table 2** Female normative value for standing jump it indicates Power

Age	Excellent	Above average	Average	Below average	Poor
14	>1.91 m	1.91-1.73	1.72-1.60	1.59-1.47	<1.47
15	>1.85 m	1.84-1.73	1.72-1.60	1.59-1.50	<1.50
16	>1.83 m	1.83-1.68	1.67-1.58	1.57-1.45	<1.45
>16	> 1.91m	1.98-1.78	1.77-1.63	1.62-1.50	<1.50

**Source:** Normative value for standing jump in power (Heae et al.2001)

**Table 3.** Stock Balance Stand test / Standard

Rating	Score /Seconds
Excellent	> 50
Good	40-50
Average	25-39
Fair	10-24
Poor	< 10

**Source:** (Jonson, et al., 1999)

**Table 4.** Illinois Agility test Norms

Rating	Male (second)	Female (Second)
Excellent	< 15.2	< 17.0
Above Average	15.2 - 16.1	17.0 - 17.9
Average	16.2 -18.1	18.0 -21.7
Below Average	18.2-19.3	21.7 -23.0
Poor	>19.3	> 23.0

**Source:** (Davis et al., 2000)

## **APPENDIX C**

Participant information sheet and informed consent form

My name is Asfaw Tadesse Erdachew. I stand working as a data collector for the study being conducted in this school and the purpose of particular fulfillment of master's degree of Haramaya University the department of sport science in sport academy. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant

**The Study Title;** The effect of aerobic exercise on some selected performance related physical fitness components in case of Shewarobit secondary school

Purpose of the study or the finding of this study would have a paramount role for physical education teacher, trainers, as well as institutions etc. It also provides a basis for the development of specific training program and time for the treatment of lack of aerobic exercise on the society. Moreover, the aim of the study to fulfilling masters of degree in sport science for the investigator and desire to the effect of aerobic exercise on some selected performance related physical fitness components in case of Shewarobit secondary school

### **Procedure and duration**

There are three variables to be tested before and training program are given to your participation in this study were not exceeded 60 minute per session. Three days per week for training. The experiment of the study was taken twelve weeks. So, I kindly request you to spare the time for exercise training.

### **Risks and benefits**

While administrating the test and during training session you may experience localized muscle fatigue in the body. You may also fell some muscle soreness and fatigue during and after the session of the exercise tests and training but it is not expected un usual risk as a direct

result of the study. If any an expected physical injury occurs appropriate first aid was provided but no financial compensation was given. There were no costs for participating in the research on part of you. Soap and packed water were given to you during the training session. In addition, when you are participating in this exercise program you improve your physical fitness. I hope that this was giving you a clear picture of Effects of aerobic exercise on some selected performance related components.

### **Rights**

Participation for this study were fully voluntary you have the right to declare to participate or not in this study. If you decide to participate you have the right to withdraw from the study at any time and will not label you for any loss of benefits which you otherwise are irritated. you do not have to answer any question that you do not want to answer.

### **Confidentiality**

If you consent to participate in this assessment your personal information was kept confidential. Participant's individual scores was disclosed outside of the testing personal without each participant writing permission. However, the only researcher may review the study data without writing consent.

### **Agreement.**

I have read at the information provided on this form and consent to participate in this study.

Name \_\_\_\_\_

Signature \_\_\_\_\_ -

Date \_\_\_\_\_

If you do not consent to participate you do not need to sign this form simply return it to the researcher.

Signature of investigator \_\_\_\_\_

Date \_\_\_\_\_

Contacts address if there is any question time about the study please contact.

Asfaw Tadesse Erdachew. At (979549253) or E-mail Asfawt0979gmail.com

## APPENDIX D

### Training Schedule for Three Months

Physical training needs well designed and prepared plan to develop or to see the effect of aerobic exercise on some selected skill related physical fitness components of the students through 12 weeks different physical fitness training intervention. In physical training plan and goals or objectives should be specified participants fitness level should be assessed before and after training exercise should be selected by following training principles it should be well adjusted to the participants fitness levels and to the weather condition; The schedule was prepared with time frame intensity and frequency of exercise.

