



The Relationship Of Post-Stroke Adult Characteristics On Increasing Muscle Strength Rehabilitation In Bukittinggi City 2023

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Abstract

Introduction: Stroke is the third leading cause of death in the world. Long-term disability and paralysis becomes a burden for living stroke survivors. Disability results from muscle and nerve weakness upper and lower extremities. This research aims to identify the relationship between individual characteristics and history of stroke with muscle strength in stroke rehabilitation patients at home, Bukittinggi 2023. **Materials and Methods:** This research was conducted from May to June 2023. This study uses a cross-sectional descriptive analysis approach with questionnaires and Manual Muscle Testing (MMT). The total sample in this study was 42 respondents, using univariate and bivariate data. Data processing results using SPSS version 2.0 with the Qhi-Square Test. **Results:** based on gender showed that men were dominant at 71.4%, marital status at 69%, and in terms of education the majority was a bachelor's degree at 38.1%. self-employed jobs get 35.7% and socio-economic average 45.2% > IDR 3,000,000., on muscle strength in post-stroke rehabilitation patients increased using the MMT method by 59.9%. **Conclusion:** there is no relationship between the characteristics of respondents (gender, marital status, education, employment and socio-economics) on increasing muscle strength in post-stroke rehabilitation patients at home with a p value greater than 0.05.

Keywords: *Characteristics Respondent, Stroke, Muscle Strength*

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1. Introduction

Stroke is a cerebrovascular disease that is often found in developed countries, currently it is also common in developing countries, one of which is Indonesia. The problem of stroke in Indonesia is becoming increasingly important because Asia is in first place with an increasing number of cases. Stroke is one of the non-communicable diseases which is still an important health problem in Indonesia. Along with increasing morbidity and mortality at the same time, in Indonesia the increase in cases can have a negative impact on the nation's economy and productivity, because stroke treatment takes a long time and requires large costs.(Tsao et al., 2023) Stroke is one of the causes of functional activity disorders such as hemiparalysis, weakness, loss of sensation in the face, arms or legs on one side of the body, difficulty speaking or understanding, difficulty swallowing, and partial loss of vision on one side.(Cahyati et al., 2013).

The prevalence of stroke in Indonesia is based on diagnosis in people aged over 15 years, where in In 2020, the highest prevalence was in the province of North Sulawesi and the lowest was in the province of Papua. Then in 2022, East Kalimantan experienced an increase in stroke cases and took first place with the highest number of cases (14.7%). Meanwhile, Papua continues to occupy the lowest position in stroke cases with a figure reaching (4.1%).(Hombali et al., 2023) Early rehabilitation can be carried out immediately after the stroke patient's condition is stable and the patient's condition has improved. Improving nerve function is the goal of early supportive care through physical therapy. Counseling therapy, spiritual therapy, speech therapy and physical therapy are rehabilitation that can be carried out for stroke patients. One way of recovery for stroke patients is through physical therapy, namely Manual Muscle Testing (MMT) exercises. (Yanti & Santik, 2022)

Programmed exercises will influence the results, namely achieving an increase in muscle strength after the intervention is given. Non-compliance with control in stroke patients is caused by various behavioral factors and is a major risk factor that





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can increase the risk of recurrent stroke.(Welten et al., 2021) long term disability. Patients generally survive for three months and one third will survive for 10 years after a stroke(Venketasubramanian, 2023) Stroke can trigger neurological disorders and loss of control of motor movements. A common motor function disorder is paralysis on one side of the body caused by a lesion on the opposite side of the brain tissue (hemiplegia). Hemiparesis on one side of the body can be identified early in the stroke. When the condition recurs, it can be accompanied by increasing disturbances in the muscles of the extremities on the affected side. Stroke, the main cause of long-term disability, also has the potential to cause detrimental emotional and socio-economic impacts for patients and their families. (Larsson et al., 2019)

Muscle strength is defined as the endurance of muscle cells to withstand loads with maximum effort. Muscle mass and strength have a maximum capacity and can decrease gradually with age(Maden et al., 2023) Decreased muscle strength can not only impact body imbalance and walking ability, but also lead to an increased risk of falls. The general impact of physical limitations in stroke patients can be a decrease in muscle strength. This is the main cause of obstacles in carrying out daily activities so that it has an impact on the quality of self-care for stroke patients.(Alawieh et al., 2018) Muscle strength recovery after stroke is a multifactorial and dynamic process. Changes in muscle strength after a stroke include a decrease in the mass and length of muscle fibers. These changes are the main factor that reduces the ability of the affected muscles to produce controlled force. (Azzollini et al., 2021)

