

The Effectiveness of Visual and Gestural Communication in Improving Functional Communication in Stroke Patients with Aphasia

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Abstract:

Background: Aphasia is one of the neurological complications experienced by stroke patients and affects their functional communication abilities. Communication difficulties in patients with aphasia result in limitations in expressing their needs, understanding messages, and participating in social interactions. Visual and gestural communication is an alternative communication approach that can aid in the rehabilitation of patients with aphasia through the use of pictures, symbols, and body movements.

Materials and Methods: This study employed a quasi-experimental design with a pretest-posttest control group design. The study population consisted of stroke patients with aphasia. Sampling was conducted using consecutive sampling based on inclusion criteria. Seventy patients with aphasia were divided into an intervention group and a control group, each comprising 35 participants. The intervention group received visual and gestural communication training as well as speech therapy for 10 days, 30 minutes per day, while the control group received speech therapy from the hospital. Functional communication ability was measured before and after the intervention using the Derby Functional Communication Scale. Data analysis used the Wilcoxon and Mann-Whitney U-tests.

Results: The study results showed a significant improvement in functional communication skills in the intervention group following the visual and gestural communication intervention, with a median increase from 7 to 11 and a p -value of <0.001 . In the control group, there was no significant difference between pre and post routine care ($p=0.206$). The between-group test results showed a significant difference in posttest scores between the intervention and control groups ($p=0.001$).

Conclusion: Visual and gestural communication intervention is effective in improving functional communication skills in stroke patients with aphasia. This intervention can be used as an alternative nursing rehabilitation approach to support communication recovery in patients with aphasia.

Key Word: Stroke; aphasia; functional communication; visual; gestural

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I. Introduction

Stroke is one of the leading causes of neurological disability worldwide, with its prevalence continuing to rise due to an aging population and unhealthy lifestyles. Stroke ranks as the second leading cause of death globally, following cardiovascular disease. Data from the Global Burden of Disease show a significant increase in the incidence, prevalence, mortality, and disability-adjusted life years (DALYs) due to stroke during the period 1990–2021, with an

estimated 11.9 million new cases annually^[1]. In Indonesia, stroke is the leading cause of disability and death with a prevalence of 8.3 per 1,000 people, while in Aceh Province the prevalence reaches 8.8 per 1,000 people^[2].

Stroke occurs due to disruption of blood flow to the brain, either caused by blockage or rupture of blood vessels, which can result in damage to brain areas responsible for motor, cognitive, and language functions. One of the most common neurological complications following stroke is aphasia, a communication disorder caused by damage to the language areas of the brain, particularly Broca's and Wernicke's areas^[3]. This condition causes impairments in understanding and expressing language, both verbally and in written form. Various studies have shown that aphasia is a common complication among stroke patients, with a prevalence ranging from 22% to 34%^[4], ^[5]. Aphasia not only affects language ability, but also impacts functional communication, social participation, interpersonal relationships, and patients' quality of life^[6].

Functional communication is the ability of individuals to receive and convey messages effectively in daily activities through verbal, nonverbal communication, as well as the use of communication aids. In stroke patients with aphasia, functional communication ability is often impaired due to limitations in understanding, interpreting, and expressing language. Patients with aphasia frequently require assistance in daily communication activities, particularly in tasks involving complex language processing^{[6],[7]}. Therefore, rehabilitative interventions are needed to help patients maintain their communication abilities optimally.

Speech and language therapy is a commonly provided intervention for patients with aphasia and has been proven effective in improving language comprehension and production^[8]. However, conventional approaches still often focus primarily on verbal exercises without integrating alternative communication methods that can support patients' functional communication. In fact, patients with aphasia tend to require communication strategies tailored to their individual needs and preferences, such as the use of visual media and body gestures^[9].

