

**EFFECT OF SELECTED EXERCISES ON THE IMPROVEMENT OF  
STRENGTH AND ENDURANCE OF FEMALE STUDENTS OF DIRE  
DAWA MARIAM SEFER SECONDARY SCHOOL, DIRE  
DAWA CITY**

**MEd THESIS**

**TEMESGEN TEKA DEFFAR**

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**Effect of Selected Exercises on the Improvement of Strength and Endurance of  
Female Students of Dire Dawa Mariam Sefer Secondary School, Dire Dawa  
City**

**A thesis Submitted to the Department of Sport Science,  
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**Temesgen Teka Deffar**

March, 2017

**HARAMAYAUNIVERSITY, HARAMAYA**  
**HARAMAYA UNIVERSITY**  
**POSTGRADUATEPROGRAMEDIRECTORATE**

As thesis Research advisors, we hereby certify that we have read and evaluated this thesis entitled: **“Effect of Selected Exercises on the Improvement of Strength and Endurance of Female Students of Dire Dawa Mariam Sefer of Secondary School, Dire Dawa City”** prepared by Temesgen Teka Deffar. We recommend that it can be submitted as fulfilling the thesis requirement.

Desta Enyew (PhD)

Name of Major Advisor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Shemelis Mekonnen (PhD)

Name of Co-Advisor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

As members of the board of Examiners of the MEd. Thesis Open defense Examination, we certify that we have read and evaluated the Thesis work prepared by Temesgen Teka Deffar and examined the candidate. We recommend that the thesis can be accepted as fulfilling the Thesis requirement for the Degree of Master of Education in Teaching Physical Education.

\_\_\_\_\_  
Chair Man

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Internal Examiner

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
External Examiner

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## **DEDICATION**

I dedicate this thesis manuscript to my wife, Honey Alemu for her dedication in the success of my life.

## **STATEMENT OF THE AUTHOR**

First, I declare that this thesis is my genuine work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the

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**Name:** Temesgen Teka Deffar

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

**Place:** Haramya University, Department of Sport Science

**Date of submission:** \_\_\_\_\_

## **BIOGRAPHICAL SKETCH**

The Author was born in 22 March, 1967 in East Jimma of Oromia Regional State. He attended his Elementary education at Deri Kidamae Gebeya School in Jimma District, Secondary and at Jimma Comprehensive and Preparatory School.

Then, he joined Kotebe College of Teachers Education in the Department of Sport Science in 2001 and graduated with Bachelor of Physical Education and Sports (BEd) in September 15, 2011 from HU.

Upon completion he was employed as health and physical education teacher in Dire Dawa Mariam Sefer Secondary School. He served for seven years and joined Haramaya University in the summer program for MEd. in Teaching Physical Education in 2014.

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## ACRONYMS AND ABBRIVIATIONS

ATP	Adenosine Triphosphate
BMI	Body Mass Index
CSAoE	Central Statistical Agency of Ethiopia
CVE	Cardio-Respiratory Endurance
DC	Difference
DT T	During Training Test
DV	Dependent Variable
HII	High Intensity Interval
IG	Intensive Gymnastics
IGS	Intensive Gymnastics Strategies
MDMS	Mean Difference in Microsecond
MDP	Mean in Percentage
MoE	Ministry of Education
PAQ	Physical Activity Redness Question
PE	Physical Education
PoT	Post Test
PT	Pre Test
SPSS	Statical Package for Social Sciences

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**EFFECTS OF SELECTED EXERCISES ON THE IMPROVEMENT OF STRENGTH AND ENDURANCE OF FEMALE STUDENTS OF DIRE DAWA MARIAM SEFER SECONDARY SCHOOL, DIRE DAWA CITY**

**ABSTRACT**

*This study attempted to explore effects of selected exercises on the improvement of strength and endurance female students of Dire Dawa. Mariam sefer Secondary School. Random sampling technique was used to select 40 female students of age 15 to 16 years old. The main objective of the study was to investigate the effect of selected exercises on the improvement of strength and endurance of female students of Dire Dawa Mariam Sefer secondary School Dire Dawa. All subjects under this study took part in experimental design pre, during and post test without control group from October 2016 to March 2017, 3 days per week for 3 months and 40 minutes per session. The selected strength and endurance exercises for the study were standard pushup, sit up test. Data were analyzed by using SPSS paired samples t-test with pair wise comparison of means at 95% confidence interval by using pre, during and post tests. The results indicated that*

*there were significance improvements in endurance due to selected exercises and physical fitness variables due to the effects of strength training. This study confirmed that selected exercises were significant to improve the strength of female students. The mean difference (MD) between pre and post test for; 40minutes respective exercises was 0.36 micro seconds or before the exercises their mean values were found in the below average according to the standard and after the exercises they were included in the above average scale due to the strength exercises. The main finding of the study was the Mariam Sefer female students have discovered positive outcomes towards their future career of health life. Due to strength and endurance exercises students also achieved both health related physical fitness and skill related physical fitness variables*

**Key words;** *Exercises .Endurance, Female Students, Strength exercises.*

## 1. INTRODUCTION

The main purpose of this part of the thesis is to set the background of the study, and scope of the study, in addition significance of the study, and definition of key terms in the study presented.

### 1.1. Background of the Study

Strength is important to every event in PE class for females. Strength is a very important components of fitness for all students but the important question is frequently asked is training for strength appropriate for children and young female students? With a sound knowledge of growth and development and the stage of student's development, the teachers now know that young students can begin learning the techniques of some strength exercises. (Gale Encyclopedia of Medicine, 2008). Strength training is synonymous with the term 'resistance training' and is defined as a specialized form of conditioning that is used to increase one's ability to produce or resist force. Strength training uses the principle of progressive overload to force the body (muscles, bones, tendons, etc.) to adapt in order to be able to produce and/ or resist larger forces. Strength training is a tool that can augment sport performance through improved strength and motor control. Resistance training helps to improve motor control and strength by "teaching" muscles how to work together in a coordinated manner (Savannah, 1999). There can't be a single best exercise for everyone because different training that has different effects and the type of strength that one person needs to improve his or her speed and jumping ability may be the opposite of what another needs. Speed and jumping ability both require an athlete to display large amounts of power. Power is a combination of strength and speed. That means  $\text{Power} = \text{Strength} \times \text{Speed}$  (Babić *et al.*, 2007). When performing a sprint, think of power as the amount of force that applies into the ground with each stride. Obviously the greater the force, the more ground going to cover with each stride. This Stride length is then combined with stride frequency or the speed at which cycle the legs when spring to determine running speed. So, it can increase speed by either increasing stride length or increasing stride frequency with the largest potential increases coming from an increase in stride length, where power is of at most importance (Knuttgen, H. G. 2003). This is influenced by the following strength qualities; Limit Strength: is the amount of force can

apply irrespective of time Limit strength can also be thought of as the strength of muscles when speed of movement is of little consequence.(Delecluse,1997 )

Explosive Strength: refers to the ability to develop max force in minimal time without the use of the plyometric stretch-reflex. Jumping from a paused position and sprinting out of the blocks both require nearly pure explosive strength. Explosive strength relies on starting strength, which is the ability to "turn on" as much force as possible in the first .03 seconds of movement (Chaffin *et al.*, 1999). Speed is the capacity to travel or move very quickly. It means the whole body moving at maximum running speed, as in the sprinter. Speed is a scalar quantity that refers to how fast an object is moving. Speed can be thought of as the rate at which an object covers the distance. A fast moving object has a high speed and covers a relatively large distance in a short amount of time (Grham, 1994). The sprint is the fastest event of all events in athletics. The distances 100m, 200m, 400m and relay events are all regarded as sprinting events. The objective is to run the distance from start to finish as fast as possible. (Basic Coaching Manual - I.A.A.F., 2000). The sprint is the fastest event of all events in athletics. The distances 100m, 200m, 400m and relay events are all regarded as sprinting events (Frank, 2000).

