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The Effect of Isometric Exercise on Self Care Ability in Stroke Infarction Patients in Garut Regency

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Abstract: Stroke infarction is caused by blockage in the cerebral artery blood vessels which results in disorders in the limbs so that isometric exercise is needed to increase the patient's muscle strength in meeting their basic needs. The purpose of this study was to determine the effect of isometric exercise on self-care ability in stroke infarction patients in Garut Regency. Quasi-experimental design with one group pre-test and post-test design with a sample size of 15 stroke infarction patients who had undergone treatment at the hospital. The sampling technique used consecutive sampling. Data collection used SOP from Technol Health care and the DSCAI-90 instrument. Data analysis used Paired t-test. This study was conducted from October to November 2024 in the Wanaraja Health Center working area, Garut Regency. The results of the Paired t-test, the average self-care ability pre-post isometric exercise action was 18.667 and a p value of 0.00 was obtained. One of the ultimate goals of isometric exercise is to improve the patient's ability to meet self-care needs and individual well-being so that the patient's ability to perform self-care agency increases. There is an effect of isometric exercise on self-care ability in stroke infarction patients. The results of the study can be used in the development of health promotion programs for health centers in carrying out follow-up care for stroke infarction patients at home.

Keywords: Isometric exercise; Self-care ability; Stroke

Introduction

Stroke is the number one cause of disability and the third leading cause of death in the world (Roth et al., 2018). The incidence of new strokes each year is more than 12.2 million people, of which more than 62% occur in individuals under the age of 70 years and will increase by 3.4 million people in 2030 with a mortality rate of around 87% per year (Feigin et al., 2022). The incidence of stroke in West Java province is 11.4% or 52,511 residents suffer from stroke (Kesehatan, 2020).

Infarction stroke is caused by blockage of blood flow due to thrombus or atherosclerosis (Hu et al., 2023). The most common impact of infarction stroke is weakness (paresis) in the limbs due to infarction in the anterior cerebral artery or the middle of the motor nerve in the frontal cortex (Smeltzer & Barre, 2018). The impact of stroke not only causes high mortality rates, but can result in up to 50% of sufferers becoming chronically disabled. The most common impact of stroke is weakness in the limbs. Hemiparesis in stroke patients is usually caused by anterior or middle cerebral artery strokes, causing infarction of the frontal cortex in the motor nerves (Benjamin et al., 2019).

The presence of this weakness can interfere with patients in carrying out their daily activities, where 70% of stroke infarction patients will experience disabilities which can interfere with patients' activities in fulfilling their self-care needs (Alchuriyah & Wahjuni, 2016).

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Self care is an individual's ability to carry out self-care to maintain life, health and well-being which is influenced by basic conditioning factors which include: age, gender, developmental status, health status, socio-cultural orientation, health care system, family system, environmental patterns and availability of resources (Alligood, 2017). One of the efforts that can be made to overcome the patient's inability to carry out daily activities can be done through isometric exercises (Syahputra & Nurwijayanti, 2021).

Isometric exercise is a body posture movement that can provide the effect of repairing or preventing muscle disorders, improving and increasing physical function, optimizing health conditions, and overall fitness. The exercise program provided is individual according to the specific needs of the patient (Khosrojerdi et al., 2018). Isometric exercises are performed to improve functional status by maintaining muscle strength and range of motion of the patient. Isometric exercises are exercises that are easy to understand and perform by patients and families because they do not cause intra-articular inflammation, pressure and bone damage (Ojoawo et al., 2016).

Isometric exercises are static exercises on the quadriceps muscle without causing movements that can stimulate pain in the joints. The movements performed will produce strength in the muscles without causing movement in the painful joints. Isometric exercises can be performed on patients who cannot tolerate repeated joint movements such as in conditions of joint pain or inflammation. Isometric exercises can be performed effectively and efficiently when the patient has returned home from the hospital (at home) (Lee et al., 2022).

The results of an empirical study in the working area of the Wanaraja Health Center, Garut Regency, obtained data that all families said they only kept the patient's limbs still during home care and had never been exposed to direct information from health workers about how to care for stroke patients at home and train limbs independently when the patient returns home from the hospital. Families only get information from other people's habits that have been done or only get information from online media.

Method

This study used a quasi-experimental design with a one group pre-test and post-test design on one group of subjects with a sample size of 15 stroke infarction patients who had undergone treatment at the hospital (Mohamed Helmy et al., 2023). The sampling technique used consecutive sampling. Data collection used standard nursing operating procedures from Technol Health care and the DSCAI-90 (Denyes Self Care Agency Instrument) instrument. Data analysis used a paired t-test.

This study was conducted from October to November 2024 in the Wanaraja Community Health Center work area, Garut Regency. The results of the paired t-test, the average self-care ability pre-post isometric exercise action was 18.667, the confidence interval at the 95% confidence level obtained a p value of 0.00. This study has been tested ethically by the research ethics committee of Universitas 'Aisyiyah Bandung and obtained an ethical approval letter Number: 160 / KEP.01 / UNISA-BANDUNG / X / 2024.