Visual and gestural communication are part of augmentative and alternative communication (AAC) that can be used as compensatory strategies for patients with language disorders. Visual communication utilizes pictures, symbols, or other visual media to help patients understand and convey messages, while gestural communication uses body movements or gestures as a form of nonverbal communication^[10]. The combination of AAC and conventional speech therapy provides significant improvements in basic communication abilities and quality of life among post-stroke patients with aphasia^[11]. Visual approaches have been shown to help patients with aphasia improve information comprehension and communication participation, while gestural communication can function as a compensatory strategy when verbal abilities are impaired^{[12][13]}. The combination of these two approaches is considered capable of supporting more effective multimodal communication in helping patients express their needs and understand information in their surrounding environment.

Although various studies have demonstrated the benefits of visual and gestural communication separately, research regarding the effectiveness of combining these two methods in improving functional communication ability remains limited, particularly in local clinical settings. Based on observations conducted in the neurological ward of dr. Zainoel Abidin General Hospital Banda Aceh, interventions provided to stroke patients with aphasia are still predominantly focused on conventional speech therapy without the use of alternative communication methods. Considering the incidence data, observational findings, the impact of aphasia, and several previous studies, this study focuses on the effectiveness of visual and gestural communication on functional communication ability in patients with aphasia.

II. Material And Methods

Study Design: A quasi-experimental study with a pretest-posttest control group design

Study Location: The study was conducted in the male and female neurology wards of dr. Zainoel Abidin General Hospital, Banda Aceh.

Study Duration: Oktober 2025 to March 2026.

Sample size: A total of 70 respondents were divided into two groups, consisting of 35 respondents in the intervention group and 35 respondents in the control group.

Sample size calculation: This study used Cohen's tables to determine the sample size using a two-tailed approach with a significance level (alpha) of 0.05. A Cohen's d value of 0.50 indicated a large effect size. Based on Cohen's table, with a statistical power of 0.80, the minimum required sample size was 64 respondents. To anticipate potential dropouts, a 10% attrition rate correction was applied, resulting in a final sample size of 70 respondents.

Subjects & selection method: The sampling technique used in this study was consecutive sampling among ischemic stroke patients with aphasia who were hospitalized in the neurology ward.

Inclusion criteria:

- Patients diagnosed with ischemic stroke accompanied by aphasia (paresis of cranial nerves V, VII, and XII).
- Patients aged 18 years and older.
- Patients with a Glasgow Coma Scale (GCS) score ≥ 14 .
- Patients who agreed to participate in the study.

Exclusion criteria:

- Stroke patients with additional neurological disorders (dementia, Parkinson's disease).
- Stroke patients with visual and hearing impairments.
- Patients with mental disorders.
- Patients using hypnotic medications.

Procedure methodology

The study began with administrative procedures, including obtaining research permission and ethical approval from dr. Zainoel Abidin General Hospital, Banda Aceh (Number: 304/ETIK-RSUDZA/2025). After obtaining approval, the researcher coordinated with the head of the neurology ward regarding the implementation of the study. Respondents were then selected based on the predetermined inclusion and exclusion criteria. Eligible respondents were provided with explanations regarding the objectives, procedures, benefits, and risks of the study, and were subsequently asked to sign an informed consent form as an agreement to participate in the study.

On the first day of the study, all respondents in both the intervention and control groups underwent an initial assessment (pretest) using the Derby Functional Communication Scale (DFCS) to measure functional communication ability. The control group received routine hospital therapy in the form of speech therapy for 10 days according to the applicable standard of care. Meanwhile, the intervention group received routine hospital speech therapy combined with visual and gestural communication interventions for 10 consecutive days with a duration of 30 minutes per day. Visual communication was implemented using a communication board containing pictures of daily activities such as eating, drinking, toileting, and emotional expressions. In addition, gestural communication was carried out through the use of body movements and simple gestures to help patients understand and convey messages.

