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Correlation Between Rehabilitation Motivation Levels and Functional Status of Post-Stroke Patients During the COVID-19 Pandemic at Brain Hospital DR. Drs. M. Hatta Bukittinggi City

Fadila Putri Aldira [a], Nasyaruddin Herry Taufik [a,b], Maryatun Hasan [a,c*]

[a] Faculty of Medicine, Universitas Syiah Kuala, Banda Aceh
[b] Departemen of Medical Rehabilitation, dr. Zainoel Abidin Hospital, Banda Aceh
[c] Department of Internal Medicine, dr. Zainoel Abidin Hospital, Banda Aceh

Abstract. *Stroke is a medical condition that can lead to a decline in a patient's neurological and functional abilities. Rehabilitation is essential for the restoration of normal function. The effectiveness of rehabilitation in post-stroke patients can be evaluated by assessing the patient's motivation to participate in the process. This study aims to examine the correlation between the level of motivation to engage in rehabilitation and the functional status of post-stroke patients during the COVID-19 pandemic. It is an observational analytic study employing a cross-sectional design, conducted on post-stroke patients undergoing rehabilitation at the Medical Rehabilitation Installation of the Brain Hospital, DR. Drs. M. Hatta in Bukittinggi City, from October 18 to November 17, 2021. The study included 50 respondents, selected through a consecutive sampling method. Utilizing the Stroke Motivation Rehabilitation Scale (SMRS) questionnaire and the Barthel Index, the assessment revealed that 62% of respondents exhibited a high level of motivation, while 48% demonstrated moderate dependence. A p-value of 0.000 was obtained from data analysis using the Spearman Rank correlation test, indicating a significant relationship between the motivation to engage in rehabilitation and the functional status of post-stroke patients during the COVID-19 pandemic at the DR Brain Hospital, Drs. M. Hatta, Bukittinggi City. Therefore, monitoring motivation levels during rehabilitation is crucial for evaluating improvements in the patient's functional status.*

Keywords: *Stroke; motivation level; functional status; rehabilitation; Indonesia.*

Type of the Paper: Regular Article.

1. Introduction

Stroke is a neurological disorder caused by an interruption of blood supply to the brain.[1] It consists of two types: hemorrhagic stroke and ischemic stroke.[1] According to the World Health Organization (WHO) in 2016, stroke is the second leading cause of death globally and the sixth leading cause of disability.[2] Approximately one-third of stroke cases result in mortality, accounting for 6.6 million deaths (3.5 million women and 3.1 million men).[2] In Indonesia, around 500,000 people suffer from stroke annually,[3] with an estimated 25% mortality rate, while the remainder experience mild to severe disabilities.[3] he 2018 Basic Health Research (Riskesdas)

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* First corresponding author;
Email: maryatun.hasan@usk.ac.id,

data revealed that the highest stroke incidence occurred in East Kalimantan (14.7%), while the lowest was in Papua Province (4.1%).[4]

In West Sumatra Province, the stroke prevalence rate was approximately 10.6%, ranking sixth among 33 provinces.[5] Data from DR. Drs. M. Hatta Brain Hospital in Bukittinggi showed that the number of hospitalized ischemic and hemorrhagic stroke patients in 2017 was 4,316, decreasing to 4,273 in 2018 and 3,485 in 2019.[6] Di tahun 2020 dari bulan Januari sampai Juni, pasien stroke berjumlah 1.644 orang.[6] From January to June 2020, stroke patients totaled 1,644, These figures indicate that stroke remains a significant health burden at this hospital.[6]

Stroke is the leading cause of long-term disability in adults if not managed properly.[7] It leads to neurological decline, including motor, sensory, cognitive, psychological, and speech impairments.[7] Motor deficits such as hemiparesis or hemiplegia result in immobility,[7] reducing muscle strength, joint stiffness, and extremity flexibility, ultimately leading to contractures and limiting patients' ability to perform Activities of Daily Living (ADL).[7]

One approach for post-stroke patients to regain normal function is through rehabilitation.[8] Rehabilitation programs serve as tertiary prevention, aiming to minimize weakness and disability while helping patients adapt to their condition and maintain a good quality of life.[9] The success of post-stroke rehabilitation depends on several factors, including patient motivation.[8] For stroke survivors undergoing rehabilitation, motivation is crucial to sustain recovery efforts, ensuring consistent participation in therapy.[8] However, another challenge in rehabilitation adherence arises during the COVID-19 pandemic[10] The pandemic likely contributed to reduced hospital visits due to patients' fear of infection.[10] This is supported by outpatient data from DR. Drs. M. Hatta Brain Hospital, which recorded 13,261 visits in 2019 but only 7,710 in 2020 during the pandemic.[6] Thus, healthcare providers must emphasize that stroke is a time-sensitive condition requiring prompt treatment to prevent complications and mortality, also patients should be encouraged to continue rehabilitation while adhering to COVID-19 health protocols.[11]

2. Materials and methods

2.1. Study Design

This observational analytic study employed a cross-sectional approach, conducted at the Medical Rehabilitation Unit of DR. Drs. M. Hatta Brain Hospital in Bukittinggi from October 18 to November 17, 2021.

