

**EFFECT OF SELECTED SKILL RELATED EXERCISES IN IMPROVING  
AGILITY AND POWER ON U-17 MALE VOLLEYBALL PROJECT  
TRAINEES IN CASE OF WOLDIA TOWN;NORTH WOLLO ZONE,  
AMHARA REGIONAL STATE,ETHIOPIA**

**MEd. THESIS**

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**Effect of Selected Skill Related Exercises in Improving Agility And Power on  
Under 17 Male Volleyball Project Trainees in Case of Woldia  
Town;NorthWollo Zone, Amhara Regional State,Ethiopia.**

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Master of Education in Teaching Physical Education**

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**March, 2018**

**Haramaya University, Haramaya**



## **DEDICATION**

I dedicate this thesis manuscript to parents and all other members of any family for their dedication in the success of my life..

## STATEMENT OF THE AUTHOR

First I declare and assure that this thesis is my work. I have followed all ethical and technical principles of scholarship in the preparation Data collection, data analysis and compilation of this thesis. Any scholar matter and all source of material that is included in the thesis have given recognition through situation. This thesis is submitted impartial fulfillment of the requirements of the master of education degree at the Haramaya University in teaching physical education the thesis will deposited in the Haramaya University library and will make available to borrowers under the rules of the library. I would like to declare that this thesis has not been submitted to another institution anywhere for the award of any academic degree Diploma or certificate. Brief quotation from this thesis may be made without special permission provided the accurate and complete acknowledgement of source is made. Requests for permission for extended quotation from or reproduction and this menu script in whole or in part may be granted by the head of the school or department when his or her judgment of the proposed use of the materials is in the interest of scholarship. However in all other instances permission must be obtained from the Author of this thesis.

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## **BIOGRAPHICAL SKETCH**

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## ACRONYMS AND ABBREVIATIONS

<b>BT</b>	Before Training
<b>Bpm</b>	Beats per minute
<b>CM</b>	Centimeter
<b>DT T</b>	During Training Test
<b>FIVB</b>	Federation International de Volleyball
<b>Gym</b>	Gymnasium
<b>MaxHR</b>	Maximum Heart Rate
<b>M</b>	Meter
<b>NASPE</b>	National Association for Sport and Physical Education
<b>No</b>	Number
<b>PR</b>	Pulse Rate
<b>PoT</b>	Post Training
<b>PT</b>	Pre Test
<b>RHR</b>	Resting heart rate
<b>RH</b>	Reach Height
<b>Sec</b>	Second
<b>SPSS</b>	Statistical Package for Social Sciences Software
<b>SD</b>	Standard Deviation
<b>SDE</b>	Standard Deviation Error
<b>SJ</b>	Squad Jump
<b>THR</b>	Target heart rate
<b>VJ</b>	Vertical jumps

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**Effect of Selected Skill Related Exercises in Improving Agility And Power on Under 17 Male Volleyball Project Trainees in Case of Woldia Town;NorthWollo Zone, Amhara Regional State,Ethiopia**

**ABSTRACT**

*The aim of the study was to assess Effect of 12 Weeks Selected Skill Related exercises on improving Agility and explosive Power Of Under 17 Male volleyball Project Trianees of woldia town. The purposive sampling technique was used to select 30 subjects of U-17 Male volleyball Project Trainees. Subjects were identified by standard format of health history questionnaire. The subjects were assigned in one group using complete purposive sampling technique. The experimental group has been provided 12 weeks for Skill related exercise. The data obtained from the subjects were analyzed by statical package of social science, version 20 software. The comparison of means was estimated by paired t-test. The level of significance was set at 0.05%. The results showed that the agility of the group was 10.5+9.5(1.0 mean difference) of pre-test and post-test respectively. Similarly results of experimental group of explosive power were 40.27+44.20 (3.93 mean difference) pre-test and post-test respectively. The present study concluded that skill related exercise have a positive impact on Improving Agility and Power of the subjects.*

**Keywords:** Plyometric training Agility, explosive Power.

# INTRODUCTION

The introduction part includes Background of the Study, Statement of the problem, scope of the study, significance of the study and objectives of the study.

## 1.1. Background of the Study

In the area of many field and court sport competitions one can hardly differentiate from the other in terms of the level of fitness performance difference. So, many people concentrate on the development of the basic physical fitness component to be effective in sports competition .physical fitness component are basic component such as agility ,strength ,power, speed ,balance ,flexibility and endurance which plays a significant role in performance of sports and games .A agility has been shown to be an important component of volleyball play demonstrated that a short term agility training program improved agility test results among young volleyball players.

Volleyball is an intermittent sport that requires players to compete in frequent short bouts of high-intensity exercise, followed by periods of low-intensity activity (Gabbett et al., 2006). However, while well-developed physiological capacities are important for team sports, athletes are also required to have well-developed skill physical fitness and decision-making ability. In addition, athletes are often required to demonstrate these qualities under high levels of pressure and fatigue (Gabbett & Georgieff, 2006).

Sports science generally aims at identifying and developing performance variables essential for competitive excellence. In addition to other indices like muscle endurance and power, muscle strength plays a cardinal role in achieving athletic excellence. The final common denominator in athletic events is what the muscles can do for you - what strength they can give when it is needed, what power they can achieve in the performance of work and how long they can continue in their activity (Guyton, 1991).

The game of volleyball is a game of agility and power for peak performance. In volleyball, the muscle which are the source of agility and power must be strong. It is important for volleyball players to have of time during the match or tournament for executing spiking or blocking skill. More research about plyometric exercises have been conducted on drop jump, while the impact of high jump has been less studied. Given the lack of research about the impact of plyometric training (over hurdle jump, high jump, drop jump) on lower extremity muscle power. The paper is aimed to investigate the impact of plyometric training (over hurdle jump, high jump, drop jump) on lower extremity muscle power and agility of volleyball trainees of woldia town under 17 volleyball trainees. The trainees participated in the selected skill related exercises with moderate intensity to study its effect on the improvement of agility and power performance.

## **1.2. Statement of the problem**

There had been analyzing, the factors for agility and power training program as important for the development of physical performance of volleyball players. A few researches have been done on the agility and power performance improvement of volleyball players. To develop this physical performance, it is clear that participating in the training program is must, but knowing which training program is used to improve agility and power performance of volleyball players is also very necessary. Thus, this study had provided selected skill related exercise for the improvement of agility and power performance that can be used by volleyball players. Based on the above reason, the research was designed to answer the following basic research questions.

1. Do selected skill related exercises have effect on the improvement of Agility?
2. Do selected skill related exercises have effect on the improvement of power?
3. Do the skill related exercises have effect in Agility and power of volleyball trainees after the 12 weeks of exercise program?

### **1.3. Scope of the study**

The research was conducted in North wollo woldia district at woldia town school based under 17 volley ball project.

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

The aim of this study is to analyze or investigate the effect of selected skill related exercises on agility and power performance improvement of under 17 volleyball project trainees. The researcher believes the study would have the following significances.

- ❖ The study would be helpful to the physical education teachers, coaches, and athletes to know which exercise is important to enhance agility and power performance.
- ❖ The study would be helpful to improve physical performance of health related qualities like flexibility, muscular endurance.
- ❖ This study would be also helpful to concerned bodies; to know about the effects of selected skill related exercises on the improvement of agility and power performance.

### **1.5. Objectives of the study**

#### **1.5.1 .General objective**

The overall objective of the study was to find out the effect of 12 weeks of selected skill related exercises on the improvement of Agility and Power of under 17 male volleyball project trainees of woldia town.

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

- ❖ To examine the effect of selected exercises in improving agility of U-17 male volleyball trainees.

- ❖ To measure the effect of selected exercise in improving power of U-17 volleyball trainees.
- ❖ To identify the effect of skill related exercises that induced by agility and power on improvement of physical fitness of volleyball players after 12 weeks of exercise program.

## **2. REIVEW OF RELATED LITERATURE**

In this section; effect of plyometric training, effect of functional training on physical fitness components, effect of training on physiological variables and intense exercise performance and components of physical fitness variables for comparing skills of volleyball players are discussed.