During the implementation phase, the researcher first taught respondents and their families how to use the communication board through demonstrations, lectures, and question-and-answer sessions. Respondents were then trained to recognize, point to, and use pictures as a medium for communicating basic needs. Furthermore, the researcher demonstrated various simple body movements, such as nodding, shaking the head, pointing to certain body parts, and facial expressions used to support the communication process. Respondents were asked to independently repeat the use of these gestures during the training sessions.

Communication training was carried out repeatedly using the same materials throughout the intervention period to strengthen patients' communication abilities. Before and after each session, the researcher monitored the respondents' general condition and vital signs to ensure patient stability during the intervention. On the 10th day, all respondents underwent a final assessment (posttest) using the DFCS instrument to evaluate changes in functional communication ability after the intervention.

Statistical analysis

Univariate analysis was conducted to describe respondents' characteristics, including age, sex, education level, occupation, and frequency of stroke attacks. Numerical data were presented as mean and standard deviation, while categorical data were presented as frequencies and percentages. Normality testing was performed using the Shapiro–Wilk test to determine the distribution of functional communication ability scores. The results showed that the data were not normally distributed; therefore, bivariate analysis was conducted using the Wilcoxon signed-rank test to compare pretest and posttest scores within groups, and the Mann–Whitney U test to compare score differences between groups. Additional analyses were performed to examine the relationship between respondents' characteristics and functional communication ability. The Spearman test was used for numerical variables, while the Mann–Whitney U test and Kruskal–Wallis H test were used for categorical variables. A p-value of < 0.05 was considered to indicate a significant relationship.

III. Result

Respondent Characteristics

This study involved 70 respondents consisting of 35 respondents in the intervention group and 35 respondents in the control group. Respondent characteristics included age, sex, education level, occupation, and frequency of stroke episodes. The results of the analysis of respondent characteristics are presented in the following table.

Table I- Sociodemographic data of patients.

Sociodemographic data	Intervention Group (n=35)		Control Group (n=35)	
	f	%	f	%
Age (years)				
Mean ± SD	59,51 ± 10,885		57,63 ± 11,924	
Min-Max	34 - 79		22 - 76	
Gender				
Male	20	57,1	21	60
Female	15	42,9	14	40
Education				
elementary	2	5,7	1	2,9
Intermediate	27	77,1	34	97,1
High	6	17,1	0	0
Occupation				

Civil Servant/Military/Police	10	28,6	3	8,6
Self-employed	12	34,3	19	54,3
Housewife	13	37,1	13	37,1
Frequency of Stroke Attacks				
1 time	22	62,9	30	85,7
>1 time	13	37,1	5	14,3

Table I shows that the average age respondents in the intervention group was $59,51 \pm 10,885$ years, while in the control group it was $57,63 \pm 11,924$ years. The majority of respondents in both groups were male, accounting for 57,1% of intervention group and 60% of the control group. Based on educational level, the majority of respondents had a secondary education. In the intervention group, most respondent worked as housewife (37,1%), while in the control group, the majority worked as self-employed individuals (54,3%). Based on the frequency of stroke episode, most respondents in both groups experienced their first stroke.

Functional Communication Ability

Table II shows that the mean score for functional communication skills before the intervention was 7.17 ± 1.294 in the intervention group and 7.09 ± 1.173 in the control group. After receiving the visual and gestural communication intervention, the mean score for functional communication skills in the intervention group increased to 11.43 ± 1.220 . Meanwhile, in the control group, there was no significant increase, with a posttest mean of 7.20 ± 1.023 . These results indicate that the intervention group experienced a greater improvement in functional communication skills compared to the control group.

Table II- Distribution of mean functional communication abilities in the intervention and control groups (n=70)

Functional Communication	Intervention Group (n=35)			Control Group (n=35)		
	Mean	SD	Min-Max	Mean	SD	Min-Max
Pretest	7,17	1,294	4-9	7,09	1,173	5-9
Posttest	11,43	1,220	8-14	7,20	1,023	5-9

Bivariate Analysis

Before conducting the hypothesis test, the researcher performed a normality test using the Shapiro–Wilk test. The test results showed a p-value < 0.05 for both groups, indicating that the data were not normally distributed. Therefore, bivariate analysis was performed using nonparametric tests. A homogeneity test was conducted to assess the equality of variances between groups before the intervention, yielding a p-value of 0.239 (>0.05), indicating that the two groups were homogeneous.

