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IMPROVING POST STROKE FUNCTIONAL ABILITY USING THE BOBATH CONCEPT : A CASE REPORT

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Abstract

Introduction: Stroke is one of the health problems that causes disability. According to the World Stroke Health Organization, there are 13.7 million new cases of stroke that cause a decrease in functional ability every year. Physiotherapy interventions based on the Bobath Concept are one of the interventions that are widely used to treat disability problems in post-stroke patients, although the results of these interventions may vary. A study is needed in the management of handling disability in post-stroke using the Bobath Concept, in order to improve functional abilities. This aim can be achieved through exercises that refer to postural improvement, movement analysis, selective movement and the role of sensory information to achieve functional targets.

Case Presentation: A 65-year-old man was diagnosed with a right ischemic stroke in December 2020 with a condition of hemiparesis on his left side of the body, 1 week after that the patient was referred for physiotherapy at the Halmahera Medika Main Clinic. The patient reported having hypercholesterolemia. During the initial stroke, the patient feels a cold and limp sensation on the side of the lesion. The results of the examination showed that the patient had impaired postural control, decreased selective movement ability, which led to a decrease in functional ability.

Management and Outcome: Patients undergo a therapy program every 3 times a week and each session lasts 40-50 minutes. Physiotherapy with the Bobath concept includes facilitation to activate postural muscles and to suppress the synergistic pattern of stroke, pelvic mobilization, hip mobilization, active assisted exercise, positioning how to sleep to sitting, balance and coordination exercises, walking exercises and facilitation of weight bearing. At the end of the study the patient experienced an increase in functional ability, especially transfer and walking category. From the results we can state that there is an increase in the patient's functional status based on the Barthel Index, especially in the ability to transfer and walk on a flat road.

Discussion: Two articles have been selected to support and compare with this study, the findings of which are in line with the research of Besios et al (2019), and Mikołajewska (2013). Base on the functional movement analysis and response to facilitation, which is part of the assessment, it shows that the given exercises improve postural orientation and posture stabilization in sitting, standing, and walking. This is the reason how the functional abilities in our patients developed after the intervention especially the transfer and ambulation abilities of walking.

Conclusion: The conclusion of this case report is that there is an increase in functional ability, especially the patient's ability to transfer or ambulate independently on one of the Barthel index items, several other items also experienced an increase although not as much as an increase in transfer ambulation.

Keywords: stroke, bobath, physiotherapy, exercise, functional, barthel index

Introduction



Data World Stroke Health Organization shows that every year there are 13.7 million new cases of stroke with decreased functional ability, and about 5.5 million deaths occur due to stroke. According to the RI Health Research Center of the Ministry of Health of the Republic of Indonesia, the Indonesia stroke prevalence in 2018, based on a doctor's diagnosis, in a population aged > 15 years was 10.9%, or an estimated 2,120,362 people (3). It is a global public health problem causing significant disability (8). Patients who have experienced a stroke will undergo physical therapy to restore their condition and functional ability. Stroke is the second leading cause of death and the third leading cause of disability in the world (3). According to World Health Organization (WHO), stroke is a condition in which clinical signs develop rapidly in the form of focal and global neurologic deficits, which can be severe and last for 24 hours or more and or can lead to death, without any obvious cause other than vascular disorder.

One of the concepts that is often used in dealing with stroke is the Bobath approach. The bobath concept is the most widely used approach to neurological rehabilitation in the world. The Bobath concept application focuses on movement analysis with respect to selective movement, postural control, and the role of sensory information to develop a movement diagnosis as a guide in intervention and evaluation (2).

In the study of Taha et al. (2018) which examined the effect of the bobath concept combined with task-oriented exercises to improve postural stability in chronic stroke patients, showed that the combination of bobath and task-oriented exercises gave good results on postural stability. The results of this study were measured using the Berg Balance Scale, Timed Up and Go test; and trunk and pelvic malalignment detected by Formetric II device. However, this study has not discussed the effect of exercise based on the Bobath concept on improving the patient's functional ability that is strongly influenced by the ability of postural stability (9).

Based on this explanation, the purpose of our study was to examine the effect of exercise based on the Bobath concept in improving the post-stroke patient's functional ability.

Case Presentation

A 65-year-old man with an office worker was diagnosed with a right ischemic stroke in December 2020 with a condition of hemiparesis on his left side of the body, the patient was treated for about 1 week in the hospital for recovery, 1 week after that the patient was



referred for physiotherapy at the Halmahera Medika Main Clinic . The patient reported having hypercholesterolemia, and had a postoperative history of his left knee which caused intermittent pain due to joint degeneration. Most of the patient's daily activities are carried out in the office and are more dominant in a sitting position.