### **2.1. Fundamental Plyometric Theory**

Plyometrics are designed to enable muscles to contract to the maximum extent in the shortest possible time (Chu, 1992). This training involves quick, powerful movements that require stretching or counter movements to activate the stretch-shortening cycle (Siff & Verkhoshansky, 1993). During this training, the athlete's neuromuscular system shows imshowed reactions to stimuli by the training of their nervous system (Voight et al., 1995). Normal daily and sport requirements of stretch-shortening exercises produce the need for functional exercises undertaken before sport-specific plyometrics. Theoretically, plyometrics can close the gap between speed and power (Voight et al., 1995).

Although speed and power are the most common products of a plyometric training programme, the promotion of agility cannot be totally ignored (Pearson, 2001). In this regard, plyometric exercises reduce the amortisation phase, where the eccentric phase transforms to the concentric. Generally, this conversion from eccentric (negative) energy to concentric (positive) energy is termed the "amortisation" which occurs within a few one hundredths of a second (Siff & Verkhoshansky, 1993). A formula has been proposed which links the efficiency of contraction time to the relationship between "time spent on the ground" and the height achieved during jumping (Voight et al., 1995). This approach was further validated by work illustrating that sprinters and jumpers (i.e. athletes that rely on the speed and strength capability of leg muscles) actually spend very little time in contact with the ground (Duda, 1988). These athletes store energy (from the eccentric and concentric phases) in their leg muscles, then partially release this energy during the

concentric contraction. Energy from the eccentric phase cannot be stored indefinitely in the leg muscles, as it disperses in the form of heat, unless the concentric phase immediately follows the eccentric phase. Typically, elite high jumpers amortise in about 0,12 seconds (Duda, 1988). Plyometric exercises have been developed to minimise the amortisation phase, although the duration of their phases have been demonstrated to also depend on learning. Therefore athletes may shorten their personal amortisation phase by learning from skills training within strength development (Chu, 1998).

## **2.2. Physiology of Plyometric Exercises**

Plyometric exercises involve the quick pre-stretching of a muscle (eccentric contraction), immediately followed by the shortening of that same muscle. This eccentric-concentric muscle contraction is often described as the stretch-shortening cycle and occurs naturally in running and jumping activities (Blazevich, 2003).

Chu (1992), Wilt (1976), Wilson et al. (1996), Voight et al. (1995) and Maarten (1990) support the principle of plyometric exercises and the stretch-shortening cycle. If muscles are stretched before the concentric contraction, the result is a more powerful contraction, due to:

- The series elastic component of the muscle, that includes the tendon and cross bridge-crossover characteristic of the actin-myosin.
- The sensors in the muscle spindle (proprioceptors) that play a big role in preparing the right muscle tension.
- The variation of sensory information that relates to the quick stretching of the muscle for the activation of the stretch reflex.

Muscle elasticity is an important characteristic of muscle tissue that explains how the stretch-shortening cycle can produce more power than a simple concentric contraction (Blazevich, 2003). As previously illustrated the muscles can develop the tension through quick stretching that is only stored for a short while so that it contains a sort of elastic

energy. For example, if one would take an elastic and stretch it out, the elastic has potential energy to return quickly to its original length (Wilt, 1976). The quick stretching of the muscles and tendons causes energy storage, which can lead to the recuperation during the concentric contraction which makes the execution easier (Wilson et al., 1996). Plyometric exercises can develop elastic characteristics of muscles and tendons, so that greater amounts of energy can be stored and used during the stretch-shortening cycle (Young, 1991).

The stretch reflex is another mechanism of the stretch-shortening cycle. This indicates that the particular muscles in any specific action have much stronger contraction values than when following a gathering phase, which contains the stretching of the muscles (Wilt, 1976). The muscles resist overstretching. Through stimulation of the stretch receptors of the muscle spindle, which causes the proprioceptive nerve impulses to move to the spinal cord and back to the same muscle, strong contractions take place to prevent the overstretching of the muscle (Duda, 1988). This is called the stretch/myoelectric reflex (Wilt, 1976). A general example of the stretch reflex is the knee's shock reaction when the doctor taps on the patella tendon with a rubber-hammer. The tap on the patella tendon causes the quadriceps tendon to stretch. The stretching is observed by the quadriceps muscle, which in turn contracts to stimuli. The stretch reflex gets activated when the muscle spindle activates stretching and leads to a powerful concentric (Lundin, 1989). Fast stretching or high stretch loads can lead to the activation of the Golgi-tendon organs (GTO's). They are stimulated in the tendons and have an inhibiting effect on the power of the next concentric contraction. The reflex acts as a protective mechanism for the musculoskeletal system through the prevention of contractions, which can lead to injury. Plyometric exercises can lead to the increase of the functioning of the stretch reflex, and this will lead to a decrease in the activation of the Golgi-tendon mechanism resulting in a more powerful stretch-shortening cycle (Young, 1991).

The stretch or myoelectric reflex responds to the rate of the muscle stretch and this reflex is of the fastest in the human body, due to the direct connection between the sensory receptors in the muscle and the cells in the spinal cord, responsible for the contraction (Baechle &

Earle, 2000). Other reflexes are slower than the stretch reflex because they have to be carried over through different canals (interneuron) to the central nervous system (brain) before the reaction (Chu, 1998).

According to Jacoby and Gambetta (1989) the base of plyometric exercises can be summarized as follows. A muscle concentric contraction (shortening action) is more powerful if immediately followed by an eccentric contraction (lengthening) of the muscle. Body weight movements that occur at a high speed, like throwing and jumping, is best executed when the movement is started in the opposite direction. When this opposite movement is stopped, a positive acceleration power is created for the opposite movement. An example of that is illustrated in the golf or baseball back swing. This change in movement in the opposite direction activates the stretch or mitotic reflex. The muscle then offers resistance against overstretching. The stretch receptors in the muscles create a powerful contraction to prevent over-stretching (Blazevich, 2003). The power produced during a concentric contraction, after a series of small eccentric movements, is more than twice as much as what is taken up after the execution of a big eccentric movement (1004 Newton versus 421 Newton) (Hennesy, 1990). The bigger the eccentric contraction, the bigger the elastic tension that is lost. Therefore, while executing plyometric exercises, for example, the single leg hop, the subject has to limit the amount of knee flexion.

Plyometric exercises could help to improve muscular performance, centered on the neuromuscular coordination. The speed of the strain can be limited through the neuromuscular coordination. This means that the body will only move in the speed range determined by the nervous system, notwithstanding the power of the muscle. Exercise with an explosive pre-stretch, improves neural effectiveness which increases the neuromuscular execution. Plyometric exercises can cause changes in the nervous system that enables the individual to better coordinate the activity of the muscle groups. More power is generated, even in absence of morphological adaptation in the muscle itself. The positive changes in the nervous system that increase the power and strength of the

execution is called the neural adaptation. The nervous system can be enlarged to become more automatic (Voight et al., 1995).

### **2.3. Plyometric Training and Sport Performance**

A considerable amount of research has been undertaken to show the positive effects of plyometric on sports performance. Brown et al. (1986) examined the effect of plyometric training on the vertical jump capability of male high school basketball players (N=26). These players were randomly assigned to an experimental training group (the plyometric group) and a control group. The experimental training group performed three sets of ten depth jumps, three days per week for twelve weeks, whilst the control group only performed regular basketball training. Results showed that the plyometric group showed significantly ( $p < 0.05$ ) in the vertical jump with arm assistance compared to the control group. Neither group differed significantly ( $p > 0.05$ ) in the vertical jump without arm assistance. In the plyometric group, 57% of the vertical jump gain was due to jumping skill improvement, and 43% was due to strength gain. Plyometric training appeared to enhance arm coordination in addition to leg strength development and could, therefore, be regarded as a suitable in-season training method (Brown et al., 1986).

