THE IMPLEMENTATION OF ANKLE FOOT ORTHOSIS USE ON WALKING ABILITY IN STROKE PATIENTS IN THE WORKING AREA OF THE GARUDA COMUNNITY HEALTH CENTER IN PEKANBARU CITY

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Abstract

Stroke is one of the leading causes of disability worldwide, including in Indonesia. One of the main impacts of stroke is impaired mobility, which hinders patients' independence in performing daily activities. Ankle Foot Orthosis (AFO) is an assistive device that can help improve the stability and walking ability of stroke patients. This study aims to determine the application of AFO use on the walking ability of stroke patients in the Garuda Community Health Center, Pekanbaru City. This study used a quasi-experimental design with a pre- and post-test approach without a control design. The sample consisted of 19 stroke patients selected using a consecutive sampling technique. Measurements of walking ability were carried out before and after the intervention using the Rivermead Mobility Index (RMI). Data analysis was performed using a Paired T-Test to observe changes before and after the intervention. The results showed that the average walking ability score before the intervention (pre-test) was 6.16 with a standard deviation of 1.167, while after the intervention (post-test) it increased to 11.37 with a standard deviation of 1.606. The statistical test results showed a p-value of 0.000 ($p < 0.05$), indicating a significant effect of AFO use on improving the walking ability of stroke patients. The use of Ankle Foot Orthoses (AFOs) has been proven effective in improving walking ability in stroke patients. Therefore, this device is recommended as part of a rehabilitation strategy to increase the independence of stroke patients in performing daily activities.

Keywords: Stroke, Ankle Foot Orthosis, Walking Ability, Rivermead Mobility Index.

INTRODUCTION

Stroke is a disease caused by a disruption in blood flow to the brain, causing sudden neurological deficits that last for up to 24 hours (Dewi et al., 2023). Strokes are generally divided into two types: hemorrhagic stroke and ischemic stroke. Both types are characterized by problems with blood flow. Of these two types, approximately 80% of stroke sufferers are ischemic and 20% are hemorrhagic (Anggiat and Krisnawati, 2021).

According to the World Health Organization (WHO), stroke is the leading cause of disability and the second-highest mortality rate worldwide. Globally, several countries have experienced a 50% increase in stroke risk over the past 17 years. In recent years, stroke cases have increased by approximately 70%, mortality by 43%, and the highest rate of strokes, approximately 89%, occurs in low-income countries (WHO, 2022). In Indonesia, the highest prevalence of stroke in 2023 was 8.3% in Aceh, while Riau ranked fourth at 7.7% (SKI, 2023).

Stroke is a complex condition, with its effects felt not only by the patient but also by their family caregivers (Dewi et al., 2023). Stroke survivors often require assistance from family or others to complete daily activities, leading to a lack of independence (Utama and Nainggolan, 2022).

Independence in daily activities and the ability to perform normal activities is crucial for stroke survivors. When they can perform these activities without relying on others, they feel useful. Conversely, if someone suffering from a stroke is unable to perform daily activities and constantly requires assistance from others, the sufferer will feel useless and dissatisfied with their life (Sriadi et al., 2020). Stroke patients generally experience weakness on one side of the body, known as hemiparesis. This condition reduces motor control and muscle strength, thus affecting walking ability (Pratama and Furqonah, 2021).

Walking ability in stroke patients is an important indicator in assessing their level of independence and quality of life. Impaired walking ability can hinder patients from carrying out daily activities and reduce their level of independence. Therefore, movement rehabilitation, particularly walking ability, is a primary focus in the care of stroke patients (Hemiparesis et al., no date). According to a study by Chu et al. (2023) entitled "Walking Ability and Functional Recovery After Stroke," published in Stroke (2017), recovery of walking ability is often an important indicator of how well patients can return to their normal activities after a stroke. In approximately 70% of stroke patients, mobility impairment is a major problem, and most experience significant difficulty walking. This article emphasizes that walking ability is closely related to overall functional recovery. The better a patient's walking ability, the greater their likelihood of recovering other functions, such as speaking and self-care.