The following table (E) includes different types of physical exercise which was performed by the subjects within 12 weeks in order to improve their health and develop some of skill related physical fitness component through aerobic exercises. The exercises hold warming up, main task (walking, jogging, ballgame, aerobic dance etc.)and cool down exercise which helps to develop student's fitness capability also consider FITT (frequency, intensity, time and types of exercise)

Principle of training was applied in the program or schedule:

**Frequency of training-** the repetition of exercise in one set. The training schedule was completed 3 days per week that is Monday, Wednesday, Friday. The exercise that was given in this part to improve student's health

**Intensity of training** – is how hard the body exercising or how much energy used when exercising. In this study the researcher was use moderate to adapt the exercise for increasing load in the consecutive three months. There are ways to measure intensity of training.

**Heart rate-** Heart rate can be an indicator of the challenge to the cardio vascular system that the exercise represents' **VO2 max-**The amount of oxygen consumed by the body during exercise.

Exercise is categorized in to three different level. These levels include moderate for aerobic exercise and are measured by metabolic equivalent of task. The e effect of exercise is different at each intensity level (i.e. training effect). Recommendations to lead a healthy life style vary for individuals based on weight, physical appearance, and existing activity levels. Published guide lines for healthy adult's states that 40-60minutes of medium intensity continuous for treatment aerobic exercise 3 times per a week was needed for developing and maintaining fitness.

For strength Training: The exercises you do (at least 8-10 exercises), the amount of weight you lift and your repetitions and sets determine the intensity of your strength workouts. In general, you want to lift enough weight that you can only complete the desired number of repetitions (around 1-3 sets of 8-16 repetitions of each exercise) (ACSM, 1990). The maximum heart rate is based on a person's age. An estimate of a person's maximum heart rate can be calculated as 220 beats per minutes of your age.(<http://www.essa.org.au/wp-content/uploads/2014/06/exercise-intensity-guidelines>).

**3. Duration of training:** the subjects perform the exercise for 40-60 min per day in this study. Duration dependent on the intensity of the activity thus, medium-intensity activity should be conducted over a longer period of time (60 min not more).

#### **4. Type of activity:**

The researcher was using the training principles, this training session was designed for three months based on the principles of frequency, intensity, types and principle of rest and recovery was given for three days per a week, one day rest in between exercise session with 40- 60 minutes each. In linking with this the training schedule of 3 months was prepared and indicated on the following page.

## APPENDIX-E

12week Training Program for Experimental Group

Appendix Table5 First month Training schedule

Day	Types of exercise	Time /min	Frequenc y/ rep/re st	Intensity (mode rate)
<b>Monday</b>	Warming up: Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part- Squats	4min		
	Lunges	5min		
	Jogging	3min		
	Walking	5min		
	Aerobic dance	4min		
	Ballgame	6min		
	sprints, oblique twist	4min		
	jumping rope	5min		
<b>Cool down-</b> stretching and relaxation exercise	4min			
<b>Wednesday</b>	<b>Warming up-</b> Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part: - Squats	3min		
	Lunges	4min		
	Jogging	5min		
	Walking	4min		
	Aerobic dance	4min		
	Ballgame	6min		
	sprints, oblique twist	6min		
	jumping rope	6min		
<b>Cool down- static</b> stretching exercise, light jogging and	4min			

	skipping			
<b>Friday</b>	Warming up- Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part- Squats	5min		
	Lunges	4min		
	Jogging	4min		
	Walking	6min		
	Aerobic dance	4min		
	Ballgame	6min		
	sprints, oblique twist	3min		
	jumping rope	4min		
<b>Cool down-</b> light jogging and static stretching and relaxation exercise	4min			

