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Enhancing Speech Ability in Stroke Patients: Clinical Application of the TADIR Aphasia Diagnostic Method

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ABSTRACT

Aphasia is a disability experienced by stroke patients and can become persistent, so that it can reduce the quality of life of stroke patients. Detection of speech ability in stroke patients as early as possible helps provide intervention as soon as possible, so that it can reduce the disability experienced by stroke patients. This study aims to provide an overview of the speech ability of stroke patients using the TADIR method. This type of research is quantitative and uses a descriptive method. The sample consisted of 43 respondents, using consecutive sampling techniques. The instrument used was a speech ability screening format using TADIR. The data that has gone through the following processing will be analyzed. Univariate analysis describes each variable: age, gender, type of stroke, comorbidities, frequency of attacks, and speech ability score. Analysis, t-tests, and correlation tests were conducted to determine the relationship between the two variables. The speech ability of stroke patients with the TADIR method received an average score of 6.65. There was an effect on the age and gender of the respondents on the speech ability score of stroke patients. Some stroke patients experience a decrease in speech ability. This research is very beneficial for the speech development of stroke patients.

INTRODUCTION

Stroke is one of the most common neurological disorders, impacting sufferers' motor, cognitive, and language abilities. Some of the speech disorders experienced by stroke patients are Aphasia, dysarthria, and apraxia. This condition causes difficulties in language production, comprehension, and motor control of speech. The severity of this disorder varies greatly depending on the type and location of the stroke experienced by the patient. [1–3] Motor, cognitive, and language deficits experienced by stroke patients can significantly reduce the quality of life of stroke patients and their families, so a comprehensive rehabilitation program is indispensable. [1,4,5]

Aphasia is a common disorder that stroke patients often experience; two to five stroke patients will experience Aphasia, which can be cured in 2-3 months, but some last for a longer time. Many stroke patients who experience aphasia experience recovery in the first few months after a stroke. However, most improvements usually occur within the first year, with substantial increases often seen within the first 2-3 months. [6,7] Aphasia is often associated with increased mortality, prolonged hospital stays, and greater disability. [6,7] Early and intensive rehabilitation efforts are needed to improve outcomes and help restore speech and language function. [8,9]

Early detection of speech skills in stroke patients can help with speech therapy and rehabilitation planning so that recovery can occur faster and more effectively. Early detection of communication disorders in stroke patients is an important thing that must be done. This is beneficial in an effective rehabilitation program. [10,11] Early tests to detect speech disorders have many advantages, but challenges include limited test repetition and poor sensitivity, especially during acute conditions. [11]

Assessment of speech ability at an early stage is essential to understand the severity of the disorder and determine appropriate therapeutic interventions. A comprehensive assessment of speech ability using appropriate instruments is needed to monitor the improvement of speech ability. It includes assessing the different phases of post-stroke to tailor the intervention to the needs of each patient. [11] The initial assessment results can be used in administering speech therapy as early as possible in the first month post-stroke, associated with better speech skills at one month and better recovery at one year. It shows that early intervention can provide self-management strategies beneficial for long-term recovery. [11] Therefore, a standardized and specific assessment method that can be used comprehensively is needed.

The proper assessment method will help detect speech disturbances experienced by stroke patients early. Several assessment methods have been validated and recommended in recent years for detecting speech disorders in stroke patients. In acute conditions, many speech and language pathologists conduct their clinical assessments due to the limitations of standardized tests. It shows the need for appropriate and specific assessment methods under certain conditions. [11]

The aphasia assessment method is mostly only able to assess one type of disorder, so the results do not cover all aspects of speech difficulties experienced by patients. The aphasia assessment method often has limitations in comprehensively evaluating all aspects of speech skills experienced by patients. Significant variation exists in how speech skills are assessed between those with mild and severe Aphasia. [12]

The results of the assessment of speech ability in stroke patients are often inaccurate due to changes in emotions or cognition experienced by the patient. Aphasia in stroke patients is often accompanied by cognitive impairment and emotional problems such as depression and anxiety. This will complicate the assessment process. This condition can affect the effectiveness of cognitive and language assessments. [13,14] Therefore, an appropriate and comprehensive method is needed to be recognized as a reliable and valid method for assessing the speech ability of stroke patients. [15]

Speech assessments are often not done in stroke patients. Initial assessment is critical to assess the speech ability of stroke patients so that they can plan effective interventions. [15] Currently, there is a need to develop aphasia assessment methods that can be adapted to the special needs of stroke patients. The tools that exist today often cannot be applied to some cognitive impairment conditions experienced by stroke patients. [11]