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

physical fitness is an important part of normal growth and development; it is known that students want to be fit and active the opportunities offered in secondary schools has been decreased in providing physical fitness lessons (Pangrazi &Darst). The purpose of the present study was to investigate the effect of selected exercises on the improvement of strength and endurance of female student of Dire Dawa Mariame Seffer secondary schools Dirdawa City. However, our Ethiopian school curriculum of physical education develops one credit hour per week (42 minutes) for classroom as well as practical sessions .This is too little to improve the health related physical fitness (strength and endurance) as required .Due to this the researcher want to investigate the effect of three month selected exercise on the improvement of strength and endurance of female students

This study was tried to answer the following research questions:

1. What are the effects of selected strength and endurance exercises on female students of Dire Dawa mariam sefer secondary school?

2. .How to improve the endurance of female students of Dire Dawa Mariam Sefer Secondary School?

3. Does strength exercise bring changes to female students of Dire Dawa Mariam Sefer Secondary School?

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

The studies were focused on examining effects of selected exercises on the improvement of female students of Dire Dawa Mariame Sfer secondary school Dire Dawa city. To setup the study in manageable manner and also it is impossible to cover all the population under the experimental study due to lack of time, money were selected from Dire Dawa Mariame Sefer secondary school 40 grade 9<sup>th</sup> and 10<sup>th</sup> female student who are volunteers and the age of 15-16 to be participant of the study.

### **1.4. Significance of the study**

The main significance of the study was to investigate the effect of selected strength exercise on the improvements of endurance and strength of female students of Dire Dawa mariam sefer secondary schools. The students also benefited from the study in that they developed their skill and health related physical fitness specifically improving their muscular strength, endurance, and also they were encouraged being the participants of this study and will viewing their future. This study is also important to the teacher in order to develop his skill and become effective teacher in the future.

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

#### **1.5.1. General Objective**

- The main objective of the study was to investigate the effects of selected exercises on the improvement of female students of Diredawa Mariam Sefer high school Dawa city.

#### **1.5.2. Specific objectives**

- To evaluate strength and endurance performance of female students of Dire Dawa Mariame Sefer Secondary School.

- To investigate the role of exercise on the improvement of strength and endurance of female students of Mariam Sefer secondary school Dire Dawa.
- To evaluate the changes of strength and endurance exercise on the Mariam Sefer female students.

## 2. REVIEW OF RELATED LITERATURE

In his chapter basic concepts that constitute to effect of selected exercises on the improvement of strength and endurance of female students of dire dawa mariam sefer secondary school, dire dawa city would be explained and support with theories and proposed by different scholars. The researcher uses the review of scholar literature as a source of data based on the existing theory as assumption about the status of students' physical fitness.

Strength and endurance training is a type of physical exercise specializing in the use of resistance to induce muscular contraction which builds the strength, anaerobic endurance, and size of skeletal muscles. When properly performed, strength training can provide significant functional benefits and improvement in overall health and well-being, including increased bone, muscle, tendon and ligament strength and toughness, improved joint function, reduced potential for injury, increased bone density, increased metabolism, increased fitness, improved cardiac function, and improved lipoprotein lipid profiles, including elevated HDL ("good") cholesterol (Shaw and Shaw, 2014).

Muscle energy systems trained using anaerobic exercise develop differently compared to aerobic exercise, leading to greater performance in short duration, high intensity activities, which last from mere seconds to up to about 2 minutes(Shaw, 2008).

High-intensity interval training, although based on aerobic exercises like running, cycling and rowing, effectively become anaerobic when performed in excess of 90% rate (Medbo *et al.*,1988). In contrast, aerobic exercise includes low heart near intensity activities performed for longer periods of time. Activities such as walking, long slow runs, rowing, and cycling require a great deal of oxygen to generate the energy needed for prolonged exercise (i.e., aerobic energy expenditure). In sports which require repeated short bursts of exercise however, the anaerobic system enables muscles to recover for the next burst.(Behrens *et al.*, 2011)

The two types of anaerobic energy systems are: 1) high energy phosphates, ATP adenosine triphosphate and CP (creatin phosphate); and 2) anaerobic glycolysis. High energy phosphates are stored in limited quantities within muscle cells. Anaerobic glycolysis exclusively uses glucose (and glycogen) as a fuel in the absence of oxygen, or more specifically when ATP is needed at rates that exceed those provided by aerobic metabolism. The consequence of such rapid glucose breakdown is the formation of lactic acid. Physical activities that last up to about thirty seconds rely primarily on the former, ATP-CP phosphates system. Beyond this time both aerobic and anaerobic glycolysis-based metabolic systems begin to predominate (McMahon and Thomas, 1984)

The by-product of anaerobic glycolysis, lactate, has traditionally been thought to be detrimental to muscle function. However, exertions key principle of speed technique training is you can't train the body to move faster by training slow. It's simple; muscles adapt. And long, slow running trains the body to run slow. One more time, slow running teaches your body to be slow! Our technique training methods use over speed training with perfect technique to re-program the brain, nervous system, and the body to move faster than ever before Elevated muscle and blood lactate concentrations are a natural consequence of any physical (De Mello *et al.*, 2004).

Maximum strength is the greatest force that contracting muscle can produce. Maximum strength is a basic quality as a foundation for power development. Power is the interaction of strength and speed, the relationship between speed of contraction and speed of movement. It relates how quickl student can produce force and not merely how much force they can produce. Successful students are powerful students and this quality of strength should be developed, once a foundation of maximum strength has been developed. Powers is obvious important in the power events of head spring hand spring pull ups push up hurdling jumping and throwing (Stoppani, 2004).

Reactive strength is the potential of students and an athlete to use the elastic properties of their muscles and tendon. Is displayed when your muscle/tendon complex is stretched prior to contracting and is otherwise known as polymeric strength, reversal strength, reflexive strength, rebound strength etc. This type of strength is evident when you perform a quick countermovement (bend down) before jumping. Strength endurance is the ability of the muscles to continue to exert force in the face of increasing fatigue. It is simply the combination of strength and duration of movement (Bissas and Havenetididis, 2008).

## 2.1. Side Leg Lift Training

Side leg lifts strengthen and build up the muscles of the hips, helping them to look larger. Besides the hips, the exercise also works the back, thighs and abdominal muscles, which help support the hips. Although side leg lifts won't decrease hip fat, they will help improve the appearance of the hips by toning and increasing muscle size. Always practice proper form for optimal results. Lie on your left side with your legs straight out and your feet stacked on top of each other. Bend your left arm beneath your head for support. Rest your right arm on your hip. Keeping your legs straight, lift your right leg up toward the ceiling. Continue lifting until you feel tension in your sides and lower back. Lower your leg back to the starting position and repeat. Continue for a total of 12 repetitions on each leg. Concentrate on using your hip and thigh to lift your leg in the air. To really work your hips, hold your leg up and squeeze your hip for a few seconds before lowering your leg back down.

For an alternate exercise, lift your lower leg instead of your top leg. Keep the inside of your top foot pressed against the ground and pulse your lower leg 20 times before switching sides. To increase the intensity of the side leg lift, loop an exercise band around both of your ankles. You can also hold a dumbbell on top of the thigh you are lifting to add resistance.

To prevent injury, always keep your head aligned with your spine. Keep your body straight from head to toe throughout the entire exercise. Don't allow your body to form a "C" shape, where your torso and feet bend forward slightly. This puts pressure on your spine and can lead to discomfort and pain. For best results, do not bend your knees and keep your kneecaps facing straight ahead. Keep your abdominal muscles tight and contracted throughout the entire exercise to help support your spine.

Breathe properly when doing leg lifts to help prevent lightheadedness and alterations in blood pressure. Exhale as you lift your leg and inhale as you return it to the starting position. Always exercise in a slow, controlled manner. Do not jerk or swing your leg, which can lead to injury. Exercise at your own pace and fitness level. Start out with just a few repetitions on each side and work your way up to 12 reps if you cannot do all of them at first. Ads by Google

## 2.2. Agility Trainings

Defining agility: at present, there is no consensus among the sports science community for a clear definition of agility. Agility has classically been defined as simply the ability to change direction rapidly but also the ability to change direction rapidly and accurately. (Bloomfield *et al.*, 1994). Agility and co-ordination are two of the many attributes required to become a successful player. Complex movement such as dribbling, turning, passing, and intercepting often necessitate quick and large changes in speed and direction and correctly executing skills requires good body co-ordination. Agility refers to the ability to change the direction of the body or to shift quickly the direction of the movement without losing balance. It is dependent on a combination of factors such as speed, strength, balance and coordination. The ability to return quickly, evade challenges and side step calls for good motor co-ordination and can be measure using agility tests (Baechle, 1994).