A person's muscle strength can basically be influenced by age, gender, and history of previous illnesses. Physiologically increasing age can reduce the ability of muscle protein synthesis and repair capacity which results in a decrease in muscle strength (Azzollini et al., 2021). Muscle fibers will shrink along with the aging process and occur more quickly in women . The decrease in muscle strength that occurs along with the reduction in muscle mass also occurs due to a history of disease that causes immobilization in the patient. As much as 10-15% of muscle strength can





be lost every week if the muscles are completely at rest, and 5.5% of muscle strength can be lost every day in conditions of complete rest and immobilization. (Susanti et al., 2019)

The phenomenon of the number of stroke patients obtained from home. The average level of independence of patients undergoing treatment is included in the fully compensatory category in meeting activity needs. Researchers in this study wanted to identify the relationship between individual characteristics and the impact of a history of a first stroke on the patient's muscle strength after a second stroke. This research can be used to design muscle strengthening exercises for stroke patients according to the patient's own history and characteristics.

2. Research Method

This research design uses descriptive analytical methods using a cross-sectional approach. This study measured muscle strength in post-stroke rehabilitation patients at home, Bukittinggi City, West Sumatra from May to June 2023. The sampling technique used the Ishac and Michael table formula to obtain 42 respondents. The inclusion criteria in this study are that the respondent is willing to be a respondent, willing to be a respondent after discharge from hospital, diagnosis by a doctor is a stroke with hemiplegic upper and lower extremity without complications, age of respondent is 26-45 years old, fully and not experiencing mental disorders, the longest post stroke is less than 6 months, can communicate well and able to use digital. Krtireia exclusion, namely not continuing to be a respondent more than 3 days, undergoing other complementary therapies, there is no network around the house of respondent, unstable physical condition.

The data collection tools used were demographic data questionnaires and Manual Muscle Testing (MMT) observation sheets. Manual Muscle Testing (MMT) is an examination method commonly used to measure musculoskeletal strength. This measurement has been tested for reliability by at least 11 previous studies and a reliability coefficient value was obtained $\alpha > 0.63$ to 0.98 for individual muscle groups, and $\alpha > 0.57$ to 1.0 for total MMT score. The validity value of MMT shows $r = 0.768$ (>0.05) (Bittmann et





al., 2020)(Bohannon, 2018) MMT provides an overview of the strength of voluntarily contracting muscle groups (Table 4.2). Researchers maintain research ethics by providing research explanations to respondents. After the respondent agrees, the respondent signs informed consent before the data collection process. Researchers also maintain the confidentiality of respondent data by using initial names and the data collected from respondents is confidential so that it is kept completely by the researcher. The collected data was then analyzed using the SPSS version 2.0 program to determine meaningful relationships between the independent and dependent variables. Univariate analysis of this research was carried out by looking at the frequency distribution of the variables gender, status, education, employment, socio-economics and patient muscle strength. Bivariate analysis was carried out using the Chi-Square test.

3. Results And Discussions

a. Result

The following is a table of the characteristics of respondents in post-stroke rehabilitation patients :

Table 4.1 Distribution of characteristic respondents

Variables	n = 42	(%)
Gender		
Female	12	(28.6)
Male	30	(71.4)
Married		
single	8	(19.0)
married	29	(69.0)
widow/widower	5	(11.9)
Education		
Senior High School	14	(33.3)
Diploma	4	(9.5)
Bachelor	16	(38.1)
Masters	7	(16.7)
Doctor	1	(2.4)





Occupation		
housewives	5	(11.9)
civil servants	3	(7.1)
private employees	6	(14.3)
retirees	1	(2.4)
farmers/laborers	9	(21.4)
entrepreneurs	15	(35.7)
others	3	(7.1)
Income economic status		
< Rp. 1,000,000	12	(28.6)
> Rp. 3,000,000	19	(45.2)
IDR 1,000,000-3,000,000	11	(26.2)

Data on the characteristics of respondents (Table 4.1) based on gender showed that men were dominant at 71.4%, marital status at 69%, and in terms of education the majority was a bachelor's degree at 38.1%. self-employed jobs get 35.7% and socio-economic average 45.2% > IDR 3,000,000.,

Table 4.2 Muscle Strength

Variables	n = 42	(%)
Muscle strength		
Increase	25	59.9
Not increase	17	40.5
Total	42	100

Data on muscle strength in post-stroke rehabilitation patients increased using the MMT method by 59.9%.