At the beginning of the stroke the patient felt a cold sensation all over the left side of his body and lost strength on the same side. Currently, the patient is unable to carry out activities and can only sit and sleep with the help of others. The results of the patient's examination showed spasticity category 3 according to the Asworth scale, and a synergistic pattern of flexion type in the left upper and lower limbs. On examination in a sitting position, it appears that the shoulder on the lesion side is higher than the healthy side, the pelvis is more focused on the healthy side, and on examination of functional ability using the Barthel index, a score of 44 means that the patient is moderately dependent. No sensory disturbance was found in this patient. Prior to undergoing a physiotherapy session, patients were asked to sign a letter of agreement and consent in the form of an informed consent at the Main Clinic of Halmahera Medika Bandung.

Management and Outcome

Exercise therapy started a week after patient was discharged from the hospital. The physiotherapy program was carried out every 3 times a week according to the neurologist referral, and each therapy session lasted for 40-50 minutes. Therapeutic facilities with the Bobath concept include facilitation to activate postural muscles and to suppress the synergistic pattern of stroke, pelvic mobilization, hip mobilization, active assisted exercise, positioning how to sleep to sitting, balance and coordination exercises, walking exercises and weight bearing facilitation.

We conducted a study on the patient's functional activity at each session using the Bartel Index. In the early stages of the study, the patient's functional activity obtained an interpretation score of 44 (moderate/moderate dependence). In the second study the patient's functional activity obtained an interpretation score with a score of 48 (moderate/moderate dependence). In the third study, the patient's functional activity obtained an interpretation score of 52 (moderate/moderate dependence). In the fourth study, the patient's functional activity obtained an interpretation score with a score of 53 (moderate/moderate dependence).



In the fifth study, the patient's functional activity obtained an interpretation score with a score of 55 (moderate/moderate dependence). In the sixth study, the patient's functional activity obtained an interpretation score of 58 (moderate/moderate dependence). While in the seventh study, the patient's functional activities obtained an increase in the interpretation value with a score of 61 (mild dependence). In the eighth study, the patient's functional activity obtained an interpretation score of 65 (mild dependence). The results of all functional examination using the Barthel index are listed in Table 1.

Table 1. Barthel Index

Category	With the help of	independent	T0	T1	T2	T3	T4	T5	T6	T7	T8
Eat	5	10	5	5	7	8	8	8	9	9	9
Transfer/move	5-10	15	5	5	6	7	8	8	8	9	10
personal hygiene	0	5	3	3	3	4	4	4	4	4	4
Toileting/wearing clothes	5	10	3	3	3	3	3	4	4	4	6
Take a bath alone	0	5	3	3	3	3	3	4	4	4	4
Walk on a flat surface	0	5	0	0	0	0	0	0	1	3	5
Up and down stairs	5	10	0	0	0	0	0	0	0	0	0
Dressing/tying shoes	5	10	5	5	6	7	7	7	8	8	8
Bowels Control	5	10	10	10	10	10	10	10	10	10	10
Bladder Control	5	10	10	10	10	10	10	10	10	10	10
Total value			44	44	48	52	53	55	58	61	65

Note: A value of 0 (zero) is given if the patient cannot perform the specified criteria.

At the beginning of the study, the patient could not sit, stand and walk without assistance and only used a wheelchair, but at the end of the study the patient had improved functional abilities. In the last session, the patient is independently able to sit from a lying position, stand from a sitting position and has started walking without assistance on a level road, also perform various functional activities as listed in the Barthel index table above. From the results, it shows that there is an increase in the patient's functional status, but it does not guarantee the patient's independence in daily life, because the achievement of the higher score on Barthel Index is not necessarily represent someone who can perform daily activity



without any help at all and have a good movement quality.

Discussion

In this case, it was found a change in the total score on the Barthel index which was originally 44 points to 65 points at the 8th meeting. The most visible changes were in two categories out of a total of ten categories, namely in the transfer category and walking on a flat surface, where the other parameters did not. there are significant changes. The patient's results, namely experiencing functional improvement in each aspect gradually in each therapy session, were measured using the Bartel index which consisted of ten items, each item experienced an increase but the increase in ambulation transfer was the most compared to other functional items. Ambulation transfer refers to the patient's ability to include the ability to move / move from chair to bed, chair to toilet, light walking etc. This ability is a complex purposeful movement. These functional items require sensory integration, postural control and selective movement. These three components can be improved through exercises based on the concept of bobath which can be applied with various movements or certain treatments accompanied by the application of skilled facilitation skills, such as the use of light touch, and the use of the environment as a medium for facilitation (6).

As for achieving the target and getting these component points, we apply several exercise movements, one of which is that we do pelvic mobilization or pelvic tilting because, the effects of stroke trigger body imbalances, asymmetrical postures, decreased muscle strength, and limited range of motion and flexibility, causing difficulties. in performing normal movement strategies.