2.2. Study Population and Sampling

The study population comprised post-stroke patients undergoing medical rehabilitation during the study period. Participants were selected through consecutive sampling, with a minimum required sample size of 30 subjects meeting the inclusion criteria.

2.3. Data Collection

Two validated instruments were employed: the Stroke Motivation Rehabilitation Scale (SMRS) questionnaire, which was used to assess levels of motivation for rehabilitation, and the Barthel Index, which was utilized to evaluate functional status.

2.4. Data Analysis

Statistical analysis included both univariate analysis to examine sample characteristics (including age, sex, education level, employment status, marital status, hemiparesis, lesion type, and lesion location) and bivariate analysis employing the Spearman Rank correlation test to determine the relationship between rehabilitation motivation levels and functional status in post-stroke patients.

3. Results

This study was conducted at the Medical Rehabilitation Unit of DR. Drs. M. Hatta Brain Hospital in Bukittinggi, involving a sample size of 50 participants. The sample comprised post-stroke patients undergoing rehabilitation between October 18 and November 17, 2021, all of whom met the predetermined study criteria.

3.1. Respondent Characteristics

The demographic characteristics of study participants included age distribution, gender, education level, employment status, marital status, hemiparesis, lesion type, and lesion location. As presented in Table 1, the majority of respondents (54%, n=27) were aged 56-60 years, followed by 46-55 years (46%, n=20), and 40-45 years (6%, n=3). Male participants (56%, n=28) outnumbered females (44%, n=22). Regarding educational attainment, 40% (n=20) completed senior high school or equivalent, followed by diploma/university graduates (32%, n=16), junior high school or equivalent (22%, n=11), and elementary school or equivalent (6%, n=3). The employed respondents constituted 84% (n=42) of the sample, while 16% (n=8) were unemployed. Marital status distribution showed 80% (n=40) were married, with the remaining 20% (n=10) being single, widowed, or divorced. Right-sided hemiparesis was more prevalent (56%, n=28) than left-sided hemiparesis (44%, n=22). Lacunar lesions accounted for 58% (n=29) of cases, while

territorial lesions represented 42% (n=21). Lesion location analysis revealed left hemisphere involvement in 56% (n=28) of participants compared to 44% (n=22) with right hemisphere lesions.

Table 1. Demographic Frequency Distribution

Charateristic	Frequency (n)	Percentage (%)
Age (years)		
40-45	3	6.0
46-55	20	46.0
56-60	27	54.0
Total	**50**	**100.0**
Gender		
Male	28	56.0
Female	22	44.0
Total	**50**	**100.0**
Education Level		
Elementary school/equivalent	3	6.0
Junior high school/equivalent	11	22.0
Senior high school/equivalent	20	40.0
Diploma/University degree	16	32.0
Total	**50**	**100.0**
Employment Status		
Employed	42	84.0
Unemployed	8	16.0
Total	**50**	**100,0**
Marital Status		
Married	40	80.0
Single/Widowed/Divorced	10	20.0
Total	**50**	**100,0**
Hemiparesis		
Right-sided	28	56,0
Left-sided	22	44,0
Total	**50**	**100,0**
Lesion Type		
Lacunar	29	58,0
Territorial	21	42,0
Total	**50**	**100,0**
Lokasi Lesi		
Left Hemisphere	28	56,0
Right Hemisphere	22	44,0
Total	**50**	**100,0**

3.2. Frequency Distribution of Motivation Levels for Participating in Rehabilitation

Based on Table 2, the research respondents who participated in rehabilitation exhibited varying levels of motivation. The highest proportion of respondents reported high motivation, with 29 individuals (58%), followed by moderate motivation at 11 individuals (22%). A smaller

percentage reported very high motivation (5 individuals, 10%), while an equal proportion (5 individuals, 10%) displayed low motivation.

