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Resilience after stroke and its correlation with functional independence

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ABSTRACT

Introduction: Resilience involves the ability to adapt to the conditions of disability experienced by post-stroke patients. The purpose of this study was to investigate the resilience of post-stroke patients and determine the relationship with the patient's functional ability.

Methods: This research was a cross-sectional study that included 122 post-stroke patient respondents who had undergone a stroke recovery phase for 5 - 8 weeks. Selection of the sample used simple random sampling method. Univariate analysis was used to describe the characteristics of each respondent. Bivariate analysis was carried out to determine the relationship between resilience and functional abilities of respondents, especially functional abilities related to activities of daily living.

Results: The results of this study found that there was a significant relationship between resilience and functional ability of the respondents (p = 0.000; 95% CI).

Conclusions: Respondents with a high level of resilience can make better use of their abilities so that they can increase their functional independence abilities. Thus, it can achieve a better quality of life improvement.

Keywords: activities of daily living, functional independence, resilience, stroke

Introduction

Stroke is responsible for an estimated 5.5 million deaths worldwide (Méndez-Gallardo et al., 2020). Based on the results of basic health research / Riset Kesehatan Dasar (Riskesdas) in 2018, stroke begins to occur at the age of 15 years and the highest prevalence is at the age of 75 years and over (Kementerian Kesehatan Republik Indonesia, 2019). Based on the age group numbers, the highest incidence of stroke occurred in the age group of 55-64 years (33.3%) and the lowest occurred in the group aged 15-24 years (Kementerian Kesehatan Republik Indonesia, 2019). Stroke causes severe long-term disability (Hollist et al., 2021). Disability is one of the sequelae of stroke that affects the patient's quality of life (Chen & Tung, 2021) and affects activities of daily living (Tiwari et al., 2021; Wassenius et al., 2022). Approximately 3/4 of stroke patients experienced paralysis and experienced severe disability rates of up to 40% or more (Li et al., 2020). Post-stroke dysfunction, which includes disturbances in movement, language, and cognition, affects the patient's activities of daily living (ADL) (Li et al., 2020). Stroke sequelae also have negative effects on patients' self-care abilities and social participation (Lv et al., 2021). The inability to carry out activities is not only related to physical, cognitive, or emotional disturbances, but also to the ability to adapt (Wassenius et al., 2022).

Resilience involves the ability to adapt to stressful events that can affect the impact of major health crises and reduce the damage caused by stress (Chen & Tung, 2021). Adaptation to stroke sequelae requires balancing all aspects of life including physical and psychological. The results showed that resilience was protective against the limitations of activities of daily living (ADL)

and modifies the relationship between the emergence of new chronic conditions and the occurrence of subsequent disabilities. This shows that individuals who had a higher level of resilience experience a lower level of disability (Chen & Tung, 2021). Resilience involves a dynamic development process that enables individuals to bounce back from adversity (Chen & Tung, 2021).

In post-stroke patients, less adaptive psychological factors have been shown to be negatively related to participation over time, while resilience has been shown to act as an independent predictor of quality of life and physical independence (Norvang et al., 2022). For this reason, resilience is a factor that needs to be considered in optimizing the functional abilities of patients after stroke, including their ability to care for themselves. So far, various efforts have been made to increase the participation of post-stroke patients in care, but have not examined or measured patient responsibility in achieving increased functional abilities independently. However, it has not been studied in more depth to what degree the patient's resilience has an effect on improving the functional independence status of post-stroke patients. Previous research found that resilience had a significant effect on ADL ability in two weeks up to the first three months after stroke, but after three months there was no significant effect on changes in ADL ability in post-stroke patients, thus recommending the need to link resilience with the psychosocial aspects of post-stroke patients (Norvang et al., 2022). In this study, respondents were selected by considering the psychosocial aspects of patients, such as those who have a passion for rehabilitation, enthusiasm for carrying out daily activities according to their abilities, including positive thinking and drawing closer to God.

Resilience also includes a deeper understanding of the relationship between intrapersonal, interpersonal, and socio-ecological constructs because it has been highlighted as important for understanding the neurophysiological and neuropsychological mechanisms of resilience in post-stroke patients. Interventions carried out to increase the patient's functional independence require active participation from the patient. This requires patient resilience. A person who is resilient is considered to have comprehensive psychological resources needed to overcome adverse events, including self-confidence, personal competence, and interpersonal interactions (Chen & Tung, 2021). For this reason, this study aims to investigate the resilience of post-stroke patients and determine its relationship with the patient's functional abilities.

Materials and Methods

Study design

This research was a correlation study using a cross-sectional approach. This research was conducted from February to July 2022 at the Badan Layanan Umum Daerah (BLUD) rehabilitation unit of Bahteramas Hospital and Kendari City Public Hospital, Southeast Sulawesi, Indonesia.

