



## The Effect of Bridging Exercise and Heel Rises Exercise on Balance Post Stroke in Makassar City

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### ABSTRACT

*Post-stroke sensory motor disorders will also result in disturbances in the sensory and motor components which cause disturbances in the posture control system so that it is unable to maintain body balance in certain positions. One of the rehabilitation programs that are often used to restore function due to motor deficits is Bridging Exercise and Heel Raises Exercise. Bridging exercise is an exercise to strengthen and stabilize the gluteus, hip and lower back. This exercise is a great way to isolate and strengthen the gluteus and hamstring (back of the upper leg) muscles. Heel raises exercise is an exercise to strengthen the leg muscles, especially the gastrocnemius muscles and plantar flexion muscles which can have effects on the nerves and skeleton. From this stimulation, when it reaches proprioception, the body will maintain balance. The method used is a quasy experiment with a pretest-posttest two-group design. And it was found that the results of this study showed that there was an effect of bridging exercise 0.001 ( $p < 0.05$ ) and heel raises exercise 0.002 ( $p < 0.05$ ) in improving the balance of post-stroke patients. So it can be concluded that the two exercises can improve the balance of post-stroke patients.*

**Keywords:** *Bridging Exercise; Heel Rises Exercise; Balance of Post Stroke Patient.*

### INTRODUCTION

Stroke a medical problem that is often encountered, is a syndrome caused by a cut off of blood flow to an area of the brain due to blockage or rupture of the arteries of the brain. The interruption of blood flow causes the area of the brain that is supplied by these arteries to experience a lack of O<sub>2</sub> and food which results in brain cells in the area being damaged or dead as a result the brain cells cannot function resulting in sudden neurological deficits in the form of half body paralysis, speech disturbances, disturbances swallowing,

dementia, cornea or death (Kartika, 2004). According to WHO (World Health Organization) criteria, stroke is clinically defined as a functional brain disorder that occurs suddenly with clinical signs and symptoms both focal and global that lasts more than 24 hours or can cause death due to cerebral circulation disorders (Kartika, 2004).

Post-stroke problems, in general, include sensorimotor disturbances, cognitive impairments, and psychiatric disorders. Post-stroke sensory motor disorders will also result in disturbances in the sensory and motor components which cause disturbances in the posture control system so that it is unable to maintain body balance in certain positions.

Balance is the ability to maintain the body in a balanced condition both in a state of rest or in a state of movement. In addition, balance is also interpreted as the ability to maintain body mass (centre of mass) against the plane of support (base of support) to fight gravity (centre of gravity) which is influenced by sensory, motor or musculoskeletal systems, especially in muscle strength, especially in the lower extremities, ligament strength as well as in terms of the anatomical arrangement of the bones (Zaidah, 2019). Balance is divided into two, namely, static balance and dynamic balance. Dynamic balance is the body's ability to control body position and posture when carrying out movements or activities such as walking and running, where the center of gravity (COG) in dynamic balance is always changing (Wijianto, Dewangga and Batubara, 2019); Budiman, 2020).

One of the rehabilitation programs that is often used to restore function due to motor deficits is Bridging Exercise. Bridging exercise, also known as pelvic bridging exercise, is an exercise, good for strengthening-stabilization exercises on the gluteals, hips and lower back (Setiawan et al., 2021) Miller, 2012). Bridging exercises are a great way to isolate and strengthen the gluteus and hamstring (back of the upper leg) muscles. If done correctly, bridging is used as a stability and strengthening exercise that targets the abdominal muscles as well as the muscles of the lower back and hips. Finally, bridging exercise is considered a basic rehabilitation exercise to improve stability/balance and spinal stabilization (Setiawan et al., 2021). Heel raises exercise is an exercise to strengthen the leg muscles, especially the gastrocnemius muscles and plantar flexion muscles which can have effects on the nerves and skeleton. From this stimulation when it reaches proprioception, the body will maintain balance (Risma Caesar Witayanti, Luh Nopi Andayani and Wayan Tianing, 2018). Sensorimotor which functions to control postural stability can be trained with heel raises exercise so that it can reduce the area based on support. This occurs because there is a stimulus that sends to the central nervous system and then changes the nerve response by increasing neuromuscular control in muscles and

joints (Faizah and Sari, 2020).

