


Difference In The Effect Of Giving Trampoline Exercise With Wooble Board Exercise On Increasing Dynamic Stabilization

Astrid Komala Dewi^{1*}, Catherine Hermawan Salim², Yurita Mailintina³

Bachelor of Physiotherapy, Husada Hospital College of Health Sciences, Central Jakarta, Bachelor of Health Administration, Husada Hospital College of Health Sciences, Central Jakarta

Article Info	ABSTRACT
<p>Keywords: Trampoline exercise, wooble exercise, dynamic stabilization</p>	<p>The aim of the research is to determine the difference in the effects of providing trampoline exercise with wooble board exercise on increasing dynamic stabilization. The sample consisted of 20 students at Esa Unggul University and were selected based on random sampling techniques using the available questionnaires. The samples were grouped into two treatment groups, treatment group I consisted of 10 people with trampoline exercise and treatment group II consisted of 10 people who were given wooble board exercise. This research method is a type of quasi-experimental pre-post test design research. Statistical analysis of this research uses the Related T-Test and the Independent T-Test. The results of the homogeneity test for the treatment group before training were with a p value = 0.008. The results of the T-Test Related test in treatment group I have a value of p = 0.001 and in treatment group II the value of p = 0.001 means that the training given to each group has an effect on increasing dynamic stabilization. And the Independent T-Test test results show a p value = 0.001, which means there is a very significant influence between treatment group I and treatment group II. It can be concluded that there is a very significant difference in effect between trampoline exercise and wooble board exercise on increasing dynamic stabilization. In this study, it is recommended that the training method can be applied with the correct procedures, carried out within more than 1 month because with increasing dynamic stabilization the results will be better if carried out within 2-3 months, and it is hoped that things that can influence the results research can be minimized in order to achieve optimal results.</p>
<p>This is an open access article under the CC BY-NC license</p> 	<p>Corresponding Author: Astrid Komala Dewi Bachelor of Physiotherapy Husada Hospital West Jakarta Astridkd91@gmail.com</p>

INTRODUCTION

The progress of health science and technology in Indonesia today many healthy and sick people often experience movement disorders and body function disorders. Many people always ignore health about the movement and function of the human body. There are various factors that affect movement and function disorders in the human body such as gender, daily activities such as physical activities, abnormalities, lifestyle, age and so on. Parts of the body organs that affect the scope of motion of the joints such as muscles, bones, ligaments, joints, bursa, fascia, nerves (Central Nerve and Peripheral Nerve) and so on. If these components

will have abnormalities, injuries and decreased anatomical and physiological functions, it will affect the impaired movement and function of the human body.

Stabilization disorders in humans usually occur with the most injuries, such as sprain ankle, ligament laxity, anterior cruciate ligament, balance disorders and others. When a person is performing certain movements that cannot maintain their balance and do not have the ability to control the center of mass, the center of gravity to the base of support, such as standing on one leg alternately using a wobble board, jumping, walking, standing one foot on the wobble board and sitting (Sell, 2020). Stabilization can be affected by various forms of factors such as the size of the fulcrum, the location of the gravitational line with respect to the fulcrum plane and the height of the weight. Stabilization also affects the sensation of the body against frictional forces which can have the effect of increasing proprioceptive function in the active stabilizer of the joint and stabilizing the tone between muscles, increasing the recruitment of motor units that will activate the golgi tendon and improve the coordination of intrafusal and extrafusal fibers with the efferent nerve in the spindle muscle so that it can improve the function of the proprioceptive, then it will also increase input sensory that will be processed in the brain as central processing. Central processing, which functions to determine the body's fulcrum and gravity alignment on the body, forms good posture control and organizes the motor sensory response that the body needs, then the brain will forward the impulse to the effector so that the body is able to create good stability when moving (Shumway-Cook, A, and Woollacott, 2005).