Displacement of the pelvis triggers difficulty in maintaining balance and a normal gait, and also limits social participation. Pelvic mobilization exercises can improve the balance of stroke patients, and stabilization exercises on the trunk and pelvis can improve functional abilities (4).

The findings of this study are in line with the research of Besios et al. (2019) on Effects of the Neurodevelopmental Treatment (NDT-Bobath) in the Mobility of Adults with Neurological Disorders. This study involved 20 people with neurological disorders (11 people with multiple sclerosis and 9 people with hemiplegia). Participants were divided into two groups, Low Frequency (LF) and High Frequency (HF). Participants participated in two intervention programs that differed in terms of frequency, where the LF group received the



NDT-Bobath intervention program once (1) a week and the HF group received the NDT-Bobath intervention program three (3) times a week with both durations of one hour per session. . As a result, the Bobath concept improved the mobility and functionality of patients with neurological disorders (BBS, $p = 0.095$ and Tinetti's test, $p = 0.099$) although it did not significantly improve spasticity (MAS, $p = 0.095$). This can be achieved because the purpose of implementing the Bobath concept is to trigger the motor learning process for efficient motor control in various environments, thereby increasing functional abilities. This is done through the management of the patient by a physiotherapist, who guides the patient through initiation of movement patterns and how to complete functional tasks (6).

The findings of this study are also in accordance with Mikołajewska's (2013) research on The Value of the NDT-Bobath Method in Post-Stroke Gait Training. This study involved 60 adult patients who had experienced an ischemic stroke. These patients received treatment using the NDT-Bobath method. The evaluation parameters used were spatio-temporal gait parameters (gait velocity, cadence and stride length) after ten therapy sessions. In the study, among the 60 subjects involved, the results were that, in terms of walking speed, improvement was experienced in 39 subjects (65%), decreased walking speed occurred in 9 subjects (15%), and no significant change was measured in 12 subjects (20%). In terms of walking rhythm, improvement was experienced by 39 subjects (65%), decreased walking speed occurred in 16 cases (26.67%), and there was no significant change in 5 cases (8.33%). Then in terms of stride length, improvements occurred in 50 subjects (83.33%), a decrease in stride width occurred in 4 subjects (6.67%), and there was no significant change in 6 subjects (10%). In conclusion, exercise with the concept of bobath in ischemic stroke patients is able to improve walking speed, walking rhythm, and improve stride length (7).

The Bobath method is based on knowledge of motor control, motor learning, and the plasticity of nerve and muscle tissue (1). Bobath concepts also underlie movement task analysis and intervention on understanding the integral relationship between postural control and sensory motor performance, which requires selective movement to produce coordinated movement sequences. It is widely recognized that the central nervous system requires accurate and updated sensory information at all stages of movement to influence motor output such as walking. Patients undergoing this treatment usually learn how to control their posture and movement, and then the movement tasks they perform. The therapist analyzes



posture and movement, then they correct any abnormalities that may be present when performed by the patient. This approach requires the active participation of the patient and care giver, while the physiotherapist facilitates movement (6).

The clinician seeks to identify the client's potential for positive functional recovery, while recognizing the limitations of the neurologic deficit. A movement diagnosis is a compilation of significant aspects of the functional movement analysis of an individual's clinical presentation. we do not treat “neurological conditions”, but treat the individual impact of neurological conditions on clients from a movement, perceptual, and cognitive perspective. Interventions specifically aim to optimize activity, participation, and quality of daily activities (5).

We apply exercises based on key aspects and flow of thought from the clinical practice of the bobath concept or the bobath of clinical practice (MBCP) model. We perform therapeutic actions to overcome the movement problems that clients experience based on three main aspects, namely functional movement analysis, skilled facilitation and Clinical reasoning. When these three aspects are carried out, the interventions carried out have included handling the problem of postural control, sensory performance and selective movement of the patient. Based on functional movement analysis and response to facilitation, which is part of the assessment, it shows that the given exercises improve postural orientation and posture stabilization in sitting, standing, and walking (6). This is the reason on how the functional ability in our patient developed after the intervention especially the transfer and ambulation ability to walk.

Conclusion

The conclusion of this case report shows that there is an increase in functional ability, especially the patient's ability to transfer or ambulate independently on one of the Barthel index items, while several other items also experienced an increase although not as much as an increase in transfer ambulation. The bobath approach to improve functional ability provides good outcomes for these stroke patients, however, the achievement of higher score on the Barthel index does not guarantee the patient's independence in daily life completely and optimally improve the quality of movement. Besides that, this results were limited to the January-February intervention period and long-term effects were not tested.



Acknowledgments

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