Many assessment methods have not been standardized in assessing the speech ability of stroke patients. Several assessment methods to assess the speech ability of stroke patients have not been standardized, thus posing various challenges in clinical practice. Most speech therapists rely on their clinical judgment rather than standard tools/methods, citing poor sensitivity to changes during the acute phase of stroke. [11] Many methods of assessing speech skills do not have a systematic evaluation of their diagnostic abilities. [16]

This research is important because it will provide information about speech skills in stroke patients using the TADIR Method. Interventions to address speech disorders in stroke patients often face challenges such as limited test repetition and poor sensitivity. [11] The TADIR method is an alternative to overcome this problem by providing a more structured and practical approach. Rehabilitation in the form of speech

therapy will be effective if it is carried out through a multidisciplinary approach. The TADIR method can contribute to a more comprehensive rehabilitation program, which is expected to provide better results. (16)

TADIR can help detect a patient's speech ability over time, making it important to assess the effectiveness of the intervention provided. The use of the TADIR method can help detect the patient's speech ability over time and can be used to evaluate the effectiveness of the intervention provided. This research aims to describe the speech ability of stroke patients using the TADIR method.

METHOD

Study design

This type of research is descriptive and describes the speech ability of stroke patients assessed using the TADIR method.

Study setting

The study was conducted at Poltekkes Kemenkes Tasikmalaya, in Tasikmalaya, West Java, Indonesia. The research involved stroke patients who met the inclusion criteria and were admitted to health care facilities affiliated with the institution. Data collection took place within these clinical settings, ensuring that the assessment of speech ability using the TADIR method was performed in a controlled and professional environment. The setting provided access to a representative sample of stroke patients, enabling the researchers to comprehensively evaluate speech impairment and apply the TADIR assessment as part of their diagnostic and rehabilitation procedures.

Population and sample of the study

The number of participants in this study was 43, and the sampling was carried out consecutively. The inclusion criteria of this study were: Stroke patients with GCS > 12, who had speech impairment (Aphasia) and were willing to be respondents. The exclusion criteria for the sample were patients who experienced a decreased level of consciousness.

Data collection and instruments

The instrument used was a speech ability screening format using TADIR. The Aphasia Test for Diagnostics and Rehabilitation (TADIR) assesses a patient's aphasia status. It was developed in 1994 and published in 1996.

Data analysis

Data processing is usually done by *editing*, *coding*, *data entry*, and *cleaning*. The data that has gone through the following processing will be analyzed. Univariate analysis describes each variable: age, gender, type of stroke, comorbidities, frequency of attacks, and ability to swallow. To determine the relationship between the two variables (dependent and independent variables), bivariate analysis, t-tests, and correlation tests were carried out.

Ethical consideration

Ethics Commission Board, Poltekkes Kemenkes Tasikmlaya No approved this research. DP.04.03/F.XXVI.20/134/2023

RESULTS

1. Univariate Analysis

Table 1. Distribution of respondents based on age and speech ability in 2024 (n=43)

Variable	Mean	SD	Min – Max	95% CI
Age	59,35	8,79	38 - 78	56,64 – 62,06
Speech Ability	6,65	5,79	0 - 20	4,87 – 8,44

Based on Table 1 above, it can be seen that the average age of the respondents in this study is 59.35 years. Meanwhile, the average speaking ability of the respondents in this study was 6.65, with the lowest speaking ability value of 0 and the highest speaking ability value of 20.

Table 2. Distribution of respondents by gender, stroke comorbidities, and frequency of attacks in 2024 (n =43)

Research Variables	Research Respondents	
	n	%
Gender		
Men	30	69,8%
Woman	13	30,2%
Comorbidities		
There	40	93,0%
None	3	7,0%
Types of Stroke		
Ischemic	34	76,1%
Hemorrhagic	9	20,9%
Attack Frequency		
First	35	81,4%
To – 2/more	8	18,6%
Sum	**43**	**100%**

Based on Table 2 above, it can be known that the characteristics of the research respondents include the majority of males 30 people (69.8%), there are 40 respondents (93%) with comorbidities, the type of stroke experienced by the majority of respondents is ischemic stroke as many as 34 respondents (76.1%), and the frequency of attacks experienced by each respondent is the majority experienced for the first time, which is as many as 35 respondents (81.4%).

2. Bivariate Analysis

Table 3. Results of respondent characteristic relationship analysis with speaking ability score 2024 (n=43)

Variable	*P Value*
Age	0,023
Gender	0,013
Types of Stroke	0,095
Comorbidities	0,181
Attack frequency	0,883

Based on Table 3, it can be seen that there is no general influence on the speech ability of stroke patients. There is a difference in the average speech ability of stroke patients between men and women. There was no difference in the average speech ability of stroke patients in respondents with hemorrhagic and ischemic strokes, with and without comorbidities, and in the first attack and subsequent attacks.

