

Aphasia Types and Language Modality Disorder by Ischemic Stroke Patient

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Abstract: This study focuses on analysing the types of aphasia caused by an ischemic stroke and their modality language disorder. The classification of aphasia syndromes employed in this research is based on Benson (1979). The subjects of the study were one male patient and two female patients with ischemic stroke in RSUD Subang. The data for this case study were collected and analyzed by using the TADIR test by Dharmaperwira-Prins (2000). Based on the analysis, it is concluded that there are two types of aphasia caused by the ischemic stroke, namely transcortical motor aphasia and broca's aphasia. The participants with broca's aphasia and transcortical motor aphasia had a disorder in spontaneous speech on personal information, such as listing, words and sentence naming, and not only verbally, but also in writing comprehension. The participant with broca aphasia had verbal paraphasia; however, the participant with transcortical motor aphasia only had literal paraphasia. Patients with broca's Aphasia and transcortical motor aphasia produced fewer than 76 words per minute, which indicated that they suffered from a non-fluent type of aphasia. Disorder with reading aloud and repetition in broca's aphasia were more severe than in those with a transcortical motor aphasia. The male transcortical motor participant was able to write, although suffering from literal paraphasia. On the contrary, the female participants were unable to write because they had the weakness on the right side of the body.

1 INTRODUCTION

The nature of communication is an interaction process between people, which is expressed in the form of one's thoughts or feelings to another using language as the medium. Effendi (1993) argues that communication means the act of delivering a message from the sender to the receiver. The message delivery in a communication process must be able to create a shared meaning between the sender and the receiver, so that a good message relay can occur. However, the message delivery is often hindered by several disturbances, Gamble (1986) in Nurudin (2007) reveals that communication disturbances are factors that affect the pace of a message or interfere with the ability of sending or receiving a message.

Generally, communication disturbances are either static ones (constant and always present), or dynamic ones (continuously changing). For instance, the static disturbances of climate and weather disturbances are wind, rain, and the obstacles from the surrounding physical environment. Meanwhile,

the dynamic disturbances be resolved despite their constant state of change, such as an engine failure on message transmission machines (telephone and the like), psychological disturbance (low self-esteem, anxiety, phobia), physical disturbance, and semantic disturbance and semantic disturbance. Semantic disturbance which causes a hindered communication process can occur because of a brain tumor, brain infection (meningitis), traumatic brain injury (TBI), dementia, alzheimer, cerebral palsy and stroke.

A Stroke is one of the brain disorder sources which occurs at the peak of a productive age and is considered to be a second cause of death after the heart attack in most countries. In the United States of America, stroke is the third death cause for adults. Every year, the mortality rate is solely caused by a stroke which accounts for more than 200,000. Stroke incidents on the national scale are approximately 750,000 each year. The incidence number of African-Americans is 60% higher than in Caucasians (Sacco, et.al., 2013). Some suffer a stroke at all ages, but two-thirds of stroke incidence, impact people of age above 65. In Asia, stroke

incidence accounts for more than two-thirds of the global incidence of stroke (Suwanwela and Pongvarin, 2016). According to the Ministry of Health data, in Indonesia, stroke is also considered to be the leading cause of death, with a stroke prevalence of 12.1/1000 recorded in 2013. Thus, it can be assumed that 4 out of 1000 Indonesians are at risk of aphasia. Unfortunately, Neuro-rehabilitation in Indonesia does not always include speech therapy. This is true especially in smaller hospitals or more remote areas where stroke is treated only with the primary care of physicians. Often, stroke patients may receive neither aphasia assessment nor intervention.

The limited attention being paid by linguists to clinical linguistics, especially language disorders of stroke patients (especially in Indonesia) are the main reason this research was conducted. Besides, according to previous research, it was found that there are language disorders suffered by people with aphasia. However, there is no specific note about the type of aphasia observed, and the linguistic disorders discussed are still in general aspects. Therefore, the objectives of the research are to analyse the types of aphasia caused by ischemic stroke and their modality language disorders.

2 APHASIA

Aphasian said can be defined as the loss or impairment of language caused by brain damage. In more depth, Goodglass and Kaplan (1972) define aphasia as disturbance of any or all of the skills, association and habits of spoken or written language, produced by injury to certain brain areas which are specialized for this function. Aphasia is labelled as aphasic, namely a variety of limited disorder such as “selective disorders of auditory comprehension, object-naming, articulation, reading or repetition...”, and these experts classify alexia with or without agraphia among the aphasias. Schuell, Jenkins, and Jumenez-Pabon (1964) require that aphasia be reserved for language disorder crossing all modalities – reading, writing, listening, speaking, and gesturing.

