

# **PROCEEDINGS** THE 1<sup>st</sup> Yogyakarta International Seminar on Health, Physical Education, AND Sports Science.

Evidence-Based Practice of Sports Science in Education, Performance, and Health.

October 14<sup>th</sup>, 2017. Eastparc Yogyakarta, Indonesia



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Chulalongkorn University อุฬาลอกรณ์มหาวิทยาลัย

## **YISHPESS** PROCEEDINGS

## THE 1<sup>st</sup> Yogyakarta International Seminar ON HEALTH. PHYSICAL EDUCATION. AND SPORTS SCIENCE.

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## **OPENING SPEECH**

As the Dean of Faculty of Sport Sciences Universitas Negeri Yogyakarta, I would like to welcome and congratulate to all speakers and participants of the First Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS) 2017 entitled "Evidence-Based Practice of Sport Science in Education, Performance, and Health".

This international seminar is actually an implementation in the framework of the assessment of the achievements and sports culture in society that can support the achievements of the Indonesian people, so that there will be a significant role of practitioners, academicians, sport people, and sports observers from Universities, Institutions and Sports Organizations to help actively facilitate in the development, assessment of innovative sports science development so as to achieve sport achievements at the National and International level.

Finally, we thank all the committee of YISHPESS for their hard work in organizing this activity, and congratulate the invited speakers and all participants. Hopefully, this seminar is significant for the development of physical education, health, and sports sciences.



## PREFACE

Alhamdulillahirobilalamin, thank Allah the First Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS) has been prepared well and on time. With all humility, we welcome and congratulate the speakers and participants of Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS) organized by the Faculty of Sport Sciences, Universitas Negeri Yogyakarta.

The YISHPESS 2017 is designed to updating and applying evidence-based practice in sports science aspects, including: education, performance and health. We hope that the invited speakers of this seminar can reduce the gaps between academic and field to get best output in the daily sport and health practices.

We would like to thank to Rector and the board of Universitas Negeri Yogyakarta for supporting this seminar come true. Praise and be grateful to the Lord, so that this proceeding can be issued. Hopefully, the publication of this proceeding can bring benefits to the participants in particular and readers in general.



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## THE EFFECT OF PLYOMETRICS TRAINING AND ACHIEVEMENT MOTIVATION TOWARDS LEG MUSCLE EXPLOSIVE POWER OF VOLLEYBALL ATHLETES IN UNIVERSITAS NEGERI PADANG

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#### Abstract

**Objectives:** The objective of this study is to determine the differences of plyometrics training using knee tuck jump and box jump and achievement motivation towards leg muscle explosive power of volleyball athletes in Universitas Negeri Padang.

**Methods:** The specific objective of this study is to determine the differences in the level of leg muscle explosive power ability between four groups of athletes who were treated differently. It was an experimental studyusing by level 2x2 designs. There were 75 males volleyball athletes of UNP taken as the population.. The sampling technique used was total sampling. The techniques of data collection used wereinstruments of leg muscle explosive power andachievement motivation. The technique of data analysisused was two ways analysis of variance (ANOVA) at the level of 5% ( $\alpha$  0.05) and Tukey test.

**Results:** The result shows that: (1) the leg muscle explosive power of the athletes trained by knee tuck jump was better/higher than those who were trained by box jump plyometrics, (2) there was interaction between the methods of training and achievement motivation towards leg muscle explosive power of volleyballathletes, (3) the explosive power of leg muscle trained with knee tuck jump plyometrics was better than box jump training on a group of athletes whose high achievement motivation (4) there was difference explosive power ofleg muscle performed by low achievement motivation athletes trained with knee tuck jump and box jump plyometrics.

**Conclusion:** Plyometrics training supported by achievement motivation will influence the leg muscle explosive power of volleyball athletes.

Keywords: Plyometrics Training, Motivation, Explosive Power of Leg Muscle

#### INTRODUCTION

Development in various fields is being actively undertaken by the current government which aims at actualize the ideals of Indonesia's independence movement. One of these goals is to create a justice and prosperous society. The realization of these ideals must be supported by qualified human resources as the doers of development.