DISCUSSION

The speech ability of stroke patients has decreased due to disturbances in the speech center. The percentage of stroke patients who experience speech disorders is quite high. Dysarthria and Aphasia are disorders that are often found in stroke patients. This condition often persists until the patient is discharged from the hospital. [17] Speech therapy carried out early and intensively has been shown to improve speech skills. Patients who performed speech exercises early showed better speech skills one

month after stroke and continued to improve for up to one year. [18] Intensive speech therapy can improve language and cognitive function, even in the chronic stage. This is evidenced by an increase in brain connectivity in related areas. [19] The recovery of speech ability in stroke patients varies. Patients with neurodynamic speech disorders tend to experience faster recovery compared to patients with cortical Aphasia. [20]

The TADIR (Aphasia Test for Diagnosis and Rehabilitation) method is one of the tools developed to assist in the early detection and management of Aphasia in stroke patients. Conventional aphasia assessments such as the Western Aphasia Battery (WAB) and Boston Diagnostic Aphasia Examination (BDAE) require many resources, including speech and language pathologists. [21]

The use of the TADIR method as a diagnostic tool in the early detection of Aphasia has several advantages. First, this method can be done relatively quickly, so it is practical for health workers in various health care facilities in hospitals, health centers, and rehabilitation clinics. Second, TADIR allows healthcare workers to identify the type and degree of Aphasia more specifically, so that a more targeted therapeutic intervention plan can be designed for each patient.

Overall, applying the TADIR method in early detection and rehabilitation of Aphasia in stroke patients is an important step in improving the quality of patient care and accelerating the recovery of their communication skills. With a structured and comprehensive assessment method such as TADIR, it is hoped that stroke patients who experience Aphasia can get effective interventions, so that they can communicate and interact with their social environment again.

Age is one of the significant factors in the occurrence of Aphasia in stroke patients. The results showed that stroke patients with Aphasia tended to be older compared to those who did not have Aphasia. This suggests that the risk of Aphasia in stroke patients increases with age.[22,23,24] Although age affects the occurrence of Aphasia in stroke patients, it does not significantly affect the type of Aphasia. Younger patients were more likely to show non-fluent Aphasia or Broca's Aphasia, but no significant association was found between age and certain types of Aphasia in older patients. [22,23] Regarding the recovery process, age does not significantly affect aphasia recovery patterns or clinical outcomes. This means that older aphasia patients do not necessarily have a worse recovery process compared to younger patients. [22]

Gender also has a role in determining the risk and severity of Aphasia. Sex differences in the prevalence of Aphasia in stroke patients are also influenced by age. More men are affected in the middle-aged age group (51-70 years), while more women are affected in the elderly age group (>70 years). [25] Concerning the type of Aphasia, women are more prone to suffer from global Aphasia and Broca's Aphasia, while men are more prone to suffer from anomic Aphasia. [26] Gender differences also affect the rate of aphasia recovery, with women showing better recovery compared to men. [25]

Some studies show that men have a higher risk of developing Aphasia after a stroke compared to women. This may be related to differences in blood flow patterns and brain connectivity between men and women. Some studies suggest that women's brains have stronger connections between hemispheres, which may help them restore language function when damage occurs on one side of the brain.

CONCLUSION AND RECOMMENDATIONS

Some stroke patients experience a decrease in speech ability. Age and gender factors have a relationship with the aphasia condition experienced by stroke patients. TADIR can be used as one of the methods for detecting speech problems experienced by stroke patients.

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CONFLICT OF INTEREST
There are no conflicts of interest.