Table 4.3 Relationship of Characteristics and Muscle Strength

Characteristics Independent Variable	Muscle Strength		P- value	OR	CI 95%
	increase	Not increase			
Gender			0.345	0.381	0.086-1.691
Female	9	3			
Male	16	14			
Married			0.638	-	-
single	5	3			





married	18	11			
widow/widower	2	3			
Education			0.380	-	-
Senior High School	7	7			
Diploma	3	1			
Bachelor	8	8			
Masters	6	1			
Doctor	1	0			
Occupation			0.194	-	-
housewives	4	1			
civil servants	3	0			
private employees	5	1			
retirees	1	0			
farmers/laborers	3	6			
entrepreneurs	8	7			
others	1	2			
Income economic status			0.729	-	-
< Rp. 1,000,000	6	6			
> Rp. 3,000,000	12	7			
IDR 1,000,000-3,000,000	7	4			

From the data obtained as a whole, there is no relationship between the characteristics of respondents (gender, marital status, education, employment and socio-economics) on increasing muscle strength in post-stroke rehabilitation patients at home with a p value greater than 0.05.

b. Discussion

The results of tests on the relationship between individual characteristics and history of stroke and the patient's muscle strength (Table 4.3) show that the percentage of stroke sufferers tends to be more common in men. However, the results of the research that has been carried out do not show any differences. (Yulendasari & Risnarita, 2022), stated that the incidence of stroke is not related to gender. stroke occurs multifactorial and not only based on gender but also due to diabetes mellitus, hypercholesterolemia, smoking, alcohol and heart disease. If someone has more risk





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factors, they are more at risk of having a stroke than healthy people. Men are more at risk than women in a ratio of 3:2. Men tend to experience ischemic stroke, while women suffer from hemorrhage more often and die twice as often as men (Susanti et al., 2019). This shows that the majority of respondents who suffered strokes were men, due to their smoking or alcohol consumption habits.

The next factor is education, based on cross tabulation between descriptions of muscle strength and education, it was found that the majority, namely 16 respondents (38.1%) had a bachelor's degree, but it had no impact on the relationship with stump patients with a p value of 0.380. This fact is not in accordance with (Notoatmodjo, 2019) theory that education is an activity or learning process to develop or improve certain abilities so that the target can stand alone. The knowledge a person has is influenced by the level of formal and non-formal education. The higher a person's level of education, the better the level of knowledge, which ultimately influences a person's thinking pattern and reasoning power. According to (Notoatmodjo, 2019) a person's knowledge has an influence on their ability to think, in other words someone with higher education will be able to make more rational decisions.

Researchers concluded that a person with a Bachelor's level of education does not necessarily have good knowledge that is able to influence thinking patterns and reasoning power, so that respondents are able to make good decisions and obtain compliance in carrying out routine routine controls for 6 months in stroke patients. This can be based on a lack of information about health, so that rehabilitation patients are less aware of themselves. Likewise, it is described in terms of activity patterns or work status. If someone is able to manage time well, and can divide their life in harmony with a healthy lifestyle, then stroke will not occur in humans. If you have had a stroke, this MMT method shows a good effect on increasing muscle strength throughout the body.

If we look at the univariate data, there is an increase in muscle strength in rehabilitation patients, this is a stroke recovery program which aims to optimize the





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physical capacity and functional abilities of stroke patients so that they are able to independently carry out daily activities. (Udiyono et al., 2019) Rehabilitation programs can improve functional capacity, abilities related to daily activities, and quality of life. High adherence to a rehabilitation program is considered an indication of motivation, and higher motivation at the start of a rehabilitation program appears to improve outcomes in stroke patients. (Oyake et al., 2020) Extensive rehabilitation programs ranging from 5 to 20 hours of therapy per week may provide improved health outcomes, but residual impairment usually remains. (Groeneveld et al., 2019)

