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Analysis of the effect of range of motion exercises on the quality of life of post-stroke patients at royal prima hospital Medan in 2024

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Abstract

Stroke is a severe medical condition that occurs due to the interruption of blood supply to the brain, either through blockage (ischemic stroke) or rupture of blood vessels (hemorrhagic stroke). With more than 15 million cases each year worldwide, stroke is a leading cause of disability and death, with a significant impact on patients' quality of life. In Indonesia, the prevalence of stroke is very high, especially among adult patients, which contributes to the high mortality and disability rates. This study aims to evaluate the effect of Range of Motion Exercises on the physical condition and quality of life of post-stroke patients at the Rehabilitation Polyclinic of Royal Prima Hospital Medan. Using a correlational descriptive research design with the One Group Pretest-Posttest approach, this study involved 30 respondents who underwent a range of motion exercises. The results of the analysis showed that before the intervention, the majority of patients were in the poor quality of life category. However, after undergoing a rehabilitation program, there was a significant improvement in the patient's quality of life, where 50% of the respondents reported an excellent quality of life. This study indicates that range of motion exercises are effective in improving the quality of life of stroke patients, which has the potential to make an essential contribution to the development of stroke rehabilitation programs in Indonesia.

Keywords: Range Of Motion Exercises; Quality Of Life; Stroke Patients; Rehabilitation

1. Introduction

A stroke is a severe medical condition that occurs when the blood supply to the brain is cut off due to a blockage (ischemic stroke) or rupture of blood vessels (hemorrhagic stroke), which can lead to damage to motor, sensory, or cognitive function in a matter of minutes (1). In the world, stroke is the leading cause of disability and death, with about 15 million cases per year, of which 5 million end in death, and another 5 million experience permanent disability. In Indonesia, stroke ranks first as the cause of death in hospitals, primarily due to risk factors such as hypertension, diabetes, and unhealthy lifestyles (2).

The lack of access to prompt and adequate medical care exacerbates the impact of stroke, especially in rural areas. This adds to the physical and emotional burden on families, as well as health systems facing a surge in stroke patients with ongoing rehabilitation needs. High treatment costs are also a challenge, especially for families with financial limitations. Therefore, prevention efforts, promoting healthy lifestyles, and developing effective rehabilitation programs are essential to reduce the long-term impact of stroke on patients and society (3); (4).

One of the severe impacts of stroke is impaired motor function that often reduces mobility, especially in the upper and lower extremities. Damage in the areas of the brain that control movement can lead to weakness, paralysis, or muscle stiffness, making it difficult for patients to perform daily activities such as eating, dressing, walking, or taking care of

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themselves. Hence, they become highly dependent on others (5). In addition to physical limitations, stroke patients also experience significant emotional and psychological impacts, as the loss of the ability to live independently often decreases their quality of life. Rehabilitation, especially range of motion training (*Range of Motion Exercises*), is essential in stroke recovery. These exercises involve active or passive joint movements to improve flexibility and mobility (3).

Range of motion exercises can prevent joint stiffness, improve blood circulation, and optimize the recovery of motor function. With regular exercise, it is hoped that patients can improve their mobility, reduce dependence, and improve their quality of life (6). Royal Prima Hospital Medan, a stroke rehabilitation center in North Sumatra, has implemented a range of motion exercises for stroke patients, but its effectiveness still needs further evaluation. This study aims to assess the effect of the range of motion exercises on the physical condition and quality of life of stroke patients so that it can support the development of more effective rehabilitation programs in the future, enrich the literature on stroke rehabilitation in Indonesia, and provide practical recommendations for health workers.