Matavulji et al. (2001) looked into the effect of plyometric training on the jumping performance of junior basketball players. Although the plyometric training has showed its efficiency, it remains generally unknown whether a limited amount of plyometric training could improve movements in subjects who already demonstrate a high level of performance. While the control group participated only in regular midseason training activity, the other two groups performed a limited amount of plyometric training, employing drop jumps from the height of either 50 cm, or 100 cm. The heights of the maximal vertical jump, as well as the maximal voluntary force and the rate of force development of the hip and knee extensors were tested prior to as well as after the training. An increase in the maximal vertical jump, as well as maximal voluntary force of the hip extensors and rate of force development of the knee extensors was observed in both experimental groups, while no significant changes were recorded in the control

group. Matavulji et al. (2001) concluded that a limited amount of plyometric training could improve jumping performance in elite junior basketball players and that the improvement could be partly related to an increase in the force of the hip extensors and rate of force development of the knee extensors. The results obtained generally support the concept that plyometric training, employing drop jumps, could be a powerful tool to improve jumping performance even in high level athletes (Matavulji et al., 2001).

Research has also been undertaken to compare different types of training to enhance performance. Wilson et al. (1996) conducted a study to gain greater insight into the adaptations invoked by plyometric and weight training. Forty-one (41) previously-trained males were randomly allocated to either a control, plyometric or weight-training group. The experimental groups trained for eight weeks, performing either heavy lifts or dynamic plyometric exercises. Vertical jump, a series of iso-inertial concentric and eccentric tests, push-up tests and maximal bench press and squats lifts were performed prior to and after the completion of the training period. Plyometric training, which included depth jumps, significantly enhanced rapid eccentric force production. The weight training dominantly facilitated concentric muscular function. These specific training adaptations would appear to be a direct result of the nature of stresses imposed during the training, with plyometric training involving the rapid development of eccentric force and weight training being limited by the concentric force potential of the musculature (Wilson et al., 1996).

In the research of Hunter and Marshall (2002) different training methods were used to improve jumping techniques. The power training was designed to increase vertical jump height, with maximum height as the only goal. With power training the following changes in drop jump was found: a decrease in eccentric lower limb stiffness, and an increase in the magnitude of counter movement and ground contact time. Flexibility training appeared to offer no benefits to drop jump height and had no significant effect on the drop jump technique. Power training was associated with the following changes in counter-movement jump technique: an increase in eccentric lower limb stiffness and the magnitude of counter movement.

## 2.4. The Basics of Plyometric Training

According to Heiderscheit et al. (1996), plyometrics have become a popular training method. It is extremely important to distinguish clearly between plyometric actions, occurring as part of many elements in sport and plyometric training, which applies plyometric actions as a distinct goal-directed training modality according to a definite methodology. There is an argument as to whether plyometric training is a specific training system in its own right (Siff & Verkhoshansky, 1993). It is argued that resistance to movement is encountered in all sports, which also questions resistance training as a specific training entity. The critics of plyometrics as a definite training method should agree that it could therefore be logical to conclude that resistance training should not be regarded as a distinct training system. Basic biomechanical analysis of the forces and tensions involved, clearly show that high levels of resistance and muscle tension are involved in many sports (such as gymnastics, swimming, rowing, and wrestling). Running or cycling over distances are examples of resistance training methods, as the athlete overcomes resistance and produces high levels of muscular tension in both sports.

It is therefore easy to justify objections regarding resistance training as a separate training method. In a similar manner, specific training for stretch-shortening actions – the development of a shortened amortisation phase - which results in shortened response time, coupled with powerful movement, is a very specific training system in its own right. Siff and Verkhoshansky (1993) clearly and comprehensively explained the plyometric method of training. It is stated that prolonged research in the direction of special strength training led to the development of the so-called ‘shock’ (plyometric) method of developing explosive strength and reactive ability.

The plyometric training method stimulates the muscles by means of a sudden stretch preceding any voluntary effort (Blazevich, 2003). Kinetic energy, and not heavy weights, accumulated by means of the body, or a load falling from a certain height, should be employed. Depth jumps and medicine ball rebounding are two of the exercise regimens commonly used in plyometrics. Plyometrics or the shock method requires the use of

mechanical shock to stimulate the muscles to produce the highest possible tension. This training method is characterized by minimal duration impulsive action between the end of the eccentric (braking) phase and initiation of the concentric (acceleration) phase. It relies on the production of a very brief explosive-isometric and eccentric-isometric phase preceding the release of the elastic energy stored in the tendons and other muscle components of the series of the eccentric (deceleration) phase. With a prolonged transition phase, also called “coupling phase”, of more than 0,15 second, the action may be considered to constitute ordinary jumping and not plyometric training. This may be visualized as if the surface, being touched by the hands or feet during the plyometric contract phase, is red hot, so that prolonged contact would be dangerous (Siff & Verkhoshansky, 1993). They further stated that it was important to note that true plyometric training usually involves ballistic rather than concentric processes. Their contention was that the activity was not purely plyometric if the athlete relies on feedback processes to control the isometric and concentric actions, instead of on feed forward programmes established before any movement begins.

A key factor in plyometric training is the development of explosive strength and reactive ability in the athlete. Explosive movements are required in many sports and are typically performed at high speeds against resistance (Robberds, 2002). The flexibility, strength and aerobic training of the athlete, are also important considerations in plyometric training. The development of explosive strength and reactive ability will be discussed later, with brief reference to flexibility, strength and aerobic training. Thereafter submaximal plyometric drills and specific movements and means that could be identified and organised into a discreet training programme for reactive ability development and explosive strength as well as important training considerations will be discussed.

## **2.5. Precautions of Plyometric**

- Plyometric training is not without any risks of injury. When performed properly it can be a safe and effective workout. A number of precautions is, however, very important before one explores this type of training :

- A good level of conditioning before beginning plyometric exercises is essential. Endurance conditioning is an absolute must, since fatigue during plyometric training can lead to an injury. Strength conditioning (through weight training) is important since it may help to reduce injuries to the muscles, tendons and ligaments.
- Overtraining should be avoided. Plyometric work should be performed for quality, not quantity. The correct execution of plyometric exercises is really important and not the amount or distance that you do. It is quite a common phenomenon for humans to compete, compare and to try to improve themselves the whole time. Therefore, it is important to focus on the execution of the exercises rather than the quantity.
- Adequate rest is very important. Allow one to three minutes rest between sets, at least 48 hours between workouts.
- Progression should be planned to ensure improvement over a period of time and to prevent injuries and overtraining. Start with simple exercises and slowly progress to more advanced exercises. For example, the participant should start with two-legged hops before progressing to one-legged hops.
- A resilient surface is important for plyometric training. Plyometric training should be done on grass or a firm mat.
- Proper clothing should be worn during plyometric training. Proper athletic shoes should be worn to prevent impact injuries. Normal T-shirts and sport shorts are adequate for plyometric training (Phillips, 1990).

## **2.6. Program Development**

Voight et al. (1995) refer to researchers that subdivided an athlete's training session in a preparation period, competition period and the first and second carrying-over period. To prevent injury plyometric training sessions have to be well planned and incorporated into an athlete's training schedule. Long-term goals are very important to prevent over training whilst still developing maximum power. The goals are influenced by factors like

adaptation of periodisation, an increased training load and the adaptation of the programme setting.

Plyometric exercises can be defined as the quick eccentric loading (taxing) of the muscle skeletal complex (Mackenzie, 2002). Plyometric exercises have to condition the neuromuscular skeletal system to be able to handle the increasing power load. Over-exertion of the stretch reflex improves the ability of the nervous system to respond maximally through lengthening of the muscles. In that way the ability of the muscles to shorten concentrically with maximal power is imshowed. Since plyometric training leads to the adaptation of the neuromuscular skeletal system, the exercises have to be developed in a sport-specific manner (Voight et al., 1995). This will prepare the body to handle the expected tension. It is very important that the athlete had followed a power training programme, before a plyometric training programme is be incorporated (Santos, 1987).

According to Yessis (1991), coaches have to keep the following factors in mind before including plyometric exercises into a programme with power and other types of exercises:

- The athlete will always start the session with speed, agility and technique work.
- Power training needs to be done second followed by exercises that improves endurance.
- If plyometric training is planned for a specific day, it has to be done before power exercises. It is very important not to do plyometric exercises and technique work afterwards. Plyometric exercises can be done in the same session as power exercises, if the amount is minimal, and if it is used as a final warm-up before power exercises.

According to Hilyer and Hunter (1989), one should do basic plyometric training in the pre-season, intense plyometric training in the pre-competition phase and maintenance of average plyometric training during the competition phase. No plyometric training is

recommended in the post-competition phase and minimal plyometric training is recommended during the off-season. To prevent the risk of potential injuries, an athlete has to undergo some testing. Medical history, structural evaluation and functional testing is of great importance (Chu, 1992; Mackenzie, 2002).