Sample

As many as 122 respondents to this study were taken based on simple random sampling technique. Respondents experienced a stroke recovery phase for 5-8 weeks. This is based on the results of previous studies that the post-stroke recovery process achieves the most significant improvement in the first week to two months after an acute stroke (Grefkes & Fink, 2020; Heltty, 2022). After three months, the recovery related to motor becomes less significant (Grefkes & Fink, 2020). Respondents aged 35-65 years, in stable condition, not experiencing cognitive impairment, able to communicate, were actively encouraged to carry out daily activities independently according to their abilities, to do exercises in the rehabilitation unit regularly, carry out diet management such as managing food that can increase blood pressure; they were also encouraged to do stress management by thinking positively and worshiping. To ensure it, the researcher asked respondents about their daily activities and how to deal with problems, then the researcher validated the respondent's answer with the family living with the respondent

Instrument

The instruments used in this were The Brief study Resilience Scale and the Barthel Index instrument. The Brief Resilience Scale (BRS) is an instrument used to measure a patient's ability to solve the problems they face (Norvang et al., 2022). The instrument reflects the toughness of the patient while dealing with his illness. This instrument consists of six question items, using a Likert scale with an assessment score of 1 (totally disagree) to 5 (strongly agree) (Norvang et al., 2022; Smith, 2008). All items in the BRS start with and revolve around 'self' or belief in one's ability to bounce back (such as the question item: “I tend to get back on my feet quickly after hard times”) (Ye e al., 2022). The BRS scores are divided into three categories, namely 1.00-2.99 (low resilience), 3.00-4.30 (normal resilience), 4.31-5.00 (high resilience). BRS had good internal

consistency, with an alpha coefficient / Cronbach's alpha value of 0.71. This result was consistent with the alpha value (range from 0.71 to 0.85) (Fung, 2020). This instrument had also demonstrated an adequate reliability value (alpha 0.83) (Rodríguez-Rey et al., 2016).

The Barthel Index (BI) is used to measure the patient's functional ability, especially the ability to perform daily activities. BI has demonstrated high internal consistency and inter-rater reliability, good validity, and adequate response among samples from various populations, such as stroke patients and neurorehabilitation patients (Yi et al., 2020). The results showed that the Barthel Index is a reliable measure, with adequate internal consistency and is valid for measuring patient functional independence (Cronbach's alpha = 0.942) (dos Santos Barros et al., 2022).

The BI score was the cumulative score of all (10) question items, with a maximum score of 10 indicating independence, and a minimum score of 0 indicating total dependence. The BI rating hierarchy can assist in understanding the sequence of loss of ADL ability in patients and provides useful information for observing and identifying potential functional disorders that occur in patients. For example, inability to perform the easiest ADLs (such as transfers) indicates severe functional dependence of the patient, whereas inability to perform only the most difficult ADLs (such as bathing) indicates a patient's mild functional dependence (Yi et al., 2020). BI scores are divided into five categories, namely 0-20 (total dependent), 25-40 (severe dependent), 45-60 (moderate dependent), 65-80 (mild dependent), and 85-100 (independent) (Li et al., 2020).

Data collection

Data collection was carried out from February to July 2022. Respondent resilience data were collected through a survey conducted by researchers and research assistants. Respondents were given an explanation of each question item contained in the questionnaire. Data on the respondent's ability to carry out daily activities were measured by the research assistant.

Data analysis

Descriptive data analysis and Chi-square were used in this study. Descriptive data analysis was carried out to analyze the respondent's demographic and clinical data. Testing the relationship between resilience and functional independence used the Pearson Chi-square test. All data were analyzed using SPSS version 25 where the significance level was $p<0.05$.

Data collection

This research has received ethical approval from the ethical commission of the University of Mandala Waluya Kendari (number of ethical letter: 422/UMW/II/2022). All respondents were given an explanation about the research before signing the informed consent.

Ethical consideration

This research has received an ethical certificate from the Ethics Commission (KEPK) of Airlangga University, Faculty of Nursing with No. 2144-KEPK, approval date 13 January 2021 and expiration date 13 January 2022. At the beginning of this study, participants fulfilled informed consent and demographic data. The researchers kept the data of each participant secret by using a code.

Results

The characteristics of the respondents can be seen in Table 1, that the average age of the respondents was 53 years (with an age range of 35-65 years). There were more female respondents than male respondents. Last education most graduated from high school (45.1%). Most respondents experienced hemiparesis on the left side of the body (61.5%). Most of the respondents were married (55.7%). All respondents had a comorbidity, the most experienced being hypertension. The degree of severity of stroke that was most experienced by respondents was moderate (71.3%).