2. Research methods

This study uses a correlational descriptive design to test the effect of a range of motion exercises on changes in the condition or quality of life of post-stroke patients at the Rehabilitation Polyclinic of Royal Prima Hospital Medan with the One Group Pretest-Posttest approach. The research location is at Royal Prima Hospital, Jalan Ayahanda No. 68A, Sei Putih Tengah, Medan Petisah, North Sumatra, and will be carried out in September 2024. The study population includes 42 post-stroke patients who underwent motion exercises at the Rehabilitation Polyclinic of Royal Prima Hospital Medan in 2023. From this population, a sample of 30 people was determined using the Slovin formula and non-probability sampling technique of consecutive sampling. The sample inclusion criteria were patients undergoing or had undergone a post-stroke range of motion exercises, could communicate or were accompanied by their families, and were willing to be respondents. Meanwhile, the exclusion criteria include patients who do not undergo a range of motion exercises or are unwilling to be respondents. Data analysis included univariate analysis to describe variables in tables and interpretation of results, as well as bivariate analysis to test the influence between variables using a paired t-test with a significance limit of $p \leq 0.05$. The research hypothesis states that if $p \leq 0.05$, then Ha is accepted, which means that range-of-motion training affects the quality of life of post-stroke patients. Conversely, if $p > 0.05$, then H0 is received, indicating no significant effect of the range of motion training on the patient's quality of life.

3. Research results

Table 1 Overview of Research Respondents by Age, Gender, Education, and Employment Status

Characteristic	Category	Sum	Percentage
Age	30 to 40 years	4	13.3%
	41 to 50 years	10	33.3%
	>50 Years	16	53.3%
	Total	30	100%
Gender	Man	18	60%
	Woman	12	40%
	Total	30	100%
Education	SMP	4	13.3%
	SMA	10	33.3%
	Higher Education	16	53.3%
	Total	30	100%
Employment Status	PNS	8	26.7%
	Private	12	40%
	Entrepreneurial	10	33.3%
	Total	30	100%

Table 2 Distribution of Frequency and Percentage of Quality of Life of Post-Stroke Patients before undergoing Range of Motion Exercises at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024

No	Quality of Life Level	Number (n)	Percentage (%)
1	Excellent Quality of Life	2	6.67
2	Sufficient Quality of Life	8	26.67
3	Poor Quality of Life	20	66.67
	TOTAL	30	100,00

Source: Primary Data processed in 2024

Table 1 shows the characteristics of respondents based on age, gender, education, and occupation. Of the 30 respondents, the majority were over 50 years old (53.3%), with the age group of 41-50 years (33.3%) and 30-40 years (13.3%) as other groups. Most of the respondents were male (60%) and had higher education (53.3%), followed by high school graduates (33.3%) and junior high school (13.3%). In terms of employment, most respondents work in the private sector (40%), followed by entrepreneurs (33.3%) and civil servants (26.7%). This data provides an overview of the demographic profile of post-stroke rehabilitation patients.

Table 2 shows the quality of life of post-stroke patients before the range of motion exercise program at the Rehabilitation Polyclinic of Royal Prima Hospital Medan. Of the 30 respondents, only two patients (6.67%) had a "Very Good" quality of life, while eight patients (26.67%) were in the "Adequate" category, and the majority, namely 20 patients (66.67%), were in the "Poor" category. These data reflect the quality of life challenges patients face before rehabilitation interventions.

Table 3 Distribution of Frequency and Percentage of Range of Motion Exercises carried out at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024.

No	Early Mobilization	Number (n)	Percentage
1	Can do well	20	66.7%
2	Can't do well	10	33.3%
	TOTAL	125	100%

Source: Primary Data processed in 2024

Table 3 illustrates the patient's ability to perform a range of motion exercises. A total of 20 patients (66.7%) were able to perform the exercise well, while ten patients (33.3%) had difficulty exercising. These results show that the range of motion exercise program successfully helps most patients improve early mobility, which is a positive indicator for post-stroke recovery.

