
The Influence of Depth Jump Training on Leg Muscle Explosion When Doing Shot Put By Sport Coaching Student Academic Year 2017/2018

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Abstract. Based on researchers' observations in the field on sport coaching education student 2017/2018, researchers observed that lectures were still shortcoming. One of them is the leg muscle during repulsion. The purpose of this study to determine the effect of depth jump training on leg muscle explosion power when doing shot put by sport Coaching Education students 2017/2018. The population of study is sport Coaching Education students 2017/2018. The sample is 12 people by using total sampling. This instrument uses MD jump. The Data obtained is analyzed by t-test. Based on the data analysis and discussion, it can be concluded that there is an effect of Depth jump training on leg muscle explosion power when doing shot put on Student Coaching Education students as evidenced by the results of $t\text{-count } 4.723 > t\text{ table } 1.796$ at $\alpha = 0.05$. This proves that by training Depth jump, the legmuscle explosive power can be better results.

Keywords: Depth Jump, Leg Muscle Explosion Power, Shot put

1. Introduction

Indonesia as a developing country is striving to do development in all fields for the advancement and prosperity of the nation. Every development effort requires the participation of every citizen and the whole nation in contributing their effort and thoughts. At the field of national development is the field of education which aims to educate the life of the nation and improve the quality of the Indonesian nation in realizing a just and prosperous society. As stated in the National Sports System Act (Law No.3 2005) Chapter 1 "Sports are all aspects regards to sports that require regulation, education, training, development and supervision. In law 4, Sport is a systematic activity to encourage, foster, and develop physical and spiritual.

For reaching an achievement is not easy. The achievements in sport area will be realized if there is cooperation with the government, the community and supporting elements in sports coaching. this statement same with according to Syarfuddin (2011: 22) that "The best achievements of athletes are the result of coaching given to athletes through training that were well programmed and directed. The athlete's best achievements are influenced by internal factors and external factors.

Based on the statement, it can be concluded that in order to achieve sports achievements, needed a directed collaboration and attention to all aspects those that contribute for the achievement, both internal and external factors. Sports activities carried out in a coordinated and continuous manner and taking into account the principles of training, training programs, training methods and so on.

Regarding to Study Programs (Study Program), Sport Coaching Study Program is one of the Study Programs that is the most popular, besides producing profesional staff in the fields of education, teaching, Coaching Study Program also produces trainers who are experts in their fields. To produce graduates those who are qualified in their fields, the Counseling Study Program teaches various courses in education and sports science. For the field of coaching, each student is required to be able

to know and be able to do various sports. One of the sports branches that are included in the compulsory course for coaching students is Athletics II.

Curriculum of the Coaching Study Program that athletics is one of the branches of sports which become compulsory courses on. The lectures carried out in practice and theory, therefore students must prepare their physical condition and knowledge relevant to athletic lectures. Athletics is a sport that requires physical conditions such as strength, explosive power, endurance, speed and coordination. In athletics there are numbers that become material in lectures that must be studied by students, one of which is the number of shot put. This number belongs to anaerobic sports which has high intensity and very fast time in the implementation of anaerobic movements. For this to be able to make maximum repulsion, the students needed physical condition must be a concern for those who doing shot put in an athletic course. The role of physical conditions in performing sports skills is very important.

In general, the achievements of an athlete are influenced by factors: (1) physical, (2) technique, (3) tactics, and (4) psychic (Asdep Centera Keolahragaan, 2014: 1). The development of a comprehensive physical condition is very important, because without a good physical condition the athlete will not be able to attend the exercises perfectly. Some components of physical conditions that need to be considered to be developed are cardiovascular endurance, endurance strength, muscle strength, flexibility, speed, stamina, agility, explosive power. These components are the main ones that must be trained and developed by athletes. The second aspect is technique, namely training specifically intended to form and develop motoric habits or neuromuscular development, the technique mastered must be the required techniques that are specialized in the athlete's sport. Likewise with tactics that are useful for fostering interpretative development or interpretation of athletes. The techniques of movement that have been well mastered must now be set forth and organized in game patterns, game forms and formations, and defense or attack strategies and tactics. The three aspects above are good, if not supported by good mental development, high achievement is not likely to be achieved.