Table 2 shows that more respondents experienced normal resilience (77.0%) than high resilience, which was only 10.7%. In addition, in Table 2 it can be seen that

Table 1 Characteristics of respondents (n=122)

Characteristics of respondents	n	%
Gender		
Woman	67	54.9
Man	55	45.1
Last education		
College	38	31.1
High school	55	45.1
Middle/Elementary School	29	23.8
Type of hemiparesis		
Hemiparesis on the left side of the body	75	61.5
Hemiparesis on the right side of the body	47	38.5
Marital status		
Marry	68	55.7
Widow/widower/not married	54	44.3
Comorbid		
Hypertension	50	41
Hypertension + diabetes	43	35.2
Hypertension + diabetes + hypercholesterolemia	29	23.8
Stroke severity		
Low	35	28.7
Moderate	87	71.3
	M±SD	
Age	53.20±10.46	

Table 2 Frequency distribution of resilience and independence of post-stroke patients in carrying out daily activities

Variable	Frequency (f)	Percentage (%)
Post-stroke patient resilience		
Low resilience	15	12.3
Normal resilience	94	77.0
High resilience	13	10.7
Patient independence in performing daily activities		
Total dependent	0	0
Severe dependent	20	16.4
Moderate dependent	80	65.6
Mild dependent	22	18.0
Independent	0	0

more respondents experienced a moderate dependent (65.6%) in carrying out their daily activities than those who experienced severe dependent which was only 16.4%. In this study, there were no respondents who were in the total dependent and independent categories.

Table 3 shows that resilience has a significant relationship with the independence of respondents in carrying out their daily activities (p value = 0.000). The results of the correlation test analysis also show that the relationship between resilience and the level of independence of the respondents has a strong relationship and a positive pattern, meaning that the better the level of one's resilience, the higher the level of independence.

Discussions

Based on the results of this study, 79.8% of respondents in the normal category of resilience experienced a moderate dependent. Stroke patients and even mild stroke patients experience ADL dependence (Wurzinger et al., 2021). Research proves that most ADL recovery usually occurs within the first six weeks after a stroke (Wurzinger et al., 2021). Respondents in this study had been undergoing stroke treatment for eight weeks so they had shown an increase in ADL independence, although the increase in functional ability that was achieved was mostly in the moderate dependent category. This is in line with the results of other studies where there was an increase in basic ADL independence during the first three months after stroke (Norvang et al., 2022). Although Norvang et al. (2022) stated that resilience is not related to functional improvement in stroke patients, other studies have found that high resilience can increase functional independence by 55% in postoperative hip fracture patients (Tan et al., 2021). In this study, respondents were actively motivated to carry out daily activities independently according to their abilities, encouraged to do regular exercises in the rehabilitation unit, make dietary adjustments, carry out stress management by thinking positively and worshiping as these can improve respondent resilience capacity.

In this study, it was also found that there were more respondents who were in the moderate dependent category (65.6%) compared to the severe dependent category (16.4%). The achievement of functional abilities of respondents in the category of mild dependent was only 18.0%. This can be associated with the presence of comorbidities experienced by respondents thereby limiting the respondent's ability to achieve optimal functional abilities. Patients with more comorbidities have poorer functional outcomes after stroke (Simić-Panić et al., 2018). Stroke patients with diabetes mellitus achieve poorer functional recovery and longer recovery after stroke, thus prolonging rehabilitation treatment (Simić-Panić et al., 2018).

Stroke recovery is a long-term process in which resilience has been shown to be a very important factor in the stroke recovery process (Han et al., 2021). To achieve this recovery, effort and a process of adaptation of the patient to the conditions of the disability that they experience are needed. Resilient individuals are able to successfully adapt to adversity and maintain mental health (Han et al., 2021). Resilience is a way to help relieve stress and emotional pressure so that it can influence the response of stroke patients to rehabilitation and achieve better long-term functional achievement results. The high level of resilience ability of the respondents in this study can also be associated with age, where the respondents have an average age of 53 years with an age range of 35-65 years. This is in line with other studies which prove that the older the

Table 3 The relationship between resilience and independence in carrying out daily activities in post-stroke patients

Resilience	Patient independence in performing daily activities					Total	p value	r
	Total dependent (n=0) n (%)	Severe dependent (n=20) n (%)	Moderate dependent (n=80) n (%)	Mild dependent (n=22) n (%)	Independent (n=0) n (%)	(n= 122)		
Low resilience	0	10 (66.7)	3 (20.0)	2 (13.3)	0	15	0.000	0.676
Normal resilience	0	9 (9.6)	75 (79.8)	10 (10.6)	0	94		
High resilience	0	1 (7.7)	2 (15.4)	10 (76.9)	0	13		

patient is, the better the resilience and healthcare outcomes achieved (Chen & Tung, 2021).