Within Group

Table III shows that in the intervention group, the median functional communication ability before the intervention was 7 (IQR = 1) and increased to 11 (IQR = 1) after the intervention. The results of the Wilcoxon test showed a Z-value of -5.196 with a p-value <0.001 , indicating a significant difference in functional communication ability before and after the visual and gestural communication intervention.

Table III- Functional communication scores before and after treatment in the intervention and control groups

Variable	Wilcoxon Test				
		Pretest Median (IQR)	Posttest Median (IQR)	Z	p
Functional Communication	Intervention Group	7 (1)	11 (1)	-5,196	<0,001
	Control Group	7 (2)	7 (1)	-1,265	0,206

Between Group

Table IV shows that before the intervention, there was no significant difference between the intervention group and the control group with a p-value of 0.611 ($p > 0.05$). After the intervention, there was a significant difference in functional communication ability between the two groups with a p-value of 0.001 ($p < 0.05$). The intervention group showed an increase in the median to 11 (IQR = 1), while the control group remained at a median of 7 (IQR = 1). These results indicate that visual and gestural communication is effective in improving functional communication skills in stroke patients with aphasia.

Table IV- Effectiveness of visual and gestural communication in the intervention and control groups

Variable	Mann Whitney U-test				
	Median (IQR) (Intervention Group)	Median (IQR) (Control Group)	Z	P	
Functional Communication	Pretest	7 (1)	7 (2)	-0,509	0,611
	Posttest	11 (1)	7 (1)	-7,182	0,001

IV. Discussion

Improvement in Functional Communication Skills in the Intervention Group

The results of the study indicate that there was a significant improvement in the functional communication abilities of stroke patients with aphasia following a visual and gestural communication intervention. In the intervention group, the median score for functional communication ability increased from 7 to 11 after a 10-day intervention. These results suggest that the combination of visual and gestural communication can help patients understand, express, and convey messages more effectively during the communication process.

The improvement in functional communication skills among the intervention group can be attributed to the use of a multimodal communication approach that incorporates visual stimuli and body movements. Visual communication helps patients understand messages through images, symbols, and more concrete visual contexts, thereby making it easier for them to identify their needs and convey information. The use of visual media allows aphasia patients to utilize nonverbal processing pathways that remain functional when verbal language abilities are impaired. Additionally, gestural communication helps patients express their needs through body movements, facial expressions, and simple gestures that can be understood by their conversation partners.

The results of this study are consistent with previous research indicating that augmentative and alternative communication (AAC) combined with routine speech therapy can improve communication of basic needs and quality of life in aphasia patients compared to speech therapy alone^[11]. Other studies also suggest that a multimodal approach is more effective than the use of a single communication method in improving the communication abilities of aphasia patients^[14]. The use of various communication modalities allows patients to maintain social interaction despite verbal limitations.

Theoretically, the findings of this study align with the concept of functional communication in aphasia patients, which refers to an individual's ability to convey messages through verbal, written, nonverbal, or combined communication modalities in daily life. Aphasia rehabilitation should not only focus on the recovery of verbal language but must also consider patients' functional communication abilities and social participation^[15]. Thus, the use of visual and gestural communication provides patients with the opportunity to remain engaged in communication despite experiencing verbal language impairments.

Functional Communication Abilities in the Control Group

In the control group, the study results showed that there was no significant improvement in functional communication skills following routine hospital therapy. The median functional communication score remained at 7, with the Wilcoxon test yielding a p-value of 0.206 ($p > 0.05$). These results indicate that the routine speech therapy provided to the control group did not produce a significant change in the functional communication skills of aphasia patients during the study period.