## 2.3. Polymeric Training

Plyometric exploit the stretch-shortening cycle of muscles to enhance the myotatic (stretch) reflex. This involves rapid alternation of lengthening and shortening of muscle fibers against resistance. The resistance involved is often a weighted object such as a medicine ball or sandbag, but can also be the body itself as in jumping exercises or the body with a weight vest that allows movement with resistance. Plyometric is used to develop explosive speed, and focuses on maximal power instead of maximal strength by compressing the force of muscular contraction into as short a period as possible, and may be used to improve the effectiveness of a boxer's punch, or to increase the vertical jumping ability of a basketball player. Care must be taken when performing plyometric exercises because they inflict greater stress upon the involved joints and tendons than other forms of exercise (Rippetoe *et al.*, 2005).

## 2.4. Weight Training

Weight training is a common type of strength training for developing the strength and size of skeletal muscles. It uses the weight force of gravity (in the form of weighted bars, dumbbells or weight stacks) to oppose the force generated by muscle through concentric or eccentric

contraction. Weight training uses a variety of specialized equipment to target specific muscle groups and types of movement. Strength training is an inclusive term that describes all exercises devoted toward increasing physical strength. Weight training is a type of strength training that uses weights rather than elastic, Eccentric Training or muscular resistance to strength

Endurance training is associated with aerobic exercise while flexibility training is associated with stretching exercise like yoga or Pilates. Weight training is often used as a synonym for strength training, but is actually a specific type within the more inclusive category. Contrary to popular belief, weight training can be beneficial for both men and women. Effective weight training develops lean muscle, increasing resting metabolic rate and helping body burn fat (Todd, 1995)

## **2.5. Circuit Training**

Circuit training is an excellent way to improve mobility, strength and stamina. The circuit training comprises of 6 to 10 strength exercises that are completed one exercise after the other. Each exercise is performed for a specified number of repetitions or for a set time before moving onto the next exercise. The exercise within each circuit is separated by a short rest period. And each circuit is separated by a longer rest period. The total number of circuit performed during a training session may vary from two to six depending on training athletes' level (beginners intermediate or advanced) athletes' period of training (preparation or competition) and athletes' training objectives (Klika *et al.*, 2013).

## **2.6. Muscle Strength and Power**

Muscle strength is the ability of a muscle to produce force, whereas muscle power is the product of force and velocity. More specifically, muscle power is muscular work per unit of time and can be calculated by the product of force (muscle strength) and velocity of movement. To recover from a perturbation and prevent a fall, a muscle must be strong enough to sustain the external load and it must respond quickly. It has been suggested that age related reductions in muscle power may be more important in the etiology of falls and physical function compared to reductions in muscle strength (Bean *et al.*, 2002; Grabiner, Owings, & Pavol, 2005; Marsh *et al.*, 2009; Moreland *et al.*, 2004; Sayers, 2008). With increasing age, there is a decline commodity in the majority of sports requiring fast dynamic movements such as sprinting, jumping, throwing, weightlifting and most field sports.

## **2.7. Resistance Training Interventions**

Muscle strength and power are modifiable risk factors for falls in older adults. Further, it has been demonstrated that resistance training can reduce the consequences of sarcopenia by improving muscle

strength and power, body composition and physical function (Hanson et al., 2009). Traditionally, strength training has been the method used to target sarcopenia. Hanson and colleagues (Hanson et al., 2009) completed a 22 week strength training program in 81 adults aged 65 to 85 to evaluate the effect on strength, power, body composition, and physical function. Participants were randomized to the strength training intervention or control group.

## **2.8. Gender Differences in Muscular Strength and Endurance**

Men are generally stronger than women because they typically have larger bodies and a larger proportion of their total body mass is made up of muscle. But when strength is expressed per unit of cross-sectional area of muscle tissue, men are only 1–2% stronger than women in the upper body and about equal to women in the lower body. Men have a larger proportion of muscle tissue in the upper body, so they can more easily build upper-body strength than women can. Individual muscle fibers are larger in men, but the metabolism of cells within those fibers is the same in both sexes. Two factors that help explain these disparities are testosterone levels and the speed of nervous control of muscle. Testosterone promotes the growth of muscle tissue in both males and females. Testosterone levels are 5–10times higher in men than in women, so men tend to have larger muscles. Also because the male nervous system can activate muscles faster, men tend to have more power. Women are often concerned that they will develop large muscles from strength training. Because of hormonal differences, most women do not develop big muscles unless they train intensely over many years or take anabolic steroids. Women do gain muscle and improve body composition through strength training, but they don't develop bulky muscles or gain significant amounts of weight. A study of average women who weight trained 2–3 days per week for 8 weeks found that they gained about 1.75 pounds of muscle and lost about 3.5 pounds of fat. Losing muscle overtime is a much greater health concern for women than small gains in muscle weight, especially because any gains in muscle weight are typically more than offset by loss of fat weight. Both men and women lose muscle mass and power as they age, but because men start out with more muscle and don't lose power as quickly, older women tend to have greater impairment of muscle function than older men. This may partially account for the higher incidence of life-threatening falls in older women. The bottom line is that both men and women can increase strength through strength training. Women may not be able to lift as much weight

as men, but pound for pound of muscle, they have nearly the same capacity to gain strength.(ACSM.2006)

## **2.9. Effect of Flexibility and Agility**

The velocity of the agility and flexibility whether or not the student is performing may affect the degree to which elastic energy storage and/or stiffness are not important for gymnastics performance. In respect of velocity, found that the increase in stretching velocity of the hip extensors and knee flexors in the terminal swing phase of sprint running increases with increase speed

This implies that the elastic elements of the muscle-tendon units contribute more to force production at faster running speeds. Thus, it might be expected that training methods that help improve elastic energy storage might help improve sprint running performance to a greater degree at faster speeds than at slower speeds (Cavagna, 2006).

Additionally found that several studies in animal models reported that muscles during constant speed running change length only slightly but contract more or less isometric ally, while the tendon in series undergoes large changes in length. This is in contrast to acceleration running, whereby the muscles shorten considerably while undergoing concentric contractions. This implies that the elastic elements of the muscle-tendon units contribute more to force production at constant-speed sprint running than during accelerating sprint running. Thus, it might be expected that teaching methods that help improve elastic energy storage might help improve sprint running performance to a greater degree during maximum speed sprint running than during accelerating sprint running (Roberts, 2002).

## **2.10. Squats**

Squatting is the most basic form of leg strengthening and muscle building exercises, but it works wonders. Although weight lifting should not be the only form of strength training involved in a routine, it is an element that should be incorporated a certain amount into a training regimen. The stronger your muscles are, the better able they will be to perform speed skills. It is important not to bulk up as much as a bodybuilder, although a certain amount of lean muscle mass goes a long way for speed. Begin by standing with feet shoulder-width apart Running is often believed to be purely about endurance, or aerobic fitness, but muscular strength also plays a major role. Strength exercises are important to create good running form, avoid injury, and become a more balanced runner. (Blazevich and Jenkins, 1998).

## 2.11. Squat training

An old routine consisting of 20-rep squats has been successfully used to put on size and improve strength in a short amount of time, even for the hardest gainers. Also known as “breathing squats,” the workout focuses on high repetition squatting 2-3x/week combine with higher caloric intake, traditionally consisting of 1 gallon of milk/day ,among other calorie sources.

It outline a 20-rep squatting workout that claim to put on 30lbs, of muscle in just 6 weeks. The overly basic program has in the gym no longer than 3-hours per week-great for anyone leading a busy life (Fry *et al.*, 2003).

## 2.12. Components of Training

There are four basic training zones that these components fall into. The first zone is aerobic conditioning, which can be defined as longer lower intensity performers. This is typically identified as 55-75 percent of VO<sub>2</sub> max, which is an easy running pace where one could hold a conversation. This type of activity stresses the oxidative energy system (Martin and Coe, 1997).