## **2.7. Plyometric exercises**

Plyometric exercises are focused on the development of a shorter amortisation phase (Siff & Verkhoshansky, 1993). Chu (1998) reasoned that plyometric training was very specific in nature but very broad in application. For the lower extremities, the athlete develops either vertical or horizontal acceleration, all movements in running and jumping being simply the exertion of some vertical or horizontal force against the ground. Even changing direction falls into this category. Medicine ball exercises train the upper extremities and can also be used in combination with lower extremity training (Reilly, 1997).

Specificity is the key concept to keep in mind when planning a plyometric training programme (Blazevich, 2003). The sport and the skill to be developed must be analyzed carefully to select suitable exercises. For instance, to develop starting speed from a crouched position, for example, an offensive line-man in American football, it does not make sense to spend too much time on depth-jumping skills, which develop vertical power. A more worthwhile exercise would be the standing long jump or double leg hops, which develops horizontal force (Chu, 1998).

Early jump-training exercises were classified according to the relative demands they placed on the athlete. All jump-training exercises can, however, be progressive in nature, with a range of low to high intensity in each type of exercise (Young, 1991). Kessel (2002) pointed out that high-intensity plyometric drills include repetitive hops or jumps using only one leg or both legs with additional external resistance provided by a medicine ball or barbell. The variety of running and jumping, as well as medicine ball exercises that is part of plyometric training will be discussed briefly below.

**Jumps-in-place:** Young (1991) stated that a jump-in-place is a jump completed by landing in the same spot where it started. These exercises are relatively low in intensity, yet they provide the stimulus for developing a shorter amortization phase by requiring the athlete to rebound quickly from each jump. Standing jumps stress single maximal effort, either horizontally or vertically (Young, 1991).

Multiple hops and jumps combine the skills developed by jumps-in-place and standing jumps (Young, 1991). Bounding: Bounding exercises exaggerate the normal running stride to stress a specific aspect of the stride cycle. They are used to improve stride length and frequency and are typically performed for distances greater than 30m (Young, 1991). Box drills combine multiple hops and jumps with depth jumps. They can be low in intensity or extremely stressful, depending on the height of the boxes used (Young, 1991).

Depth jumps use the athlete's body weight to exert force against the ground. Depth jumps are performed by stepping out from a box and dropping to the ground, then attempting to jump back up to the height of the box. The key to performing this exercise and decreasing the amortisation phase, is to stress the "touch and go" action off the ground (Young, 1991).

**Drop jumps:** Athletes perform drop jumps by jumping from a raised platform and, upon touching the floor, executing a maximal vertical jump (Baca, 1999). Drop jumps are exercises in which the athlete, by forced eccentric contraction, attempts to enhance subsequent exercise performance (Baca, 1999). Matavulji et al. (2001) maintained that drop jumps could prove to be a powerful tool for improving jumping performance in high-level athletes. A study by Walshe and Wilson (1997) found numerous mechanisms that influenced drop jump achievement. These findings offer important additional insight into the limitations of the dynamic stretch-shortening cycle performance. They stated that muscle-tendon complex stiffness may well be an important link to performance inhibition at high eccentric loads. This in turn may have implications on the development of flexibility training programmes for activities incorporating these contractions. Stiffer performances recorded significantly poorer drop jump achievement under high stretch-

shortening-cycle load conditions when compared to more compliant subjects. This finding could possibly be ascribed to greater Golgi-tendon inhibition, or a less functional response to the effects of elastic recoil on contractile mechanics, consequently retarding the stretch-shortening cycle ability (Walshe & Wilson, 1997). Furthermore, Baca (1999) found that video-based methods seem to be a promising means to analyse drop jumps.

**Squat jumps:** Driss, et al., (2001) compared the effects of external loading, on power output in a squat jump, on a force platform in athletes specialising in strength and power events and in sedentary individuals. These results indicated that the effect of external loading on power output in a squat vertical jump depends on physical activity. During squat jumps, mean and peak power decreased with increasing load in sedentary individuals. The magnitude of this decrease was similar to that previously reported for the same loads during vertical jump with counter-movement in sedentary individuals. In contrast, mean power was significantly higher with a 5 kg load in power-trained athletes. Peak power did not vary significantly in the three load conditions (0,5 and 10 kg) in power-trained athletes. These results suggest that peak power is independent of load, provided that peak velocity is higher than the optimal velocity for power output. The velocity of the centre of mass at the peak power was significantly lower in the sedentary individuals than in the strength and power athletes. It is presumed that peak power on a force platform underestimates maximal power in sedentary individuals (Driss et al., 2001).

### **3. MATERIALS AND METHODS**

This section deals with Description of the study area, subjects of the study, Source of data Treatment and study design, Experimental material, sample and sampling techniques, Types of data and data collection methods, Inclusion and Exclusion criteria, data collection instrument, reliability of data, Data collection procedure, reliability of tests and data analysis techniques.

#### **3.1 Description of the study Area**

Woldia is the town which is the capital of North wollo zone and Located in the north of Dessie and southeast of Lalibela in Amhara region. This town has latitude and longitude of 11 °50'N 39°36'E and an elevation of 2112 meters above sea level. Based on the 2007 national census conducted by the central Statistical Agency of Ethiopia (CSA), this town has a total population of 46,139, of whom 23,000 are men and 23,139 women. The majority of the inhabitants practiced Ethiopia Orthodox Christianity, with 80.49% reporting that as their religion, while 18.46% of the population said they are Muslim. (Source, wikipedia )

#### **3.2. Subjects of the Study**

The present study had been conducted on 30 male volleyball project trainees of woldia town. The study had experimental and control groups. The control group comprised 15 subjects and the experimental group also had 15 participants.

#### **3.3. Source of Data**

The researcher used primary source of data gathered from the subjects using pre, during and post-test measurement in the field on the selected skill related fitness parameters and from the control group participants.

### **3.4. Treatment and Study Design**

They were completely familiarized with testing and training protocols before the beginning of the study. All participants were monitored by members of the research team during each training session. A certified exercise instructor led all training sessions, and other members of the research team monitored each participant during training sessions. Each participant recorded all of his exercise data, which were also carefully monitored by the members of the research team. In this study, adherence to the program was effective, with all participants completed 36 injury-free workouts over the 12-weeks of training program. These trainees trained continuously for 12 consecutive weeks with the guidance and treatment of the researcher and other assistant teachers. The training was mainly focused on skill related form of exercises with moderate intensity to study their effects on agility and powers. Participants were tested PT and PoT to determine differences in these variables.

#### **3.4.1. Training Procedures**

In this study, experimental group had engaged through training activities of selected physical fitness qualities in addition to the normal training events. Like zigzag run, jump squat, step hurdle and hurdle hops. Therefore, all subjects had taken a pre-test firstly, for the selected physical fitness qualities such as ;Vertical jump and Agility T drill run later has given a crucial training program three times in a week for one hour time span of three months. The training program had based on recommendations of intensity and volume from (Piper and Erdmann, 1998).

Using similar drills, sets, and repetitions, the researcher had prepared training session plan for experimental players. Skill related exercise had only performed three times per week to allow for sufficient recovery between workouts as recommended by researchers (Adams et al., 1992). Training volume ranged from, 4 –5 sets, and 4-6 repetitions. However, the control group had made a normal training activities on their own training program scheduled however did not participate to the selected physical fitness qualities training as like as experimental group. Finally, all subjects had taken a post-test then

differentiate the effect of trained and non-trained subjects with the selected physical qualities regarding to the standard quality.