One indicator of high quality human resources is a high level of physical health and fitness, both physically and psychologically. The growth and development of physical and the psychic must be in line. Someone who has a high level of intelligence will be less able to do much if he has low level of health and physical fitness. Therefore, one of the ways to obtain physical fitness is by doing exercises.

According to Undang-Undang no. 3 Tahun 2005 about the National Sport System Chapter II article 4: "national sport is aim at maintain and improve health and physical fitness, achievement, human quality, inculcating moral values and noble character, sportsmanship, discipline, fosteringof the nation, national security, and raising the dignity, prestige and honor of the nation".

In addition, it is necessary to improve the athlete and coaches training, the provision of sports facilities and infrastructure and the development of a good sports system to actualize what is desired. To achieve these goals, it is need to take concrete steps towards the pattern of sports training in this country.

In every kinds of sport, the needs of physical fitness elements are different. This is directly related to the characteristics or the needs of the sport itself. There are sports that require strength,

speed and endurance, but there are sports that only require flexibility and strength. This is the concern of the coaches and trainers so that the desired achievement is achieved well.

Volley ball is one of the most popular sports in Indonesia. The volley ball branch is also expected to bring the name of the nation and the country in the International event. However, the facts show that volley ball's achievements in Indonesia in general, and West Sumatra in particular, are still relatively low. This can be seen with the lack of achievements that have been attained by the volley ball team of West Sumatra at the National Sports Week (PON) or other national championships.

Volley ball needs various elements of physical condition, such as: strength, speed, agility, balance of explosive and other power. All those components are needed to support the activities of the game such as: jumping, blocking, smash and defense. The optimal vertical jump will allow an athlete to do blocking and smash. For that, at every volley ball athlete is required to have a perfect jumping ability.

The ability to jump must be developed on every volley ball athlete. There are many ways to improve that skill. To be able to jump driftly and to do a fast and maximum movement requires explosive power, that is a fusion of strength and speed.

One method for developing explosive power is by pliometric exercise. It is a form of exercise that stimulates the muscles to perform work activities quickly. This pliometric exercise activity consists of; knee tuck jump, squat jump, box jump, split squat jump and depth jumptraining. Thus, the pliometric exercises consist of a jumping motion with a beat and a hover.

Volley ball club in Universitas Negeri Padang is one of the existing clubs in West Sumatra. Based on the observation, it was seen that those athletes still have low ability to jump. It was proved by the results of the researchers' preliminary survey of 23 volley ball athletesin Universitas Negeri Padang. The result is as follows: 2 athletes or 8.69% were in a very good classification, 5 athletes or 21.74% were in good classification, 6 athletes or 26.08% were in sufficient classification, 8 athletes or 34.78% were in the poor classification, and 2 athletes or 8.69% were in very poor classification.

According to Radcliffe (1985: 50), there are so many exercises in order to be able to jump higher; they are decline hop(a forward jump exercise), sidehop (jumping hurdle), squat jump, knee tuck jump, split squat jump, box jump and depth jump. Of the many forms of exercise above, the knee tuck jump and box jump are forms of pliometric exercises aimed at improving the ability of explosive power of the lower limbs muscles. These exercises will stimulate the occurrence of stretch reflex in the lower leg muscles, in which it will eventually lead to an improvement in explosive power capabilities.

In addition to the above factors, the element of motivation is also important in increasing the explosion power of leg muscle. Soemanto (2008: 205) achievement motivation are conditions or circumstances that activate or give encouragement to behave or to achieve the goals generated by the motivation. Motivation achievement will be directly related to the desire and willingness of the athlete in undergoing the training process. Athletes who have high achievement motivation in the practice are expected to have good leg muscle explosiveness, because with the motivation of achievement, athletes will undergo all series of exercises vigorously. In contrast, athletes with low achievement motivation are assumed to have low limb muscle explosiveness.

While external factors includes the quality of the trainer, that is how a trainer makes an exercise program to increase the explosive power of his athlete's lower limbs and how it is practiced. A good coach should be able to explain and demonstrateany form of practices to the athletes. So the athlete will easily digest and apply it in the field. Existing facilities and infrastructure also affect the training process to increase the explosive power of the leg muscles. Facilities and infrastructure have important role in the training process.Without equipped facilities and infrastructure, it is difficult for the trainer to organize the training. This will affect the quality of the training itself.