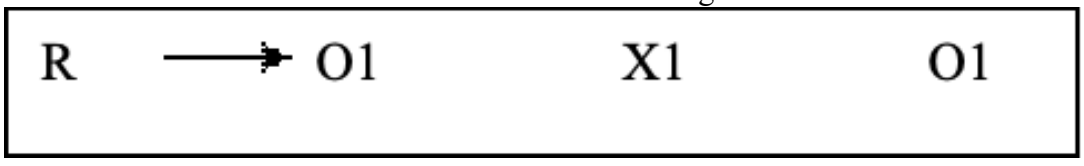
Factors affecting walking ability in stroke patients vary widely, ranging from age and gender to stroke severity. One of the main factors in walking recovery is stroke severity. Patients with more severe strokes tend to experience greater difficulties in motor rehabilitation. Furthermore, psychological factors such as depression and anxiety can also slow the recovery process. Muscle strength, particularly in the legs and lower body, plays a crucial role in determining how well a patient can walk after a stroke (Gert Kwakkel, Tom Carmichael, 2014). Restoring walking ability in stroke patients requires a holistic approach, including appropriate physical therapy, psychological management, and appropriate medical intervention. Gait therapy that focuses on muscle strengthening, coordination improvement, and relearning basic movements can accelerate the recovery process. Therefore, it is important for medical personnel and rehabilitation specialists to provide a program tailored to each patient's condition so they can regain improved mobility and a higher quality of life (Gert Kwakkel, Tom Carmichael, 2014).

Ankle Foot Orthosis (AFO) is a splint-shaped orthopedic device (partially covering the lesion/disability) that is attached to the ankle. This device is designed

RESEARCH METHODS

This research is a quantitative study with a quasi-experimental design using a pre- and post-test approach without a control group. This design does not have a comparison group (control), but rather a first observation (post-test) to test changes that occur after the experiment. In this study, the researchers first conducted a pre-test on the walking ability scores of stroke patients, then administered an ankle-foot orthosis intervention. Afterward, the researchers conducted a post-test on the walking ability scores of the stroke patients.

Scheme 3.1 Research Design



Description:
R: Respondent (patient with stroke)
O1: Walking ability score before intervention
O2: Walking ability score after intervention
X: Ankle-Foot Orthosis intervention

RESEARCH RESULTS

A. Univariate Analysis

Univariate analysis was used to describe each variable studied descriptively, thus obtaining general data (age, gender, education, occupation, stroke duration, stroke history) as well as data related to the ankle-foot orthosis method on walking ability in stroke patients in the Garuda Community Health Center work area of Pekanbaru City. The results of the univariate analysis in this study can be seen in the following description:Characteristics Respondents

1. Characteristics Respondents

Table 1. Frequency Distribution of Respondents According to Age Characteristics in the Work Area of Garuda Health Center, Pekanbaru City

Age	Frequenscy (N)	Precentage (%)
Adult (19-44) years	2	10,5%
Pre-elderly (45-59) years	13	68,4%
Elderly (>60) years	4	21,1%
Total	**19**	**100,0%**

(Source : Analysis Data Primary, 2025)

Based on table 1, it can be seen that more than half of the 44 respondents were in the pre-elderly age range of 45-59 years, totaling 13 people (68.4%) and respondents who were in the adult age range of 19 years were 2 people (10.5%).

2. Gender

Table 2. Frequency Distribution of Respondents by Gender in the Work Area of Garuda Health Center, Pekanbaru

Gender	Frequenscy (N)	Precentage (%)
Male	11	57,9%
Female	8	42,1%
Total	19	100,0%

(Source : Analysis Data Primary, 2025)

Based on table 2, it can be seen that more than half of the respondents were male, as many as 11 people (57.9%), and the respondents were female (42.1%).

