

The Effectiveness of Bobath Exercises on the Ability to Walk and Leg Spasticity of Stroke Patients

Suharto^{1*}, Arpandjam'an², Abd Rahman³, Suriani⁴

^{1,2,4} Physiotherapy Study Programs at the Ministry of Health Makassar

³Bhayangkara Makassar Police Hospital

*Email : Suhartoftt11@gmail.com

ABSTRACT

Common problems of stroke include spasticity, weakness, and loss of balance on the affected side causing the inability to maintain postural alignment so that patients experience barriers to daily activities. The aims of this study aims was to determine the effectiveness of weight exercises on walking ability and reducing spasticity in stroke patients. The type of research was pre-experimental with pre-test - post-test one group design. The study population was post-stroke hemiparesis patients at Bhayangkara Hospital Makassar and the study sample was 12 people according to the research inclusion criteria. The independent variable was bobath exercises and the dependent variable was the ability to walk and spasticity. The measurement of walking ability uses the Timed Up and Go Test scale and the measurement of spasticity using the Asworth scale. The results of the study on the ability to walk obtained a score of $p = 0.00$ and spasticity obtained a value of $p = 0.00$. Bobath exercise can improve walking ability and reduce spasticity of stroke patients, so treatment of stroke patients should use this method.

Keywords: Bobath exercises, walking, spasticity, stroke.

INTRODUCTION

Stroke attacks often cause sufferers to experience motor disabilities such as spasticity or joint contractures, so this condition needs to be prevented from the start of having a stroke. (Imran et al, 2020) Stroke can cause sudden death or result in disability for the sufferer. In Europe the incidence of stroke is twice as high in men than women. In the United States, stroke is the third leading cause of death after heart disease and cancer. Every year 500,000 people in the United States suffer a stroke, of which approximately 100,000 people suffer from hemorrhagic strokes, including intracerebral hemorrhage and subarachnoid hemorrhage. (Imran et al, 2020)

The resulting deficit has a significant impact on the independence, quality of life and productivity of the workers. Common deficiencies in stroke include spasticity, weakness, and loss of balance on the affected side leading to an inability to maintain postural alignment. (Sharma & Kaur, 2017) Nerve damage and stroke in particular are the leading causes of long-term disability worldwide (Annethattil et al. , 2017)

In Indonesia, although there is no complete epidemiological study, Budiarmo et al reported that stroke mortality from household surveys was 37.3 per 100,000 population. Based on the 2007 Basic Health Research (Riskesdas) conducted in 33 provinces by the Indonesian Ministry of Health, it was found that stroke is the main cause of death in Indonesia. surviving a stroke is one of the major health problems in the world. 50% of these patients have impaired balance, coordination, spatial orientation and weight distribution. (Krukowska et al., 2016)

Postural control is one of the most important indicators of functional recovery after stroke. There is a strong correlation between trunk performance and balance, gait, and functional skills of stroke patients. Weakness and increased tone in the trunk muscles, increased postural imbalance, failure of dynamic stability, and difficulty in transferring weight all negatively impact the patient's activity performance. (Kilinc et al., 2016)

Impaired torso function often occurs in stroke patients. Previous studies have reported muscle weakness and trunk muscle

activity. significant error of trunk position, inadequate central pressure control while sitting, decreased trunk performance and trunk asymmetry during activity (Haruyama et al., 2017).

Function not only depends on muscle tone but also on muscle strength, coordination, endurance and sensation so that management of spasticity does not have to focus exclusively on the problems of patients with passive muscle stretching (Picelli et al., 2018). Currently, one of the selected treatment methods for stroke is bobath exercises. Trunk is the core of the treatment program for hemiplegic patients using the Bobath concept. With proper trunk control and weight transfer, the posture will be upright and the achievement of functional movement will be achieved (Kiliñç et al., 2016). Bobath is an effective treatment for improving walking of stroke patients compared to traditional medicine. (Mikołajewska, 2017)

Several studies on bobath exercises are Mikołajewska, Emilia (2017), Dubey L et.al (2018), Ko EJ, Chun MH (2016) which concluded that bobath exercises can improve the functional motion of stroke patients, because it improves the control of trunk and lower extremity movements. , hip muscle strength, walking speed and daily activities in stroke. (Dubey et al., 2018) so that the intervention of bobath exercises is the physiotherapy treatment of choice for stroke patients. Based on this description, further research is needed to determine the effectiveness of bobath exercise on the ability to walk and decrease limb spasticity in stroke patients at the Bhayangkara Police Hospital in Makassar.