Biomechanics is one of the factors that affect stabilization. Because biomechanics is an analysis of human body movements, it has biomechanical concepts which means: General Biomechanic (in general). General Biomechanic is a section of Biomechanics that talks about the basic laws and concepts that affect the human organic body both in a stationary and moving position. It is divided into two parts, namely: Biostatics are parts of general biomechanics that only analyze the body in a stationary position or move in a straight line at a uniform speed. Biodynamic is a general biomechanics that deals with images and movements of the body that affect without considering the forces that occur (kinematics) and movements caused by the forces that act in the body (kinematics) (Tayyari, 2009). Stabilization is the ability to maintain various forms of body positions in various places and has the ability to control the center of mass, the center of gravity to the base of support (Shumway-Cook, A, and Woollacott, 2005). Stabilization in humans is divided into two parts, namely static stabilization and dynamic stabilization. Static stabilization is the body's ability to keep in a fixed position. For example, standing on one leg, standing on a wobble board. While dynamic stabilization is the body's ability to maintain the position of the body when moving.

The treatment carried out in stabilization disorders is by way of exercise or exercise. Physical activity of everyone in living their daily life is aware that it is part of physical exercise or exercise. To maintain and increase physical freshness which is done happily, consciously without coercion and become part of a person's life needs. Exercise is in supporting the paradigm of healthy living, it should be carried out with physical activity that improves or maintains physical fitness and overall health and well-being. Exercise is also an activity or

activity that has often been done by humans since ancient times. There are many types and types of exercises, ranging from those done by individuals or individuals to those done by groups, ranging from types of exercises that are cheap and easy to do to exercises that require large costs. In doing exercises or exercises that require stability, the weight factor is very important. Body weight distribution also affects the level of stability. If the weight distribution is concentrated to the upper body, it will increase the location of the weight point of the body and thus it will be a disadvantage for those who need stability in the upper body position. Therefore, to improve stabilization by losing weight.

In accordance with KEPMENKES 1363 of 2008 Chapter 1, article 1 paragraph 2 is stated that: "Physiotherapy is a form of health service that is intended to individuals and/or groups to develop, maintain and restore movement and function of the body throughout the human life span by using manual handling, improvement of movement, equipment (physical, electrotherapeutic and mechanical), functional training and communication" In daily life, humans are always on the move. The meaning of motion in general is the change of one part or the whole body to do something with a certain purpose. While the meaning of movement specifically is the cooperation between the brain, nerves, muscles, bones and joints which is caused by stimulation from the outside through the body's senses to do something with a certain purpose. A person's movement can be said to be normal if the movement has a normal strength value and has a certain purpose.

A physiotherapist is a specialist who helps heal patients through physiotherapy methods. Physiotherapists according to the WCPT (World Confederation for Physical Therapy) in 2010 are professional health workers who work for people of all ages with the aim of preserving, improving health, restoring function, and dependence when individuals have abilities or problems with disorders caused by physical, psychological, and so on. Physiotherapy also plays a very important role throughout the human life cycle in terms of handling (promotive), healing (curative), prevention (preventive), inability to carry out functional activities or restoration of function and movement (rehabilitative). In addition, physiotherapy also has a role in ergonomics or mechanical body exercises, fitness and fitness. Therefore physiotherapy is responsible for the disorders and weaknesses of movement and function caused by the factors of muscle strength, balance, flexibility, and coordination of the neuromuscular on the decrease in dynamic stabilization in a person.

Stabilization exercises are a form of exercise that can be done by developing a stable proximal control area of the body that is characterized by free response and can be given a variable prison load. When stabilizing, it is usually with static or isometric muscle contractions. Because stabilization plays a role in keeping body segments immobile. Therefore muscle shortening is very minimal. Stabilization exercises are generally in the form of trampoline exercises. Trampoline exercise is an exercise that utilizes the power of gravity so that every cell in the body becomes strong. This exercise is usually done on a trampoline. There are many different types of trampoline exercises as well as the various trampoline exercises: Sprint on Place, Double knee ups, Side-to-side jumps, Planks on trampoline.