Based on the problem, the researchers wanted to prove in the research to see the "influence of pliometric training (knee tuck jump and box jump) and achievement motivation to increase the ability of lower limb explosive power ". it is hoped that this research will contribute significantly to increase the achievement of volley ball athlete in Universitas Negeri Padang in particular and West Sumatera in general.

### METHOD

The objective of this study is to determine the differences of plyometrics training using knee tuck jump and box jump and achievement motivation towards leg muscle explosive power of volleyball athletes in Universitas Negeri Padang. This research was conducted at UNP which was carried out in April - May 2016. The research method used was experimental study, since Ref [4] experimental method is a method that can correctly test the hypothesis about causality. The research design used was ANAVA by level 2 x 2. But before the data is analyzed, first tested the requirements of the normality test and homogeneity test. For normality test using Lilliefors, while for homogeneity test using bartlet test. For all tests performed with a 5% confidence level.The controlled variable (attribute) was level of achievement motivation (high and low). Dependent variable was the ability of muscle limb explosive power. Limb muscle explosive uses a vertical jump test with a Lewis formula. Furthermore, the experimental units are grouped into such a way to be homogeneous.

## **RESULTS AND DISCUSSION**

Based on the measurement results obtained data as follows:

	A <sub>1</sub>		A <sub>1</sub> A <sub>2</sub>		Total	
B1	Ν	10	n	10	Ν	20
	ΣX	1491,82	∑X	1332,40	∑X	2824,22
	∑X²	223680,10	∑X²	179631,55	∑X²	403311,65
	Mean	149,18	Mean	133,24	Mean	141,21
B <sub>2</sub>	Ν	10	n	10	Ν	20
	ΣX	1369,98	∑X	1432,05	ΣX	2802,03
	∑X <sup>2</sup>	191631,65	∑X²	208095,65	∑X²	399727,30
	Mean	137,00	Mean	143,20	Mean	140,10
Total	Ν	20	n	20	N	40
	ΣX	2861,80	ΣX	2764,45	ΣX	5626,24
	∑X²	415311,75	∑X²	387727,20	∑X²	803038,95
	Mean	143,09	Mean	138,22	Mean	140,66

Table 1. Descriptive analysis result

Based on the calculation results presented in the two-way ANAVA table above, the following is the description of each hypothesis:

**The first hypothesis**, in the ANAVA table, it was found that  $Q_{counted}3.50$  is higher than  $Q_{table} = 2.95$  at level  $\alpha$  of 0.05 ( $Q_{counted}3.50 > Q_{table}$  ( $\alpha = 0.05$ ) = 2.95. It proves that the volley ball athlete's limb muscle explosive power with pliometric knee tuck jump exercises is better / higher than the group trained with plyometrics boxjump exercise.

The method of plyometricsknee tuck jump and box jump are ones of the training methods that can be used in increasing the explosive power of volley ball athletes muscle. The characteristic of this method is the intensity of moderate training load, high volume and repetition. In order to increase the athletes' explosive power, the plyometrics knee tuck jump and box jump methods are well appropriate. With a lot of repetition and a little rest, this method will provide stimulation to the leg muscles so that the process of jumping and smash is maximum.

If the process of doing a jump and smash is good, it will has a good impact on the muscle explosive power. A good leg muscle explosive power will support to attain the desired achievement.in line with the results of research that is one of the most effective ways in relation to increased

strength and increased endurance, physical speed and energy of athletes is plyometric training (Aghajani, 2014).

**Second hypothesis**, in ANAVA table, it was found that  $F_{counted}$  14,57 is bigger than  $F_{table}$  4,11 at level  $\alpha$  of 0.05 ( $F_{counted}$  = 14,57 > $F_{table}$  ( $\alpha = 0.05$ ) = 4,11. It proves that there is an interaction between the exercise method and the achievement motivation for the leg muscle explosive power of volley ball athletes. The choice of suitable training methods to increase the explosive power of the leg muscles is the responsibility of a trainer. The trainer must be able to determine the appropriate method which is relevant to the training objectives. In addition, the characteristics of athletes can also be a reference for trainer in determining the method used. It is assumed that the athlete will perform poorly if he is treated with inappropriate method of training. This will certainly affect the improvementofleg muscle explosive power. Besides, psychological factor of the athletes is also a particular concern to the coach. One of the indicators that can make the atmosphere more vibrant in doing exercise is the motivation that is owned by the athlete.

