PHYSIOTHERAPY MANAGEMENT FOR STROKE PATIENT ON STATIC BALANCE ABILITY: A CASE STUDY

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Abstract

Introduction: Stroke is a disease that causes damage to the brain due to infarction or bleeding in the blood vessels that supply blood to the brain, resulting in a lack of oxygen and glucose supply to brain tissue. In stroke patients, the general symptom that appears is weakness on one side of the limb which will affect the ability to balance. Handling efforts that can be done are to offer single leg stance and walking training.
Case Presentation: The patient is 67 years old, female with a job as a housewife. Currently the patient is able to carry out activities well at home, but the patient often complains that his left side of the limb still feels heavy and his balance decreases when standing or walking.
Management and Outcome: The study was conducted 3 times a week in 4 weeks. Mini Mental State Examination (MMSE) was given to determine the cognitive level of respondents. Evaluation is carried out every week using the Functional Reach Test (FRT). Physiotherapy management that used single leg stance and walking training which was carried out for 4 weeks resulted in an increase in static balance in the patient.
Discussion: Single leg stance and walking training can increase proprioceptive input which will increase the ability to support on the injured side so as to produce a balanced weight bearing. In addition, the provision of this exercise can train visual, somatosensory, vestibular and proprioceptive which will maintain an upright body position during walking and improve the correct gait pattern so as to improve balance ability.

Keyword: stroke, static balance, single leg stance, walking training

Introduction

Stroke is a disease that causes damage to the brain due to infarction or bleeding in the blood vessels that supply blood to the brain, resulting in a lack of oxygen and glucose supply to brain tissue (Jeon & Choi, 2015). So far, stroke is defined as a manifestation of non-traumatic vascular disease of the Central Nervous System (CNS), ischemic or hemorrhagic tissue injury can be found in the brain which usually results in permanent damage in the form of cerebral infarction, intracerebral hemorrhage and subarachnoid hemorrhage (Cheung, 2014). Stroke is the leading cause of death and disability in several countries. According to the Basic Health Research (RISKESDAS) in 2018, the prevalence of stroke in Central Java was 11.8%. Stroke survivors have a variety of disorders, including sensory disturbances and

decreased ability to balance. When standing they tend to rest on the side of the healthy leg, resulting in an asymmetrical posture that will ultimately affect movement, balance, gait and daily activities (Jeon & Choi, 2015).

Balance is defined as the ability to maintain, achieve, or restore a state of balance in performing any posture (Osoba et al., 2019). There are two types of balance, namely static balance and dynamic balance. Static balance can be interpreted as the ability to maintain a body position that does not move or change, while dynamic balance is the body's ability to maintain balance when moving. In this study, researchers will use a static balance component. This is because static balance is a prefix before the occurrence of movements such as walking. Improved balance in a static position can improve mobility, gait and activities of daily living. (Supriyono, 2015). Static balance can be measured using the Functional Reach Test (FRT) with a high level of reliability and validity. The reliability value of the functional reach test is r = 0.89 which means excellent and the validity value is r = 0.71 (Outermans et al., 2010).

Case Presentation

A 67-year-old patient, female with a job as a housewife, complained that the left limb felt heavy when moved. 4 years ago the patient fell in the bathroom and lost consciousness and was taken to the hospital. From the results of the examination, the patient was diagnosed with a non-hemorrhagic stroke (a blockage in the brain). The patient has a history of high cholesterol levels in the blood. Currently the patient is able to carry out activities well at home, but the patient often complains that his left side of the limb still feels heavy and his balance decreases when standing or walking. The patient's cognitive level is very good as evidenced by the results of the MMSE value showing a value of 27 which means there is no cognitive impairment, the patient can answer the physiotherapist's questions well and can still remember and explain events that have occurred for a long time.