Stabilization exercise is a form of exercise that is adjusted so that a person is able to move or be dynamic and able to maintain the position of the body. In addition to trampoline

exercises that are used to increase dynamic stabilization, there is also a wobble board exercise that is also used to improve dynamic stabilization. Wobble board exercise is a stabilization exercise in a static body position, which is the body's ability to maintain stability in a fixed position. In exercises using a wobble board, the muscles of the legs have a great effect on maintaining body stability to keep it in a balanced position. The influence of the anterior tibial muscle and the peroneus communis muscle plays an important role in directing the movement of the wobble board. Where in this exercise there must be good coordination between the vestibular system, proprioceptive and leg muscles.

Dynamic stabilization can be influenced by visual, vestibular, and proprioceptive. So if there is a weakness or interference from one of these factors, it can affect a decrease in the level of dynamic stabilization in a person. For example, a person who is in a moving or dynamic state such as jumping but is able to maintain his position and does not fall, then a person is able to withstand the earth's gravitational force and has high dynamic stability. Meanwhile, a person when making a jumping movement but is unable to maintain his position and then falls and is unable to resist the force of gravity so that he suffers an injury due to loss of dynamic stabilization. Therefore physiotherapy is responsible for the disorders and weaknesses of movement and function caused by the factors of muscle strength, balance, flexibility, and coordination of the neuromuscular on the decrease in dynamic stabilization in a person.

One form of treatment carried out by physiotherapy is by providing a regular and directed exercise to increase dynamic stabilization, namely by using trampoline exercise. Trampoline exercise is an exercise that uses the core muscles including the muscles of the abdominal, lower lumbar, and body area on the pelvis (pelvic). These muscles are responsible for supporting the spine and providing stability to a person. These muscles work together to form a force that aims to maintain the spine according to the symmetrical body alignment and become more stable, making it easier for the body to move effectively and efficiently. When the body moves effectively and efficiently, it can reduce the risk of injury, improve sports and exercise abilities such as strength and function and provide support to the body when performing all dynamic movements.

Trampoline exercise describes the ability to control body position, control position and central movement of the body including: head and neck alignment, alignment of vertebral column thorax and pelvic stability and ankle and hip strategies (Karren Saunders & Chabut, 2009). In addition, trampoline exercises use your abdominal muscles by doing bouncing exercises (rebounders) to stabilize, and control an upright posture, and control a person's jumping height. Trampoline exercise activities will maintain good alignment and posture in a moving or dynamic state both in doing movements and become the basis for all movements in the arms and legs. In addition, trampoline exercise also has an effect on increasing dynamic stabilization. Trampoline exercises and wobble board exercises are balance tools used to train balance. This tool is also beneficial for balance. Without a good balance in posture, it will affect stabilization when moving.

The method of assessing dynamic stabilization, namely with the dynamic postural stability index (DPSI), is a stabilization test using two movements, namely jumping in the

anterior-posterior direction (AP) and jumping in the medial lateral direction (ML) (Ross et al, 2009). In the anterior-posterior jump movement, participants are instructed to stand on two legs at a distance of 40% of the body height. Participants were instructed to jump forward 12 inches over the obstacle course and land on their feet, stabilize as fast as possible and balance for 10 seconds with their hands on the hips. In the medial-lateral direction of the jumping movement, participants were instructed to stand at a distance equal to 33% of the height of the body away from strength. Participants were instructed to jump over a 6-inch obstacle course to test the strength of the legs, stabilize as quickly as possible and for 10 seconds the hand in the hip after stabilizing. For both movements the upper extremity was unlimited, but participants were asked to quickly place their hands on the hips once they had stabilized. In vertical movements, participants are ordered to stand next to the midline that has been installed on the wall and then jump according to their abilities for 10 seconds. Based on the background of this problem, the author is very interested in trying to study and understand how to handle physiotherapy in improving dynamic stabilization by providing trampoline exercise and wobble board exercise.

METHODS

This research method is quasi-experimental by looking at the phenomenon of causal correlation in the two treatment groups of the research object. The research conducted also aims to learn. Difference Effect of adding trampoline exercise with wooble board exercise on increasing dynamic stabilization.