Stroke rehabilitation is divided into 3 stages, including acute stage rehabilitation which begins 24-72 hours after a stroke, subacute stage rehabilitation starting 2 weeks-6 months after a stroke, and chronic stage rehabilitation more than 6 months after a stroke. One way to achieve recovery depends on compliance with physiotherapy and the condition of the body. The process of post-stroke recovery includes restoring brain nerve function and restoring the ability to carry out activities. (Fauzia et al., 2022) One form of initial rehabilitation for stroke sufferers is by providing mobilization in the form of MMT, both passive and active. Providing range of motion exercises for 2 weeks with 8 repetitions and carried out 2 times a day can influence the degree of joint range of motion. (Anita, 2018)

Muscle strength is the ability of muscles to withstand loads, both external loads and internal loads. Strength of a muscle is generally needed to carry out activities. All movements are the result of increased muscle tension as a motor response. Muscle strength can be described as the ability of muscles to withstand loads in the form of external loads and internal loads. Muscle strength is closely related to the neuromuscular system, namely how much the nervous system is able to activate muscles to contract, so that the more muscle fibers are activated, the greater the strength produced by the muscle. Programmed training will influence the results, namely achieving an increase in muscle strength after being given the intervention. (Suwaryo et al., 2019)





4. Conclusion

The results of the analysis state that there is no relationship between gender, education, occupation and socio-economics on muscle strength stroke patients with a p-value greater than 0.05 but if seen from the univariate table, MMT increased in post-stroke rehabilitation patients.

5. Compliance with ethical standards

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Disclosure of conflict of interest

There is no potential for any stakeholder to have a conflict of interest in this research.

Statement of informed consent

In our capacity as writers, every action we perform constitutes a joint agreement or consent.

Reference

- Alawieh, A., Zhao, J., & Feng, W. (2018). Factors Affecting Post-Stroke Motor Recovery: Implications On Neurotherapy After Brain Injury. *Behavioural Brain Research*, 340, 94–101. <https://doi.org/10.1016/j.bbr.2016.08.029>
- Anita, F. (2018). Pengaruh Latihan Range Of Motion Terhadap Rentang Gerak Sendi Ekstremitas Atas Pada Pasiepasca Stroke Di Makassar. *Journal Of Islamic Nursing*, 3(1), 97–99.
- Azzollini, V., Dalise, S., & Chisari, C. (2021). How Does Stroke Affect Skeletal Muscle? State Of The Art And Rehabilitation Perspective. *Frontiers In Neurology*, 12(December). <https://doi.org/10.3389/fneur.2021.797559>
- Bittmann, F. N., Dech, S., Aehle, M., & Schaefer, L. V. (2020). Manual Muscle Testing—Force Profiles And Their Reproducibility. *Diagnostics*, 10(12). <https://doi.org/10.3390/Diagnostics10120996>
- Bohannon, R. W. (2018). Reliability Of Manual Muscle Testing: A Systematic Review. *Isokinetics And Exercise Science*, 26(4), 245–252. <https://doi.org/10.3233/IES-182178>
- Cahyati, Y., Nurachmah, E., Priyo Hastono, S., Kemenkes Tasikmalaya, P., Keperawatan, J., Studi Magister, P., & Ilmu Keperawatan, F. (2013). Perbandingan Peningkatan