MATERIALS AND METHODS

The type of research was pre-experimental with pre-test - post-test one group design. The study population was post-stroke hemiparesis patients at Bhayangkara Hospital Makassar and the research sample was 12 people who were determined based on the results of the large sample count. Sample inclusion criteria,

namely: 1) post-stroke hemiparesis patients who experienced limb spasticity, 2) unable to walk, 3) willing to participate in this study, 4) subject age: 40 - 65 years and 5) able to communicate well. while the exclusion criteria were: 1) stroke patients with diabetes mellitus, 2) post-stroke hemiplegia patients and 3) blood pressure more than 140/90 mmHg.

Data was collected by recording the identity of post-stroke hemiparesis patients and then measuring spasticity using the Asworth scale (Syatibi & Suhardi, 2016) and measuring walking ability using the Timed Up and Go Test (Nurmalasari et al., 2019) before and after treatment.

Research procedures are carried out starting from:

1. Preparation of research administration, namely research ethics, research permits, research schedules and research materials. This research has received ethical approval from the Health Research Ethics Commission of the Makassar Health Polytechnic with Ethical Approval Recommendation No. No. : 0533 / KEPK-PTKMS / VII/2021, July 2, 2021
2. Pres test measuring walking ability using the Timed Up and Go Test (Nurmalasari et al., 2019) and measuring spasticity with Asworth (Syatibi & Suhardi, 2016) and (Sánchez-Mila et al., 2018) which were recorded in measurement blank.
3. Research Implementation
The treatment of this study was intervention on the research subjects as many as 12 post-stroke hemiparesis patients who were given bobath exercises at a dose: 1 time/day, 3 times a week and 6 times for each study subject. Implementation of Bobath exercises by activating the movements of the abdominal muscles, pelvic floor muscles, lumbar extensor muscles and hip muscles, ankle muscles (dorso flexion and plantar flexion) plus trunk flexion, extension and rotation movements.

4. Implementation of the Post test

After the treatment was carried out on the research subject, measurements of walking ability and spasticity were carried out (Sánchez-Mila et al., 2018) which were recorded on the measurement form according to the physiotherapy examination form used in the Physiotherapy Study Program of the Health Polytechnic of the Ministry of Health Makassar. ability to walk and leg spasticity, data analysis was performed using a paired T test with a significant level of $p < 0.05$ with CI = 95%.

RESULTS AND DISCUSSION

Table 1. Age and gender distribution of research subjects at the Bhayangkara Police Hospital in Makassar

Characteristics of Research Subjects	n	%
Gender		
Man	7	58.33
Woman	5	41,67
Age		
48 – 56 years	5	41,67
57 - 64 years old	7	58,33
Total	12	100

Walking Ability

Walking ability is the ability of research subjects to move their legs which can be measured by the Time Up and Go Test. The results of the test of treatment data are presented in table. 2 Paired t Test obtained p value = 0.00 which means that there is a significant effect of the treatment of bobath exercises on increasing the walking ability of the research subjects.

Table 2. Paired t test of the research subject's walking ability

Treatment	Mean Pre Test	Mean Post Test	p
<i>Bobath exercises</i>	25.4500	17.9750	0.000

Limbs spasticity

A muscle disorder characterized by an increase in muscle tone and difficulty in passive movement as measured using the

Asworth scala (Syatibi & Suhardi, 2016). The results of testing the treatment data are presented in table 3. The results of the Paired t Test obtained p value = 0.000, which means that there is a significant effect of the treatment of bobath exercises on the reduction of limb spasticity of the research subjects.

Table 3. Paired t test for spasticity of research subjects

Treatment	Mean Pre Test	Mean Post Test	p	Difference in Mean Pre-Post test
<i>Bobath exercises</i>	3.000	1.666	0	- 1.3333

In table 2 the results of the study show that there is a significant effect of the treatment of bobath exercises on the walking ability of the research subjects. Bobath exercise improves trunk control, dynamic sitting balance, standing balance, gait and activities of daily living in patients after subacute stroke (Cabanas-Valdés et al., 2016), (Tamil & Ravi, 2019) Further research by Karthikeyan, Thangavelu (2020) (Karthikeyan, 2020) that functional task intervention with unilateral ankle foot orthose (AFO) and knee gaiter is more effective than bobath intervention in stroke patients. Bobath training effect improves balance by 103%, (Prime, 2017). Improved balance in post-stroke patients as an effect of the bobath training method due to an increase in the body's ability to improve postural control and stability (Kilinç et al., 2016)

Balance relates to posture regulation that involves little muscle activity to maintain body stability. The function of posture regulation is to keep the body in a balanced position. Changing the center of gravity can be improved by setting a good attitude attitude. With the Bobath method, stroke patients will learn to adjust their position so as to create a good balance in doing activities (Kilinç et al., 2016), (Pratama, 2017). Walking exercise with a time of 12 weeks in a distance of 10, the results are better for

increasing the walking ability of stroke patients (Kiliñç et al., 2016)

Table 3 shows a significant effect of the treatment of bobath exercises on the reduction of limb spasticity of the research subjects. The bobath technique can reduce spasticity and is very effective for improving gross motor skills and plays an important role in treating cerebral palsy and increasing muscle tone, reflexes and patterns of reaction and movement (Trisnowiyanto & Syatibi, 2020)

The results of the current study indicate that individuals with high spasticity have greater impaired balance control in standing compared to individuals with low spasticity (Rahimzadeh Khiabani et al., 2017). The subjects of this study had low spasticity values, namely 2 and 3 from the results of the Asworth scale measurement.

