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YOGYAKARTA INTERNATIONAL SEMINAR ON HEALTH, PHYSICAL EDUCATION, AND SPORT SCIENCES
YISHPESS 1st

PROCEEDINGS

THE 1ST YOGYAKARTA INTERNATIONAL SEMINAR ON HEALTH, PHYSICAL EDUCATION, AND SPORTS SCIENCE.

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

October 14th, 2017. Eastparc Yogyakarta, Indonesia

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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.

Dean of Faculty of Sport Sciences,
Universitas Negeri Yogyakarta

Prof. Dr. Wawan S. Suherman, M.Ed.

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.

Yogyakarta, October 14th, 2017
Chairperson of the Committee

Dr. Or. Mansur, M.S.

CONTENT

THE EFFECT OF SUPPLEMENT SOYBEAN MILK AND WHEY PROTEIN IN LOAD EXERCISESTOWARD THE INCREASING HYPERTROPHY OF THIGH MUSCLES

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Abstract

Objectives: The The aims of this study were to determine the effect of load exercises with supplement soybean milk and whey protein to increase the hypertrophy of thigh muscle and determine which method is better in increasing hypertrophy of muscle.
Methods: This research is a quasi experimental research. The population is an active member in Fitness Center One Gym Kota Padang 24 people. The sample was selected through 12 proportional random sampling technique. The instrument in this study is the measurement of the band to measure the circumference and skin folds to see the thickness of the thigh layer. Then calculated using the formula MTC - (3.14 x TSF) where the MTC is the circumference of the thigh and TSF is the thickness of the thigh thickness. Data analysis technique used to prove hypothesis is t test at significance level α = 0,05
Results: 1) There was significant effect of soybean milk with weight training on thigh muscle hypertrophy with sig = 0.00 <α = 0,05 with mean of 409,52 2) there was significant effect of Whay protein with weight training on muscle hypertrophy with sig = 0.028 <α = 0.05 with an average of 423.10. 3) There was no significant difference between soybean milk and Whay protein with weight training on thigh muscle hypertrophy Sig = 0.707> α = 0.05.
Conclusion: The provision of soy milk and Whay protein significantly influenced by weight training, but there was no significant difference between the two forms of supplementation on hipertropy of the thigh muscle

Keywords: Soybean Milk, Whey Protein, Load exercise, Thigh Hypertrophy

INTRODUCTION

Sport is an useful task of daily human activities to upgrade the healthiness of physical and spiritual. The progress of sports has given the significant contribution to the development of public health. Further, sport also contribute great improvement to the nation's ability to sustainable execute the establishment system .

One of those ways is the communities' participation to keep health and fitness in order to gain the ideal body shape. Then, by doing sport, the sportsmen can be more attractive that help to increase the confidence and exhibit their social status in daily activities. Sport is the safest way to achieve those goals. Based on Undang-Undang Republik Indonesia no. 3 of 2005 about National Sport System Article 4 states that: "National sports aim to maintain and improve health and fitness, achievements, human quality, inculcate moral values and noble character, sportivity, discipline, cultivate and foster the unity of the nation, strengthen the national resilience, and raising the dignity and honor of the nation ".

Sport is a series of sequences and organized movement which consciously do by the people to upgrade their functional abilities. It depends on their goal of doing sports. Based on Undang-Undang and the definition of sport, it can be concluded that sports can also enhance the moral and moral values to improve the quality of human being in daily life and even in doing sport activities.

By doing sport, it can produce the fitness of body and gain an ideal body shape. It is best to do the exercises. One of popular exercises to get the ideal body shape is load exercise. To achieve the maximal result of the exercise, the sports man have to understand the principles of the exercise itself.

The conducted execise based on the principles of exercise is expected to provide the maximum results, so the goal of the program can be achieved.

Load exercises can be done at fitness centers. Many people have been joined the fitness club to practice the load exercises. Giriwijoyo & Sidik (2013: 209) states that load exercises will cause the muscle enlargement due to: (1) enlargement of muscle fibers (muscle hypertrophy), (2) increase in capillaries in muscle, (3) increase the connective tissue inside the muscle. Muscle hypertrophy is the increasing of contractile elements (actin and myosin) in the muscle, which causes the increasing of muscle tone, thickening of sarcolemma, and increasing connective tissue between muscle fibers that lead the increasing strength of passive muscle and enlarge the muscle.