#### **3.4.1.1 Power (Vertical jump)**

Being able to jump vertically is extremely important in such sports as volleyball .The vertical jump involves a lot of technique. Some easy corrections applied to increase your vertical jump based on technique alone. This was enable the volleyball to use maximum power from the specifically body strength and hamstring muscles, which enabled the highest jump. The arms should work simultaneously with the rest of the body on the ascension/declension (<https://www.google.com.et> search Vertical Jumps)

#### **3.4.1.2 Squat Jump**

It is plyometric movement where both feet leave the ground at the same time. (That is code for "jump.") Not only do they work your muscles harder but also they add some cardio to your strength training. So to take your basic squat to the next level, add a jump! Start in the beginning squat position. Lower yourself about half way and then jump up in the air before landing on your feet, standing. You can swing your arms for momentum, if you like. Plyometric exercises as jump squats are extremely strenuous and your muscles need three days off in between workouts. Therefore, add jump squats to your training for a maximum of two days per week, such as Tuesday and Saturday. If you play sports and are in season, only do jump squats once per week and do not schedule them the day before games to keep your legs from becoming fatigued during competition. (<http://www.womens healthmag.com> fitness, squat-jumps)



**Figure1. Squat Jump Exercise Training**

Image Source: Pop sugar Studios by Susi May 2/07/14

**Procedures:** - This exercise is an advanced dynamic power move that done only after a complete warm up. ([www.popsugar.com/fitness/How-Do-Jump-Squats-994573](http://www.popsugar.com/fitness/How-Do-Jump-Squats-994573))

- Stand with feet shoulder width and knees slightly bend
- Bend your knees and descend to a full squat position.
- At the bottom of the squat, powerfully explode straight up bringing your knees toward your chest while in midair.
- At the top of the jump, your thighs should touch your torso.
- Release your legs, control your landing and descend into the squat again for another explosive jump.
- Upon landing immediately, repeat the next jump.
- Avoid doing these drills on concrete and use a soft, flat landing surface until you are comfortable with the exercise.
- As you improve, you can jump over gates as shown in the photo.

### **3.4.2. Agility exercises**

#### **3.4.2.1. Step hurdles**

The step- up exercise includes placing small hurdles about two feet apart such that they create four segments between them. The athlete must start on the outside of one of the end segments and move from one end of the hurdles to the other and then back again (=

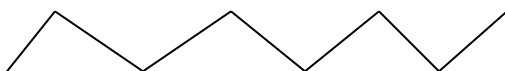
one repetition). This must be done one leg at a time (not hopping) and as quickly as possible the participants should complete three sets of five continuous repetition of this exercise. This exercise helps to improve foot quickness as well as overall agility.

### **3.4.2.2. Hurdle Hops**

The set up for this exercise is the same as the step hurdles above. The only different is that the athletes hop through the segments, with both legs together at all times and no pauses during a repetition. This is a more explosive action that has some crossover benefit to vertical jumping development as well as agility.

### **3.4.2.3. Staggered Run (zigzag)**

This exercise will help to improve the athlete agility while running both forward and backward. To set up this exercise a single cone must be placed as the starting point. Then a second cone should be placed about 5 yards away at a 45 degree angle from the first cone (with respect to the starting line). The next cone should be placed 5 yards away from the second cone such that the three cones make a triangle. Add three more cones to the setup that a line from cone to cone looks like this



The athlete would run forward through this as fast as possible by staying to the outside of each cone. After reaching the final cone, said athlete would retrace his steps by backpedaling. This constitutes one repetition. Each athlete should perform 4-7 repetitions.

All of the above agility exercises serve to improve the neuromuscular system by forcing it to produce a large amount of forces very quickly (i.e. high power). Additionally, these exercises help to wake the athletes' ankles more flexible and stronger when faced with lateral stress.

### **3. 5. Experimental Material**

The research would use the field of North wollo woldia secondary school as a study area. The materials that the researcher would use for the study would be stopwatch, whistle, cones, and jumping ropes and tape measure for the training session as well as for evaluation tests.

### **3.6. Sample and Sampling Techniques**

In this study, the researcher used purposive sampling techniques this is because there was only one volleyball project trainees in woldia town, which hold 15 project trainees, and then the researcher used this project as a whole for experimental study purpose. The entire subject were healthy and residents at home of the town and volunteers to participate in this study.

Before the commencement of tests, the subjects were oriented about the purpose of the study and their cooperation had sought. The subjects participated throughout the testing period and cooperated for the success of the collections of necessary data.

### **3.7. Types of Data and Data Collection Methods**

The investigator used quantitative method of data gathering tool. From the beginning, the ordered sets of questions were filled by the trainees to know the status of participants about their health and fitness to select the participants. Next, the researcher tested pre physical fitness test on the outlined variables, then went to the continuous plyometric exercises. After 6 weeks of intervention, during fitness tests were given and at the end of the trainings post tests were made. The fitness tests included Vertical Jump test and Agility T test. The data's were recorded by the researcher and assistants collaboratively. A careful familiarization phase was undertaken with each participant before the start of the study so that learning effects would be minimized. All measurements for testing (pre, during training and post training) were made with the identical equipment, positioning, test technicians, and technique for each subject.

### **3.8. Inclusion and Exclusion Criteria**

Male subjects who fulfill the health history questionnaire and whose age is U- 17 would be part of the school based sport team and would be part of the study, and female project are not participant in the study.

### **3.9. Reliability of Data**

The reliability of data was assured by instruments reliability and testers competency. In addition, to get consistent results from the different testing periods, the test conditions such as surface, equipment remain the same. The tests were conducted on similar weather conditions by the same testing personnel at the same time of day.

Reliability was established by the test re-test processes. Subjects from all groups were tested on selected variables. Three repeated measurement of individuals on the same test was done to determine reliability.

The instruments such as stopwatch, centimeter, second were used for this study. All instruments were in good working condition and standardized enough to serve the purpose of the study.

### **3.10. Data Collection Procedure**

In this study, four tests were conducted both had taken pre and post training to determine the selected physical fitness quality training outcomes. Vertical jump test was to determine of how high an athlete can elevate off the ground from a standstill. And reproducibility of the tests (Paule et al., 2000; Roozen, 2004). Prior to training, all subjects had their baseline selected physical fitness quality tested, using the two tests previously mentioned. The total testing session was approximately one hour for each subject, which included warm-up, ten-minute rest times between tests. Each test had explained and demonstrated. Before testing, subjects had given practice trials about two minutes to the testing procedures. All tests were counterbalanced pre and post testing to

ensure that testing effects had minimized. Three successful trials were use per test for each subject, and the best value had taken for each session. Rest periods of 3 minutes had allocated between all trials.

### **Testing order**

The tests should have conducted in the following order:

- Power (vertical jump) Test
- Agility T- test

### **Functional Warm Up**

All participants should do a functional warm up to reduce the possibility of injury and to help increase their performance on the earlier tests. The following is an example of a functional/dynamic warm up that could use.

1. 5 minutes light aerobic activity, jogging preferred
2. Walking lunges: 5 per leg, two times
3. Deep squats: 15
4. Squat jumps 10.

#### **3.10.1 Power (Vertical jump) Test**

Testing and measurement are the means of collecting information upon which subsequent performance evaluations and decisions had made but in the analysis, we need to bear in mind the results. The Vertical Jump test is a very common test for measuring power. There are many variations and technique for conducting this test. The expected results had affected by these test variations - the norms used as just a guide, and has based on the vertical jump off two legs, no run-up, no pause, and with full arm movements. See also a selection of vertical jump test results. The Sergeant Jump Test (Sergeant, 1921), also known as the vertical jump test, was developed by (Dr. Dudley Allen Sergeant, 1849-1924).

**Objective;** - To monitor the development of the athlete's elastic leg power

**Required Resources:**

- Wall
- Tape measure
- Chalk



**Figure 1. Vertical Jump Test**

Source: Sergeant Jump Test (Sergeant, 1921)

**Procedure;-**

- The athlete warms up for 10 minutes
- The athlete chalks the end of his finger tips
- The athlete stands side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips of the fingers (M1)
- The athlete from a static position jumps as high as possible and marks the wall with the chalk on his fingers (M2)
- The assistant measures and records the distance between M1 and M2.

### 3.10.2. Agility T-test

**Purpose** – the T-test of agility for subjects and includes forward, lateral and backward running.

**Equipment required**- tape measure, marking cones, stopwatch and time gates

**Procedure**; - set out four cones as illustrated in the diagram 5 yards= 4.57m 10 yards=9.14m.

The subject starts at cone A, on the command of the timer, the subject sprints to cone B and touches the base of the cone with their right hand. They then turn left and shuffle sideways to cone C, and also touches its base, this time with their left hand. Then shuffling sideways to the right hand. They then shuffle back to cone B touching with the left hand and run backwards to cone A.