## APPENDIX-F

**Table 6** Second month exercise schedule

Day	Types of exercise	Time /min	Frequenc y/ rep/re st	Intensity (mode rate)
Monday	Warming up: Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part- Squats	4min		
	Lunges	5min		
	Jogging	4min		
	Walking	5min		
	Aerobic dance	5min		
	Ballgame	6min		
	Sprints, oblique twist jumping rope	4min 5min		
	<b>Cool down-</b> stretching and relaxation exercise	4min		
Wednesday	<b>Warming up-</b> Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part: - Squats,	5min		
	Lunges	4min		
	Jogging,	5min		
	Waking	4min		
	Aerobic dance	5min		
	Ballgame	5min		
	sprints, oblique twist jumping rope	6min 6min		
	<b>Cool down- static</b> stretching exercise, light jogging and skipping	4min		

<b>Friday</b>	Warming up- Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part; Squats	5min		
	Lunges	5min		
	Jogging	6min		
	Waking	6min		
	Aerobic dance	6min		
	Ballgame	6min		
	sprints, oblique twist	5min		
	jumping rope	6min		
<b>Cool down-</b> light jogging and static stretching and relaxation exercise	4min			

**Table 7** Third month exercise schedule

<b>Day</b>	<b>Types of exercise</b>	<b>Time /min</b>	<b>Frequenc y/ rep/re st</b>	<b>Intensity (mode rate)</b>
<b>Monday</b>	Warming up: Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part- Squats	5min		
	Lunges	5min		
	Jogging	5min		
	Waking	5min		
	Aerobic dance	5min		
	Ballgame	6min		
	sprints, oblique twist	6min		
	jumping rope	6min		
<b>Cool down-</b> stretching and relaxation exercise	4min			

<b>Wednesday</b>	<b>Warming up-</b> Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part: - Squats,	5min		
	Lunges	5min		
	Jogging	5min		
	Waking	5min		
	Aerobic dance	6min		
	Ballgame	6min		
	sprints, oblique twist	6min		
	jumping rope	6min		
<b>Cool down- static</b> stretching exercise, light jogging and skipping	4min			
<b>Friday</b>	Warming up- Walking, Jogging, leg swing (inward and outward) Dynamic stretching	5 min	2rep/1min rest	40-60%
	Main part- Squats	5min		
	Lunges	5min		
	Jogging	5min		
	Waking	6min		
	Aerobic dance	6min		
	Ballgame	6min		
	sprints, oblique twist	6min		
	jumping rope	6min		
<b>Cool down-</b> light jogging and static stretching and relaxation exercise	4min			

**Table 8** Pre and posttest fitness results of experimental group

No	Pre-Agility	post Agility	Pre-Balance	Post Balance	pre-power	post power
1	24	14.5	5	13	1	1.7
2	19.3	12	6	18	1.5	1.6
3	21	10	8	11	1.2	1.65
4	22	6	8	10	1.5	1.71
5	26	8	9	23	1.4	1.65
6	24	9.6	10	12	1.3	1.56
7	19.5	16	5	10	1.1	1.6
8	20	14.5	9	20	1	1.68
9	27	10	6	16	1.3	1.59
10	21	15.5	3	8	1.2	1.57
11	25.3	13	12	12	1.4	1.65
12	17.9	8	7	10	1.5	1.49
13	21	12.5	8	15	1	1.45
14	19	15.3	13	25	0.9	1.57
15	22	10	9	40	0.8	1.39
16	19.8	15.4	11	34	1	1.25
17	27	15.5	10	25	1.3	1.65
18	20.5	13.2	6	11	1.15	1.24
19	19.6	10	12	18	1.2	1.4
20	21	11	10	15	1.3	1.39
21	19.5	10	5	10	1.15	1.15
22	26	11	4	9	1.2	1.75
23	17	12	7	16	1.3	1.45
24	18	10	8	13	1	1.67
25	18.6	14	8	10	1.04	1.15
26	22.5	15	9	12	1.4	1.41