The second zone is anaerobic conditioning. Tempo and steady-state runs are terms that are associated with this zone. Anaerobic conditioning can be defined as a medium intensity workload at around 75-90 percent of VO<sub>2</sub> max. The running duration in this zone is often 15-25 minutes. The medium intensity effort stresses the oxidative system with minor fast glycolysis contributions (Baechle and Earle, 2008).

The third zone is aerobic capacity, commonly referred to as interval and/or farther runs. This is performed at a moderately high intensity effort of 90-100 percent VO<sub>2</sub> max. Due to the increased intensity, the pace typically cannot be held for longer than 10-11 minutes when running within the zone, primarily stressing the fast glycolysis and oxidative energy system (Martin and Coe, 1996; Baechle and Earle, 2008).

The final zone is anaerobic capacity, which is commonly known as speed work. Speed work is often performed at 100-110 percent of VO<sub>2</sub> max. Since anaerobic capacity is a high intensity zone, any intervals/running performed generally last 30-120 seconds. Speed work primarily stresses the phosphate and fast glycol sis energy systems (Martin and Coe, 1996; Baechle and Earle, 2008).

Current trends in middle-distance training involve high emphasis in anaerobic capacity and aerobic capacity. Research indicates that using these high intensity interval workouts increases the ability to

process lactate, improve pacing ability, improve activation of fast twitch muscle fibers, as well as other physiological improvements (O'Sullivan, 2006; Blasco-Lafarga *et al.*, 2013).

Current strength training regime also includes an abundance of weights and polymeric training. Research indicates these methods improve neuromuscular and anaerobic characteristics explosive strength, muscular-tendon stiffness, and overall running performance (Spurr *et al.*, 2002; Baechele and Earle, 2008 and Ramiez-Campillo, 2014).

Although weights and plyometrics differ from running, they may still fall into the fourth zone of anaerobic capacity since they highly stress the body. Alternately, they may fall into a speed development zone, which is characterized by actions performed at maximal effort between 110-130 percent of VO<sub>2</sub> max. These efforts last only 5-10seconds, and primarily stress the phosphate energy system (Jeffreys, 2013).

### **2.13. Effects of Exercise**

Strength exercises include high emphasis in aerobic capacity, anaerobic capacity, weights and polymeric exercises. Current research on these trends has shown improvement in short and middle distance running performance, at a potential cost to the athlete. However, the trends that focus on improving anaerobic and aerobic capacity with little to no contribution to anaerobic and aerobic conditioning may adversely affect the athlete (Virus and Virus, 2001 and Zouhal *et al.*, 2007).

Other problems that are possible when training at high intensities are cases of blood disorders. New findings have reported many middle-distance runners experiencing hemolytic, caused by the heart contracting at a high velocity. When the heart contracts forcefully and rapidly it initiates large stroke volumes, which pushes the blood through arteries/arterioles at high velocities. This causes breakage to the membranes in red blood cells, thus disabling them from performing their functions properly (Zouhal *et al.*, 2007).

Additionally, studies suggest that during high intensity training, lactate is introduced into the blood stream faster than the body can use or metabolize it. This causes lactate accumulation in the blood. During the invasive process of lactate overload in the blood, a response is triggered to release stress hormones Furthermore, red blood cells can become damaged from the over-worked circulatory system trying to keep up with the demands Although the common trends in training may increase performance and produce certain benefits, it comes with a cost to the health of the athlete. Current trends suggest

improvement in performance, but coaches should implement these trends safely into their training regimes (Peeling *et al.*, 2009).

There are numerous factors to consider when try to avoiding these problems. First, if the majority of the problems are initiated by the onset of lactate accumulation in the blood, the logical step would be to increase lactate threshold. This may include using methods high intensity interval training, to eliminate spending a large percentage of training working in an anaerobic state (Jones *et al.*, 2007).

Next would be to identify lactate threshold methods and identify proper pacing/effort for each individual athlete. This may help the coach control/protect the athlete from working too hard during the workouts. The last factor is proper implementation of the training. There are numerous components in this area to consider. This is where a coach's art or style comes into play. The coach is responsible for adapting the program to create an environment for the athlete to be successful (O'Sullivan, 2006).

The most popular way to increase lactate threshold is through working on anaerobic conditioning, which is the second zone identified in training theories. Tempo, steady state, interval and fertile running are common lactate threshold workouts. Ideally, coaches should strive to get the athlete in the zone where they are working at 75-90 percent of VO<sub>2</sub> max. Most coaches do not have means to measure each athlete's VO<sub>2</sub> max values. Close estimates can be figured by using max heart rate values. When using heart rate values as an indicator, the goal is to keep it at 70-90 percent of max heart rate. The main visual indicator is observing the athletes during the workout. If they are gasping for air, not able to complete a sentence, or bent over in fatigue they are probably working too hard. Coaches should encourage them to feel/listen to their bodies while training in this zone to understand the effort needed to achieve a productive workout (Martin and Coe, 1997).

Workouts can vary greatly but the intent is to get the athlete running within the zone at the appropriate time during workouts. Examples of these workouts include mile repeats with minute rest, 400 meter repeats with short jog recoveries, or fatlike-style runs alternating zone running with easy jogging. Rest is very limited so proper pacing/effort is crucial for a productive workout (Martin and Coe, 1997 and O'Sullivan, 2006).

### 3. MATERIALS AND METHODS

In this section description of study area, source of data, the subject of the study, research design, sample size and sampling technique, data collection instrument, inclusive and exclusive criteria, training protocol, methods of data collection and procedures of data collection and methods of data analysis were discussed.

#### 3.1. Description of the Study Area

The study was conducted in Dire Dawa city. Dire Dawa is city in Hararge region, Ethiopia. It is a commercial and industrial center located on the Addis Ababa–Djibouti railroad. Manufactures include processed meat, vegetable oil, textiles, and cement. There are also railroad workshops in the city. Dire Dawa was founded in 1902 when the railroad from Djibouti reached the area, and its growth has resulted largely from trade brought by the railroad. The mean annual temperature of Dire Dawa is about 25.40C. The average maximum temperature of Dire Dawa is 31.40C, while its average minimum temperature is about 18.20C. The region has two rain seasons; that is, a small rain season from March to April, and a big rain season that extends from August to September. The aggregate average annual rainfall that the region gets from these two seasons is about 604 mm Dire Dawa is the city in which different nation and nationalities of Ethiopia live together. Based on the 2007 census conducted by the Central Statistical Agency of Ethiopia (CSAE), Dire Dawa has a population of 341,834 of women 171,461 are men and 170,461 women and 233,224 or 68.23% of the population are urban. In Dire Dawa administration there are about 13 sport projects in different sports in three (3) age categories that mean U-13, U-15 and U-17 by all sexes. Geographically Dire Dawa is located about 515 kilo meters from the capital city of the Ethiopia Addis Ababa in the Eastern part of the county and about 47 kilo meter from the Harare city. Specifically Dire Dawa is found in eastern Ethiopia at (9<sup>0</sup>36'N latitude and 41<sup>0</sup>52'longitude) (<https://en.wikipedia.org>). The map of the study site is indicated on page 53.

### **3.2. Experimental Materials**

For this study the following equipment, materials and facilities were used by the researcher: stop watch, whistle, skipping ropes, measuring tape, pens, pencils, rope made ladders, boxes, on the football field, and volley ball court.

### **3.3. Research Design**

The study was focus on experimental study for 12 weeks (3 months) of selected strength exercise and examined the students' strength and endurance performance. In this study there were forty (40) female students from total population of two hundred thirty (230) female students without controlled group. The practices were continued for 12 weeks (3 months) three days per a week (3 days/weeks) frequency exercise days (Monday, Wednesday and Friday) for 40-60 minutes duration , intensity moderate (55-69HRmax) ,time of training at morning (12:00-1:00LT). The test had been taken in Dire Dawa Mariam Sefer soccer pith & volley ball court the researcher used 40minutes session to measure their performance. The pre, during and post tests on selected health related physical fitness parameters such as cardiovascular endurance, muscular endurance, muscular strength, flexibility and body composition.