Shot put is one of the numbers in athletics. The term athletic comes from the Greek word "athlon" which means to compete or compete (<http://id.wikipedia.org>). The term athletics in Indonesia is interpreted as a branch of sport that compete walk race, run, jump and throw numbers. Shot put is one of the numbers in athletics that competes in technique and coordination as well as body strength to resist shot that made of brass or metal as far as possible. The Shot must be made of solid material such as iron, brass or other metal. The shot weight for the male is 7.26 kg with a diameter of 110-130 mm and for the female is 4 kg with a diameter of 95-110 mm. The diameter of the shot put circle is 2.135 meters with a stop board of 1.22 meters in length. The repulsion sector forms an angle of 40 degrees from the midpoint of the starting circle.

Shot put is one of the throwing numbers, according to Dragan (1979) in Siswantoyo (2009: 63) identifying elements / criteria needed including height and muscular, high anaerobic, explosive power, biacromial size should be high, reaction time, concentration. to put a large amount of energy is needed, this means that the athlete who is tall and large will have a greater chance of becoming a champion. Besides strength there are also other elements, namely the ability of the element of dexterity, timeliness and speed of throwing (Giri Wiarto, 2013: 57). To obtain distant repulsion, can do weight training continuously and with the right intensity of training. Components of the dominant physical condition needed for shot put numbers include: strength, explosive power, speed, flexibility, agility and balance (Jurnalristanso.blogspot.com, 2014).

Based on the paragraph above, that the physical condition of the leg muscle explosive possessed by students in performing shot put will support the good movement and rapid response of part body, this is very useful in gliding, resisting and continuing movements in shot put.

One of require in the shot put is the explosive power of the leg muscles during repulsion. Explosive power is one of the important biomotor components in sports activities, especially in sports activities that explosive movements. Because explosive power will determine how hard people can hit, how far to throw, how high the jump, how fast it runs and so on.

According to Arsil (1999: 71) "explosive power depends on the strength and speed of the body. High contraction is defined as the ability of muscles that are strong and fast in contracting ". in other hand , Bafirman and Apri Agus (2008: 84) explained that, "explosive power is the ability to direct power quickly in a short time to provide the best moment on the body or object in an explosive movement that intact to achieve the desired goal".

According to Corbin in Arsil (1999: 82) "Explosive is the ability to display or use power by explosive or quickly, expulsive is one aspect of body fitness". To jump higher, where to do a quick smash as well as good service and precise and accurate blocks, you need plyometric training. According to Radclife and Ferention (1999: 1) "plyometrics are exercises or tests aimed at linking movement of speed and strength to produce explosive movements". Which can stimulate the occurrence of stretch reflexes in the lower limb muscles, which will eventually lead to an increase in explosive power of leg muscle.

From the results of observations by researchers in the field, students of 2017, researchers observed that there were still many shortcomings in lectures. One of them is leg muscles during repulsion. According to Radclife and Ferention (1999: 3) states that: "some forms of plyometric training that can increase leg muscle explosive power include: depth jump, double leg hop progression, double leg speed hop, side hop, side hop spront, angle hop and others ".

A. Shot Put

Shot put is one of the athletic numbers that are often competition, both at the regional, national, and international levels. According nurmai (2004: 8) Shot put is an activity or activity of the body that is carried out with a tool (Shot) with the implementation of refuse in order to maximize the distance of objects that are released. According to Moccasport (www, moccasport, com) with the title athletic sport Shot put is an activity carried out to achieve a throw or repulsion that is as far away. In the shot put sport, bullets that are used in a round shape like a ball are made of stale or brass weighing for a 4 kg female, for a 7 kg male and consisting of the following techniques:

- a. The Brien O technique or the technique of back drop is a technique that is done by gliding where the implementation is, the athlete stands behind the ring with his back facing the direction of the Shot , the put is held under the chin by raising his left hand, the athlete bends his right leg and lifts his body to get ready glide back across the ring, and do repulsion, this technique is generally used by athletes who have smaller postures with very explosive arm movements and short lever work. In general, the gliding techniques are more used , because it is easier and has a high success rate. For more details can be notice in the figure below:

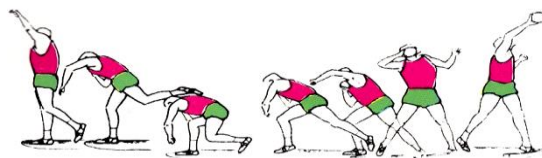


Figure. 1 The gliding technique of Shot Put
Source. Gerry Carr

- b. Rotational technique (Rotation) is the process of spinning at the beginning as the discus throwing which is carried out before the shot put motion, this technique uses a footwork discus thrower that is shaped in 360° and there is a guard that is 450° . In the rotate technique is more difficult to master than the gliding technique, because the rotational technique must be done within the limits of the shot put ring and the rotational motion makes shot control more difficult to do and the tempo setting required in the rotational technique is also very important because the athlete must be able to turn the rotational motion into linear motion. And generally this rotational technique is only taught to throwers who are more adept as an alternative after they have mastered the skating technique. For more details, you can notice the figure below:

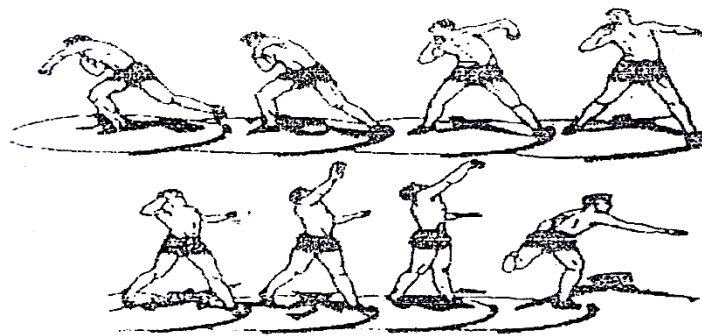
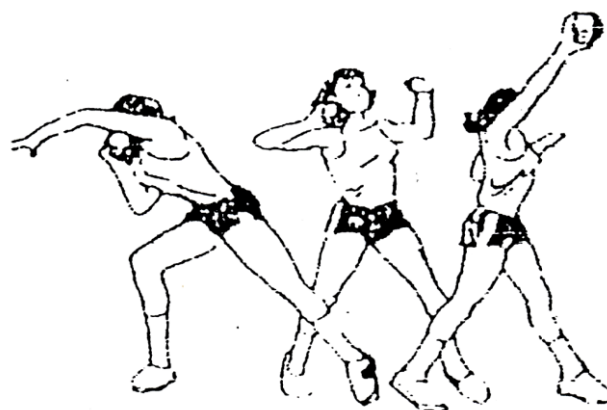


Figure. 2 The Rotational technique of Shot Put
Sumber: Gerry Carr

- c. Orthodox technique (sideways) the process of taking a prefix by side step the repulsion direction. The point of weight is on the one leg. The foot swings to the side of the body parallel to swinging with the foot or leaning slightly forward to hold the weight of the put, at the same time the foot that becomes the center of weight is slightly bent. To maintain balance as a continuation of the motion that has been done, the Athlets makes a half-spin motion, by swapping the left foot to move behind the weight (follow trough), while the right leg and body slightly lower. For more details, you can notice the figure below:

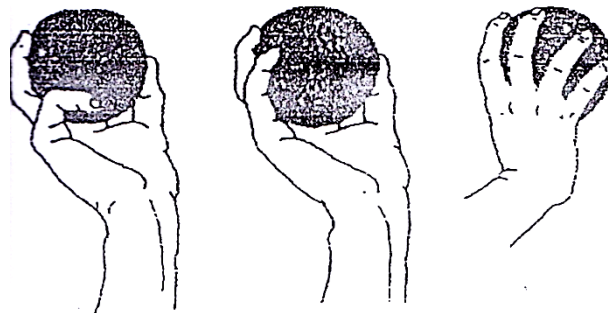


In the past , shot put sport only relied on natural energy to get achievements and new records, after conducting research, new factors were found that affect shot put sport as expressed by U. Jonath / E. Haag / R. Krempel (1988: 44) "Important factors influencing shot put are:

- 1) The Shot acceleration path
- 2) Height of depart and angle of departure of the shot
- 3) Spin between the shoulder shaft and the waist shaft
- 4) Shot acceleration and starting time is puted
- 5) final of all part repulsion jointly and at the right time, and especially coordination between arm and leg movements. Basic techniques in shot put according to PB PASI (1979: 16)

a. Holding The Shot

The Sjot must be at the end of the fingers, first, second and third fingers. the main point in the putting, these fingers should not be far apart from the pinkie, because it is useful to maintain the stability of the shot. The shot must be kept under the jaw to notice the figure below:



b. Depth Jump Training

Depth jump) is the most popular form of leg plyometric training than other forms of exercise to develop leg muscle explosive ability, so that this form of exercise becomes a model or example of plyometric training because of studies that have been conducted by experts can effectively produce leg muscle power. Depth jump exercises are depth exercises that start from standing on a tall gymnastics box (18 inches), then landing on the mat with two legs, and immediately jumping up front. After that, immediately return to the box to make the next jump. This activity is carried out repeatedly during specified stimuli. (Radliffe & Farentinos: 1999; 60).

Based on the above statement that the depth jump exercise is an exercise depth from the box with a square off to do the forward jump with a swing of the hand up, then landing with both feet involving the work of the thigh muscles, calf muscles and ankle muscles.

The depth jump is an activity or body activity carried out by jumping on one foot or two legs for a jumper in order to maximize distance and height. The point is a jumper or athlete who is trying his best to make the jump as far as possible or as high as possible in accordance with the bench or block that has been provided by the trainer as a means or training load. Thus the technique of movement in the implementation of the depth jump), based on predetermined rules.

With the variety of depth jump exercises given by the trainer, the more complex physical abilities (biomotor abilities) needed in this exercise in terms of supporting muscles of movement, large muscles are the main muscles of movement in jumping depth exercises), such as hip muscles (gluteus maximus) and upper leg muscles are needed for almost all movements while other muscles such as arm and shoulder muscles are needed to support movement or as a balance. Smaller muscles such as the muscles of the lower limbs are needed to support the movement of the jump. The back muscles such as the abdominal, back and hip muscles are muscles that support the stabilization of the body which functions to form an efficient posture when running and jumping.

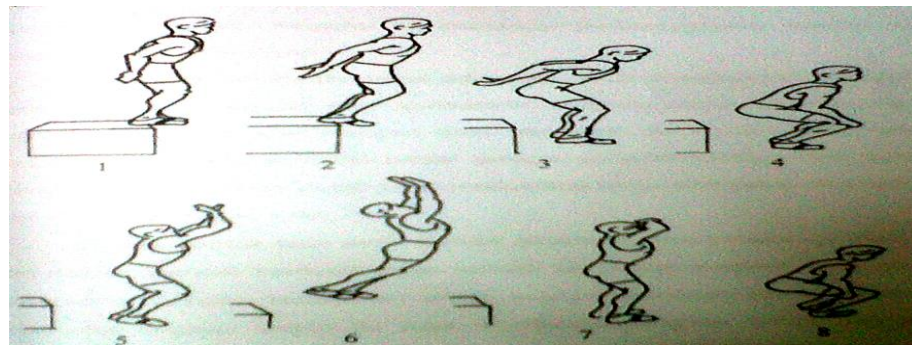


Figure 7. Steps doing Depth Jump

Source : James C. Radcliffe and Robert C. Farentinos, High-Daya ledaked Plyomerics (USA: Human Kinetics, 1999)

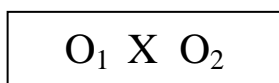
A. Prior Research

Talent scouting of shot put athletes on Sport Coaching Education students 2016 acedemic year (Ni Putu Nita Wijayanti, 2016).

