

Difference Influence of Core Stability Exercise and Ankle Proprioceptive Exercise toward Dynamic Balance on Young Adult Overweight

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Abstract: Overweight is excess weight gain abnormal fat or excessive that can divert health, which occurs due to energy imbalance while the energy comes in is greater than the energy expended (WHO, 2017) that resulting in a build up of energy reserves stored in adipose tissue (Sherwood, 2016). Adipose tissue accumulation and an increase in excess body mass can cause a decrease in muscle mass, resulting in impaired muscle response and loss of body stability mechanism (Greve et al., 2008). The purpose of this study was to determine the differences in core stability exercise and ankle proprioceptive exercise in improving the dynamic balance of overweight young adult women. The results obtained before practice in first group (K1) is $58,9 \pm 9,46$ and second group (K2) is $58,2 \pm 4,18$. The average after exercise on first group (K1) is $92,1 \pm 4,15$ and second group (K2) is $91,0 \pm 3,47$. The conclusion of this study is that there is no difference between Core stability exercise and Ankle proprioceptive exercise in increasing the dynamic balance of overweight young adult.

1 INTRODUCTION

World Health Organization (WHO) reports that in 2016, around 1.9 billion adults aged 18 and over were overweight with a prevalence of 39% men and 40% women (WHO, 2016). The highest prevalence still occurs in developed countries such as America and Europe which are overweight was 62%, while for the prevalence of overweight in Southeast Asia reached 14% (WHO, 2016), and for the prevalence of overweight in Indonesia shows 13,5 % (Kementrian Kesehatan Republik Indonesia, 2019). A person with an overweight condition experiences morphological and functional changes in the muscles that cause a decrease in strength muscle and muscle contraction, a decrease in muscle flexibility and muscle elasticity, as well as a proprioceptive decrease that will eventually lead to a decrease in the body's balance system (Suadnyana, I.A, Nurmawan, Sutha, Muliarta, 2015).

Balance is the body's ability to control the center of gravity of the fulcrum (Yuliana I Putu; Irfan, Muhammad; Fadhil Dzil Ikrom Al Hazmi, Dhofiril,

2014). Balance is the ability to maintain equilibrium both static and dynamic when placed in various positions (Shumway-Cook et al., 2011). Static balance is the body's ability to maintain a position where the center of gravity (COG) is at rest or not moving (Abrahamova and Hlavacka, 2008). Dynamic balance is the ability to maintain body stability when moving or when body movements or body parts occur from one point to another (Miller, 2006). To improve the balance, physical training is needed to strengthening the muscles involved, increase postural stability and exercise the somatosensory system. Physical exercise carried out regularly, systematically and continuously, all outlined in an exercise program can significantly improve physical abilities (Dias and Armstrong, 2004).

In improving body balance, we need an exercise that is to strengthen the muscles involved, increase postural stability and somatosensory system training. One study states that proprioceptive training is effective in increasing students' static balance and core stability exercise is effective in increasing the dynamic balance of students (Karakaya et al., 2015).

On the other research found that there is a significant relationship between dynamic balance and body mass index (BMI), where overweight students have a lower dynamic balance compared to students with normal BMI. However, the comparison of core stability exercise and ankle proprioceptive exercise in improving the dynamic balance of overweight adolescents is still not explained (Habut et al., 2015).

Core stability exercise is an exercise that uses the ability of the trunk, lumbar spine, pelvic, hip, abdominal muscles and muscles along the spine to work together to form strength that aims to maintain the spine according to the body's symmetry alignment and become more stable and prevent injury (Berrigan et al., 2006). Core stability exercise is targeted at the abdominal muscles that connect the pelvis, spine and shoulders, which helps in maintaining good posture and provides the basis for all arm and leg movements. Akuthota et al., (2008) says that the techniques of core stability exercise are crunch, dynamic leg and back, Superman, static straight legs, and hundreads.

Ankle proprioceptive exercise is a simple exercise to train sensorimotor that controls postural stability. This exercise will send proprioceptive afferent input to the central nervous system thereby changing the efferent nerve response by increasing neuromuscular control of muscles and joints and balance control. The types of training techniques in ankle proprioceptive exercise are stretching, strengthening, and standing on the balance board (Karakaya et al., 2015). The purpose of ankle proprioceptive exercise is to gradually train the lower limbs such as ankle, knee and hip to be strong and reactive to improve function, reduce knee pain, slow down the degenerative process of the joints, improve balance so as to reduce the risk of falls and injuries.

2 METHODS

This study uses a Randomized Pre-Test and Post-Test Group Design research design consisting of two groups: a group given core stability exercise (K1) and a group given ankle proprioceptive exercise (K2) with each group totaling 5 people who meet the inclusion criterias are women aged 19-22 years, has a body mass index of 23-24.9 kg / m², and is physically and mentally healthy, and exclusion criteria are active exercise, undergoing a weight loss program, dysminore, and taking drugs that have an effect on balance. The research was carried out for 6 weeks at the Bhakti Wiyata Kediri Institute of Health Sciences, from April to May 2018, which had previously been approved by the subject through informed consent.