In doing sports activities, there are several large muscles in the human body that need to be trained for supporting the performance, they are the muscles in the arm, the chest, muscles in the stomach, and muscles in the thighs. These muscles have a very important role in the body to resist, to beat, to lift, to walk and etc. One of the most important muscles in the body is located in the thighs. Thigh muscles are a large group of muscles and are one of the most powerful muscles in the body. These muscles are the largest part of the quadriceps muscles and help to maintain the stability of the knee joints. Muscle thighs are most important in functional activities which involving lower limbs.

To achieve optimal muscle function for increasing the hypertrophy of muscle, healthy nutritional support is required. Nutrition is one of factors that play a role in improving achievement for athletes. Toruan (2008: 145) explains that "Without load exercises then there is no stimulus to grow bigger, therefore to enlarge the muscle mass the load exercises must be done, PLUS with enough nutrition". These nutrients can be obtained from carbohydrates, fats, and proteins. The provision of protein is not just practice time.

In increasing the hypertrophy of muscle, those three sources of nutrients are needed, but the role of protein is the nutrients as the basis of muscle formation. Burnley et.al (2010) states that the protein has considerable potential to reduce muscle damage and pain.

Tipton & Wolf also denote that exercise has a profound effect on muscle growth, which can occur only if the synthesis of muscle protein exceeds the breakdown of muscle protein. Therefore, consuming protein is important for the increasing the hypertrophy of muscle. The load exercises practitioners believe that to achieve the perfect physical need an organized exercise and consume the supplements in order to increase muscle mass.

According to the sources of protein, the protein is divided into two kinds, they are animal protein and vegetable protein. The animal protein comes from meat, eggs and milk, while vegetable protein comes from grains, soybeans and wheat.

One of the vegetable protein is soybean milk. Toruan (2008:33) states that Toruan (2008: 55) denotes that soybean is a protein source of vegetable protein which is good to consume on the equal amount of gram with chicken. The soybean contains higher protein than chicken meat. Meanwhile, whey protein, the animal protein, is milk that has been through factory process which also contain high protein. Hence, the higher protein or which one is the better protein source in increasing hypertrophy and strength of muscle between these two supplements is unknowned. Because in load exercises is not only about proper exercise program but also good nutritional intake such as soybean protein of vegetable protein and whey protein of animal protein. Thus, both types are indispensable for hypertrophy of muscle.

Based on the researcher's observation and interview result with members at fitness center in Padang City, particularly in One Gym fitness, there are many factors that inhibit the increasing the hypertrophy of muscle, such as genetic, unmatch the exercises method, lack of facilities at fitness place, and the lack of understanding by the fitness members about nutritional factors. They were confused which the best nutrition for muscle improvement is.

Because of many intake of nutrients, the type of vegetable protein such as soybean milk, tofu, fermented soybean cake, spinach vegetables contain high protein. Then, the type of animal

protein such as eggs, pure cow milk and whey protein (factory processed beef) are also contain the high protein.

Then, most of the fitness members also do not pay attention to good diet and rest, and they tend to stay up late. Furthermore, members were also lack of understanding of the proper exercise methods and exercise principles in increasing strength and hypertrophy of muscle. In addition, members of fitness rarely train their lower limbs muscles like the muscles in the thighs. It was proved by the survey of each day during load exercises. They tend to only train and focus on the upper muscles of body. So, there is a gap between upper muscles and lower muscles of body which can affect the appearance.

Therefore, most of the members did not gain the maximal results, especially the hyperthrophy of thigh muscles. In this study, the researcher wanted to know which is the best nutrition between soybean milk and whey protein in increasing the hyperthrophy of thigh muscle.

Based on the identification of the problems, there are many factors that affect the increasing hypertrophy of thigh muscle. By concerning how wide the problem become, the limit of time, funds, energy and references and etc, then in this research, the researcher limited the problem to the additional effect of soybean milk and whey protein in load exercises to increase hyperthrophy of thigh muscle. According to Umar (2014: 77), the hypertrophy of muscle is the increasing size of the diameter or diameter of muscle fibers. Further, Giriwijoyo & Dikdik (2013: 209) state that hypertrophy of muscle is produced by: (a). Increasing the contractile elements (actin and myosin) in the muscle, which also increase the muscle-active strength. (b). The thickening and strenght of sarcolemma and the increasing amount of connective tissue between the muscle cells (muscle fibers),which leads to increase muscle-passive strength. (c). Increasing the amount of capillaries in the muscle, which causes the muscles become easier to maintain their homeostatic conditions, specifically on the trained muscles for endurance.