**Scoring**- the trial will not be counted if the subject cross one foot in front of the other while shuffling, fails to touch the base of the cones, or fails to face forward throughout the test. Take the best time of three successful trials to the nearest 0.1 second.

### 3.11. Data Analysis Techniques

The data which were collected through performance test was analyzed, interpreted and tabulated into meaningful form using computerized statistical package software (SPSS version 20) in parametric statistics. The paired T-test was used to compare the pre and post training results. The level of significance was 0.05%.

## **4. RESULT AND DISCUSSION**

This chapter deals with presentation and analyzing of the data collected through Experimental method such as pre-test and post-test results of explosive power and agility for individual volleyball subjects from Experimental and control group. The researcher had used the quantitative research method to get a fertile data.

### **4.1. Results of Vertical Jump Test**

The present study investigated on the effect of 12 weeks selected skill related exercise in improving agility and power u-17 volleyball trainees in woldia town which hold 30 subjects then the researcher used this project 15 for experimental study purpose. However, for the control group the researcher used 15 subjects who were participated actively in woldia secondary school volleyball trainees. Because of such reasons, the researcher did not apply any sampling techniques Therefore, All subjects were healthy and residents at home of the town and volunteered to participate in the present study. Before the commencement of tests, the subjects were oriented about the purpose of the study and their cooperation had sought. The subjects participated throughout the testing period and cooperated for the success of collection of necessary data. Both groups were perform activities of normal daily living and agreed not to change or increase their current exercise habits during the course of the study.

The experimental training group participated in a 12-week training program performing the selected physical fitness qualities of exercises designed for the subjects while the control group did not participate in this selected physical fitness qualities of exercises.

A 12-week selected skill related exercise program had developed using three training sessions per week.

The training programs had based on recommendations of intensity and volume derived from (Piper and Erdmann, 1998) using similar drills, sets, and repetitions.

Based on (Parsons and Jones,1998)in order to monitor the effectiveness of this training, specific fitness tests had implemented to assess each element of volleyball specific fitness.

These tests used before players begin a training program and an 8-12 week intervals. Trainees should first warm up thoroughly, and avoid training the day before the fitness tests. Therefore, all subjects perform testes with following test order and functional warm up as prerequisites for the selected fitness protocols before starting the present study then after that the training had continuous at that time only the experimental subjects should participated but not the control subjects did taken part for the selected training protocols. The researcher had used squat jump, agility T drill and zigzag run on the training events to determine its effects on power and agility. However, the control and experimental subjects did perform a normal and equal training program scheduled except the selected fitness qualities had given for the experimental subjects in addition to the normal training plan. So as such, condition the two group subjects did perform a required training based on the prepared daily plan for three month and all had taken part their own prescribed training schedule for three times in a week for one hours. Thus all subjects the same as in the beginning situation they under gone a test as already listed test protocols with followed a procedures. Finally the data was gathered from the experimental and control groups results as in the form of pre-test and post-test method of power, and agility had been organized using appropriate and relevant statistical method of analysis. The method, which assists to come up with findings, including arithmetic mean, standard deviation and t-test method had used.

Physical qualities had a significant outcome on volleyball subjects that were power and during a training program on the case of woldia Town. Results revealed that subjects who had the Physical qualities had superior power and agility during the training session. Since, there is a significant difference between the mean change scores for experimental and control groups from pre and post-test conditions.

Volleyball exercise training had an effect on subjects' physical quality performance on explosive leg power and agility. Overall aim of anaerobic training in volleyball is to

increase a player's potential to perform high-intensity exercise during a game. The specific aims of anaerobic training in volleyball were to improve the ability to act quickly and to produce power rapidly. Thus, a player reduces the time required to react and elevates performance during a game. The authors conclude that the anaerobic training that is given to the experimental group such as leg power and agility had a significantly enhance the overall performance of subjects when compared to the control subjects that did not perform such training program on comparing elite u-17 subjects with age-matched sub-elite volleyball players.

Reilly et al. (2000) found that performance on any physical quality was the best distinguishing feature of the elite individuals. The study showed that training through the selected physical quality had a great improvement for volleyball players better than the player they were did not perform such training event. Bangsbo (1994) described various running tests specifically designed for volleyball players. The researcher disclosed that the volleyball players had record the reliable data about the selected physical quality test for experimental and control players. So, the experimental players had scored a good results as compared to the control player.

U.S volleyball Coaching Manual (2010) recognizes that; volleyball is a physically demanding sport characterized by explosive activities such as explosive leg power and agility. Thus, as the result obtained experimental subjects had achieved a better record for pre and post-test value as compared to the control players. The previously discussed studies support the finding of the current study that the practitioners' had well physical quality performance when they had participated volleyball training on fitness component program and the current study formed a significant effect on players' the set quality of fitness.

Distinct to previous study, the result of the current finding reveal that volleyball training had effect on the selected physical qualities such as power and agility. These results suggest that squat jump exercise had an impact on player's power for the development of vertical jump during the required sessions.

Because, the experimental players were found superior than their controlled player regarding to the mean value of pre-test and post-test as analyzed in table 4.4. The study also support the result of the study he concluded that trained players were found significantly better on all physical fitness variables than non-trained players. As showed the researcher's result suggest that when players had squat jump exercise, they could have improve their vertical jumping ability through the development of power than controlled players.

**Table 1 Mean Values of Vertical Jump**

Variables	Group	Test	No	Mean	MD	Std. Deviation
power	Experimental	Pre-test	15	40.27	3.93	1.870
		Post-test	15	44.20		1.612
	Control	Pre-test	15	40.65	1.2	1.86
		Post-test	15	39.45		1.73

As indicated in the above table, experimental players had 40.27 result of mean for pre-test and 44.20 for post- test power. While, control players had 40.65 pre-test and 39.45 post-test for this physical quality recorded and the level of significance was set at 0.05. Experimental and control players difference of mean value were 3.93 and 1.2 respectively.

#### **4.1. Results of Vertical Jump**

**Table 2. Mean Values of Vertical Jump**

Variables	Group	Test	No	Mean	MD	Std. Deviation
Agility T-test	Experimental	Pre-test	15	10.5	1.0	1.4918
		Post-test	15	9.5		1.6782
	Control	Pre-test	15	11	0.5	2.6348
		Post-test	15	11.5		2.6883

Table 7. Reveals the result of Agility T-test mean value for pre-test 10.5 and post-test 9.5 to experimental players. On the other hand, 11 pre-test and 11.5 post-test for control players and the level of significance was set at 0.05. Experimental and control players difference of mean value were 1.0 and 0.5 respectively.

Investigation from experimental and control player like pre and post-test measurement revealed that the Agility T-test had a greater mean record value for experimental player than the control player as depicted on Reilly et al. (2000) found that performance in an agility run test was the best distinguishing feature of the elite individuals “on comparing elite 15–16-year old players with age-matched sub-elite soccer players”. The authors conclude that Agility T-test had a great significant effect on the enhancement of agility performance for well-trained volleyball players than non-trained one.

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

### **5.1 Summary**

The purpose of the present study was the effect of 12 weeks selected strength exercise in improving agility and power u-17 volleyball trainees in case of woldia town. In this study, all possible efforts were made to get the most credible answers to the basic questions by making strong review of related literature, collecting relevant information through experimental pre and post -test. To this end, this study has general and specific objectives so to achieve that there were different parameters had study used. It can draw some attentions of concerned bodies especially in woldia projects.

Subjects for the study were 30 males who were participated in U-17 volleyball project trainees. It divided into two groups, an experimental group and a control group. The experimental group performed in a three-month of selected physical fitness qualities training program that was agility T-test and power (vertical jump). However, the control group did not perform the selected physical fitness training qualities. Nevertheless, they did perform as equal as normal training activities to the experimental trainees for the prescribed training scheduled. The basic purpose of training is to improve human capabilities in all their manifestations and the effects of training depend on the physiological stimulus provided by the exercise undertaken. The dimensions of exercise are its intensity, its duration and its frequency.