Management and Outcome

The study was conducted 3 times a week for 4 weeks. The time of the research was carried out on January 07, 2020 to January 29, 2020. The initial procedure of the study was carried out by explaining the method and the course of the research for the next 4 weeks, then asking for an approval signature to be a response in the research to be carried out. Evaluation is done every week using the Functional Reach Test (FRT). Before being given a programmed exercise, the patient was given a questionnaire to determine the cognitive level using the Mini Mental State Examination (MMSE). The MMSE consists of 10 questions covering orientation, registration, attention and calculation, recall and language comprehension. The final score of the MMSE is grouped into several categories, namely values 0-16 there is cognitive impairment,

values 17-23 are close to cognitive impairment, values 24-30 are normal (no cognitive impairment). In doing this exercise, the physiotherapist must measure blood pressure before and after exercise to monitor the patient's condition.

Table 1. Physiotherapy Intervention Dosage

Tools and materials:

1. Stopwatch
2. Seat
3. Marker (tape)
4. Meter line
5. Measurement form paper
6. Sphygmomanometer
7. Stethoscope
8. Stationery

Procedure:

1. Single Leg Stance

Type of exercise:

a. Standing position
b. Standing on the affected side (weight bearing)
c. Lifting one healthy leg
d. Perform repetitive flexion and extension movements while standing on one leg

According to research from Jung et al (2014), single leg stance exercise is 2 minutes. Frequency of exercise 5 times a week.

Prosedure:

a. The patient is asked to stand upright for 30 seconds.
b. Followed by standing by supporting on the affected side according to the patient's ability by holding on to a chair, carried out for 30 seconds.
c. After that the patient was asked to lift one healthy leg by holding on to a chair, this movement was carried out for 30 seconds.
d. This is followed by repeated flexion and extension movements of the knee for 30 seconds.

Picture 1. Exercise position. (A) Standing position, (B) standing on the affected side, (C) Single leg stance on the affected side.

Note: In the single leg stance exercise, when the patient performs a one leg lifting movement, it is necessary to pay attention to the following:

a. It is necessary to pay attention to patient safety, every therapist/researcher exercise is always near the patient.
b. Alignment of the patient's body is considered from the initial position to the end, the position of the body posture is emphasized in an upright and static position (no rotation of

the patient's body). The therapist/researcher needs to assist in this achievement to reduce exercise difficulties and demonstrate correct posture or provide verbal corrections so that patients can understand movement patterns as best they can.

c. The position of the raised leg is ensured that it is the iliopsoas muscle that contracts so that the pelvis remains symmetrical so that there is no compensation for movements that arise due to activation of the quadratus lumborum muscle which can result in incorrect and unbalanced proprioceptive aiming so that it can lead to wrong perceptions.

2. **Walking Training**

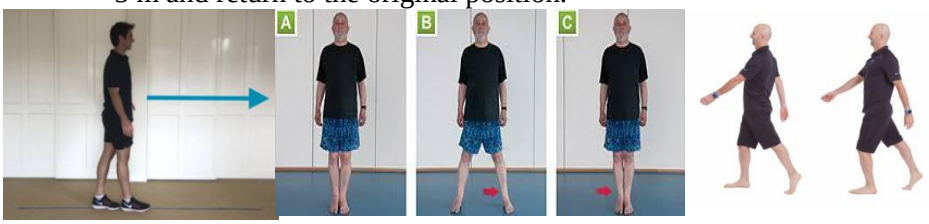
The walking training is carried out for 15 minutes, this exercise is done 6 repetitions with a distance of 1 repetition, which is 10 meters. Frequency 5 times a week.

Exercise type:

a. Tandem walking
b. Side step walking
c. Backward walking

Prosedure:

a. Make a track to do walking training, a track as far as 5 m forward, 5 m to the side, and 5 m back.
b. The patient is asked to perform tendem walking, walk along the track for 5 m and then return to the original position.
c. Continue to do side step walking to the right through the 5 m track and side step walking to the left over the 5 m track.
d. Then do a backward walking movement, walk backwards through the track as far as 5 m and return to the original position.



Picture 2. Exercise position. (A) Tandem Walking, (B) Side-step Walking, (C) Backward Walking.