### **3.4. Sample Size and Sampling Techniques**

The random sampling technique was used by the researcher to select forty (40) subjects of the ages 15 and 16 that mean female students from total population of 230 students.

### **3.5. Inclusive and Exclusive Criteria**

Forty (40) female students of Dire Dawa Mariam sefer secondary school with age 15-16 years old included and students who had any impairment on their physique or students with disability and chronic disease as well as recent physical injury or students with different problems were excluded from the study and students whose age is less than 15 years and more than 16 years also excluded from the study.

### **3.6. Source of Data**

The researcher was used primary source of data by taking pre, during and post tests on the field by measuring times on 40min indoor & outdoor teaching in (minutes) to know their performing performance levels at the beginning of the class, in the middle and at the end of the program. The researcher was also use secondary data from different documents; like books and internet to support the study.

### **3.7. Training Protocol**

The researcher selected different strength and endurance exercises which were provided to the subjects in 12 weeks according to the schedule. Physical exercise needs certain pre request activities which are helpful to prepare the body to the main activities and reduce the occurrence of certain injuries. There are also teaching principles which should be followed while performing physical activity. Teaching principle is very important to achieve what we want to gain from the teaching learning. So in each exercise the researcher followed the teaching principle. Before the main activity the subjects performed warm up activity and after exercise cool down activities

In the warm up the researcher used a maximum of 15 minutes

Dynamic stretching two (2) minutes

Walking two (2) minutes

Easy run five (5) minutes

Low intensity interval run six (6) minutes maximum

During the main part the subjects performed the activities from simple to complex through the training according to training principle. After main part cool down activities will followed. Cooling down activities helps the heart, lung and circulatory system to normal level and avoids muscle fatigue

#### **In cooling down activity there are**

Easy walk two (2) minutes

Relaxation one (1) minutes

Static stretching five (5) minutes

### **3.8. Methods f Data Collection**

The researcher was collected data by taking pre-test, during test and post test at the end of 12 weeks of continued selected strength and endurance exercises. Quantitative data were collected through the appropriate health related physical fitness test measures such as BMI (body max index) for body composition, 12 minutes run/walk test for cardiovascular endurance, push up test for muscular strength, sit up test for muscular endurance, sit and reach test for flexibility .

#### **3.8.1. Procedures of Data Collection**

Data were collected by measuring the subjects BMI, 12minute run /Queer test, and push pre, during, were collected in the same way and finally their post-training tests were collected and differences would be identified.

#### **3.10. Fitness Test Analysis.**

The following fitness test as a parameter of health related physical fitness variables were recorded especially for pretest, during training and for posttest.

##### **3.10.1. Twelve Minute Run / Walk test**

Before starting this test the equipment's that used for the test such as stop watch, measuring tape and marking cones were arranged. The participants performed enough warming up and stretching exercise. On command "Go" the participants run/walk for 12 minutes. The total distance covered by the participants with in 12 minute was recorded in meter (m). Throughout the test the participants were encouraged to push themselves to run as hard as possible.

##### **3.10.2. Push up Test**

To measure muscular strength the researcher used push up test before starting this test the participants performed warming up and stretching exercise for minimum of 10 minutes. The subject being tested on prone lying position putting their palms at the shoulder level on the ground, face-down on the mat and knees on the floor. On the signal "go" they were asked to raise their body upward until the arms were

fully extended, then lowered until the elbows bend at 90 degrees. The total number of pushups per one minute in knee bent position was recorded as their score..

### **3.10.5. Body Mass Index (BMI)**

BMI is a calculation of body weight and height indices for determining degree of obesity. The most common formula for body mass index is body weight in kilograms divided by height in meters squared. Therefore, during body mass index test the participants were removed their shoes and should have light clothes and stands on calibrated beam. The height in meters (m) and their weights in kilograms (kg) were recorded. Then, BMI will be calculated with the following equation

$$\text{BMI} = \frac{\text{Weight (k)}}{\text{Height (m)}^2}$$

### **3.9. Methods of Data Analysis**

Researcher was analyzed and interpreted data by comparing. The data collected through fitness tests were analyzed, interpreted and tabulated in to a meaningful idea using manually and in computer in order to compare the health related physical fitness variable changes observed among participants that underwent strength and endurance exercise program. The data was analyzed using computerized statistical package software (SPSS). The paired t-test was used to compare the pre training and post training data. The level of significance is 0.05

### **3.10. Ethical Issues and Ethical Considerations**

This study was deal with the ethical issues related to the investigation. It could take guarantees and confidentiality of the information that have been given to the study and risk of harm due to participation. Therefore the study was conduct action based on the university rules, code of conduct and polices concerning to the research ethics. The protocol was approving by the university guide lines and written consent has been given and informed the concerning bodies

### 3.11. Limitation of the study

The limitations of the study: there is only one period allotment in Dire Dawa schools PE class since from 2004 E.C, so that the researcher has no chance to select the subjects from larger population and able to uses random sampling technique.

### 3.12. Delimitation of the Study

- The subjects are selected randomly by the researcher from a single period of class.
- The subjects are well trained for 12 weeks and it simplifies the works of the researcher.
- The subjects found in proper age levels so the researcher can collect fair data.
- 

## 4. RESULTS AND DISCUSSIONS

The study was tried to investigate effects of selected strength and endurance exercises on the improvement of female students of Dire Dawa Mariam Sefer secondary school in Dire Dawa city administration. The researcher selected some strength exercises and provided for the subjects for 12 weeks (3 months). The training was given three days per week (3days/week) for 40minutes per session (40min/session) in the morning session & afternoon only from 12::00—2:00 AM, 10.30-12:00 local time. The strength and endurance of the students totally measured three times throughout the programs. That means pre test, during test and post test were collected in the same way from 12 minutes run for endurance, push up for strength ,BMI for body composition. After data were collected in such away the researcher was analyzed data by SPSS. The results of the study was discussed as follow.

Here are the pre-post test scores, and the table contains three variables with mean  $\pm$ standard deviation.

Table 1. The mean value of strength and endurance pre, during ,post test

Dependent variables	PT	DT	PoT

12 minute run	1755.80 ± 181.394	1896.02 ± 185.358	2103.73±198.698
Push up	8.73 ± 2.264	14.33 ±2.712	21.47± 3.072
BMI	21.065 ± 1.7357	20.4550±1.58873	19.7750 ± 1.40671

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Values- mean ± SD, PT = pre training test, DTT=during training test, PoT= posttest of aerobic exercise training, BMI=Body Mass Index

#### 4.1. Change in Mean Values of Twelve Minute Run/Walk Test

The table 1 showed that there was significant difference in-between the pre to post test score. The improvement in performance was due to the aerobic exercise in which they were engaged in. The mean score value for 12minute run/walk test before aerobic exercise was 1755.80m, during training test was 1896.02m and after training mean score value was2103.73m,.When we compare the mean value score of before training test with the mean score values of after 12 weeks aerobic exercise, the mean difference value increased by 347.93. When the mean value is compared with norms the subjects were below average; they are in lower average in during test and they improved their fitness to higher average at posttest. But some subjects age category is below ranges given by Elizabeth Quinn, Updated,2016. This result indicated the effective change was observed on participants' cardiovascular fitness level and muscular strength. The result of this study was agreed with the finding of Shahana and his friends. They conducted study on effect of aerobic exercise programmers on health related physical fitness components of middle aged women. The conclusions of this study was improved cardio respiratory endurance, flexibility, muscular strength endurance and decreased skin fold thickness (body fat %) among the experimental group of middle-aged women after 12 weeks of aerobic (Shahana *et al.*, 2010).