All subjects participated in two physical qualities tests power (vertical jump) and agility both had taken pre and post testing. Experimental method employed to collect a data used to analyze the change mean scores to experimental and control for (pre- post) values. The fitness requirements for volleyball depend on the level of performance. To succeed based on results of testing selected parameters. These parameters have designed to predict performance capacity, taking in to account the trainees current level of fitness (Peltola with Thomson & Beavis 1992). Fitness profiling had achieved by means of a battery of tests. The data was gathered from the experimental and control groups results as in the form of pre-test and post-test method of power and agility had been organized using

appropriate and relevant statistical method of analysis. The method which assists to come up with findings including arithmetic mean, standard deviation and t-test method had used. Finally, as study revealed that the experimental trainees had performed the selected physical fitness training had significantly greater than the control trainees, which did not perform the prescribed physical fitness protocols. Therefore, physical fitness training has been a significant effect on volleyball to enhance their fitness performance.

### **5. 3. Conclusions**

Based on the results obtained from this study, the researcher has drawn the following conclusions.

- ❖ As the result obtained in the study, offer Squat jump exercise training of players had a significant effect on the enhancement of power for vertical jump.
- ❖ Physical quality of the players, like power (vertical jump), had a change with the aid of training drill.
- ❖ Agility T-test had significant effect on the performance of volleyball players.
- ❖ Concerned on the result, hamstring drill had both significant impact on the Agility and power of players'.In general, the main finding of this study was the foremost selected physical qualities such as; explosive leg power (vertical jump) and agility T-test had been improved the players' physical performance on the required training program.

### **5.4. Recommendations**

Based on the conclusions derived from the findings of the data analyzed, the following recommendation made as possible ways of curbing the problems observed.

- ❖ Volleyball the coachs should give emphases to a critical training program to the volleyball project players and take actions to improve players' better performance enhancement.

- ❖ power (vertical jump) training had effect on players', enhance their power performance. Therefore, it is suggested that practicing the correct training program would improve player's performance efficiency when properly practiced.
- ❖ it is suggested that improving agility training may also be effective in enhancing maximal agility performance.
- ❖ Lastly, this study only showed that the effect of volleyball training on the selected physical qualities for U-17 male project players and its result was good improvement. Therefore, specificity while thinking physical fitness improvement need to be strictly followed... having specific training/exercise for each fitness element.

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## **7. APPENDICES**

## Appendix-A

### Health history and physical readiness Questionnaires

This questionnaire is designed to obtain information on the health status and physical readiness of the subjects participating for the research study. The information will be kept strictly confidential.

For students: - please read the following questions carefully and indicate your correct response to each question by encircling it on the choice letter given.

1. Do you have a recent physical injury such as bone, muscle, joint etc will be aggravated by physical exercise?

A. yes                      B. No

2. DO you have suffered with heart problem before?.

A. yes                      B. No

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

A. yes                      B. No

4. Are you taking any prescription medicines?    A. yes                      B. No

If your response is yes, name them below

Name of Drug    Dosage

- -                      - -

5. Identify any medical problem that you had before.

A. cardiovascular    C. Neuromuscular

B. Respiratory      D. None

6. Identify any physical problems you had before.

A. Hand bone broken

C. back bone dislocation

B. head skull broken

D. leg bone broken      E. None

7. Is there any history of coronary heart disease within your family?

A. yes

B. No

8. Do you currently participate in an exercise program regularly (at least 2 times per week). If your response is no explain your reason below why should not participate.

I hereby state I have read, understand and answered honestly the question above .I also state that I wish to participate in the physical exercise program.

Client's Full name \_\_\_\_\_ Trainers Full name \_\_\_\_\_

Client's signature \_\_\_\_\_ Trainers signature \_\_\_\_\_

Date \_\_\_\_\_

Date \_\_\_\_\_

## **Appendix-B**

### **Consent to participate voluntarily in this research study woldia town.**

Researcher's Name: - Denbolaw Mengesha

Supervisor's Name: - Destaw Eneyew

Thesis title: - Effect of 12 week's selected strength exercise in improving agility and power on u-17 male volleyball trainees in case of woldia town, north wollo Amhara regional state.

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

The researcher will explain to you in detail the purpose of the project, the procedures to be used the potential benefits and the possible risks of participation in this study. You can ask the researcher any questions that you may have about the study, and expect to receive satisfactory answers the same. A basic explanation of the project is summarized below. After discussion, if you agree to participate in the study, please sign this form in the presence of researcher. You discontinue at any time from the study if choose to do so.

#### **1. Purpose and procedures**

The purpose of this research project is to investigate the effect of exercise training on the improvement of agility and power fitness status of u-17 male trainees. The subject to be involved in this study will be 30 male trainees and participation on this study will require you to perform a certain test to measure the physical fitness variables.

## 2. Risk and the safeguards

The risks of this research study are small. While administering the tests and during training session you may experience localized muscle fatigue. You might feel some muscle soreness and fatigue during and after the cessation of the exercise tests and training but we do not expect any unusual risks as a direct result of this study.

## 3. Confidentiality

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

## 4. Contact address

Denbolaw Mengesha Lemma Tel +251913243062

I certify that I have read and fully understand the above project. I willingly consent to participate.

Signature of subject\_\_\_\_\_

Name\_\_\_\_\_

Parent's signature\_\_\_\_\_

Name\_\_\_\_\_

Address\_\_\_\_\_

Date\_\_\_\_\_

Certify that I have explained fully to the above subject the nature, the purpose, the potential benefits and possible risks involved in this research study.

## **Appendix - C**

### **Training Schedule**

#### **Description of the training schedule**

In sport training it needs well designed and prepared plan. The purpose of training plan is to identify the work to be carried out to achieve agreed objectives and to be effective in the training program outcomes. Sport fitness training plans are the strategies for achieving peak performance. In sport training plan goals and objectives should be specified. Participant's fitness level should be assessed before, during, and after training exercise should be selected and specific to the selected fitness component needed to develop; it should be well adjusted to the participant's fitness level and the weather condition.

Training plan can be a short term or it can be a long term plan. Basically, some fitness component needs short term training and the need to train for a long period of time. Due to this reason, the researcher will be concentrated on a short term training plan (three month). One of the most important rules of training for results comes back to the principle of Arnold's book (Arnold's encyclopedia of body building) state that, the intensity of the work out and the frequency of the training session play an important in stimulating muscle growth and performance improvement.

Change comes from exercise, exercises are physical stressors. Training too often or with too much intensity and not allowing proper rest between sessions could cause either an over use injury or lead to over training. Both of which can significantly limit a client ability to achieve fitness goal. <https://www.acefitness.org/blog>

Planning the session and the training weeks based on the above mentioned reasons and others the researchers will use the training principles so, this training session is designed for three months and based on the principle of frequency, intensity, and principle of rest

and recovery .It will be a three days per week and 60 minutes of each training days.

The training session will starts with warming up exercise and it will continue up to the cool down exercises.

The Frequency of exercise is a fine balance between providing just enough stress for the body to adapt and allowing enough time for healing and adaptation to occur a program that works every body part every session should be completed 3 days per week with a day's rest between sessions. So, this study will be applied for three days of a week and for a total of 12 weeks ( three month) Source:[www.cardiosmart.org](http://www.cardiosmart.org)(American college of cardiology) and [htt:llm.betterhealth.vic.gov.au2lbhcarticles.nsf\(mskpagelexercise intensity?\)](http://llm.betterhealth.vic.gov.au/2lbhcarticles.nsf(mskpagelexercise%20intensity?))

### **Exercise intensity**

Exercise intensity refers to how hard the body is working during physical activity. The heart rate, breathing, temperature and perspiration all measure your level of exercise intensity. Exercise intensity is described as low, moderate or vigorous. For maximum health benefits, the goal is to work hard, but not too hard described as moderate intensity by Australia's physical activity and Sedentary Behavior Guideline. Source: [www.cardiosmart.org](http://www.cardiosmart.org) (American college of cardiology) and [htt:llm.betterhealth.vic.gov.au2lbhcarticles.nsf \(mskpagel exercise intensity\)](http://llm.betterhealth.vic.gov.au/2lbhcarticles.nsf(mskpagel%20exercise%20intensity?))