Table 4 Distribution of Frequency and Percentage of Quality of Life of Post-Stroke Patients after undergoing Range of Motion Exercises at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024

No	Quality of Life Level	Number (n)	Percentage (%)
1	Excellent Quality of Life	15	50.00
2	Sufficient Quality of Life	12	40.00
3	Poor Quality of Life	3	10.00
	TOTAL	30	100.00

Source: Primary Data processed in 2024

Table 4 shows the improvement in the quality of life of post-stroke patients after participating in the range of motion exercise program at the Rehabilitation Polyclinic of Royal Prima Hospital Medan. Of the 30 respondents, as many as 15 patients (50%) reported a "Very Good" quality of life, significantly improving after rehabilitation. A total of 12 patients (40%) were in the "Adequate" category, also showing improvement, although not as large as the previous group. Only

three patients (10%) reported a "Poor" quality of life. Overall, these data show that range of motion exercises positively impact the quality of life of post-stroke patients, with most experiencing a noticeable improvement.

Table 5 Distribution of Frequency and Percentage of Quality of Life Rate of Post-Stroke Patients Before and after undergoing Range of Motion Exercises at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024

No	Quality of Life Level	Number (n)	Mean	SD	Min Max
1	Pre-Range of Motion Exercise	30	2.50	0.80	1-4
2	Post-Range of Motion Exercises	30	4.00	0.50	3-5

Source: Primary Data processed in 2024

Table 5 compares the quality of life of post-stroke patients before and after undergoing a range of motion exercises at the Rehabilitation Polyclinic of Royal Prima Hospital Medan. At the pre-intervention measurement, patients' mean quality of life was 2.50, with a standard deviation (SD) of 0.80, indicating that most patients experienced low to moderate quality of life. After the intervention, the average quality of life increased significantly to 4.00 with SD 0.50. The value range changed from 1–4 before the intervention to 3–5 afterwards. This increase indicates that range of motion exercises positively impact the well-being of post-stroke patients. These results confirm the effectiveness of a range of motion exercises as a helpful rehabilitation intervention to improve patients' quality of life.

Table 6 Wilcoxon Signed Ranks Test Description Test Results Changes in the Quality of Life of Post-Stroke Patients after Undergoing Range of Motion Exercises at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024.

No	Pain Level	Number (n)	Mean	With	*p-value*
1	Early Pre-Mobilization	30	0.80	4.126	0.000
2	Post-Early Mobilization	30	0.50		

Source: Primary Data processed in 2024

Table 6 presents the analysis results using the Wilcoxon Signed Ranks Test to assess changes in the quality of life of post-stroke patients after undergoing a range of motion exercises. In this study, 30 respondents were measured before and after the intervention. The analysis results showed that at the pre-mobilization stage, the mean quality of life of patients was 0.80, with a Z value of 4.126 and a p-value of 0.000. A high Z-value and a significant p-value ($p < 0.05$) showed a clear and significant difference in the quality of life before the intervention. After undergoing a range of motion exercises, the patient's average quality of life decreased to 0.50, which indicates a significant improvement. Overall, the results of this trial suggest that range of motion exercises positively impact the quality of life of post-stroke patients at the Rehabilitation Polyclinic of Royal Prima Hospital Medan, emphasizing the importance of rehabilitation interventions in the recovery process.

4. Discussion

4.1. The level of quality of life of Post-Stroke patients before undergoing Range of Motion Exercises at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024

Only two respondents (6.67%) reported quality of life in the "Very Good" category, indicating that very few patients experienced an optimal quality of life before the intervention. Most patients, i.e., 20 respondents (66.67%), were in the "Poor" category, indicating a significant decrease in quality of life. This reflects the major challenges faced by post-stroke patients, primarily related to physical and emotional limitations, which require rehabilitation interventions. Post-stroke patients often experience physical limitations, such as difficulty moving, speaking, and performing daily activities independently. In addition, they also face psychological impacts such as anxiety, depression, and frustration due to loss of ability. These physical limitations, including muscle weakness and balance disorders, decrease the quality of life. Emotionally, many patients feel isolated and lose hope, worsening recovery (7).

In this context, rehabilitation interventions are critical to help improve the patient's condition. Rehabilitation programs, such as range of motion exercises, physical therapy, and psychological support, aim to restore physical function, enhance independence, and help patients adjust emotionally. Range of motion exercises, for example, aim to improve joint mobility, strengthen muscles, and improve the patient's ability to carry out daily activities. These rehabilitation

interventions also provide patients with support to cope with the psychological impact of stroke, help them develop coping strategies, and facilitate a more holistic recovery. With a combination of physical and psychological therapies, post-stroke patients can experience significant improvements in their quality of life (8).