## 4.2. Change in Mean Values Pushup Test

As indicated in the table 1 and figure 1 the push up Mean value of pre training test result was 8.73 during training test was 14.33 and post training test was 21.47 .When we compare performance of an individual's before training test result to after training test 12.73 mean difference was recorded. From the age group of participants(17-22) some them are categorized under 15-19 and others are under 20-29(see appendix D table 3). The improvement in pushup performance implies an enhancement in muscular strength. From this result it is possible to conclude that aerobic exercise has positive effects on push up performance, indeed in muscular strength. When the mean value is compared with norms the subjects were below average; they are in average at during test and their improved their fitness to above average at posttest. This result matched with the finding of Selvam and his friend. They conducted a study on selected effect of aerobic exercise on selected physiological variables among college girls. Their study finding revealed that aerobic exercise uses large muscle groups rhythmically and continuously and elevates the heart rate and breathing for a sustained period.( Selvam and sudha 2008)

## 4.3. Changes in Mean Values BMI Test

According to table 1 and figure 1, significance difference was observed on the mean value of BMI. The mean values of an individual's before exercise was 21.065 which was decreased to 20.4550 and 19.7750 during and after aerobic exercise respectively .At the end of the study, the mean value of participants BMI was significantly reduced by 1.29kg/m<sup>2</sup>. When the mean value is compared with norms the subjects show the same level, healthy weight even though their value of BMI is decreased. During the aerobic exercise period the height of individuals was constant and reduction of BMI was reduction of weight on participants. Body mass index and body weight of individuals was reduced by 12 weeks aerobic exercises, the main reason of this change might be increase of daily calories expenditure of participants during aerobic exercise. This result was consistent with the finding of Willis and his friends. The result of their investigation showed that Aerobic exercise was efficient method of exercise for losing body weight and body fat (Willis *et al.*, 2012).This result was also agreed with finding of Arslan. He pointed out eight weeks step aerobic dance exercise significantly decreased body

composition parameter of middle aged sedentary obese women (Arslan, 2011) Aerobic exercise including walking, running, and swimming has been proven to be an effective way to lose weight

#### 4.4. Effect of selected Exercise on strength and endurance

Table 2. The mean value and significance difference level of each test results of participants

Dependent Variable	Parameter(I)	Parameters (II)	Mean Difference ( I-II)	Sig. (2-tailed)
CVE	POT	PT	347.93	.000
		DTT	140.22	.000
Push up(No)	POT	PT	12.74	.000
		DTT	5.6	.000

BMI(kg/m <sup>2</sup> )	POT	PT	-1.29	.000
		DTT	-0.61	.000

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PT = pre training test which was taken before aerobic exercise, DTT=during training test which was measured at 6th week of aerobic exercise, POT= posttest which is taken after 12th week of aerobic exercise training, BMI=body mass index

Table 2, showed the overall result of each test. The mean difference value of 12minute run/walk from post to pretest was the highest (347.93) as compare to post to during test (140.22). It includes the mean difference from one test to another and the significance of posttests in reference to the pretests .Similarly Pushups and BMI performance was increased and More significant improvement was recorded after 12 week aerobic exercise.

The finding of this study showed that 12 weeks of aerobic exercise had significant effects on health related physical fitness components of females. The aerobic exercise significantly reduced the body mass index and body weight, improved cardiovascular endurance, abdominal endurance/strength and flexibility of individual's. Similarly in a study conducted by Hopkins *et al.* (1990), proved significant improvement in all functional fitness components of their participants including cardio respiratory endurance, strength/endurance, , flexibility, body fat and balance was reported. This study was also corroborated by Petrofsky *et al.* (2008) who did their study on the effect of aerobic dance and diet programmed on cardiovascular fitness, body composition, and weight loss in women. They reported a significant decrease in body weight, reduced waist girth and an improved cardiovascular function and general fitness.

As a general the finding of this study showed an incensement in CVE, no. of pushups per one minute the study showed an increment in value of with in pre posttest.

Fitness for living in the house or on the farm or at office or factory or in work places or in any service implies freedom from disease, enough strength, endurance and other abilities to meet the demands of daily living. Doing physical activity everyday contributes to optimum health and quality of life. Life styles can be changed to improve health and fitness through daily exercises. Aerobic exercise

stimulates heart, lungs and all working group of muscles and produces beneficial changes in body and mind. Many physiological changes are determined by daily aerobic exercises. The purpose of the study was to determine the effect of 12-week aerobic exercise programmers on health-related physical fitness components, which are cardio respiratory endurance, upper body extremity strength and body composition in school-age-.students. A total of 40 school-aged students from Mariam Sefer secondary school Dire Dawa 15-16 years were selected as subjects for the study. They were tested to collect the data on selected variables. The cardio respiratory endurance, upper body strength and body fat percentage were selected variables. Further, 40 subjects were randomly assigned as experimental group. The experimental group underwent aerobic exercise training three days for 12 weeks. The post-tests were conducted on both groups to collect the data on the variables of the study. Significant difference seen at the 0.05 level with 29 degree of freedom is 2.045 and at 0.01 level with 29 degree of freedom is 2.756 in experimental group following 12 weeks of aerobic training programmers for cardio respiratory endurance, flexibility, muscular strength endurance and skin fold thickness (body fat %). The conclusions of this study are improved cardio respiratory endurance, flexibility, muscular strength endurance and decreased skin fold thickness (body fat %) among the experimental group of school-aged students after 12 weeks of aerobic training. (Shahana *et' al*,211)

## **5. SUMMARY, CONCLUSIONS AND RECOMNEDATIONS**

### **5.1. Summary**

The purpose of this study was to find out the effects of selected exercises on the improvement of strength and endurance of female students of Dire Dawa Mariam Sefer secondary school. This research was conducted on forty (40) female students of Mariam Sefer Secondary School from regular class aged 15-16+ years old in Dire Dawa city. All subjects under study took part in experimental design before and after class session tests without control group from November to January in 2017.

This study assessed and tried to investigate effects of selected exercises on the improvement of strength & endurance of female students of Dire Dawa Mariam Sefer Secondary School. There are a lot of exercises that develop strength and endurance of participants. For this study primary data were used. The primary data are obtained from experimental variables according to designed parameters. Quantitative data were collected through the appropriate health related physical fitness test measures

like 12 minutes run/walk test for cardiovascular endurance, push up test for muscular strength, and body mass index (BMI) test for body composition. The analysis of data were done through paired t-test to see the difference if any. The level of significance was set at 0.05. As the tests result indicated that there was progressive improvement in endurance and strength of the students from pre-test to during and to post test due to the selected exercises training programs. The tests results showed that statistically significance enhancement observed in the participants' performance related physical fitness level especially (strength, endurance and BMI ). Strength training provides strenuous work entirely suited to an individual's specific needs, existing capacity and rate of adjustment to progressive vigorous exercise .Based on the analysis made, 12 weeks of aerobic exercise had significant strength and endurance physical fitness components of female's students of mariam sefer secondary school Dire Dawa. The aerobic exercise significantly reduced the body mass index and body weight, improved cardiovascular endurance, upper body strength and BMI of individual's. Regular participation in strength and endurance training program 3 days/a week can improve the physical fitness of students. Therefore, a generally speaking regular participation in selected strength and endurance training improves the health of the active participant students. It was also found that selected strength and endurance exercises have significances in improving the performance of the students on skill related physical fitness as well as health related physical fitness.

## 5.2. Conclusions

Based on the major findings of the study, these points were stated as conclusions:

- Every student has the ability to increase their strength and endurance capabilities, it simply needs to work hard and work smart.
- The selected strength exercises presented in this paper can provide students with a good interest for attending PE class regular program.
- Even minor adjustments in posture and technique can make them better participant after just a practical session.
- The aerobic exercise significantly reduced the body mass index and body weight of High school females

- Students that participate in strength and endurance will develop self confidence and social life in school area other places.

### **5.3. Recommendations**

Based on the results of study, these recommendations are made:

- The school should give a wide opportunity for participating female students in physical exercises.
- Since aerobic exercise require no equipment or minimal equipment. females community may be encouraged to undergo these type of exercise training regularly for physical fitness improvement
- Individuals need to participate in regular physical activities to promote health related fitness. This can help to reduce the possibility of obesity, overweight and improves cardiovascular endurance, muscular strength/endurance and flexibility

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## **7. Appendices**

### **Appendix A**

#### **Physical Activity Readiness Questionnaire (PAR-Q)**



- |                             |       |       |
|-----------------------------|-------|-------|
| C. Musculoskeletal injuries | 1 yes | 2. No |
| D. Hypertension             | 1 yes | 2. No |
| E. Cardiovascular disease   | 1 yes | 2. No |

8. Or other health problems if any

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If you answered “YES”

If you answered “yes” to one or more questions, talk with your teacher before you become much more active or before you have a fitness test .tell you teacher about the par-q and which questions you answered “yes”

If you answered “NO”

If you answered no honestly to all of the questions you can be reasonably sure that you can become much more physically active or take part in a physical fitness appraisal being slowly built up gradually. This is the safest and easiest way to go.