Table 2. Frequency Distribution of Rehabilitation Motivation Levels

Motivation Level	Frequency (n)	Percentage (%)
Very Low	0	0.0
Low	5	10.0
Moderate	11	22.0
High	29	58.0
Very High	5	10.0
Total	**50**	**100.0**

3.3. Frequency Distribution of Functional Status

Based on Table 3, the functional status distribution among respondents was predominantly characterized by moderate dependence, with 24 individuals (48%) falling into this category. This was followed by severe dependence (11 respondents, 22%), independence (8 respondents, 16%), mild dependence (5 respondents, 10%), and complete dependence (2 respondents, 4%).

Table 3. Frequency Distribution of Functional Status

Functional Status	Frequency (n)	Percentage (%)
Total Dependence	2	4.0
Severe Dependence	11	22.0
Moderate Dependence	24	48.0
Mild Dependence	5	10.0
Independent	8	16.0
Total	**50**	**100.0**

3.4. Relationship Between Motivation Level for Rehabilitation and Functional Status in Post-Stroke Patients

Both variables in this study, namely the level of motivation for rehabilitation and functional status, were analyzed using the Spearman Rank correlation test. The results of the statistical analysis regarding the relationship between the level of motivation for rehabilitation and the functional status of post-stroke patients are presented in the following table.

Table 4. The Relationship Between Motivation Level for Participating in Rehabilitation and Post-Stroke Patients' Functional Status

Motivation Level	Functional Status										Total		P value
	KP		KB		KS		KR		M				
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	
Very Low	0	0	0	0	0	0	0	0	0	0	0	0	
Low	2	4	3	6	0	0	0	0	0	0	5	10	
Moderate	0	0	8	16	3	6	0	0	0	0	11	22	0,000
High	0	0	0	0	21	42	5	10	3	6	29	58	
Very High	0	0	0	0	0	0	0	0	5	10	5	10	

Table 4 indicates that the majority of subjects in this study exhibited a high level of motivation. Further analysis revealed a significant relationship between the level of motivation for rehabilitation and the functional status of post-stroke patients (p-value = 0.000). Therefore, the alternative hypothesis (Ha) for this study is accepted.

4. Discussion

4.1. Sample Characteristics

In this study, among the 50 respondents, the majority were aged 56-60 years, accounting for 27 individuals (54%). This finding aligns with a study conducted at Tugurejo Regional General Hospital in Semarang City, which reported that the average age of post-stroke patients was over 55 years (67.7%).[12] Similarly, research at Prof. Dr. R. D. Kandou General Hospital indicated that the largest age group for stroke patients was 41-60 years, totaling 96 patients (70.58%).[13] According to the National Heart, Lung, and Blood Institute (NHLBI), stroke generally occurs in patients aged 55 years and older, with its incidence doubling in each subsequent decade.[14] Age significantly impacts the recovery of post-stroke patients, with increasing age leading to a decline in recovery rates.[15]

The distribution of respondents by gender revealed that males were the most prevalent, with 28 individuals (56%). This is supported by a study at Haji General Hospital Surabaya, which found that male post-stroke patients constituted 57.4%.[16] Consistent with this, research at Prof. Dr. R. D. Kandou General Hospital showed that stroke patients were more frequently male, accounting for 73 individuals (53.7%).[13] As age increases, the risk of stroke rises in both men and women.[17] Below 84 years of age, stroke more commonly affects men, whereas above 85 years, it is more frequently observed in women.[17] While several studies report a higher incidence of stroke in men, stroke-related mortality is more common in women due to the influence of estrogen hormones.[17] This is typically observed in post-menopausal women, where a decline in estrogen levels impairs the flexibility of blood vessels and hinders blood flow. One disease particularly prevalent among menopausal women is atherosclerosis, which can trigger ischemic stroke.[17]

Regarding the respondents' educational attainment, the most common level was high school/equivalent, comprising 20 individuals (40%). This aligns with a study conducted at AL Dr. Ramelan Hospital Surabaya, where 45.5% of post-stroke patients had a high school education.[18] Some studies indicate no significant relationship between education level and functional status.[19] While education level might influence research outcomes, its impact is generally minimal.[19] Generally, educational attainment affects patient cooperativeness in adhering to

rehabilitation protocols.[19] Higher education levels tend to facilitate easier patient adherence to the rehabilitation process.[19]