B. Framework

In an effort to achieve the highest achievement in the field of sports, there are several components that hold an important role in it such as physical condition and mental readiness and the availability of tools or known as facilities and infrastructure. In the physical condition component which is the main foundation and basic foundation of achievement in sports, especially in the athletics branch, especially in shot put numbers, in addition to increasing speed, coordination of motion and strength and explosive power of the physical itself, due to explosive power is one of the most important elements and must always be considered.

This is according to the theory of motion in general is the result of the resultant explosive power of the limb muscles of the body. Shot put is one of the numbers between the throwing numbers that is competed in an athletic match. For more details, the focus of this research can be seen in the following framework :



Information :

O1: Pretest (Before being given training)

X: Treatment (Exercise given)

O2: Posttest (After being given training)

2. Research methodology

This research is planned in the Rumbai Athletic Sport Center field. This research is planned to be carried out in March - August 2019. The population is the entire subject of the study (Arikunto, 2002: 108) and in this study the population is all of students of the 2017-2018 SportCoaching Education

class. The sampling technique uses total sampling technique which is the technique of determining the sample if all members of the population are used as samples, if the populations are below 100 (Arikunto, 2012: 126), so in the samples of this research is 12 students.

The type of data obtained is primary data. Due to the data needed in this study is primary data, the data collection is carried out by test. The test used is the MD jump. To collect data obtained in this study the instrument used to test the leg muscle power by using the MD Jump test. This test aims to measure leg muscle power (Risfandi, 2010).

The equipment needed for this test are:

1. Explosive power (vertical jump) gauges, namely Jump MD (Digital Meter)



Figure 8 : Jump MD
Source : Risfandi (2010)

2. Form for recording test results and stationery

Implementation:

- a sample stands perpendicular on the MD jump.
 - b Wearing the jump md on the waist of the object feel comfortably and the strap is tight.
 - c Turn on jump md, and score in a state of 0.00.
 - d Sample takes a position ready to jump up as high as possible.
 - e Sample may not approach when jumping up
 - f Body position must not be tilted forward or back when jumping.
 - g Scoring.
 - h Look at the score after sample jumped
 - i The score on jump md is the result of a high jump test by sample.
- The score obtained by the sample is the highest score from the three times chance to jump.

Data analysis technique

Data obtained as individual scores were processed by using statistical procedures to prove whether the hypothesis proposed by the authors was accepted or rejected. Data collected from the pre-test and post-test were analyzed by using the normality test and t-test.

The normality tes of the data post-test

Ritonga (2006: 44) explains the normality test is done by the liliefors test by determining the maximum observation liliefors value Lo_{max} . The value of $Lo = F(z) - S(z)$ and compared with the value of L Table from the Liliefors table. If $Lo_{max} < L$ Table then the data is normally distributed.

To find out whether depth jump exercises take affect leg muscle power, the following steps are used:
Paired observation test

The steps according to Ritonga (2006: 72-73)

1. Set up verbal hypotheses and statistical hypotheses.

Ho = There is no effect of depth jump training on leg muscle power in the senior ool high sch10 Pekanbaru volleyball team.

H1 = There is an effect of depth jump training on leg muscle power in the Senior High School 10 Pekanbaru volleyball team.

μ_1 = pretest

μ_2 = posttest

Ho = $\mu_1 = \mu_2$

H1 = $\mu_1 \neq \mu_2$

2. Determine $\alpha = 0.05$ then calculate the average and variance in the search for the t value calculated

by the formula: $t = \frac{\bar{d}}{sd/\sqrt{n}}$

Information :

\bar{d} = Average

Sd = Standart deviation

n = Sampel

3. Find out of the table 0,05 with (db) is $V = n - 1$

4 Decision, t count \geq t table Ho rejected, t count $<$ t table Ho accepted.

3. Research Result

Data Description

Based on the explanations and descriptions that have been collected previously, in this chapter analysis and discussion will be obtained in this study. The results of the study will be described in accordance with the objectives of the hypothesis proposed earlier.

a. Pre test

Based on the analysis of the preliminary test data, the Effect of Depth Jump Training on leg muscle explosive power on Sport Coaching Education students 2017/2018 showed the following results: the highest score is 50 and the lowest score is 31 with average is 41 and a standard deviation is 6.78.

b. Post test

Based on the analysis of the final test data, the effect of Depth Jump training on leg muscle explosive power on Sport Coaching Education students 2017/2018 showed the following results: the highest score is 71 and the lowest is 37 with average is 50.67 and standard deviation is 11.62.