### **Things change**

Even if you answered “no” to all questions you should delay becoming more active if you are temporarily ill with a cold or a fever or if any other. If your health changes so that you answer “yes” to any of the above questions, tell your fitness or health professional and ask whether you change your physical activity plan.

### **Assumption of risk**

I hereby state that I have read, understood and answered honestly the questions as well as I wish to participant in learning program.

Participant Name \_\_\_\_\_

Investigator Name \_\_\_\_\_

Signature \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Date \_\_\_\_\_

**Thank you for your cooperation!!**

## Appendix B

### Participant Information Sheet and Informed Consent Form subjects

My name is Temesgen Teka I am working as a data collector for the study being conducted in Dire Dawa city on the title saying effects of selected strength and endurance exercise on the improvement of female students of Dire Dawa Mariam sefer secondary school variables. I am studying for my master degree at Haramaya University, college of natural and computational science department of sport science. I kindly request you to lend me your attention to explain you about the study and being selected as the study subject.

**Research Title:-Effect of Selected Exercise on the Improvement of Strength and Endurance of Female Students of Dire Dawa Mariam Sefer Secondary School, Dire Dawa City**

**Purpose of the Study:** the aim of this study is to examine the effects of selected exercise on the improvement of strength and endurance of female students of Dire Dawa Mariam Sefer Secondary School, Dire Dawa city.

**Procedure and Duration:** first the current performance levels of the subjects will be tested/measured and recorded then different selected strength exercises which are applied to the subjects for 12 weeks (3 months). Finally post practical test will be taken by the researcher and compared with previous performance to investigate the difference.

**Risk and Benefits the Researcher;** will select safe environment. Safe facilities, equipment, materials and favorable time will set to minimize the risk. But if there is any risk no financial compensation will be given. There will be no cost for participating in this study. The benefit will be after teaching, packed water during the teaching, tea ceremony at the end of the study. Since the subject's gymnastics activities are given the great benefit they obtain from the study is they will improve their performance that will help in their future life.

**Right:** Participation for this study is 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 this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

**Confidentiality:** The information you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons or housing. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

**Contacts address:**

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

Temsegen Teka Defare +2510910461665 or

Dr .Desta Enyew (PhD) Major Advisor +2510938310940

If you have any questions on your rights as a research subject, you can call the Institutional Research Ethics Review Committee (IRERC) at (+251) 256-66-18-99 or P.O.BOX 235, Harar, for information.

**Declaration of informed voluntary consent:**

I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. Therefore, I declare my voluntary consent to participate in this study with my signature as indicated as below.

Participant code no \_\_\_\_\_

Name of investigator \_\_\_\_\_

Signature \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Date \_\_\_\_\_



## **Appendix D**

### **Description of Training Plan**

In order to look good, feel good and enjoy a healthy lifestyle it is essential to engaging in regular physical activity. To do this need to know how to apply important training principles in order to remain safe during activity. A physically educated person demonstrates understanding of movement concepts, principles, strategies and tactics as they apply to the learning and performance of physical activities. Here are some basic principles to be followed in developing training program, Volume, intensity overload, progression, specificity, regularity and individuality

#### **Volume**

Volume Refers to the quantity or amount of any teaching. It is the total of all repetitions, such as practical test for gymnastics or final test lifted for leg cross activities. For continuous endurance exercises it is the repetitive activities or generally covered sessions. In the jumps and throws it may be the total number of jumps or throws performed in a session.

#### **Overload**

Over load that the various systems of the body will become stronger and function better if increased demands are placed upon them. The body will adapt to these increased demands however, the amount of overload needed varies with each individual.

#### **Progression**

Progression says that as you work harder (overload) body adapts. Because body gets accustomed to this new workload, must progressively increase the amount of work for improvement to occur. Remember, injuries result when progression is not followed and overload is added too quickly.

#### **Specificity**

Means you must do specific exercises to improve specific components of physical fitness in specific body parts. For example, flexibility exercises will increase flexibility but will not necessarily improve cardio respiratory fitness. Therefore, must select the appropriate physical activity to develop specific components of physical fitness.

#### **Regularity**

**Regularity** means that to participate in physical activity regularly for it to be effective. In other words “move it or lose it”.

### **Individuality**

Training program must meet desired goals and objectives. Everyone starts at a different place. **F.I.T.T.**

"**F**" is for **Frequency** or how often you exercise. Exercising at least three times per week is recommended.

"**I**" is for **Intensity** or how hard you exercise. Heart rate is a good way to measure intensity.

"**T**" is for **Time** or how long you exercise. Sixty minutes per day is recommended for teenagers (this can be accumulated throughout the day). Research shows that as time increases, intensity decreases.

"**T**" is for **Type** or kind of exercise you choose. You should choose an activity that will help you meet your goals, that you enjoy and that you will do.

**Sources:** “Get Active! Get Fit!” (Stokes & Schultz) & “Personal Fitness” (Williams, Harageones, Johnson & Smith)

Every exercise session should be preceded by approximately five-ten minutes of a general warm-up, followed by several sport specific warm-up exercises performed at a light intensity. Each student should be physically and emotionally prepared to participate in a strength activity program.

## **Appendix E**

### **Three month training schedules**

Table 2. First Month (November, 2016)

Days of exercises		Types of exercises	Duration	Intensity	Volume	Total rest
1 s t w e e k	Tuesday	Warm up Interval running cool down	15' 28' 10'	Moderate 65 - 74 % intensity	Moderate 25' work out	50x8x400(7)
	Thursday	Easy run& Dynamic stretching Acceleration speed Static stretching	15' 27' 10'	Moderate 65 - 74 % intensity	Moderate 27'work out	30x10x200(8)
	Saturday	Warm up Up step running Cool down	15' 25' 10'	Moderate 65 - 74 % intensity	Moderate 25'on stage	20m up step on the stage(10')
2 n d w e e k	Tuesday	Jogging Dynamic stretching Ladder exercise Cool down	12' 29' 9'	Moderate 65 - 74 % intensity	Moderate 29' workout time	15mx10(9') d/t strength exercise
	Thursdays	Warming up Strength speed Cool down	15' 28' 10	65 - 74 % Moderate Intensity	Moderate 28' workout	20x10x100(8)
	Saturday	Warm up Uphill run Static stretching	15' 20' 10'	Moderate 65 - 74 % intensity	Moderate Total of 20' workout	15' moderate inclination
3 r d w e e k	Tuesday	Easy run Dynamic stretch Resistance run Static stretch	10' 5' 29' 8'	Moderate intensity 65-74%	Moderate 29 work out time	30x10(8)
	Thursday	Warm-up Speed strength Cool-down	15' 27' 10'	65 - 74 % Moderate Intensity	Moderate 27' workout	40x8x200(8)
	Saturday	Easy jog Circuit training Static stretch	15' 28'' 9'	Moderate 65 - 74 % intensity	Moderate 28' workout	6 stations 6x3x1'(1'30" 2'30")
4 t h w e e k	Tuesday	Warm up Weight training Static stretching	15' 28' 8'	Moderate 65 - 74 % intensity	Moderate 28' workout	15mx3rep(30" 1.30') 9' recovery
	Thursday	Jogging Dynamic stretching Circuit training Static stretching	10' 5' 28'' 7'	Moderate intensity 65-74%	Moderate 28' workout	10' b/n varieties of activity

	Tuesday	Warm up Aerobic training Relaxing cool down	15' 30' 5'	Moderate intensity 65-74%	Moderate 30'work out	10' recovery
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Table3. Second Month (December, 2016)