The research of Besios et al. (2018) proved that the Bobath method improves mobility and functionality of patients with neurological disorders but does not improve spasticity, (Besios et al., 2018) but Park and Kim (2017) concluded that Bobath exercises in cerebral palsy for 1 year at a dose of 35 minutes per days, 2-3 times per week was significantly effective in reducing spasticity but did not improve gross motor function (Park & Kim, 2017) and (Cardoso et al., 2020).

Bobath exercises can significantly increase the excitability of alpha motor neurons in central nervous system disorders. With this increase, the motor learning process can be formed as well as the adaptation process and plasticity in the nerves that can help restore movement activity in stroke patients (Besios et al., 2018). Therefore, a bobath intervention approach is needed to improve functional abilities in stroke patients so that they can move return. Likewise research (Kiliñç et al., 2016) and (Besios et al., 2019) stated that the exercise program developed individually in the Bobath concept further improved trunk performance, balance, and walking and functional abilities in stroke patients compared to conventional exercise. The motor learning program was more effective than the Bobath technique but the

combined effect of the two techniques was more effective than the individual effect, with significant changes in upper limb functional recovery in stroke patients. (Annethattil et al., 2017)

CONCLUSION

Bobath exercises can improve walking ability and reduce spasticity in stroke patients, so this method can be a reference for treating stroke patients who experience spasticity.

ACKNOWLEDGEMENT

The authors would like to thank the Director, Wadir I, II, III, the head of UPPM and his staff, the head of the physiotherapy department and lecturers who have provided support in this research.

REFERENCES

- Annethattil, A., Paul, J., & Sebastian, J. (2017). Combined effect of Bobath technique and Motor Relearning Program (MRP) over its individual effects to improve upper limb functions in stroke patients. *International Journal Medical and Exercise Science*, 03(04), 435–442.
<https://doi.org/10.36678/ijmaes.2017.v03i04.003>
- Besios, T., Nikolaos, A., Vassilios, G., & Giorgos, M. (2019). Effects of the Neurodevelopmental Treatment (NDT-Bobath) in the Mobility of Adults with Neurological Disorders. *Open Journal of Therapy and Rehabilitation*, 07(03), 120–130.
<https://doi.org/10.4236/ojtr.2019.73008>
- Besios, T., Nikolaos, A., Vassilios, G., Giorgos, M., Tzioumakis, Y., & Comoutos, N. (2018). Effects of the Neurodevelopmental Treatment (NDT) on the Mobility of Children with Cerebral Palsy. *Open Journal of Therapy and Rehabilitation*, 06(04), 95–103.
<https://doi.org/10.4236/ojtr.2018.64009>
- Cabanas-Valdés, R., Bagur-Calafat, C., Girabent-Farrés, M., Caballero-Gómez, F. M., Hernández-Valiño, M., & Urrútia