The research conducted was a pre-test post-test control group design. Where the group is divided into two groups. The first treatment group was given trampoline exercise while the second treatment group was given a wooble board exercise. The purpose of this study is to see the difference between trampoline exercise and wooble board exercise on increasing dynamic stabilization. Dynamic stabilization is measured by the dynamic postural stability index (DPSI). The results of the measurement of dynamic stabilization will be analyzed and compared between the first treatment group and the second treatment group.

Treatment Group I

In group I, before being given exercise, measurements were first carried out with the Dynamic Postural Stability Index (DPSI) After that, the sample was given a trampoline exercise. And at the end of the study, it will be evaluated by looking at the results of measurements on increasing dynamic stabilization.

Treatment Group II

In the treatment group II, before being given exercise, measurements were first carried out with the Dynamic Postural Stability Index (DPSI). After that the sample is given a wooble board exercise. And at the end of the study, it will be evaluated by looking at the results of measuring the increase in dynamic stabilization.

In this study, sampling was carried out by the sample purposive sampling technique, namely by selecting samples that have the criteria set in this study with the aim of obtaining samples that truly represent the status of the population taken as sample members. In this study, the sample to be taken is 20 people. Of the 20, 10 women will be put into treatment

group I and 10 men will be put into treatment group II. In this technique, the researcher determines the sampling criteria consisting of acceptance criteria (inclusive criteria), rejection criteria (exclusive criteria), and abortion criteria. Sampling is carried out based on the criteria that have been determined. The sampling criteria consisted of inclusion criteria, exclusion criteria, and abortion criteria. The sample taken is based on the following criteria:

Inclusive criteria

This criterion is an inclusive criterion for acceptance in taking samples is

- a. Men and women aged 20 - 25 years who are often active in sports such as jogging, cycling, physical strength, and other sports are done 3 times a week for at least 30 minutes.
- b. The sample had no history of diseases of the spine, lower extremities, no spinal injuries, no neurological disorders, vasculair, no balance disorders, and jumping should not be performed in pregnant women.
- c. Sample willing to participate in the study 22 times within 1 month.

Exclusive criteria

The exclusive criteria (rejection criteria) in sampling are:

- a. Sample with complaints and history of spinal disease
- b. Lower extremity injuries
- c. Spinal Injuries
- d. The presence of neurological disorders
- e. Vasculair disorders,
- f. Presence of balance disorders,
- g. And pregnant women.

Drop Out

The criteria for abortion or failure to follow as a research sample are :

- a. Sample did not follow the exercise program until the end of the study
- b. Experiencing an injury while given an intervention or exercise
- c. Sample does not follow regular or routine exercises

RESULTS AND DISCUSSION

The research was conducted in the RT 04 Tomang Area, West Jakarta in the July-August 2024 period. Sample healthy men and women who are 20 to 25 years old. Sampling is carried out using the random sampling technique, which is a sample taken from a population that meets the criteria with the aim of obtaining a randomly taken sample that allows each subject in the population to get the same possibility to be selected.

From the results of this study, it is shown that the dynamic stabilization in the sample has increased relevantly, the value of the increase in dynamic stabilization in a person can be measured by DPSI (Dynamic Postural Stability Index) using anterior-posterior (AP), medial-lateral (ML), and vertical (V) motion tests. After being measured, the dynamic stabilization value is obtained and then the hypothesis is tested. In this study, there are three hypotheses where each hypothesis is tested to determine whether there is a difference in the increase in dynamic stabilization before and after the administration of trampoline exercise and wooble

board exercise in treatment group I and treatment group II. In the Hypothesis I test using the T-Test Related test in the treatment group I, the value of $p = 0.001$ was obtained with the H_0 hypothesis rejected if $p < \alpha$ (0.05). In the hypothesis test II using the T-Test related test in treatment group II, the value of $p = 0.001$ was obtained with the H_0 hypothesis test rejected if $p < \alpha$ (0.05). In the hypothesis test III using the T-test Independent test, the samples in treatment group I and treatment group II obtained a value of $p = 0.008$ with the H_0 hypothesis test rejected if $p < \alpha$ (0.05). But in the hypothesis III test, it turned out that the p value $>$ the value of α (0.05) which means that H_0 was accepted.