In terms of employment status, the majority of respondents were employed, totaling 42 individuals (84%). This is consistent with a study at PKU Muhammadiyah Sruweng Hospital, which reported that 60.4% of post-stroke patients were employed.[20] However, this contrasts with studies conducted at Pacarkeling and Gundih Community Health Centers, where 62% of stroke patients were unemployed and 38% were employed.[21] A meta-analysis by Crepeau and Scherzer demonstrated a moderate relationship between pre-stroke employment status and patient outcomes.[19] Patients with higher prior job qualifications were more likely to return to work and be more competitive than those who were unemployed.[19]

Based on marital status, the majority of respondents were married, accounting for 40 individuals (80%). This finding is consistent with a study at Haji General Hospital Surabaya, where 21 post-stroke patients (95.5%) were married, while only 1 individual (4.5%) was widowed/divorced/single.[22] Marital status is often linked to family support.[23] Strong family support is known to enhance patient adherence to hospital-based rehabilitation.[23] Family support is expected to influence the motivation of post-stroke patients undergoing rehabilitation.[24] Tangible support can include assistance with the costs of patient treatment and care during rehabilitation.[24] This form of support can also involve physical care of the patient during illness.[24] Furthermore, family support is expected to encourage patient motivation in following rehabilitation programs.[24] Family support also plays a role in providing patients with information regarding their current condition.[24] Emotional family support can provide patients with comfort, a sense of being loved, encouragement, trust, empathy, and attention, thereby making patients feel valued and accepted.[25]

The distribution of respondents based on a history of hemiparesis showed that right hemiparesis was the most common, affecting 28 individuals (56%). This is supported by a study at Atma Jaya Hospital, which found a distribution of 54.4% right hemiparesis and 45.6% left hemiparesis.[26] A study conducted in Egypt reported that post-stroke patients with dominant right-sided hemiparesis achieved higher ADL scores compared to those with left-sided hemiparesis.[27] This is because right hemiparesis indicates damage to the left hemisphere, which affects speech, language, and motor functions.[27] Post-stroke medical rehabilitation therapy can be provided to improve patients' daily activities and achieve better outcomes.[27]

Regarding the lesion type among the study respondents, lacunar infarct was the most common, observed in 29 individuals (58%). This aligns with a study at Dr. Kariadi General Hospital in Semarang, which also identified lacunar lesions as the most frequent type, affecting 29 individuals

(80.6%), while territorial lesions were found in 7 individuals (47.2%).[28] Ischemic stroke patients over 55 years old frequently experience lacunar infarcts.[29] The underlying pathology for lacunar lesions is Small Vessel Disease (SVD), involving pathological processes in perforating arteries, which are small blood vessels.[29] The pathology typically involves microatheroma and fibrinoid necrosis, leading to occlusion of these blood vessels.[29] The most common risk factor for this type of lesion is hypertension.[29]

Considering the lesion location in the study respondents, lesions in the left hemisphere were the most prevalent, affecting 28 individuals (56%). This is consistent with a study at Dr. Kariadi General Hospital in Semarang, which also showed a higher number of lesions in the left hemisphere (19 individuals, 52.8%) compared to the right hemisphere (17 individuals, 47.2%).[28] Infarction occurs more frequently in the left hemisphere than in the right, attributed to differences in intima-media complex and blood flow velocity in the left carotid artery, which trigger atherosclerotic changes leading to ischemic stroke.[30]

4.2. Frequency Distribution of Rehabilitation Motivation Levels

Study participants undergoing rehabilitation exhibited varying levels of motivation. The highest proportion demonstrated *high motivation*, comprising 29 individuals (58%). This finding aligns with research conducted at PKU Muhammadiyah Gamping Hospital in Yogyakarta, where 12 participants (40%) showed high motivation,[24] and is further supported by data from H. Abdul Manap Hospital in Jambi, reporting high motivation in 64.4% of cases [31] According to Maulani, elevated motivation stems from patients' strong desire to recover from stroke.[31] Conversely, respondents with low motivation often struggled to accept their condition, lacked initiative in pursuing recovery-supporting activities, and faced limited health education from medical professionals.[31]

Notably, *no participants* exhibited *very low motivation* in this study, suggesting that most patients seeking rehabilitation services maintained sufficient recovery motivation. However, the COVID-19 pandemic introduced significant psychological stressors, including depression and anxiety, which reduced motivation for daily activities compared to pre-pandemic levels.[32]

For post-stroke patients, routine therapy adherence declined due to hospital visitation restrictions and infection fears.[33] Such pandemic-related anxiety directly impaired rehabilitation participation.[33] underscoring the need for healthcare providers to educate patients on maintaining therapy while adhering to safety protocols.[34]