- Cuchí, G. (2016). The effect of additional core stability exercises on improving dynamic sitting balance and trunk control for subacute stroke patients: A randomized controlled trial. *Clinical Rehabilitation*, 30(10), 1024–1033.
<https://doi.org/10.1177/02692155155609414>
- Cardoso, J. S., Cristina, I., Universidade, T., Miranda, G., & Universidade, T. (2020). *ACIDENTES VASCULAR ENCEFÁLICO * Dentre as estratégias de tratamento tradicionais mais utilizadas por terapeutas Método Bobath , desenvolvido na década de 1950 e voltado a pessoas de qualquer idade por Contensão Induzida (TCI), uma técnica de neuro - reabilitação desenvolvida para.* 4(2), 178–191.
- Dubey, L., Karthikbabu, S., & Mohan, D. (2018). Effects of Pelvic Stability Training on Movement Control, Hip Muscles Strength, Walking Speed and Daily Activities after Stroke: A Randomized Controlled Trial. *Annals of Neurosciences*, 25(2), 80–89.
<https://doi.org/10.1159/000486273>
- Haruyama, K., Kawakami, M., & Otsuka, T. (2017). Effect of Core Stability Training on Trunk Function, Standing Balance, and Mobility in Stroke Patients: A Randomized Controlled Trial. *Neurorehabilitation and Neural Repair*, 31(3), 240–249.
<https://doi.org/10.1177/1545968316675431>
- Imran et al. (2020). Journal of Medical Science Efektifitas New Bobath Concept terhadap Peningkatan Fungsional Pasien Stroke Iskemik dengan Outcome Stroke Diukur Menggunakan Fungsional Independent Measurement (FIM) dan Glasgow Outcome Scale (GOS) di Rumah Sakit Umum Daerah. *Jurnal of Medical Science*, 1(1), 14–19.
- Karthikeyan, T. (2020). *Therapeutic Efficacy of Functional Task with Unilateral AFO and Knee Gaiter versus Bobath Intervention on Patients Gait Dysfunction in Stroke Population - A Comparative Study.* 02, 73–78.
- Kilinç, M., Avcu, F., Onursal, O., Ayvat, E., Demirci, C. S., & Yildirim, S. A. (2016). The effects of Bobath-based trunk exercises on trunk control, functional capacity, balance, and gait: A pilot randomized controlled trial. *Topics in Stroke Rehabilitation*, 23(1), 50–58.
<https://doi.org/10.1179/1945511915Y.000000011>
- Krukowska, J., Bugajski, M., Sienkiewicz, M., & Czernicki, J. (2016). The influence of NDT-Bobath and PNF methods on the field support and total path length measure foot pressure (COP) in patients after stroke. *Neurologia i Neurochirurgia Polska*, 50(6), 449–454.
<https://doi.org/10.1016/j.pjnns.2016.08.004>
- Mikołajewska, E. (2017). Bobath and traditional approaches in post-stroke gait rehabilitation in adults. *Biomedical Human Kinetics*, 9(1), 27–33.
<https://doi.org/10.1515/bhk-2017-0005>
- Nurmalasari, M., Widajanti, N., & Dharmanta, R. S. (2019). Hubungan Riwayat Jatuh dan Timed Up and Go Test pada Pasien Geriatri. *Jurnal Penyakit Dalam Indonesia*, 5(4), 164–168.
<https://doi.org/10.7454/jpdi.v5i4.241>
- Park, E. Y., & Kim, W. H. (2017). Effect of neurodevelopmental treatment-based physical therapy on the change of muscle strength, spasticity, and gross motor function in children with spastic cerebral palsy. *Journal of Physical Therapy Science*, 29(6), 966–969.
<https://doi.org/10.1589/jpts.29.966>
- Picelli, A., Chemello, E., & Smania, N. (2018). Neuromotor techniques, physical treatments and orthoses in spasticity. *Biosystems and Biorobotics*, 19, 489–500.
https://doi.org/10.1007/978-3-319-72736-3_32
- Pratama, A. D. (2017). Training Bobath

- Methods Better Than Feldenkrais Methods To Improve of Balance Among Post Stroke Patients. *Jurnal Vokasi Indonesia*, 5(2).
<https://doi.org/10.7454/jvi.v5i2.83>
- Rahimzadeh Khiabani, R., Mochizuki, G., Ismail, F., Boulias, C., Phadke, C. P., & Gage, W. H. (2017). Impact of Spasticity on Balance Control during Quiet Standing in Persons after Stroke. *Stroke Research and Treatment*, 2017. <https://doi.org/10.1155/2017/6153714>
- Sánchez-Mila, Z., Salom-Moreno, J., & Fernández-De-las-peñas, C. (2018). Effects of dry needling on poststroke spasticity, motor function and stability limits: A randomised clinical trial. *Acupuncture in Medicine*, 36(6), 358–366. <https://doi.org/10.1136/acupmed-2017-011568>
- Sharma, V., & Kaur, J. (2017). Effect of core strengthening with pelvic proprioceptive neuromuscular facilitation on trunk, balance, gait, and function in chronic stroke. *Journal of Exercise Rehabilitation*, 13(2), 200–205.
<https://doi.org/10.12965/jer.1734892.446>
- Syatibi, M. M., & Suhardi, S. (2016). Manipulasi Organ Golgi Tendon Untuk Mengurangi Tingkat Spastisitas Otot-Otot Penggerak Lengan Pasca Stroke Infark. *Jurnal Keterapian Fisik*, 1(1), 15–20.
<https://doi.org/10.37341/jkf.v1i1.63>
- Tamil, N., & Ravi, P. (2019). *Effectiveness of Bobath Approach on Trunk Balance in Patients*. 271720003.
- Trisnowiyanto, B., & Syatibi, M. M. (2020). Differences Influence of Aquatic Therapy and Neuro Developmental Treatment on the Motor Functional Development Ability of Children With Cerebral Palsy. *Jurnal Keperawatan Dan Fisioterapi (Jkf)*, 2(2), 165–171.
<https://doi.org/10.35451/jkf.v2i2.413>