According to Setyobroto (2005: 24) states motivation is the process of actualization of moving sources and drivers of individual behavior meet the needs to achieve certain goals. Motivation is an encouragement that exists within the individual athlete, the impulse can come from within and also come from outside the athletes. A high motivation athlete is assumed will have high leg muscle explosive power in undergoing the training because high motivation will support the athlete during training process. In contrast, athletes with low motivation are suspected to have low leg muscle explosiveness.

**The third hypothesis,** based on advanced testing of volley ball athletes'leg muscle explosive power using plyometrics knee tuck jump exercise compared to those who treated using plyometrics box jump exercise for high motivation group ( $A_1B_1$  vs  $A_2B_2$ ), it was found that  $Q_{counted} = 8.11$ is higher than  $Q_{table} = 3.79$  at level  $\alpha$  of 0.05. Thus, the athletes' leg muscle explosive power trained with plyometrics knee tuck jump exercises is better than those who were trained with plyometric box jump exercise in high achievement motivation group.

In the process of training, the symptoms that often appear is a sense of laziness especially related to physical condition exercise. Thus, the coach should be able to provide understanding to the athlete during the training process in order to achieve the goals. Selecting another method is one of solutions that can be done by the coach. This research used plyometrics knee tuck jump training method. The plyometrics knee tuck jump method is a method that starts from a standing position with feet shoulder width apart, then jumps vertically as high as possible by bending the knee to the chest, and finally landed with previous body gesture. Another method used was plyometrics box jump method. In order achieve the initial plan, then every athlete needs achievement motivation. Good achievement motivation will encourage athletes to always complete each series of exercises maximally. A well-motivated athlete will not think of any negative things during the training. Thus, it can be concluded that achievement motivation hasvery important role during the training process.

**The fourth hypothesis**, based on advanced testing of volley ball athletes'leg muscle explosive power using plyometrics knee tuck jump exercise compared to those who treated using plyometrics box jump exercise for low motivation group ( $A_1B_1$  vs  $A_2B_2$ ), it was found that  $Q_{counted} = 4.17$  is higher than  $Q_{table} = 3.79$  at level  $\alpha$  of 0.05. Thus, there were differences between the athletes' leg muscle explosive power trained with plyometrics knee tuck jump exercises and those who were trained with plyometric box jump exercise inlow achievement motivation group or the null hypothesis is rejected.

Hypothesis testing results reinforce those differences. It was proved that there are highly significant differences of athlete's leg muscle explosive power trained by plyometric knee tuck jump exercises and those who were given plyometric exercise jump box. This fact shows that the training method using plyometric training knee tuck jump is better than box jump training in improving the leg muscle explosive power of volley ball athletes who have high motivation. On the other hand, the low motivation groups perform better when using box jump exercise than using knee tuck jump exercises, ie 143.20 and 137.00, respectively.

According to the results of the study Riggs MP, Sheppard JM (2009) the findings of this study suggest that relative peak and average power outputs are factors highly associated with vertical jump height in elite male and female beach volleyball players. The difference between these two average scores is proved by the results of inferential testing, so the data shows a difference. These results represent that the training method using plyometric knee tuck jump exercises is lower thanbox jump exercise in low achievement motivation group.

## CONCLUSION

Firstly, overall, it was proved that the leg muscle explosive power of volley ball athlete trained by plyometric knee tuck jump training is better / higher than those who were trained by box jump exercises.

Secondly, there is an interaction between the training method and the achievement motivation toward the leg muscle explosive power of volley ball athlete.

Third, the leg muscle explosive power of highly motivated volley ball athletes treated by plyometric knee tuck jump exercises is better than those who were treated bybox jump exercises.

Fourth, there are different explosive powers shown by the low motivated athletes who were treated by knee tuck jump exercises and those who treated by box jump exercises. In other words, the null hypothesis is rejected.

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