### **Measuring exercise intensity**

There are various ways to measure exercise intensity to make sure the body is getting the most out of every workout. One coach may need to experiment to find out which method of measuring exercise suits best. There are three different measuring methods include:

- ❖ Target Heart Rate Method
- ❖ Taking Test Method And
- ❖ Exercise Rating Scale

Measuring exercise intensity using target heart rate. The human body has an in-built system to measure its exercise intensity the heart. Your heart rate will increase in proportion to the intensity of your exercise. You can track and guide your exercise intensity by Calculating Your Target Heart Rate | THR range.

The ranges of exercise intensity

- ❖ Low (light) is about 40%-54% MaxHR
- ❖ Moderate is 55%-69%
- ❖ High (vigorous) is > 70%

For moderate intensity physical activity a person's THR should be 50 to 70 percent of their maximum heart rate. Maximum rate is based on a person age. An estimate of a person's maximum heart rate can be calculated as 220 beats per minute (bpm) minus your age. Because it is an estimate, use it with caution. Keep your heart rate at the lower end of your recommended range if you are just starting regular exercise.

Gradually increase the intensity of your workouts as your fitness improves. Also, your heart should stay in the lower ranges during warm-up and cool down periods. Using heart rate monitors is an easy way to keep track of heart rate while you are exercising, or you can take your pulse. Source: [www.cardiosmart.org](http://www.cardiosmart.org)(American college of cardiology) and <http://llm.betterhealth.vic.gov.au/2lbh/articles.nsf> (mskpageexercise intensity).

Measuring heart rate by taking pulse

Taking your pulse at regular intervals lets you know whether you are exercising within your target heart rate range. Some tips include;

- Take your pulse before you warm up.
- Take your pulse again when you have been exercising for about 5-10 minutes
- Continue taking your pulse at regular intervals

The radial pulse is located on your inner wrist .To measure it, you should

- Put the first three fingers of one hand against the inner wrist of the other hand just below the thumb.
- Highly press your fingers into the hollow next to the tendon on the thumb side your artery lies just beneath the skin.
- Using a watch with a second hand, count your pulse for 15 seconds. Multiply this figure by four to get your beats per minute.(for example, 31 pulse beats over 15 seconds equal a pulse rate of 124 beats per minute).you can also take your pulse by pressing your fingers lightly against one of your carotid arteries, located on either side of the windpipe

Factors known to influence heart rate it's not just exercise that affects your heart rate. Your beats per minute could be raised by a number of internal and external factors including

- Hot weather Caffeine intake
- Hormone fluctuations
- Stress or anxiety
- Cigarette smoking
- Medication

Source: [www.cardiosmart.org](http://www.cardiosmart.org)(American college of cardiology) and <http://llm.betterhealth.vic.gov.au/2lbh/articles.nsf> (mskpage/exercise intensity). So, the researchers will use the above mentioned mechanism to measure the exercise intensity of the exercise session. But result can be fluctuated due to the above mentioned influenced factors. The main objective of this general training schedule will be to improve the agility and power performance of male school volleyball players of woldia secondary school students. In connection with this the training schedule is mentioned.

## Appendix-D

### Training plan

**Table 1 First Month Training Schedule (November, 2017)**

Days per week	Duration	Types of exercise	set	Rest b/n set (station)	Duration	Exercise intensity
Tuesday	45 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity		1minute	10	Moderate intensity   55-69% MaxHR
		1.seven cone zigzag drill	5x3	1minute	4 minute	
		2.sqaut jump 4 cone each	5x3	1minute	6 minute	
		3.anl hop	5x3	1minute	7 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise.			10 minute	
Thursday	45 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity.			10 minute	Moderate intensity
		1.seven cone zigzag drill	5x3	1minute	4 minute	
		2.sqaut jump 4 cone each	5x3	1minute	6 minute	
		3.Jumping on the spot and with movement	5x3	1minute	7minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise		1minute	10 minute	
Saturday	45 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity.			10 minute	Moderate intensity   55-69% MaxHR
		1.30 yard shuttle run	4x3	1minute	4 minute	
		2.Altenative leg jumping rope	2x3	1minute	6 minute	
		3."T" drill run	2x3	1minute	7 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise			10 minute	

**Table 2 Second Month Training Schedule (December, 2017)**

Days per week	Duration	Types of exercise	set	Rest b/n set (station)	Duration	Exercise intensity
Tuesday	50 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity		1minute	10	Moderate intensity   55-69% MaxHR
		1.seven cone zigzag drill	5x3	1minute	5 minute	
		2.sqaut jump 4 cone each	5x3	1minute	7 minute	
		3.ankl hop	5x3	1minute	8 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise.			10 minute	
Thursday	50 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity.			10 minute	Moderate intensity
		1.seven cone zigzag drill	5x3	1minute	5 minute	
		2.sqaut jump 4 cone each	5x3	1minute	7 minute	
		3.Jumping on the spot and with movement	5x3	1minute	8 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise		1minute	10 minute	
Saturday	50 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity.			10 minute	Moderate intensity   55-69% MaxHR
		1.30 yard shuttle run	4x3	1minute	5 minute	
		2.Altenative leg jumping rope	2x3	1minute	5 minute	
		3."T" drill run	2x3	1minute	8 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise			10 minute	

**Table 3 Third Month Training Schedule (January, 2018)**

Days per week	Duration	Types of exercise	set	Rest b/n set (station)	Duration	Exercise intensity
Tuesday	60 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity		1minute	10	Moderate intensity   55-69% MaxHR
		1.seven cone zigzag drill	5x3	1minute	6 minute	
		2.sqaut jump 4 cone each	5x3	1minute	7 minute	
		3.ankl hop	5x3	1minute	8 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise.			10 minute	
Thursday	60 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity.			10 minute	Moderate
		1.seven cone zigzag drill	5x3	1minute	6 minute	
		2.sqaut jump 4 cone each	5x3	1minute	7 minute	
		3.Jumping on the spot and with movement	5x3	1minute	8 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise		1minute	10 minute	
Saturday	60 minutes	General and specific warming up exercise walking, jogging, running on the spot with rotating activities and stationed general and specific stretching activity.			10 minute	Moderate intensity   55-69% MaxHR
		1.30 yard shuttle run	4x3	1minute	6 minute	
		2.Altentive leg jumping rope	2x3	1minute	7 minute	
		3."T" drill run	2x3	1minute	8 minute	
		4.Minor game	1	1minute	13 minute	
		Cool down breathing, stretching exercise			10 minute	

## Appendix-E

### Results of Fitness Tests

**Table 4 Vertical Jump Test Results**

NO	Subject code	Pre-test	During test	Post test
1	EG1	39	40	43
2	EG2	38	39	41
3	EG3	40	42	44
4	EG4	38	40	43
5	EG5	41	42	46
6	EG6	42	43	45
7	EG7	40	42	44
8	EG8	43	45	47
9	EG9	39	40	43
10	EG10	44	45	47
11	EG11	38	40	44
12	EG12	41	42	44
13	EG13	42	43	45
14	EG14	40	42	44
15	EG15	39	40	43

**Table 5 Agility T-test Result**

No	Pre	During	Post
EG1	11	10	9.5
EG2	10	9.5	9.5
EG3	12	11	10
EG4	10	9.5	9
EG5	9.5	9	8.5
EG6	10	9	9
EG7	13	12	11
EG8	12	11	10
EG9	10	9	8.5
EG10	10	9	8.5
EG11	14	12	10
EG12	12	11	10
EG13	10	9	8.5
EG14	10	10	9
EG15	10	9	9

## Appendix-F

### Normative Data of agility and Power tests

**Table 6 Normative data for Agility T-test**

Grades	Male (in second)
Excellent	<9.5
Good	9.5-10.5
Average	10.5-11.5
Poor	>11.5

**Source:** Palole.et.al (2000)

**Table 7 Normative data for Vertical jump Test**

Grades	Male(in cm)
Excellent	>65
Above average	56-65
Average	50-55
Below average	40-49
Poor	<40

**Source:** //www.brianmac.com.uklmobile

### Appendix-G

map WOLDIA ethiopia

city WOLDIA map country ethiopia



**Figure 1.** Map of Study Site

**Source:** - Google 2017 Map Data