The control group received only conventional speech therapy consisting of vocal exercises and word repetition, performed three times during the treatment period. Speech therapy is indeed the primary intervention in the rehabilitation of aphasia patients, but its effectiveness is greatly influenced by the intensity of the exercises, the frequency of therapy, the patient's clinical condition, and the communication methods used. A therapeutic approach that focuses solely on verbal aspects is often suboptimal for aphasia patients with severe language impairments because damage to the language centers causes patients to have difficulty both understanding and producing verbal language.

The findings of this study are consistent with previous research indicating that conventional speech therapy can be beneficial for language recovery; however, significant improvements in functional communication generally require a more comprehensive and multimodal approach^[16]. The combination of speech therapy with AAC or alternative communication strategies yields better results than verbal therapy alone^[14].

The lack of significant improvement in the control group may also be due to limited communication support during the rehabilitation process. Aphasia patients not only experience linguistic impairments but may also have deficits in attention, memory, and executive function, which affect their ability to communicate successfully in daily life^[17]. Therefore, therapy that does not incorporate visual and gestural cues and supportive communication may result in a slower recovery of communication skills.

In addition, functional communication skills are determined not only by the ability to speak, but also by the ability to understand messages, use nonverbal communication, and maintain social interactions. Aphasia patients require a therapeutic approach that facilitates meaningful communication through various modalities such as facial expressions, body movements, and images. A communication approach that focuses solely on verbal communication is insufficient for optimally improving patients' functional communication^[18].

Differences in Functional Communication Abilities Between the Intervention and Control Groups

The results of the study showed that prior to the intervention, there was no significant difference in functional communication ability between the intervention group and the control group ($p = 0.611$). This indicates that both groups had relatively comparable baseline conditions. However, after the intervention, there was a significant difference between the two groups with a p -value of 0.001. The median functional communication score in the intervention group increased to 11, while the control group remained at a median of 7. These results indicate that visual and gestural communication intervention has a greater effect than routine speech therapy alone.

The difference in improvements in communication skills between the two groups can be explained by the fact that the intervention group received a combination of speech therapy and visual-gestural communication therapy. This combination of therapies helps patients convey messages through nonverbal means such as pictures, symbols, writing, and body movements, allowing them to continue participating in communication despite having verbal language impairments. In contrast, the control group received only conventional speech therapy, which focuses more on verbal exercises, resulting in more limited communication stimulation.

The multimodal approach used in the intervention group provides more comprehensive sensory and motor stimulation than a verbal-only approach. Previous studies have shown that the use of various communication modalities such as visual, verbal, and motor can activate various neural pathways that remain functional in aphasia patients. The repeated delivery of communication exercises can also support the reorganization of language function in the brain through neuroplasticity mechanisms—that is, the brain's ability to form new neural connections as part of the post-stroke recovery process^{[19][20]}.

In addition to improving communication skills, the use of visual and gestural communication strategies can also enhance patient engagement in daily activities and the decision-making process during treatment. A supportive communication environment allows patients with aphasia to feel better understood and able to actively participate in social interactions and healthcare services. Therefore, combining speech therapy with visual and gestural communication can be considered an effective rehabilitation strategy to improve the functional communication abilities of stroke patients with aphasia.

V. Conclusion

This study demonstrates that visual and gestural communication interventions are effective in improving functional communication skills in stroke patients with aphasia. The intervention group showed a significant improvement in functional communication skills after receiving visual and gestural communication training, whereas no significant improvement was observed in the control group, which received only routine speech therapy. Furthermore, there was a significant difference in functional communication skills between the intervention and control groups following the intervention. The use of pictures, symbols, and body movements helps patients understand information, express needs, and maintain communication interactions despite verbal language impairments. Thus, visual and gestural communication can be considered as a supportive intervention in the rehabilitation of stroke patients with aphasia and can be integrated into nursing practice to improve the quality of communication and patient participation during the care and rehabilitation process

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