3. education

Table 3. Frequency Distribution of Respondents According to Education in the working area of the Garuda Health Center, Pekanbaru City

Education	Frequenscy (N)	Precentage (%)
No Schooling	1	5,3%
Elementary School	1	5,3%
Junior High School	3	15,8%
High School	8	42,1%
Bachelor's Degree	5	26,3%
Master's Degree	1	5,3%
Total	**19**	**100,0**

(Source : Analysis Data Primary, 2025)

Based on table 3, there are 1 respondent who has no school (5.3%), elementary school 1 person with (5.3%), junior high school 3 people with (15.8%), high school 8 people with (42.1%), graduate school 5 people with (26.3%), graduate school 1 person (5.3%).

4. Work

Table 4.Frequency Distribution of Respondents According to Occupation in the Work Area of the Garuda Health Center, Pekanbaru City

occupation	Frequency (N)	Percentage (%)
Housewife	2	10,5%
Self-employed	4	21,1%
Self-employed	11	57,9%
Civil servant	2	10,5%
Total	19	100,0%

(Source: Analysis Data Primary, 2025)

Based on table 4, there are 2 housewives (10.5%), 4 entrepreneurs (21.1%), 11 self-employed (57.9%), and 2 civil servants (10.5%).

5. Duration of Stroke

Table 5. Frequency Distribution of Respondents According to Stroke Duration in the Garuda Community Health Center Work Area, Pekanbaru City

duration of stroke	Frequency (N)	Percentage (%)
<2 years	12	63,2%
>2 years	7	36,8%
Total	19	100,0%

(Source: Analysis Data Primary, 2025)

Based on table 5, there are 12 people with <2 years (63.2%), and 7 people with >2 years (36.8%).

6. history of stroke

Table 6 Frequency Distribution of Respondents According to Stroke History in the Garuda Community Health Center Work Area, Pekanbaru City

history of stroke	Frequency (N)	Percentage (%)
first attack	14	73,7%
repeat	5	26,3%
Total	19	100,0%

(Source: Analysis Data Primary, 2025)

Based on table 6, it can be seen that more than half of the respondents had a history of first stroke, as many as 14 people (73.7%), and 5 people (26.3%) respondents had a history of repeated stroke.

B. Bivariate Analysis

A bivariate analysis was conducted to examine the effect of ankle-foot orthosis on walking ability in stroke patients in the Garuda Community Health Center in Pekanbaru City. The results were considered effective if the p-value was <0.05. The paired t-test was used to compare the measurement results before and after the intervention.

Based on the results of the study that the average walking ability of stroke patients before being given ankle foot orthosis was 6.62, with a standard deviation of 1.167 while the average walking ability of stroke patients after being given ankle foot orthosis was 11.37 with a standard deviation of 1.606 Then the results of the paired T-test statistical test obtained a p value of 0.001 (p value <0.05), the Standard Error (SE) value at the pre-test stage was 0.268, while at the post-test it increased to 0.368. This SE value shows how far the average walking ability score of stroke patients in the sample can reflect the actual population average. At the pre-test stage, the relatively small SE (0.268) indicates that the average initial score has a fairly high level of accuracy in representing the stroke patient population. After being given the Ankle Foot Orthosis (AFO) intervention, the SE value increased to 0.368, which indicates that there is slightly more variation in patient response to the use of this assistive device, meaning that there is an effect of ankle foot orthosis on walking ability in stroke patients in the Garuda Community Health Center work area, Pekanbaru City.

DISCUSSION

According to the World Health Organization (WHO), stroke is the leading cause of disability and the second highest mortality rate in the world. Globally, several countries have had a stroke risk of as much as 50% over the past 17 years. In the last few years, stroke cases have increased by around 70%, mortality by 43%, and the highest number of strokes, around 89%, occurs in low-income countries (WHO, 2022). In Indonesia itself, in 2023, the prevalence of stroke sufferers was ranked highest at 8.3% in Aceh, while the prevalence of stroke in Riau was ranked 4th with a figure of 7.7% (SKI, 2023).