In other relevant studies, it turned out that the value of the coefficient calculation to test the difference between treatment group I and treatment group II the average hypothetical result was ($p < 0.05$). Another study showed that the dynamic stabilization value in the DPSI measurement was much better than the test with single-leg standing. "The one-way ANOVA and post hoc comparisons demonstrated that dynamic postural stability scores were significant" (Amin, A. A., Amanati, S., & Novalanda, 2018). In this study, there are several samples that have special criteria for research, where researchers must know their sports activities such as jogging, cycling and fitness. And know about the injuries that have occurred in the samples that were studied because in this study the samples should not have injuries such as spinal injuries, knee injuries, neurological disorders, fractures and so on. Because it will be dangerous for samples that have injuries. Basically, this research is only devoted to healthy people who like and enjoy exercising. In addition, the researcher also asked about the weight and height of the samples. Because it meets the criteria for women and men who are 20-25 years old with a height between 155-170 cm. And weight 50-70kg.

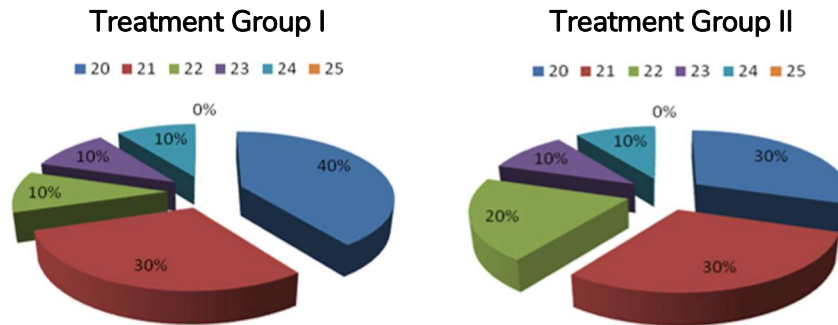
The samples in doing dynamic stabilization exercises in the exercise are much more significant because in the trampoline exercise it spends a lot of energy on the body, can increase the strength of the lower leg muscles, gluteus muscles, and control directional movements, as well as movements that are done more and very unique and when the exercise is completed measurements with DPSI (Dynamic Postural Stability Index) the jumping results are much increased. Many techniques and methods are used to improve movement stability, one of which is by giving trampoline exercises and wooble board exercises. In this study, the researcher wanted to see the impact of the influence of trampoline exercise and wooble board exercise used to improve dynamic stabilization. The sample obtained was divided into two groups, namely 10 people in treatment group I who were given trampoline exercise and 10 people in treatment group II who were given wooble board exercise to increase dynamic stabilization.

After a one-month study, the results were obtained that there was a difference in the increase in dynamic stabilization between the treatment group I who were given trampoline exercise and the treatment group II who were given wooble board exercise. Where the provision of trampoline exercise has a greater effect than wooble board exercise on increasing dynamic stabilization. In the treatment group I "there was an effect of increasing dynamic stabilization on the administration of trampoline exercise". As for hypothesis I, a t-test related test was used with the number of samples of 10 people and dynamic stabilization measurements using DPSI (Dynamic Postural Stability Index) and midline measuring

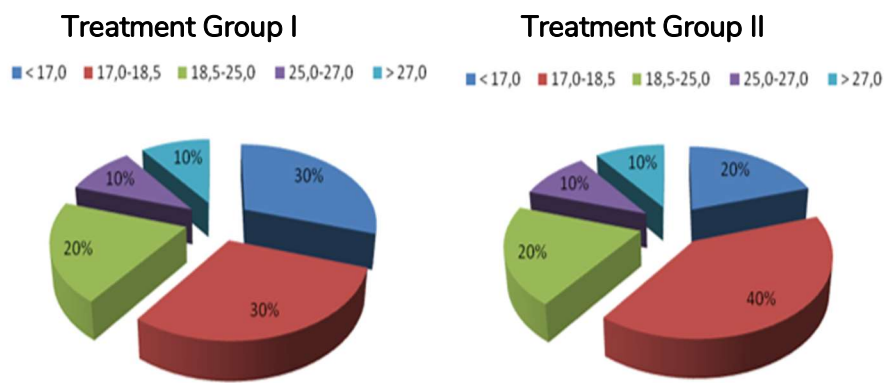
instruments were obtained that increased at the end of each second week. At the beginning before the training was given, the value of dynamic stabilization ability in the treatment group I with a mean value of 78.90 and a standard deviation value of 15.42 and at the end of the study there was an increase in dynamic stabilization with a mean value of 101.60 and a standard deviation value of 13.01 with a P value = 0.001 ($p < 0.05$) which means that there was a significant increase in dynamic stabilization.