This study aims to determine whether there is an effect of bridging exercise with heel rise exercise in improving balance in post-stroke.

## METHOD

This research is a quasi-experimental pre-experimental study with a pretest-posttest two-group design with treatment twice a week for 2 months. This study aims to determine the effect of Bridging Exercise and Heel Rises Exercise on Balance in post-stroke in Makasar City. After doing the research, data processing and analysis were carried out with the normality test of the Shapiro Wilk and the effect test of the Wilcoxon test using the SPSS Windows 20 application.

## RESULTS

**Table 1.**  
 Characteristics of Research Subjects

Sample Characteristics	Frequency	Percentage %
<b>Gender</b>		
Man	6	42.9
Woman	8	57.1
<b>Age</b>		
45-50 years	5	35.7
51-55 years	4	28.6
56-60 years	3	21.4
61-65 years	2	14.3

Source: Primary Data (2022)

Based on the results of the study showed the characteristics of respondents based on gender and age. As for the characteristics of the sample based on gender, the majority were women, as many as 8 people (57.1%), while based on age data, most of them showed an age range of 45-50 years, as many as 5 people (35.7%).

**Table 2.**  
 Distribution of values before and after giving Bridging Exercise

Bridging Exercise	N	Min	Max	Average $\pm$ SD	p-value
Pretest	14	8	21	14.36 $\pm$ 4.483	0.001
Posttest	14	9	23	15.50 $\pm$ 4.587	

Source: Primary Data (2022)

Based on the results of the study, it can be seen that there is a change in the score obtained based on the average value from the pre-test to the post-test. The results of this study indicate that before and after being given a bridging exercise, there is an increase in

the respondent's balance value.

Based on the results of the normality test using the Shapiro Wilk test to see static balance data found before training the value of  $p = 0.320$ , after being given training  $p = 0.295$ , which means that the value of  $p > 0.05$  then the data obtained is normally distributed. The data that has been obtained, then an analysis of the variable effect test is carried out, namely the provision of bridging exercise using the Wilcoxon test to determine the effect of bridging exercise on the balance of post-stroke patients and the results obtained with a significant value of  $p = 0.001$ , which means that the value of  $p < 0.05$ , which means there is a difference in balance post-stroke patients before and after being given bridging exercise, it can be concluded that bridging exercise can improve the balance of post-stroke patients. This is in line with the theory of Bridging Exercise which states that bridging has an important role in maximizing the function of the core muscles (erector spine muscle group, abdominal muscle group, and pelvic muscle group) when carrying out activities primarily to increase muscle strength (Manitu, Widani and Aima, 2017).

This is also supported by theory, (Irfan, 2010) states that a synergistic postural muscle response that leads to the time and distance of the required muscle group activity can maintain balance and control of posture, several muscle groups in both the upper and lower extremities. serves to maintain posture when standing upright and regulate body balance in various movements. The muscle strength of the legs, knees and hips must be adequate to maintain body balance when there is external force pressure. Muscle strength is directly related to the ability of the muscles to resist the force of gravity and other external loads that continuously affect body position. The ability of the muscles to carry out upright and stable reactions is a form of muscle activity to maintain balance both static and dynamic.

**Table 3.**  
 Distribution of values before and after giving Heel Rises Exercise

Heel Rises Exercise	N	Min	Max	Average $\pm$ SD	p-value
Pretest	14	10	20	15.93 $\pm$ 4.582	0.002
Posttest	14	10	26	19.29 $\pm$ 5.717	

Source: Primary Data (2022)

Based on the results of the study showed differences in average values before and after giving heel rises exercise. It can be seen that there is a change in the score obtained based on the average value from the pre-test to the post-test. The results of this study indicate that before and after the heel rises exercise is given, there is an increase in the respondent's balance value.