Note: What needs to be considered in the walking training exercise are:

a. It should be noted about patient safety in every exercise the therapist/researcher is always near the patient.
b. Position the patient's body in proper alignment, in an upright and static position (no rotation of the patient's body). The therapist/researcher needs to assist in this achievement to reduce exercise difficulties and demonstrate correct posture or provide verbal corrections so that patients can understand movement patterns as best they can.
c. Walking training movements performed by the patient in accordance with the procedure.

Evaluation results before and after physiotherapy management in the form of single leg stance and walking training using the Functional Reach Test (FRT). The FRT assessment criteria consist of <15

cm which can be interpreted as a risk of falling, a value of 15-25 cm is interpreted as a moderate risk of falling and a value of >25 cm is interpreted as an absence of a fall risk.

Table 2. Evaluation results with Functional Reach Test (FRT)

	Pre	**Post**
FRT	23 cm	30 cm

After 4 weeks of exercise, it showed a change in static balance as measured using the functional reach test (FRT). In measurements before giving exercise in the form of single leg stance and walking training the FRT results showed a value of 23 cm and after 4 weeks of administration, the FRT increased to 30 cm. From the results of the evaluation above, it was found that there was an increase in the patient's static balance.

Discussion

Single leg stance exercise is done by combining 4 different movements, namely the first to stand in a still position which aims to make adaptation to the standing position, so that there will be motor learning from muscle contractions in the lower extremities in stroke patients (You et al., 2012). The second exercise is standing with the support on the side of the lesion aims to build body awareness and increase stabilization of the pelvis. The stabilization in the pelvis will be used as the basis for postural control (Gjelsvik, 2016). The next exercise is single leg stance using the injured leg as a support by holding on and repeating flexion/extension movements at the knee joint for 30 seconds in the single leg stance position. Repeated movements of the knee joint after a single leg stance will increase the ability of the extensor muscles in the hip and knee which will raise awareness to determine the fulcrum (weight bearing). Muscles in the lower extremities consist of muscle spindles or proprioceptive sensory receptors that have sensitive receptors such as the Golgi tendon organs. Proprioceptive stimulation will provide segmental movement information for the motor control system so that the activated muscle strength also changes. Single leg stance exercise will increase the sensory input of muscle activation in the lower extremity on the side of the injured leg so that it will make the body load more balanced and cause an increase in balance ability (Jung et al., 2014).

In walking training, patients are given exercises in the form of tandem walking, side-step walking and backward walking. At the time of tandem walking exercise, stroke patients will be trained visually by looking forward in order to broaden the direction of view to be able to walk straight. In addition to visual training, walking exercises also activate somatosensory, vestibular and proprioceptive which maintains an upright body position during walking. This exercise is done slowly in order to increase the proprioceptive response, so that there is an increase in sensory input that will be processed in the brain as central

processing. Central processing serves to determine the fulcrum of the body and the alignment of gravity in the body to form good posture control and then the brain will transmit these impulses to the effector so that the body is able to create good stability and improve balance abilities (Ayu, 2018). The side-step walking exercise aims to create greater muscle activity and produce a good gait. The results of this exercise lead to an increase in symmetrical gait and improvement in gait provides an important clinical factor for recovery due to the active participation of the hip adductor and abductor muscles combined with hip extension during side-step walking, which is very useful for stroke patients with a synergistic effect. the lower extremities (Kim, Jeon, Lee, & An, 2013). In the backward walking exercise there is no visual information to anticipate ground conditions. Patients must adjust and adapt to changes in visual, proprioceptive, and vestibular information by increasing control of movement to maintain balance (Sedhom, 2017).

Conclusion

The provision of single leg stance and walking training provides a more significant increase in static balance, because these two exercises activate the visual, vestibular, somatosensory and proprioceptive systems which play a very important role in balance control. So it can be concluded that the administration of these two exercises when combined will provide an increase in balance, especially static balance which is significant for single leg stance and walking training.

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