4.2. The level of quality of life of Post-Stroke patients after undergoing Range of Motion Exercises at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024

After participating in the range of motion exercise program at the Rehabilitation Polyclinic of Royal Prima Hospital Medan, the quality of life of post-stroke patients has improved significantly. Of the 30 respondents, 15 patients (50%) reported a "Very Good" quality of life, demonstrating the effectiveness of the intervention in improving physical and emotional well-being. A total of 12 respondents (40%) were in the "Adequate" category, indicating improvement, although not as strong as the "Very Good" group. Only three respondents (10%) were still in the "Bad" category, so 90% of patients felt the positive impact of this program.

Range of motion training programs support neuroplasticity, help the brain reshape damaged nerve connections, and prevent secondary complications such as muscle atrophy and joint contractures. By maintaining muscle and joint flexibility, patients can increase independence in daily activities. In addition, this rehabilitation program also provides psychological encouragement, improving the patient's confidence and expectations for recovery, in line with the biopsychosocial model that prioritizes the interaction of biological, psychological, and social factors (9). Overall, these results confirm that range exercise programs positively influence the quality of life of post-stroke patients, with the majority of patients experiencing significant improvements after rehabilitation interventions (10). Nonetheless, more targeted interventions may be needed to help patients still in the "Bad" category.

4.3. The Effect of Range of Motion Exercises on the Quality of Life of Post-Stroke Patients at the Rehabilitation Polyclinic at Royal Prima Hospital Medan in 2024

The analysis using the Wilcoxon Signed Ranks Test showed significant changes in the quality of life of post-stroke patients after undergoing a range of motion exercises. Of the 30 respondents, the mean quality of life before the intervention was 0.80, with a Z-value of 4.126 and a very significant p-value ($p < 0.000$). This confirms that range of motion exercises effectively improve patients' quality of life, providing strong evidence that these interventions contribute to the physical and emotional well-being of post-stroke patients. Previous research, such as that conducted by Daulay (2021), supports these findings by showing a significant effect of passive ROM training on muscle strength and joint range of motion, with a p-value of 0.001 (11). Warasti (2024) also found a significant increase in functional activity ability in older people with stroke conditions after daily activity exercises, with a p-value < 0.0001 (12).

After the intervention, patients' average quality of life decreased to 0.50, reflecting the improvements experienced in various aspects of life. This decrease in mean values indicates a transition from bad to better conditions, including increased self-esteem, decreased pain, and improved social interaction. These results show that range of motion exercises improve physical abilities and significantly support patients' emotional and social well-being. Theoretically, post-stroke functional recovery is influenced by structured rehabilitation, in which range of motion exercises stimulate neuroplasticity and increase independence. Biopsychosocial models explain that these exercises provide physical and psychological benefits, while motivation theory suggests that a good program can improve patient motivation to participate actively. Overall, the decline in average quality of life levels, along with increased independence and emotional support, underscores the importance of rehabilitation programs such as range of motion exercises in improving the quality of life of post-stroke patients (13).

5. Conclusion

Based on the research results on the quality of life of post-stroke patients at the Rehabilitation Polyclinic of Royal Prima Hospital Medan in 2024, it can be concluded that most patients experienced a poor quality of life before undergoing a range of motion exercises. Only two respondents (6.67%) reported quality of life in the "Very Good" category, while 20 respondents (66.67%) were in the "Poor" category. This suggests that many patients have not achieved optimal physical and emotional well-being, requiring rehabilitation interventions to improve their condition. Physical and emotional limitations, such as mobility difficulties and negative psychological impacts, are significant challenges that must be addressed through rehabilitation programs. Therefore, appropriate interventions, such as range of motion exercises, are essential to help post-stroke patients improve their quality of life. This rehabilitation program focuses on the physical aspect and provides the necessary psychological support to support the patient's recovery process.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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