4.3. Frequency Distribution of Functional Status

The most prevalent functional status among the study respondents was *moderate dependence*, with 24 individuals (48%). This finding is supported by a study conducted at PKU Muhammadiyah Bantul Hospital, which reported that 19 patients (70.4%) had moderate dependence, while 8 (29.6%) were independent.[35] Similarly, research at Dr. Soekardjo Hospital in Tasikmalaya found 37 patients (71.15%) with moderate dependence and 15 (28.85%) who were independent.[7] These results align with data from Jombang General Hospital, where 18 patients (37.5%) exhibited moderate dependence, and 16 (33.3%) had severe dependence.[36]

Stroke patients often experience motor paralysis, leading to impaired movement—particularly in the upper and lower extremities.[37] which restricts their ability to perform daily activities.[37] A study by Subyantoro further noted that most patients examined had moderate-to-mild dependence or were fully independent, likely due to consistent adherence to activities of daily living (ADL) training and other therapeutic interventions.[38]

4.4. The Relationship Between Rehabilitation Motivation Levels and Functional Status in Post-Stroke Patients

In this study, respondents with *low motivation* predominantly exhibited *severe dependence* (3 individuals, 6%) or *total dependence* (2 individuals, 4%). Among those with *moderate motivation*, 8 respondents (16%) had severe dependence, while 3 (6%) showed moderate dependence. Conversely, respondents with *high motivation* were primarily classified as *moderately dependent* (21 individuals, 42%), followed by *mild dependence* (5 individuals, 10%) and *independence* (3 individuals, 6%). Notably, all respondents with *very high motivation* (5 individuals, 10%) achieved *independent* functional status. These findings highlight that *moderate dependence* was most prevalent among respondents with high motivation. Elevated motivation levels are anticipated to correlate with improved functional outcomes, provided post-stroke patients receive adequate exercise interventions and complementary therapies. Importantly, *independence* was exclusively observed in patients with *high* or *very high* motivation, suggesting that post-stroke participants undergoing medical rehabilitation at DR. Drs. M. Hatta Brain Hospital, Bukittinggi, maintained strong intrinsic drive for functional recovery—even during the COVID-19 pandemic.

A Romanian study identified *functional rehabilitation* as a key predictor of functional status in post-stroke patients,[39]emphasizing training to restore activities of daily living (ADLs). Similarly, research in Taiwan demonstrated that *motivation* significantly predicted functional improvement in stroke patients.[40] Supporting this, Canadian researchers reported that high motivation drives behavioral changes and rehabilitation adherence, directly correlating with

maximal functional recovery.[8] Collectively, these studies underscore that sustained motivation enhances rehabilitation efficacy and optimizes functional outcomes.[8]

4.5. Study Limitations

The current investigation focused solely on motivational factors and did not examine other variables known to affect functional recovery in post-stroke patients, such as stroke classification, rehabilitation duration, or family support systems during medical rehabilitation.

5. Conclusions

The study findings demonstrate three key outcomes: First, a majority of respondents (58%, n=29) exhibited high motivation levels for rehabilitation. Second, moderate functional dependence emerged as the most prevalent status (48%, n=24) among participants. Most significantly, the analysis revealed a statistically significant association between patients' rehabilitation motivation levels and their functional status during the COVID-19 pandemic at DR. Drs. M. Hatta Brain Hospital, Bukittinggi. These results collectively highlight the crucial role of psychological factors in post-stroke recovery, even amidst pandemic-related healthcare challenges.

Abbreviations

ADL	Activities of Daily Living
COVID-19	Coronavirus Disease 2019
SMRS	Stroke Motivation Rehabilitation Scale
WHO	World Health Organization
NHLBI	National Heart, Lung, and Blood Institute
SVD	Small Vessel Disease
PKU	Pusat Kesehatan Umum (General Health Center)
DR.	Dokter (Doctor)
Drs.	Doktorandus (Dutch academic title)
Riskesdas	Riset Kesehatan Dasar (Basic Health Research)
Ha	Alternative Hypothesis
n	Number of subjects (in statistical reporting)
%	Percentage
p-value	Probability value
χ^2	Chi-square test

Data availability statement

Data will be shared upon request by the readers.

Credit authorship contribution statement

Fadila Putri Aldira: Data curation, Formal analysis, Visualization. Nasyaruddin Herry Taufik: Investigation, Resources, Validation, Writing - review & editing. Maryatun Hasan: Conceptualization, Methodology, Funding acquisition, Writing - original draft, Supervision

Declaration of Competing Interest

The authors of this manuscript declare no conflict of interest or competing interest.

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