Based on the results of the normality test using the Shapiro Wilk test to see static

balance data found before training the value of  $p = 0.747$  statistically while after being given training  $p = 0.889$ , which means that the value of  $p > 0.05$  then the data obtained is normally distributed. The data that has been obtained, then an analysis of the variable influence test is carried out, namely giving heel rises exercise using the Wilcoxon test to determine the effect of heel rise exercise on the balance of post-stroke patients and the results are obtained with a significant value of  $p = 0.0002$ , which means that the value of  $p < 0.05$  is a difference in balance post-stroke patients before and after being given heel rises exercise, it can be concluded that heel rises exercise can improve the balance of post-stroke patients.

## Discussion

Post-stroke sensory motor disorders will result in disturbances in the sensory and motor components which cause disturbances in the posture control system so that it is unable to maintain body balance in certain positions.

By providing bridging exercises it can also help to practice walking in post-stroke Non-Hemorrhagic Stroke patients which is a major thing because walking training is a locomotion ability that is very important in carrying out daily activities so that as early as possible the patient is declared medically stable. of course, this is confirmed by having the abilities that support a patient to be able to stand and walk (Irfan, 2010).

These muscle strengthening exercises can provide better muscle strength, increase muscle tone, increase endurance and bone density. Also, exercises to strengthen the gluteus maximus muscle are an important part or stage in the management of patients with impaired walking ability due to NHS which affects patient ambulation.

Stroke patients experience gait disturbances for various reasons, including sensory disturbances, muscle weakness, spasticity, etc., and the main goal of rehabilitation is to regain independent walking. The movement of the heel raises exercise contracts the ankle tightly to maintain a standing posture and contributes to postural control through an anticipatory contraction before changes in the centre of mass. The strength of the ankle plantar flexion on the paretic side is related to the walking speed of stroke patients (Jung et al., 2020).

Heel lifts are commonly used in clinical settings to strengthen the plantar flexors in a standing position and can be performed without the use of any equipment. Fujiwara et al. reported a significant increase in plantar flexor strength and thickness and decreased postural sway in elderly subjects after eight weeks of heel lift exercise. Another study

reported significant increases in plantar flexor strength, gait speed, and rhythm in stroke patients (Jung et al., 2020).

This is in line with research (Lee et al., 2017) which showed a significant increase in increasing strength, walking speed and static and dynamic balance which stated that the heel rises exercise generates most of the energy needed to move body mass forward. Heel rises exercise can train the sensorimotor which controls postural stability by reducing the area based on support. Heel rises exercise sends proprioceptive afferent input to the central nervous system so that it can change the efferent nerve response by increasing neuromuscular control in muscles and joints which affects body balance (Faizah and Sari, 2020).

Post-stroke patients who are independent in their daily activities are certainly able to have good muscle strength and adaptation so sufficient physical activity will make stroke patients have better balance.

## CONCLUSIONS AND SUGGESTIONS

In this study, it can be concluded that the distribution of balance in post-stroke patients before and after being given bridging exercise is 14.36 and 15.50, which means there is a difference in the balance value in post-stroke patients. Meanwhile, the distribution of balance in post-stroke patients before and after being given heel raises exercises was 15.93 and 19.29, which means there is a difference in the balance value in post-stroke patients. So it can be concluded that the two exercises can improve the balance of post-stroke patients. As for suggestions for respondents, it is hoped that they will continue to do Bridging Exercise with Heel Rises Exercise on Balance in post-stroke patients as an effort to improve balance. Future researchers can conduct research with a longer treatment time and more innovative forms of training by looking at other factors.

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