Several factors that influence the increasing hypertrophy of muscle are biological factors such as age and nutrients of food can affect the hypertrophy of muscle. Wiarto (2013: 51) mentions that the muscle is a connective tissue with the main function to consciously or unconsciously contract and serve the motion of the body. In addition, Pearce (2009: 19) mentions that muscle is a network that has a specific function. It is to contract and it consists of cylindrical fibers that have similar characteristics with other tissue cells.

It is safe to conclude that the muscle is an active propulsion, which do contraction as result of stimulation of heat, cold, and other touches or mechanically terms (massage and pull), thermis (cold and heat), kemis (salt, acid and base), and electrical. Fox & Kirby (1987: 101) denotes that there are three types of muscle contraction. They are isotonic, isometric, and isokinetic where each of them has an effect to the muscles in various ways.

According to Wiarto (2013: 58), based on the muscles location of the body (a) the muscles of the head, (b) the muscles of the neck, (c) the abdominal muscles, (d) the chest muscles, (e) arm muscles, and (f) leg muscles. The muscles of the arms and legs also consist of two parts, namely the upper arm muscle and the lower arm muscles and the lower limbs and upper limbs muscles.

Moore & Dalley mention that the muscles of the upper limbs consisted of quadriceps femoris muscle which four muscles are located at the front of the upper limbs consists of the vastuslateralis muscle, rectus femoris, vastusmedialis and vastusintermedius. Then there is also a sartorius muscle extending across the front of the thigh, and on the back there are hamstrings muscles consisting of biceps femoris and semitendinosus. These muscles have a very important role in doing activities such as walking-jumping, climbing stairs to climbing-running and many other activities.

Moreover, the effect of nutrients are also very important to increase muscle mass, one of those is soybean milk. Soybean milk or manufactured soybean essence is known that soybean is a highest protein source of vegetable protein as Toruan (2008: 55) denotes that soybean is aprotein source of vegetable protein which is good to consume on the equal amount of gram with chicken. The soybean contains higher protein than chicken meat. Another high-protein nutrient derived from animal protein is whey protein.

Whey protein is similar with other proteins. In order to be absorbed well by the body, it is necessary to know the quality of protein. The quality of the protein depends on its ease of digestion, amino acid composition and reference protein. Whey protein is known as the best source of protein among other protein sources due to the completeness of its amino acid contained. Protein after absorption (in the form of amino acids) will undergo metabolism. Briefly, Suhardjo (1999: 125) explains that the protein is absorbed through the intestinal wall → Portal Veins → the liver to the blood circulation → the entire tissue of body. These amino acids are primarily required for the formation of new tissue / replacing worn (worn out). Some of the amino acids will be broken down and release some parts of amino acids and fuse with amino acids then produce the amino acid pool. Amino acid pool is located in the cell and blood circulation. When amino acids-amino acids are needed, they can be taken from the amino acid pool to form the protein of body. Khairuddin (2016: 44) explains that on transaminase muscle (result of glycolysis) or known as alanine. Alanine is transported by blood to the liver, wherein alanine is converted again into pyruvate by transaminase. At the liver, the process gluconeogeneration can use pyruvate to synthesize glucose, which can enter the blood andbe used by the muscles. It is called the glucose alanine cycle. Therefore, protein is very important to increase hypertrophy of thigh muscle.

In addition, another way to increase hypertrophy of muscle is load exercises. According to Sumosardjuno (1996: 84),load exercises is a training of stabilizing condition involves repetitive movements with submaximal loads. One method of load training is the pyramid method. Stoppani (2006: 91) defines that pyramid method is one of the strength training system that is stimulate the increasing of strength. Further, Stoppani (2006: 91) describes that pyramid method is the best way of exercising to stimulate groups of muscles to grow. Chandler & Brown, (2008: 195-206) states that the methods of strength and hypertrophy exercises of thigh muscle is (a). Back Squat, the muscles used are gluteus maximus, quadriceps, and hamstring. (b) Leg Extension, muscle used is quadriceps. (c) Leg Curl, muscles used is hamstring.