## APPENDIX-G

### Post-Pre-Deviation Results of Experimental Group

**Table 9** Post-pre-deviation results of experimental group

Agility Deviation Result	Balance Deviation Result	Power Deviation Result
-9.5	8	0.7
-7.3	12	0.1
-11	3	0.45
-16	2	0.21
-18	14	0.25
-14.4	2	0.26
-3.5	5	0.5
-5.5	11	0.68
-17	10	0.29
-5.5	5	0.37
-12.3	0	0.25
-9.9	3	-0.01
-8.5	7	0.45
-3.7	12	0.67
-12	31	0.59
-4.4	23	0.25
-11.5	15	0.35
-7.3	5	0.09
-9.6	6	0.2
-10	5	0.09
-9.5	5	0
-15	5	0.55
-5	9	0.15
-8	5	0.
-4.6	2	0.11
-7.5	3	0.01

## APPENDIX-H

### Pre and Post Test Fitness Results of Control Group

**Table 10** Pre and posttest fitness results of control group

No	Pre-Agility	post Agility	Pre-Balance	Post Balance	pre-power	post power
1	22	24	6	9	1.2	1.2
2	15	13	5	11	1.5	1.3
3	21	21	7	10	1.2	1.15
4	22	22	6	6	1.5	1.2
5	26	27	9	12	1.3	1.3
6	24	24	10	10	1.3	1
7	19	20	5	5	1.1	1.04
8	21	20	9	4	1.1	1.4
9	25	27	6	7	1.3	1.3
10	21	21	3	8	1.2	1.14
11	21	19	12	8	1.4	1.25
12	18.5	17.9	6	9	1.5	1.12
13	21	21	8	10	1.02	1.5
14	17	19	13	6	0.9	1.2
15	20	22	9	13	0.8	1.25
16	19.8	16	11	8	1.1	1.1
17	25	27	10	7	1.3	1.5
18	20.5	19	8	12	1.15	1.2
19	15	12	12	3	1.2	1.5
20	21	21	10	6	1.3	1.4
21	13.5	15	5	9	1.15	1.3
22	26	27	4	5	1.2	1.1
23	17	16	7	10	1.3	1
24	18	19	8	9	0.9	1.3
25	20	18.6	8	8	1.04	1.2
26	20	22.5	9	4	1.4	1.4

## APPENDIX - I

### Post-Pre-Deviation Results of Control Group

Table 11 Post-pre-deviation results of control group

Agility deviation	Balance deviation	Power deviation
2	3	0
-2	6	-0.2
0	3	-0.05
0	0	-0.3
1	3	0
0	0	-0.3
1	0	-0.06
-1	-5	0.3
2	1	0
0	5	-0.06
-2	-4	-0.15
-0.6	3	-0.38
0	2	0.48
2	-7	0.3
2	4	0.45
-3.8	-3	0
2	-3	0.2
-1.5	4	0.05
-3	-9	0.3
0	-4	0.1
1.5	4	0.15
1	1	-0.1
-1	3	-0.3
1	1	0.4
-1.4	0	0.16
2.5	-5	0

## APPENDIX-J

### Profile of Participants Experimental Group

**Table 12** Profile of participants Experimental Group

No	Code	Grade & section
1	AA.ex.1	11L
2	AA.ex.2	11M
3	AA.ex.3	11A
4	AA.ex.4	11A
5	AA.ex.5	11B
6	AA.ex.6	11B
7	AA.ex.7	11D
8	AA.ex.8	11B
9	AA.ex.9	11A
10	AA.ex.10	11A
11	AA.ex.11	11M
12	AA.ex.12	11L
13	AA.ex.13	11C
14	AA.ex.14	11E
15	AA.ex.15	11E
16	AA.ex.16	11A
17	AA.ex.17	11G
18	AA.ex.18	11M
19	AA.ex.19	11K
20	AA.ex.20	11L
21	AA, ex.21	11K
22	AA.ex.22	11A
23	AA.ex.23	11B
24	AA.ex.24	11F
25	AA.ex.25	11N
26	AA.ex.26	11J