For stroke patients, independence in daily activities and the ability to perform normal activities is crucial. When patients can do these activities without relying on others, they will feel useful. Conversely, if someone with a stroke is unable to perform daily activities and constantly requires assistance from others, they will feel useless and dissatisfied with their life (Sriadi et al., 2020). Stroke patients often experience weakness on one side of the body, known

as hemiparesis. This condition reduces motor control and muscle strength, thus affecting walking ability (Pratama and Furqonah, 2021).

Walking ability in stroke patients is an important indicator in assessing their level of independence and quality of life. Impaired walking ability can hinder patients' daily activities and reduce their level of independence. Therefore, movement rehabilitation, particularly walking ability, is a primary focus in stroke patient care (Hemiparesis et al., no date). According to a study by Chu et al. (2023) entitled "Walking Ability and Functional Recovery After Stroke," published in Stroke (2017), recovery of walking ability is often an important indicator of how well patients can return to their normal activities after a stroke. In approximately 70% of stroke patients, mobility impairment is a major problem, and most experience significant difficulty walking. This article emphasizes that walking ability is closely related to overall functional recovery. The better a patient's walking ability, the greater their likelihood of recovering other functions, such as speaking and self-care.

Factors affecting walking ability in stroke patients vary widely, ranging from age and gender to stroke severity. One of the main factors in walking recovery is stroke severity. Patients with more severe strokes tend to experience greater difficulties in motor rehabilitation. Furthermore, psychological factors such as depression and anxiety can also slow the recovery process. Muscle strength, particularly in the legs and lower body, plays a crucial role in determining how well a patient can walk after a stroke (Gert Kwakkel, Tom Carmichael, 2014). Restoring walking ability in stroke patients requires a holistic approach, including appropriate physical therapy, psychological management, and appropriate medical intervention. Gait therapy that focuses on muscle strengthening, improving coordination, and relearning basic movements can accelerate the recovery process. Therefore, it is crucial for medical personnel and rehabilitation specialists to provide a program tailored to each patient's condition so they can regain improved mobility and a higher quality of life (Gert Kwakkel, Tom Carmichael, 2014).

Ankle Foot Orthosis (AFO) is an orthopedic device in the form of a splint (partially covering the lesion/disability) that is attached to the ankle. This device is designed with pathological, biomechanical, and mechanical aspects in mind. It functions to assist movement in stroke patients, improve foot posture, and facilitate daily activities (Firmanurulita, 2024). Ankle-foot orthoses (AFOs) can also be used as a therapeutic tool for stroke patients to reduce post-traumatic pain while walking or after walking, and to train walking skills (Ayudya, 2022). Ankle-foot orthoses (AFOs) can also be used on uneven surfaces and stairs, making them easier for users. This allows some stroke patients who desire to walk smoothly and look like others to do so independently (Trimandasari, Pudjiastuti, and Rokhati, 2019).

CONCLUSION

The results of the study showed that of the 19 respondents studied, more than half of the respondents were in the pre-elderly age range of 45-59 years (13 people); more than half of the respondents were male (11 people) (57.9%), with a high school education (8 people) (42.1%), more than half were self-employed (11 people) (57.9%), half had a stroke duration of <2 years (12 people) (63.2%), and more than half had a history of a first stroke (14 people) (73.7%). Before the ankle-foot orthosis intervention, the walking ability of the 19 respondents had a mean value of 6.62% with a standard deviation of 1.167%. After the ankle-foot orthosis intervention, walking ability in 19 respondents increased by a mean of 11.3% with a standard deviation of 1.606. The difference in the average walking ability score before and after ankle-foot orthosis was 6.62. The difference between the pre- and post-test scores was 4.68. Based

on the results of the paired sample t-test, the p-value (0.001) <0.005 was obtained, thus concluding that ankle-foot orthosis has an effect on walking ability in stroke patients in the Garuda Community Health Center area of Pekanbaru City.

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