Pre test and post test dynamic balance is measured using the Y Balance Test with one foot in the center of the grid, and the other foot reaches three measurement angles (anterior, posteromedial, posterolateral) as far as possible without using footwear in centimeters (cm) (Fullam et al., 2014).

This study was approved by the ethics committee of the Faculty of Dentistry, Airlangga University. The data collection technique in this research is quantitative which is done by numerical calculation. The collected data is processed and analyzed through a computer using SPSS, with the significance level of 0.05. The statistical tests used were data normality test with Shapiro Wilk test, data homogeneity test with Levene's test, paired sample t-test to determine differences in the balance value between before and after treatment in each group, and Mann Whitney test to determine differences in results increasing balance between groups.

3 RESULTS AND DISCUSSION

Based on the results of data analysis using paired sample t test, the p value in group one (K1) is 0.001, and group two (K2) is 0,000 so it can be concluded that there is an effect of core stability exercise and ankle proprioceptive exercise on the dynamic balance of young adult overweight. However, to test the difference in effect using the Mann Whitney test p value = 0.994 so that it can be concluded that there is no difference between core stability exercise and ankle proprioceptive exercise in improving the dynamic balance of young adult overweight.

Core stability exercise can improve balance by having an effect on muscle and joint tissue (Yuliana I Putu; Irfan, Muhammad; Fadhil Dzil Ikrom Al Hazmi, Dhofirul, 2014). The mechanism of change that results in an increase in the level of tension in the muscles, is a result of the work of muscle contraction. Muscle contraction is accompanied by an increase in motor recruitment which will further produce energy output from increased muscle contraction. Increased deposited motor unit receptors during training, which is a neuralmechanism that occurs for two to six weeks. When exercise increases the amount of tension that causes muscle changes during contractions which is then followed by an increase in muscle size, the greater the diameter of the muscle fibers, the greater the muscle contraction. The joint is one of the passive stabilizers that is bound by ligaments. In balance defense, the need for a joint condition that is stable and without pain will reduce the joint's ability to make a move. Movement that

made by the joint is obtained through proprioceptive stimulus to the position and motion to be performed. With the proprioceptive nature of the joints, when doing joint exercises it will be more stable because it is supported by the strength of the muscles as movers and the stability of the ligaments that direct and limit joint motion (Yuliana I Putu; Irfan, Muhammad; Fadhil Dzil Ikrom Al Hazmi, Dhofirul, 2014).

Ankle proprioceptive exercise is an exercise that gradually exercises the lower limbs such as ankle, knee and hip to be strong and reactive to improve function, reduce knee pain, inhibit the degenerative process of the joints, improve balance so as to reduce the risk of falls and injuries, there are three techniques: stretching, strengthening dan berdiri diatas balance board (Basavanthappa and Basavanthappa, 2011).

Stretching is a form of physical exercise where the skeletal muscles are consciously extended. Stretching is a general term used to describe a therapeutic maneuver. This maneuver is intended to extend the soft tissue structure that is pathologically or non pathologically shortened so as to increase tissue flexibility. Stretching is given to maintain or increase the elasticity of muscle tissue, tendons, fascia, ligaments and joint motion (McHugh and Cosgrave, 2010).

Strengthening exercise by using this therapy aims to increase the strength of leg muscles and lower limbs. All movements produced are the result of an increase in muscle tension as a motor response. Muscle strength can be described as the ability of muscles to withstand both external and internal forces. Muscle strength is closely related to the neuromuscular system that is how much the nervous system's ability to activate muscles to contract. The more muscle fibers that are activated, the greater the strength the muscles produce (Dias and Armstrong, 2004; Suadnyana, I.A, Nurmawan, Sutha, Muliarta, 2015). Muscle strength of the legs, legs and hips is very instrumental in maintaining body balance when there is external force. Muscle strength is directly related to the ability of muscles to fight the forces of gravitation and other external loads that continuously affect body position (Dias and Armstrong, 2004).

Balance board is used to train balance with the aim of increasing proprioceptive joints, coordination of motor skills and core muscle strength to avoid falling and injury especially at the ankles and knees (Reynolds, 2010). This exercise will send proprioceptive afferent input to the central nervous system thereby changing the efferent nerve response by increasing neuromuscular control of muscles and joints and balance control (Karakaya et al., 2015). By

improving proprioceptive, one can get the balance needed to maintain stability and can quickly change direction when needed (Swandari, 2015). Not only does it increase proprioception, the balance board also trains vestibular abilities. When the body is above the balance board, the receptors will be forced to provide information to the cerebellum and ganglia wards to issue compensatory movements so that the body stays balanced.

4 CONCLUSIONS

Based on the results of research that has been done, it can be concluded that there is no difference between core stability exercise and ankle proprioceptive exercise in increasing the dynamic balance of young adult overweight. Based on the results and conclusions above, the researcher conveys the suggestion that further research be carried out with a greater number of subjects, so that it can show the results of the exercise of increasing balance and differences in the value of balance between groups.

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