## APPENDIX-K

### Profile of Participants Control Group

**Table 13** Profile of participants Control Group

No	Code	Grade & section
1	BB.ex.1	11B
2	BB.ex.2	11G
3	BB.ex.3	11C
4	BB.ex.4	11C
5	BB.ex.5	11D
6	BB.ex.6	11F
7	BB.ex.7	11F
8	BB.ex.8	11A
9	BB.ex.9	11D
10	BB.ex.10	11G
11	BB.ex.11	11C
12	BB.ex.12	11J
13	BB.ex.13	11K
14	BB.ex.14	11C
15	BB.ex.15	11D
16	BB.ex.16	11B
17	BB.ex.17	11J
18	BB.ex.18	11E
19	St.co.19	11E
20	BB.ex.20	11K
21	BB.ex.21	11K
22	BB.ex.22	11H
23	BB.ex.23	11B
24	BB.ex.24	11H
25	BB.ex.25	11F
26	BB.ex.26	11L

**APPENDIX-L**

Table 14 Illinois agility run test

## Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean	
Pair 1	Illinois agility run pretest for experimental group	20.87	26	2.613	.512
	Illinois agility run post test for experimental group	12.00	26	2.763	.542
Pair 2	Illinois agility run pre-test for control group	20.36	26	3.265	.640
	Illinois agility run post test  for control group	20.42	26	4.108	.806

## Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 Illinois agility run pre-test for experimental group & Illinois agility run post test for experimental group	26	.170	.406
Pair 2 Illinois agility run pretest for control group & Illinois agility run post test for control group	26	.922	.000

## 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 Illinois agility run pretest for experimental group - Illinois agility run post test for experimental group	8.865	3.465	.680	7.466	10.265	13.046	25	.000



## APPENDIX -M

**Table 15** One leg stand test

### Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean	
Pair 1	one leg stand pretest for experimental group	8.00	26	2.561	.502
	one leg stand pretest for experimental group	16.00	26	7.864	1.542
Pair 2	one leg stand pre-test for control group	7.92	26	2.591	.508
	one leg stand posttest for control group	8.04	26	2.645	.519

### Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 one leg stand pretest for experimental group & one leg stand pre-test for experimental group	26	.506	.008
Pair 2 one leg stand pretest for control group & one leg stand post test for control group	26	-.140	.496

## 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 one leg stand pretest for experimental group - one leg stand pre-test for experimental group	-8.000	6.928	1.359	-10.798	-5.202	-5.888	25	.000
Pair 2 one leg stand pretest for control group - one leg stand post test for control group	-.115	3.953	.775	-1.712	1.481	-.149	25	.883

## APPENDIX-N

**Table16** Standing Long Jump test

### Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean	
Pair 1	standing long jump pretest for experimental group	1.20	26	.193	.038
	standing long jump posttest for experimental group	1.51	26	.174	.034
Pair 2	standing long jump pretest for control group	1.21	26	.184	.036
	standing long jump post test for control group	1.24	26	.146	.029

### Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 standing long jump pre-test for experimental group & standing long jump post test for experimental group	26	.234	.250
Pair 2 standing long jump pretest for control group & standing long jump post test for control group	26	-.036	.862

## 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 standing long jump pretest for experimental group - standing long jump post test for experimental group	-.317	.228	.045	-.408	-.225	-7.093	25	.000
Pair 2 standing long jump pre-test for control group - standing long jump post test for control group	-.038	.239	.047	-.134	.058	-.814	25	.423

Figure 1:- Map of the Study Area