Days of exercises	Types of exercises	Duration	Intensity	Volume	Total rest	
5 s t w e e k	Thursday	Warm up Interval run Cool down	10' 33' 7'	Moderate to High 75-84%	Moderate 33' workout	50x6x100(10)
	Tuesday	Easy run Acceleration speed Cool down	13' 30' 7'	Mod to H i g h 75-84%	Moderate 30' workout	30x8x200(10)
	Thursday	Warm up Up step run Static stretching	10' 30' 8'	Moderate to high 7 5 - 8 4 % Intensity	Moderate 30' workout	12' total recovery
6 t h w e e k	Tuesday	Warm up Ladder drills Cool down	12' 30' 10'	Moderate to High 7 5 - 8 4 % intensity	Moderate 30' workout	15mx10(8)
	Thursday	Warm up Strength speed Cool down	10' 30' 10'	Moderate to High 7 5 - 8 4 % intensity	Moderate 30'workout	20x8x100(10)
	Saturday	Easy run Uphill training Static stretch	10' 25' 8'	Moderate to High 75-84%	Moderate 25' workout	17' total rest Moderate inclination
7 t h w e e k	Thursday	Warm up Resistance exercise Static stretching	10' 34' 6'	Moderate to High 7 5 - 8 4 % intensity	High 34 workout	30m resistance run 10' total rest
	Tuesday	Warm up Speed strength Static stretch	10' 34' 6'	Moderate to High 7 5 - 8 4 % Intensity	High 34'workout	40x6x200(10)
		Easy run Circuit training Cool down	10' 34' 6'	Moderate to High 7 5 - 8 4 % intensity	High 3 4 ' t o t a l workout	6 stations 6x3(30" 1') 9' total rest
8 t h	Tuesday	Warm up Weight training Static stretching	10' 35' 5'	8 5 - 1 0 0 % maximum Intensity	High 30' workout	10' recovery time b/n activities

w e e k	Thursday	Warm up ABC exercises Static stretch	10' 34' 6'	85-100% maximum Intensity	High 34' workout	ABC exercises 10' total rest b/n the activities
		Warm up	10	85-100%	High	10' total recovery
	Tuesday	Plyometric training Cool down	34 6	maximum Intensity	34' workout	time

Table 4. Third Month (January, 2017)

Days of exercises	Types of exercises	Duration	Intensity	Volume	Total rest	
9 t h w e e k	Thursday	Easy run Interval training Static stretching	10' 35' 5'	95-100% maximum Intensity	35' of work out	10' total rest b/n activities
	Tuesday	Warming-up Acceleration speed Cooling down	10' 30' 6'	Maximum Intensity 95-100%	100m speed w i t h recovery	2're b/n each 100mx7 total 14' re
	Thursday	Dynamic stretching Easy run Up step training Relaxation of muscle Static stretching	5' 10' 25' 3' 5'	95-100% maximum Intensity	Volume 25' with high intensity	2' re b/n each hill of 50m distance 12 total rest
1 0 t h w e e k	Tuesday	Warming-up and moderate interval Ladder drills Cooling down	15' 30' 5'	95-100% maximum Intensity	Total of 30' volume	10' recovery time 15m ladder d/t strength drills
	Thursday	Warming up Strength speed Cooling down	12' 25' 8'	95-100% maximum Intensity	For 25' s t r e n g t h exercises	30mx12x100(60'') total 15' recovery time
	Tuesday	Warming up Uphill training Cooling down and	12' 20' 10'	95-100% maximum Intensity	20' uphill run with recovery	30mx8x100%(1.30') a total recovery time 18'
1 1 t h w e e k	Thursday	Warming up and dynamic stretching Resistance run Cooling down	10' 5' 27' 8'	95-100% maximum Intensity	27' assist run 30'' recovery b/n each	30mx12 against resistance 10' with his friend
	Tuesday	Warming up Speed strength Cooling down	10' 25' 8'	Maximum Intensity  95-100%	2 5 ' m a x i m u m speed	50 m x 8 x 100 (60') recovery time 17'
	Thursday	Dynamic stretching Warming up Circuit training Relaxation and stretching	4' 8' 28' 8'	95-100% maximum Intensity	28' work out w i t h recovery	6 stations 6 appropriate strength trainings (30'' b/n station)

		Cooling down				(90'' b/n one full circuit)x3 circuits
1 2 h w e e k	Tuesda	Warming up Weight training Relaxation Cooling down	15' 35' 3 7'	95-100% maximum Intensity	35' different w e i g h t t r a i n i n g w i t h recovery	Push up, Sit up, Squat Skip rope Step d/t types Sand ball
	Thursday	Warming up Aerobic training Cooling down	10' 30' 8'	95-100% maximum Intensity	A total of 30' work out	Aerobic training
	Tuesday	Warming up Push-up, Sit-up training Cooling down	10' 30' 8'	95-100% maximum Intensity	30' of P u s h - u p , S i t - u p training training	12' recovery Sprinting from different positions

## Appendix F

### Norms of Each Fitness Test

#### 1. Body Mass Index (BMI)

Table 5. Standard Value of Body Mass Index (Bmi) In Kg/M2)

BMI (kg/m2)	Classification
< 18.5	Under Weight
18.5 – 24.9	Healthy Weight
25.0 – 29.9	Over Weight
30.0 – 39.9	Obesity

(WHO, 2012)

## 2. Push up test

Table 6. Standard Values of Push up Test per Minute (Female)

Age(Years)	Needs Improvement	Fair	Good	Very Good	Excellent
15-19	≤11	12-17	18-24	25-32	≥33
20-29	≤9	10-14	15-20	21-29	≥30
30-39	≤7	8-12	13-19	20-26	≥27
40-49	≤4	5-10	11-14	15-23	≥24
50-59	≤1	2-6	7-10	11-20	≥21
60+	≤1	2-4	5-10	11-16	≥17

Source: Lippincott Williams and Wilkins, 2010

Table 7. Standard value of 12 minute run/walk test in meter

Age		Excellent	Above Average	Average	Below Average	Poor
13-14	M	>2700m	2400-2700m	2200-2399m	2100-2199m	<2100m
	F	>2000m	1900-2000m	1600-1899m	1500-1599m	<1500m
15-16	M	>2800m	2500-2800m	2300-2499m	2200-2299m	<2200m
	F	>2100m	2000-2100m	1700-1999m	1600-1699m	<1600m
17-20	M	>3000m	2700-3000m	2500-2699m	2300-2499m	<2300m
	F	>2300m	2100-2300m	1800-2099m	1700-1799m	<1700m
20---29	M	>2800m	2400-2800m	2200-2399m	1600-2199m	<1600m
	F	>2700m	2200-2700m	1800-2199m	1500-1799m	<1500m
30-39	M	>2700m	2300-2700m	1900-2299m	1500-1899m	<1500m
	F	>2500m	2000-2500m	1700-1999m	1400-1699m	<1400m
40-49	M	>2500m	2100-2500m	1700-2099m	1400-1699m	<1400m

	<b>F</b>	>2300m	1900-2300m	1500-1899m	1200-1499m	<1200m
<b>50</b>	<b>M</b>	>2400m	2000-2400m	1600-1999m	1300-1599m	<1300m
	<b>F</b>	>2200m	1700-2200m	1400-1699m	1100-1399m	<1100m

**Source:** Elizabeth Quinn, Updated June , 2016

## Appendix G

### Paired Sample T-test Results

Table 8 .Paired Sample T-Test Results of Each Parameter

Test	Test	Mean	MD	SD	SIG.	Lower bound	Upper bound	T value
12m Run	PT→ DTT	1755.80→1896.0 2	-140.22	48.39	.00	-155.7 0	-124.74	-18.325
	PT→POT	1755.80→2103.7 3	-347.93	79.76	.00	-373.4 3	-322.41	-27.587
Push up	PT→ DTT	8.73→14.33	-5.6	1.56	.00	-6.100 7	-5.099	-22.621

	PT→POT	8.73→21.47	-12.74	2.30	.00	-13.48	-12.012	-34.959
BMI	PT→ DTT	21.065 →20.455	0.61	.37	.00	.488	.7313	10.167

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MD=mean difference      M= minutes

SD=standard deviation

### List of Figure in the Appendix

Figure1.Map of the study site