Testing Requirements Analys by Lilliefors Test

Analysis of normal data test was carried out by using the Liliefors test. The results of the normal test analysis for each variable is presented in the form of a table below, and the calculation of the results can be notice in the appendix.

Table 9. Test data normality by the Liliefors test

No	Variabel	Lo	Lt	Keterangan
1	Latihan <i>Depth jump</i> (awal)	0.144	0.242	Normal
2	Latihan <i>Depth jump</i> (akhir)	0.190		Normal

In the table above it can be seen that the results of Lo are less than Lt, it can be concluded that the data are normally distributed.

Hypothesis testing

To test whether the hypothesis proposed in this study is accepted or not, the data tested by using the bound sample t-test is performed. From the analysis conducted, the t-test value between pre-test and post-test on Depth jump exercise toward the leg muscle explosive power showed result is 4.723 and then compared with the value of the t-table at a significant level of 0.05 degrees of freedom N - 1 (11) turned out to show the result is 1,796, this shows that the value of t-count (4,723) > t-table (1,796), it can be concluded that the hypothesis stating that there is an influence of Depth jump exercise on leg muscle explosive power on Sport coaching Education students was accepted (detail calculation testing this hypothesis can be seen in appendix).

Discussion

Explosive power muscle is the ability of a muscle or group of muscles to overcome load resistance at high speed in an intact motion (Sajoto, 1995: 17). Explosive power referred to in this study is the explosive power of leg muscles that is an explosive power of leg muscles in overcoming resistant or weights in an intact motion with short speed. Explosive power is an element among the components of the physical condition components of human biomotor ability, which can be increased to certain limits by doing certain exercises accordingly.

To get a good leg muscle explosive power that is by giving exercise. One exercise that can increase leg muscle explosive power is the Depth jump exercise. Depth jump training is an exercise that uses a rope, where athletes will jump forward and back over the rope.

Based on the analysis conducted, the value of the t-test between the pre-test and post-test of the Depth jump exercise on the leg muscle explosive power showed score is 4.723. Furthermore, the value obtained is compared with the table at a significant level of 0.05 with degrees of freedom N - 1 (11) turns out that the score obtained is 1.796, this shows that the value of t-count (4.723) > t-table (1.796) thus it can be concluded that the hypothesis stating there is an influence of Depth jump training on leg muscle explosive power on Sport Coaching Education students 2018/2019.

From the analysis it can also be concluded that there is an influence of Depth jump exercise on increasing leg muscle explosive power. Programmed and continuous training, the more routine we do the Depth jump exercise, so leg muscle explosive power is better.

Based on the above, it is clear that to get the results of leg muscle explosive power, can be improved by doing Depth jump exercises. This can be seen from the results obtained that by using the Depth jump exercise, there is also an increase in the leg muscle explosive power results obtained, especially on Sport Coaching Education students who have done this research.

This improvement was seen from the research process conducted on 12 samples. Before the exercise is done, carry out Pre-test then given by training, the end of the exercise is taken data post-test as a final results. After the data is collected, it is then analyzed using a statistical formula to find out whether there is an influence or not.

4. Conclusion

Based on data analysis and discussion, it can be concluded that there is an effect of Depth jump training on leg muscle explosive power during shot put when doing shot put on Sport Coaching Education students as evidenced by the results of $t\text{-count } 4.723 > t\text{-table } 1.796$ at $\alpha = 0.05$. This proves that by doing Depth jump exercises, the leg muscle explosive power can be better results.

Recommendation

According to the conclusions of the research results, it can be recommended to:

1. The Coaches and teams to do regular Depth jump exercises to get good leg muscle explosive power
2. Among the training results obtained, after doing the Depth jump exercise, to get good leg muscle explosive power, especially on sport Coaching Education students 2018/2019.
3. To the next researcher, so they can carry out further research by using a larger sample and long term.

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