Result and Discussion

Result

The results of the study on the characteristics of infarct stroke patients can be seen in table 1.1. as follows:

Table 1. Frequency Distribution of Characteristics of Infarct Stroke Patients (N=15)

Characteristics	Frequency	Percentage %
Age (Years):		
< 50	4	13.3
≥ 50	13	86.7
Gender:		
Male	10	66.7
Female	5	33.3
Education Level:		
Elementary School	3	20
Junior High School	2	13.3
High School	10	66.7
Occupation:		
PNS	1	6.7
Private	2	13.3
Self-employed	12	80

Based on Table 1, it shows that almost all stroke infarction patients (86.7%) are over 50 years old, most (66.7%) are male, most (73.3%), have a high school education, and almost all (80%) have self-employed jobs.

The results of the analysis of pre-action and post-action self-care ability can be seen in Table 2.

Table 2. Average Score of Pre-action and Post-action Self-Care Ability in Stroke Infarction Patients (N = 15)

Self-care Ability	Mean	Std. Deviation	Minimal	Maximal
Pre- Treatment	19.89	4.833	15	29
Post-Treatment	38.56	5.855	31	46

Based on Table 2, it is known that the average score of self-care ability of stroke infarction patients before isometric exercise was performed was 19.89 and the average score after the action was performed was 38.56.

Based on this, there is a change in self-care ability in stroke infarction patients through isometric exercise. The results of the analysis regarding the effect of isometric exercise on pre-action and post-action self-care ability in stroke infarction patients can be seen in Table 3.

Table 3. Effect of isometric exercise on self-care ability in stroke infarction patients (N = 15)

	Mean	SD	95% Confidence Interval of the Difference		t	p value
			Lower	Upper		
Pre-Post Treatment	18.667	5.074	14.766	22.567	11.036	0.00

Based on Table 3, it is known that the results of the paired t-test average self-care ability pre-post isometric exercise action is 18.667. The results of the confidence interval of the difference at the 95% confidence level obtained a p value of 0.00 which means that there is an effect of isometric exercise on self-care ability in stroke infarction patients.

Discussion

The aim of isometric exercise is to maintain and increase muscle strength to meet the needs of independent self-care, maintain personal health, prevent disease complications and create self-confidence in patients (Maharani, 2023). In addition, isometric exercise also aims to improve, restore, or add physical function to overcome complaints from stroke infarction disease, namely loss of voluntary control over motor movements. Motor losses that can occur are hemiplegia, hemiparesis, and decreased abnormal muscle tone (Oscar et al., 2023).

Isometric exercises are static exercises on the quadriceps muscle without causing movements that can stimulate pain in the joints (Onwunzo et al., 2021; Widodo et al., 2022; Yang et al., 2024). The movements performed will produce strength in the muscles without causing movement in the painful joints (Anwer & Alghadir, 2014). Isometric exercises can be performed on patients who cannot tolerate repetitive joint movements such as those with joint pain or inflammation (Smeltzer & Barre, 2018). Isometric exercises can be done effectively and efficiently when the patient has returned home from the hospital (at home) (Maharan et al., 2023; Ojoawo et al., 2016; Park et al., 2021). Isometric exercises are generally used to maintain and increase muscle strength without any joint movement. This exercise can be done maximally or submaximally. Both have the effect of increasing muscle strength and inducing hypertrophy. Maximal isometric exercises are used for the purpose of increasing muscle strength while submaximal is used to maintain muscle strength (Khosrojerdi et al., 2018; Kochar et al., 2024; Ullman et al., 2021).

The application of isometric exercise in this study was carried out by training muscle contractions in the upper and lower extremities without doing muscle lengthening and shortening exercises (isotonic exercise) which was carried out every day in stroke infarction patients (Alarab et al., 2023; Azeem & Zemková, 2022). The strength of the intensity of muscle contractions performed depends on the position of the joint. The intensity of the strength used is 60-80% of maximum strength and is adjusted for each position. The load is slowly increased until muscle strength increases. Isometric exercises are performed for 6-10 seconds. The use of repetitive contractions by giving resistance for 6-10 seconds for each repetition will reduce muscle spasms and increase the effectiveness of the results of isometric exercises (Patandianan et al., 2015).

One of the ultimate goals of isometric exercise is to improve the patient's ability to meet self-care needs and individual well-being both in healthy and sick conditions carried out by the individual himself so that the patient's ability to carry out self-care agency increases. Self-care agency is a complex ability of individuals or adults to know and meet their own needs which are influenced by the level of age development, life experience, socio-cultural orientation about health and other existing sources (Anwer & Alghadir, 2014).

Isometric exercise is a form of health service that can be easily done by the patient themselves or the patient's family. Isometric exercise can improve self-care ability so that the functional health status of stroke infarction patients increases and helps the recovery process faster (Olviani et al., 2017).

Conclusion

Based on the results of the research that has been conducted, there is a change in self-care ability in stroke infarction patients through the provision of isometric exercise and isometric exercise has an effect on increasing the ability of stroke infarction patients to meet the needs of daily activities.

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Author Contributions

Each author has contributed to the research process. The process of conceptualizing the theory and research methods, obtaining research permits, data collection, data analysis, and supervision were carried out by Zahara Farhan as the corresponding author. The process of data collection, data validation, data analysis, and preparation of the publication manuscript were assisted by Devi Ratnasari, Dani Sujana, Milani Nazi'ah, and Azis Gandri Mabarti as research members.

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Conflict of Interest

During the research process and preparation of this research report, there was no personal conflict of interest that influenced the research results, either in data collection, data presentation or interpretation of research data. Each author has agreed to publish the results of this research at his/her own expense so that no one can interfere with the process of publishing this research.

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