Meanwhile, in the results of hypothesis II, the treatment group II that was given wooble board exercise experienced an increase in dynamic stabilization. At the beginning before the training, the initial DPSI (Dynamic Postural Stability Index) value in the treatment group II with a mean value of 77.80 and a standard deviation value of 13.43 and at the end of the study there was an increase in dynamic stabilization with a mean value of 93.60 and a standard deviation value of 15.75. With a value of p value = 0.001 ($p < 0.05$) which means there is a significant increase in dynamic stabilization. Based on the data mentioned above, it is known that in treatment group I and treatment group II there is an increase in dynamic stabilization. However, based on the results of the difference between the two mean and the independent t-test test in hypothesis III, the value of $p = 0.008$ ($p < 0.05$) was obtained, which means that there was a difference in the increase in dynamic stabilization between the treatment group I and the treatment group II. This is because the effects of the two exercises above are different. Basically, trampoline exercise and wooble board exercise use the same principle in administering exercise doses. These two exercises were carried out 12 times with an overload and progressive dose of exercise aimed at increasing dynamic stabilization. This exercise is affected by the time or duration of exercise after being given the exercise between treatment group I and treatment group II with each different sample group and different levels of dynamic stabilization, this is related to the different age levels of the samples. In the fourth or final week, from all the samples in each group, the measurement results showed a very significant increase in dynamic stabilization.

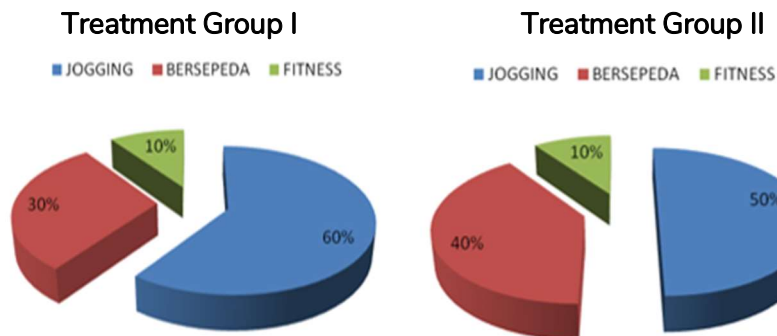
In this research on dynamic stabilization, there are many interesting samples because there are several samples whose dynamic stabilization values fluctuate due to poor physical conditions, the samples do not routinely practice so that many factors affect the ups and downs of the dynamic stabilization value. There are also samples that when measured vertical movements have a value of 25cm from the height of the body even though the height is 155cm but the results of the jump are quite far, while those who have a height of 165cm the results of the jump are not too tall about 7cm from the height of the body. In addition, there are also samples that when measured anterior-posterior (AP) and medial-lateral (ML) movements are the result of jumping further than those during lateral medial movements (ML).