The purpose of this study was to determine: 1) the effect of soy milk feeding with weight training on thigh muscle hypertrophy 2). Effect of whay protein with weight training on thigh muscles 3) differences in effect of soy milk and whay protein with weight training on hipertropy of thigh muscle

Based on the reviews of theoretical above, it can be concluded that many factors and load exercises that can increase the hypertrophy of thigh muscle, plus soybean milk and whey protein supplements in load exercises. Based on the problem, the theory, the conceptual framework in which the hypothesis is proposed is as follows:

1. There is signifcant effect of soybean milk in load exercises to increase hypertrophyof thigh muscle.
2. There is significant effect of whey protein in load exercises to increase hypertrophyof thigh muscle.
3. The effect of whey protein is better than soy milk in load exercises to increase hypertrophyof thigh muscle.

METHOD

The method used in this study is quasi experimental research (quasi experiment). Iskandar (2008: 64) states that experimental research is a study that requires researchers to manipulate and control one or more independent variables and observe the dependent variable, to see the differences according to the manipulation of the independent variables or see a causal relationship of two or more variables by giving more treatments to the experimental group.

The design of this study is Two Group Pretest-Posttest Design or treated differently two groups with similar characteristics (Sugiyono, 2006: 74). It means that one group was trained by load exercises method plus soybean milk supplement (100g) and another group was trained by load exercises method plus whey protein supplement (100g) starting with pretest and giving treatment for 16 meetings then doretest (postest). Population in One Gym Padang were 50 active. More than

one month for 12 people and less than one month for 38 people. The samples were selected by purposive sampling technique (Iskandar, 2008: 74). It means that the technique of sampling which based on certain characteristics that have been considered. The characteristics are newly registered members who pass than one month as member. It is because the members have been understanding the exercises have not changed too much on the strength and hypertrophy of thigh muscles. Last, they have willingness to participate in the study with certain period of time.

According to Arikunto (2006: 112), most researchers assume that large samples or the greater represents of population will result better finding. This assumption is not always be right. It depends on the characteristics of subjects as represents in the population. It is closely related to the homogeneity of the subject in the population. ".

Based on the explanation above, the researcher set the number of samples in this study were 12 members of One Gym Padang who gendered men aged between 17-30 years. The 12 samples were divided into two groups: 6 samples were given soybean milk and 6 more were given high protein milk by using ordinally matching pairing. It is done to decrease wider distinction of average between these two groups.

Each group of soybean milk and whey protein consumed 100 grams in a day, which is drunk after doing load exercises because Novita (2014: 47) states that the consumption of liquid protein and carbohydrate supplements immediately after exercise proves can provide more effective glycogen restoration.

The instruments to measure the circumference of the thigh muscles is by using the measuring tape (meter) and skin fold thickness, the measurement is conducted by measuring the circumference of the muscles on the thigh and measuring the thickness of the fat on the thigh. The thigh muscle was counted by following formula: MTMC = MTC - (3.14 x TSF). Data analysis techniques used are normality test, homogeneity test and t test.

RESULTS AND DISCUSSION

Based on calculations that have been done by using t-test.

Table 1. Summary of hypothesis testing results 1

Soybean Milk	*Mean*	Std	Sig (2 tailed)	α
Pre-test	398,46	21,98	0,000***	0,05
Posttet	409,52	21,01		

The first hypothesis (Ho) is rejected and Ha accepted. It can be drawn where sig = 0,000< α = 0,05 So, it is safe to conclude that soybean milk supplement has a significant effect in increasing the hypertrophy of thigh muscle.

Table 2. Summary of hypothesis testing results 2

Whay Protein	*Mean*	Std	Sig (2 tailed)	α
Pre-test	398,63	20,65	0,028**	0,05
Posttet	423,10	14,60		

Signifikan **

The second hypothesis (Ho) is rejected and Ha accepted. It can be seen where sig= 0,028> α = 0,05. So, it can be concluded that load exercises with slow motion gave a significant effect in increasing the hyperthrophy of thigh muscle.

Table 3. Summary of hypothesis testing results 3

Treatment	*Mean*	Std	Sig (2 tailed)	α
Post-test Soybean Milk	409,52	21,98	0,707*	0,05
Posttet Whay Protein	423,10	14,06		

Non Signifikan *

The third hypothesis is Ha rejected and Ho accepted. It has been proved where sig= 0,707> α= 0,05 It can be concluded that hypothesis proposed there is no significant difference between giving soy milk and whay protein to thigh muscle hypertrophy Furthermore, if seen the average increase in exercise for 16 times weight training plus whey protein gives better effect in improving thigh muscle hypertrophy than milk soy.