The results of this study indicate that there was a strong relationship between resilience and increased patient independence in performing ADLs. This relates to the patient's adaptability to the conditions they experienced. Post-stroke patients who can adapt to the conditions they experience are associated with more positive emotions, which are generally related to mental health and better quality of life (Matérne at al., 2022). Stroke not only damages the sufferer's physical health, but also affects his mental health (Zhao et al., 2021). Resilience is closely related to positive emotions that contribute to positive mental health and act as a buffer against negative psychological stress and psychological distress (Matérne et al., 2022). A low level of resistance is associated with a greater susceptibility to pathological reactions that occur in stroke patients. In contrast, patients with high levels of resilience can make better use of their abilities to adaptively cope with and adapt to negative life events (Zhao et al., 2021).

Based on a longitudinal developmental perspective, the effect of resilience on mental health status has a chain effect: mental health status appears to affect resilience, then resilience in turn influences mental health status (Wu et al., 2020). Through sufficient resilience, individuals have the ability to overcome the negative effects of stress and face challenging life changes (Chen & Tung, 2021). This can explain that post-stroke patients who have good resilience have a better level of independence in performing ADLs. Independence can be achieved through a process of training, including rehabilitation. Stroke patients undergoing rehabilitation are required to be active participants in their treatment, and are motivated to participate actively (Yoshida et al., 2021). The active participation of the patient can improve the patient's functional ability (Heltty, 2022). Active participation can be achieved by cultivating enthusiasm within the patient to carry out activities (Heltty, 2021). This enthusiasm is part of resilience.

Even so, in this study there were 9.6% of normal resilience respondents who were severe dependent. This is related to the lack of support system received by respondents, where, based on marital status, it can be seen that some respondents have the status of a widower, widow, and are not married. Even though many of them have married status, there are still respondents who do not get social support from their families. This can be due to the age of the respondent's partner who has also entered the elderly stage and the fatigue experienced by the respondent's partner so that it is not optimal in providing physical, psychological, and emotional support to the respondent.

Lack of social support is considered a risk factor for impaired resilience (Lima et al., 2020). Resilience as an interactive and multifactorial process involving individuals and the environment, including the family. Continuity of care at home can affect an individual's capacity to deal with the disease. This continuity includes family functions and acceptance, financial resources, education level, spiritual beliefs, service availability, and health information (Lima et al., 2020). Support for post-stroke patients is very important for rehabilitation, increasing individual resilience, and preventing mental disorders such as post-stroke depression. The support provided by the family includes emotional support which includes trust, empathy, affection, love, listening, information support, availability of facilities and information. There was evidence that emotional support is an important factor in health recovery (Lima et al., 2020).

In addition to emotional support, post-stroke patients also need informational support. The results of the study show that resilience was also correlated with the availability of information (Han et al., 2021). The family as a source of support for patients also contributes in providing information to patients. Information will help patients to better understand the conditions they were experiencing so that they can perform better resilience. Research proves that a greater level of resilience will be associated with better cognitive and emotional outcomes (Gyawali et al., 2020). When individuals think they are unable to control what happens in a situation, then their adaptive skills become limited and often ineffective, leading to powerlessness. Conversely, when individuals believe that life events and outcomes can be managed, they will make active efforts to overcome adverse situations, opening possibilities for moving forward and achieving resilience. By becoming resilient, individuals gain the strength to adapt, resist stress, and potentially thrive in the face of adversity (Chen & Tung, 2021).

The findings from this study have several practical implications for the care of post-stroke patients. In optimizing patient resilience in an effort to improve the functional abilities of post-stroke patients, nurses need to improve providing information to patients and their families. Information can be conveyed through leaflet media. Patients and families are also always motivated and confident in their ability to achieve better functional abilities. These efforts are aimed at increasing patient resilience and can be included in nursing care interventions.

However, this study also had limitations, where the results cannot be generalized to the general population, considering that this research was conducted in Kendari, Southeast Sulawesi, which only covered a small portion of the ethnic groups in Indonesia. In addition, the resilience measurement instrument used in this study has not explored in depth the indicators of life principles or cultural values as things that increase resilience.

Conclusions

This study proves that resilience was related to the independence of post-stroke patients in performing ADLs. The achievement of resilience is inseparable from the patient's ability to understand the importance of doing exercises during rehabilitation. This is also inseparable from family support in providing information, infrastructure, financial, emotional for the healing of patients. Future research needs to add aspects that need to be assessed in patient resilience such as related to norms and customs because these aspects effect on increasing patient resilience. The higher the patient's resilience level, the greater the patient's level of independence to improve the patient's quality of life.

Conclusions

The authors thank all those who have helped so that this research can be carried out.

Conclusions

All authors declared no conflict of interest.

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