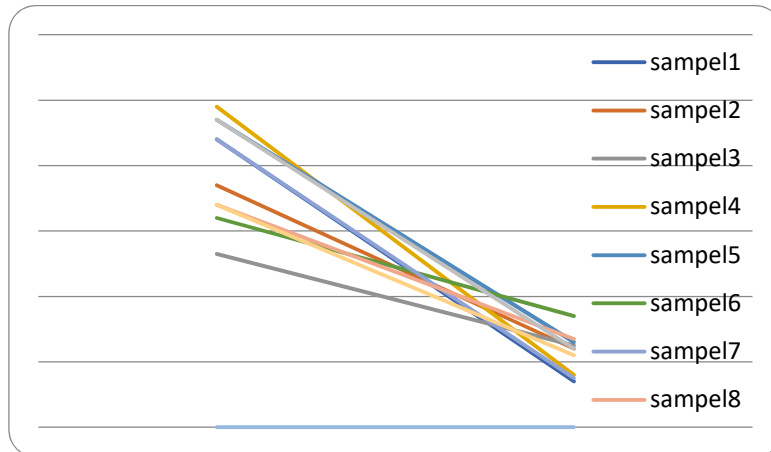
Graph 1 Distribution of samples by age In treatment group I and treatment group II



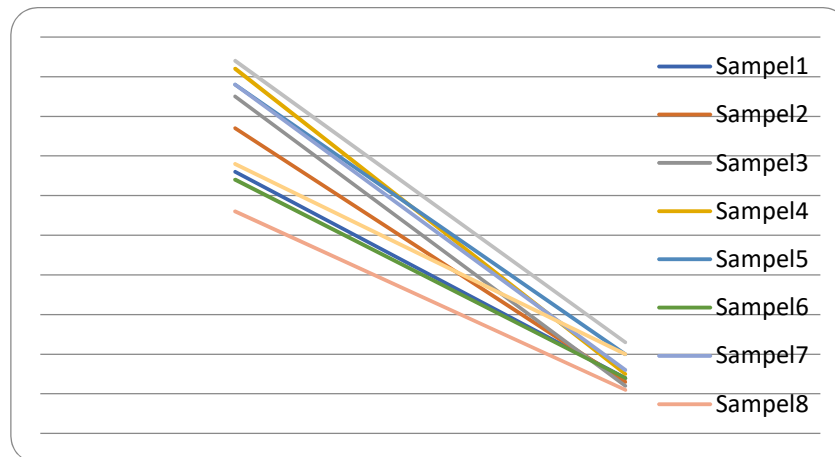
Graph 2 Sample distribution based on BMI In treatment group I and treatment group II



Graph 3 Distribution of samples based on hobby In treatment group I and treatment group II



Graph 4 The value of increasing dynamic stabilization in treatment group I with Trampoline exercise before and after exercise



Graph 5 The value of increasing dynamic stabilization in treatment group II with given a wooble board exercise before and after exercise

CONCLUSION

Based on the results of the research and discussion above, the conclusions that can be drawn are as follows: Training with trampolines can improve dynamic stabilization. Training with a wooble board can improve dynamic stabilization. There is a difference in dynamic stabilization between trampoline training and wooble board training. To improve dynamic stabilization ability, the exercises provided will have a more meaningful influence if done for 4 weeks by doing regular and disciplined exercises, giving training doses that are overload and progressive, with the condition of samples that do not experience fatigue, and paying attention to the angle of movement in the exercise.

REFERENCE

Amin, A. A., Amanati, S., & Novalanda, W. (2018). *Pengaruh Terapi Latihan, Transcutaneous Electrical Nerve Stimulation Dan Kinesiology Taping Pada Post Rekonstruksi Anterior*

Cruciate Ligament. Jurnal Fisioterapi Dan Rehabilitasi, 2(2), 115–124.
<https://doi.org/10.33660/jfrwhs.v2i2.39>.

Karren Saunders & Chabut. (2009). *Core Strength For Dummies*. Canada.

Ross et al. (2009). *Modern Financial Management, 8th edition*. Singapore: McGrawHill Inc.

Sell, T. C. T. & L. (2020). *Strenght, Flexibility, And Balance Characteristic of Highly Proficient Golfers (Journal of Australia orthopaedic research)*.

Shumway-Cook, A, and Woollacott, M. . (2005). *Motor Control Theory And Practical Applications (Philadelphia:)*.

Tayyari. (2009). *Occupational Ergonomics, Principle And Applications (1st Ed.)*. London: Chapman And Hall.