- Kekuatan Otot Paise Hemiparese Melalui Latihan Range Of Motion Unilateral Dan Bilateral. *Jurnal Keperawatan Indonesia*, 16(1), 2354–9203.
- Fauzia, I. E., Ahyana, & Kasih, L. C. (2022). KEPATUHAN REHABILITASI PASIEN PASCA STROKE DI RUMAH SAKIT UMUM DAERAH Dr. ZAINOEL ABIDIN BANDA ACEH. *JIM Fkep*, VI, 1–9.
- Groeneveld, I. F., Goossens, P. H., Van Braak, I., Van Der Pas, S., Meesters, J. J. L., Rambaran Mishre, R. D., Arwert, H. J., & Vliet Vlieland, T. P. M. (2019). Patients' Outcome Expectations And Their Fulfilment In Multidisciplinary Stroke Rehabilitation. *Annals Of Physical And Rehabilitation Medicine*, 62(1), 21–27. <https://doi.org/10.1016/j.rehab.2018.05.1321>
- Hombali, A., Mahmood, A., Gandhi, D. B. C., Kamalakannan, S., Chawla, N. S., D'souza, J., Urimubenshi, G., Sebastian, I. A., & Solomon, J. M. (2023). Clinical Practice Guidelines (Cpgs) For Stroke Rehabilitation From Low- And Middle-Income Countries (Lmics): Protocol For Systematic Review. *Plos ONE*, 18(11 November), 1–9. <https://doi.org/10.1371/journal.pone.0293733>
- Larsson, L., Degens, H., Li, M., Salviati, L., Lee, Y. I., Thompson, W., Kirkland, J. L., & Sandri, M. (2019). Sarcopenia: Aging-Related Loss Of Muscle Mass And Function. *Physiological Reviews*, 99(1), 427–511. <https://doi.org/10.1152/physrev.00061.2017>
- Maden, T., Sari, E. O., Turhan, B., & Maden, Ç. (2023). Comparison Of Physical Activity, Functional Fitness And Fatigue According To Gender In Young-Old. *European Journal Of Geriatrics And Gerontology*, 5(3), 189–195. <https://doi.org/10.4274/Ejgg.Galenos.2023.2023-1-4>
- Notoatmodjo, S. (2019). *Buku Ilmu Perilaku Kesehatan* (A. B. Saifuddin (Ed.); Cetakan Ke). PT Bina Pustaka.
- Oyake, K., Suzuki, M., Otaka, Y., Momose, K., & Tanaka, S. (2020). Motivational Strategies For Stroke Rehabilitation: A Delphi Study. *Archives Of Physical Medicine And Rehabilitation*, 101(11), 1929–1936. <https://doi.org/10.1016/j.apmr.2020.06.007>
- Susanti, S., Susanti, S., & Bistara, D. N. (2019). Pengaruh Range Of Motion (ROM) Terhadap Kekuatan Otot Pada Pasien Stroke. *Jurnal Kesehatan Vokasional*, 4(2), 112. <https://doi.org/10.22146/jkesvo.44497>
- Suwaryo, P. A. W., Widodo, W. T., & Setianingsih, E. (2019). The Risk Factors That Influence The Incidence Of Stroke. *LPPM Sekolah Tinggi Ilmu Kesehatan Kendal*, 11(4), 251–260.
- Tsao, C. W., Aday, A. W., Almarzooq, Z. I., Anderson, C. A. M., Arora, P., Avery, C. L., Baker-Smith, C. M., Beaton, A. Z., Boehme, A. K., Buxton, A. E., Commodore-Mensah, Y., Elkind, M. S. V., Evenson, K. R., Eze-Nliam, C., Fugar, S., Generoso, G., Heard, D. G., Hiremath, S., Ho, J. E., ... Martin, S. S. (2023). Heart Disease And Stroke Statistics - 2023 Update: A Report From The American Heart Association. In *Circulation* (Vol. 147, Issue 8). <https://doi.org/10.1161/CIR.0000000000001123>





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- Udiyono, A., Tyas, K. F. C., Saraswati, L. D., & Susanto, H. S. (2019). Hubungan Antara Rehabilitasi Dan Dukungan Keluarga Dengan Kejadian Stroke Berulang (Studi Kasus Di RSUD Dr. Adhyatma, Tugurejo Semarang). *Jurnal Kesehatan Masyarakat (E-Journal)*, 7(4), 2356–3346. [Http://Ejournal3.Undip.Ac.Id/Index.Php/Jkm](http://Ejournal3.Undip.Ac.Id/Index.Php/Jkm)
- Venkatasubramanian, N. (2023). Advances In Neurological Diseases And Stroke. *Journal Of Cardiovascular Development And Disease*, 10(2). <https://doi.org/10.3390/Jcdd10020066>
- Welten, S. J. G. C., Onland-Moret, N. C., Boer, J. M. A., Verschuren, W. M. M., & Van Der Schouw, Y. T. (2021). Age At Menopause And Risk Of Ischemic And Hemorrhagic Stroke. *Stroke*, 52(8), 2583–2591. <https://doi.org/10.1161/STROKEAHA.120.030558>
- Yanti, A. D. L., & Santik, Y. D. P. (2022). Risk Factors Associated With Disability Among Elderly With Stroke In Indonesia: A Secondary Data Analysis Of 2018 National Basic Health Research. *Journal Of Public Health For Tropical And Coastal Region*, 5(3), 140–154. <https://doi.org/10.14710/Jphtcr.V5i3.15694>
- Yulendasari, R., & Risnarita, D. (2022). Peningkatan Pengetahuan Terkait Pencegahan Penyakit Stroke Di Ruang Bougenvill RSUD DR. H. Abdul Moeloek. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (Pkm)*, 5(6), 1623–1627. <https://doi.org/10.33024/Jkpm.V5i6.5065>