REFERENCES

1. Bores J. Management of the communicatively challenged adult after stroke: Partners in rehabilitation. In: After Stroke: Enhancing Quality of Life. Kessler Institute for Rehabilitation, Inc, Saddle Brook, NJ, United States: Taylor and Francis; 2020. p. 99–101.
2. Sheikhany AR, Othman DM, Elshebl OZ, Abdelhady AF. Language profile in different kinds of apraxia in post-stroke patients. Egyptian Journal of Otolaryngology. 2022;38(1).
3. Ginex V, Veronelli L, Vanacore N, Lacorte E, Monti A, Corbo M. Motor recovery in post-stroke patients with Aphasia: The role of specific linguistic abilities. Topics in Stroke Rehabilitation. 2017;24(6):428–34.
4. Malliarou M, Tsionara C, Patsopoulou A, Bouletis A, Tzenetidis V, Papathanasiou I, et al. Investigation of Factors That Affect the Quality of Life After a Stroke. In: Advances in Experimental Medicine and Biology. Laboratory of Education and Research of Trauma Care and patient safety, Nursing Department, University of Thessaly, Larissa, Greece: Springer; 2023. p. 437–42.
5. Rimmele DL, Thomalla G. Long-term consequences of stroke. Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz. 2022;65(4):498–502.
6. Brisebois A, Brambati SM, Rochon E, Leonard C, Marcotte K. The longitudinal trajectory of discourse from the hyperacute to the chronic phase in mild to moderate poststroke aphasia recovery: A case series study. International Journal of Language and Communication Disorders. 2023;58(4):1061–81.
7. Wilson SM, Entrup JL, Schneck SM, Onuscheck CF, Levy DF, Rahman M, et al. Recovery from Aphasia in the first year after stroke. Brain. 2023;146(3):1021–39.
8. Kadojić D, Bijelić BR, Radanović R, Porobić M, Rimac J, Dikanović M. Aphasia in patients with ischemic stroke. Acta Clinica Croatica. 2012;51(2):221–5.
9. Aras B, İnal Ö, Kesikburun S, Yaşar E. Response to Speech and Language Therapy According to Artery Involvement and Lesion Location in Post-stroke Aphasia. Journal of Stroke and Cerebrovascular Diseases. 2020;29(10).
10. Lucka E, Lucki M, Cybulski M, Daroszewski P, Lisiński P. The Use of the ICF Classification Sheet to Assess Cognitive-Behavioral Disorders and Verbal Communication in Patients after Ischemic and Hemorrhagic Stroke during Rehabilitation. International Journal of Environmental Research and Public Health. 2022;19(19).
11. Vogel AP, Maruff P, Morgan AT. Evaluation of communication assessment practices during the acute stages post stroke. Journal of Evaluation in Clinical Practice. 2010;16(6):1183–8.
12. Mozeiko J, Pascariello A. How are SLPs managing services for people with mild Aphasia? Journal of Communication Disorders. 2020;84.
13. Døli H, Helland T, Andersen Helland W. Self-reported symptoms of anxiety and depression in chronic stroke patients with and without Aphasia. Aphasiology. 2017;31(12):1392–409.
14. Bonini M V, Radanovic M. Cognitive deficits in post-stroke Aphasia. Arquivos de Neuro-Psiquiatria. 2015;73(10):840–7.
15. Laures-Gore JS, Farina M, Moore E, Russell S. Stress and depression scales in Aphasia: Relation between the aphasia depression rating scale, stroke aphasia depression questionnaire-10, and the perceived stress scale. Topics in Stroke Rehabilitation. 2017;24(2):114–8.

16. McMicken BL, Muzzy CL. Prognostic indicators of functional outcomes in first time documented acute stroke patients following standard dysphagia treatment. Disability and Rehabilitation. 2009;31(26):2196–203.
17. Vidović M, Sinanović O, Šabaškić L, Hatičić A, Brkić E. Incidence and types of speech disorders in stroke patients. Acta Clinica Croatica. 2011;50(4):491–3.
18. Roberts S, Bruce RM, Lim L, Woodgate H, Ledingham K, Anderson S, et al. Better long-term speech outcomes in stroke survivors who received early clinical speech and language therapy: What's driving recovery? Neuropsychological Rehabilitation. 2022;32(9):2319–41.
19. Katsuno Y, Ueki Y, Ito K, Murakami S, Aoyama K, Oishi N, et al. Effects of a new speech support application on intensive speech therapy and changes in functional brain connectivity in patients with post-stroke Aphasia. Frontiers in Human Neuroscience. 2022;16.
20. Safronova MN, Kovalenko A V. Neurodynamic Speech Disorders in the Acute Period of Ischemic Stroke. Neuroscience and Behavioral Physiology. 2024;54(4):554–7.
21. Mahmoud SS, Pallaud RF, Kumar A, Faisal S, Wang Y, Fang Q. A Comparative Investigation of Automatic Speech Recognition Platforms for Aphasia Assessment Batteries. Sensors. 2023;23(2).
22. Ellis C, Urban S. Age and aphasia: A review of presence, type, recovery, and clinical outcomes. Topics in Stroke Rehabilitation. 2016;23(6).
23. Shnait I, Abbas MS, Ali MS, Alghabban SLS, Hameed NS. Evaluation of Rituximab in Immunothrombocytopenia Splenectomized and Non-Splenectomized Patient. South Eastern European Journal of Public Health. 2024;24(S4):278–92.
24. Tsouli S, Kyritsis AP, Tsagalis G, Virvidaki E, Vemmos KN. Significance of Aphasia after first-ever acute stroke: Impact on early and late outcomes. Neuroepidemiology. 2009;33(2):96–102.
25. Chen Y, Li YS. Effects of gender on post-stroke Aphasia. Journal of Shanghai Jiaotong University (Medical Science). 2009;29(8):978–81.
26. Li TT, Zhang PP, Zhang MC, Zhang H, Wang HY, Yuan Y, et al. Meta-analysis and systematic review of the relationship between sex and the risk or incidence of poststroke Aphasia and its types. BMC Geriatrics. 2024;24(1).