Umar (2014: 77) denotes that hypertrophy of muscle is the increasing of size of the diameter or diameter of muscle fibers. Further, it is not only supplements which able to increase the hypertrophy of muscle but alsoload exercises. According to Sumosardjuno (1996: 84) load exercise is a training method of stabilizing conditions that involve repetitive movements with submaximal loads.

CONCLUSION AND SUGGESTION

Conclusion

1. There was significant effect of soybean milk with weight training on thigh muscle hypertrophy member fitness one gym city of Padang
2. There was significant effect of Whay protein with weight training on muscle hypertrophy member fitness one gym city of Padang
3. There was no significant difference between soybean milk and Whay protein with weight training on thigh muscle hypertrophy member fitness one gym city of Padang

Suggestion

1. The instructors at the Fitness Center are suggested to provide good nutrition such as soybean milk and whey protein to increase the hypetrophy of muscle.
2. Fitness members not only focus on exercises program but also on nutritional intake which contain high protein such as soybean milk and whey protein in order to increase the hypertrophy of muscle would be rapidly achieved.
3. For the further researcher, it suggested to continue this study with the same protein contained between soybean milk and whey protein in load exercises for increasing the hypertrophy of muscle.

REFERENCES

Arikunto, Suharsimi. 2006. *Prosedur Penelitian Suatu Pendekatan Praktek*. Jakarta :Renika cipta.

Burnley, Elizabeth C. Dahstrom et.al. 2010. Impact of Protein Supplement on Muscle Recovery After Exercise-Induced Muscle Soreness. *NCBI Journal*. Diunduh tanggal 19/6/2017 dari https://www.ncbi.nlm.nih.gov/pubmed/24435468.

Chandler, T. Jeff & Brown, Lee E. 2008.*Conditioning for Strength and Human Performance.*USA : Lippincott Williams and Willkins.

Fox, Edward L & Kirby, Timothy E. 1987.*Bases Of Fitness.* New York: Macmillan Publising Company.

Giriwijoyo, Y. S. Santosa, & Sidik Dikdik Zafar. 2013. *IlmuFaalOlahraga (FisiologiOlahraga)*. Bandung : PT Remaja Rosdakarya Bandung.

Khairuddin, 2016.*Penerapan Ilmu Gizi dalam Aktivitas Olahraga.*Padang: Penerbit SUKABINA Press.

Iskandar. 2008. *Metodologi Penelitian Pendidikan dan Sosial.* Jakarta: Gaung Persada Press.

Novita, Sari Harahap. 2014. *Protein Dalam Nutrisi Olahraga.* Jurnal Ilmu Keolahragaan. Diunduh tanggal 19/6/2017 dari http://digilib.unimed.ac.id/1387/1/Protein/dalam/nutrisi/olahraga.pdf

Moore, Keith L & Dalley, Arthur F. Clinically Oriented Anatomy, *Anatomi Berorientasi Klinis. Hartanto, Huriawati.*(terj). 2013. Jakarta :Erlangga.

Pearce, Evelyn C. 2009. *Anatomi dan Fisiologi untuk Paramedis.* Jakarta : PT Gramedia Pustaka Utama.

Sumosardjuno, Sadoso. 1996. *Sehat&Bugar (Petunjuk Praktis Berolahraga yang Benar).* Jakarta: PT Gramedia.

Suhardjo & Clara, M. Kusharto. 1999. *Prinsip-Prinsip Ilmu Gizi.* Yogyakarta: PENERBIT KANISIUS.

Stoppani, Jim. 2006. *Encyclopedia of Muscle and Strength*. USA : Human Kinetics.

Sugiyono. 2006. *Metode Penelitian Administrasi:* Dilengkapi denganMetode R & D. Edisi 17. Bandung: Alfabeta.

Toruan, Phaidon. 2008. *Performance nutrition.* Jakarta: Prima diet cathering.

Umar. 2014. *Fisiologi Olahraga.* Padang : FIK Universitas Negeri Padang. UNP Press.

Undang-Undang RI No. 13 Tahun 2005 tentang Sistem Keolahragaan Nasional.

Wiarto, Giri. 2013. *Fisiologi dan Olahraga.* Yogyakarta :Graha Ilmu.

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