Sinanović, et. al. (2011) states that there are different definitions of aphasias, but the most widely accepted neurologic and/or neuropsychological definition is that aphasia is a loss or impairment of verbal communication, which occurs as a consequence of brain dysfunction. It manifests in impairment of almost all verbal abilities, i.e. abnormal verbal expression, difficulties in

understanding spoken or written language, repetition, naming, reading and writing.

2.1 Types and Characteristics of Aphasia

Apart from the Broca's and Wernicke's type of aphasia, Ardila (2014) proposed diverse aphasia classifications since Broca's first description of a language disorder associated with brain pathology (Broca, 1863). There are, however, two most influential aphasia classifications, that have significantly guided the area during the last decades: the Boston Group classification; and Luria's aphasia interpretation. The first one has been particularly influential in the US and western European countries; the second one has been mostly used in eastern European countries and Latin America. Boston Group classification represents a further development of Wernicke's ideas about brain organization of language, and includes two basic distinctions: (1) aphasias can be fluent or non-fluent; and (2) aphasias can be cortical, subcortical, or transcortical (e.g., Benson, 1979; Goodglass and Kaplan, 1972). Nevertheless, this research uses the classification stated by Benson (1979) that classifies aphasia more in detail, into global aphasia, Broca's aphasia, Wernicke's aphasia, anomic aphasia, conduction aphasia, transcortical motor aphasia, transcortical sensory aphasia, and mixed transcortical aphasia.

Examination, diagnosis, and treatment on aphasia patients resulted in the classification of aphasia. Some systems use neurology criteria, in which the location of brain injury becomes the condition to classify aphasia. Other systems classify aphasia based on the linguistic ability of the disorder, namely The National Aphasia Association in the United States of America classifies aphasia into *fluent* and *non-fluent*. In fluent aphasia, also called as Wernicke's/posterior/sensory/receptive aphasia, the language comprehension is very poor, but fluent in their language. Fluent aphasia results in long and unorganized utterances, good articulation with the melody and supra-segmental characteristics just like in normal utterances (these characteristics may give the impression to the audience that fluent aphasia possesses a good linguistic ability).

Non-fluent aphasia is also called as Broca's/anterior/motor/expressive aphasia. People with non-fluent aphasia may have difficulty in word production, even though the comprehension is relatively intact. In non-fluent aphasia, patients challenge themselves to express utterances, unlike

the ones with fluent aphasia. They realize that they are poor and frustrated and have great difficulty forming complete sentences. The articulation and the characteristics of supra-segmental utterances form are severely disturbed. The intonation unit is really short and affects the grammatical ability, the deficit of sentences structure's ability, and producing incomplete sentences. Non-fluent aphasia patients are also known as suffering from agrammatic speech, in which their speaking quality is like telegraphic speech. For instance, if they want to say, "I will take the dog for a walk", they will only say, "walk dog". The occurrence of lexical-semantic disorder, in which the patients make mistakes in using dictions, for example, using 'front' when they mean 'back'. This is called semantic paraphasia, while phonemic paraphasia occurs when the intention is saying 'snowman', but 'stowcan' comes out instead.

3 STROKE

3.1 Definition of Stroke

Stroke is defined as cerebrovascular disease that is incorporated into a sudden neurologic disorder caused by a blockage of blood flow to the brain through the artery supply system. In line with Wolf (2004) in Talvitie, et.al. (2010), stroke is the most common, life-threatening neurologic disease with an annual incidence of approximately six cases in 1000 persons. The older term often used is Cerebrovascular Accident (CVA). According to Delaney and Potter (1993) in Teasell, Hussein and Norhayati (2013), stroke is a cerebrovascular disorder which represents the third leading cause of mortality and the second major cause of long-term disability in North America.

3.2 Types of Strokes

The types of stroke as mentioned by Ardila (2014) are the two major types of strokes distinguished: hemorrhagic and ischemic.

Haemorrhagic stroke (see figure 1) is another type of stroke. It is caused by an artery in the brain bursting and causing localized bleeding in the surrounding tissues. Two major types of brain hemorrhage are distinguished, as figure 1 shows.

- a. Subarachnoid hemorrhage: There can be bleeding into the subarachnoid, the space between the arachnoid and the pia mater, the

innermost membrane surrounding the central nervous system. Most frequently, it is caused by bleeding from a cerebral aneurysm, but also can be due to bleeding from an arteriovenous malformation or head injury; Injury-related subarachnoid hemorrhage is often seen in the elderly who have fallen and hit their head. Among the young, the most common injury leading to subarachnoid hemorrhage is motor vehicle crashes;

- b. Intracerebral hemorrhage: is a type of stroke caused by bleeding within the brain tissue itself. It is most commonly caused by hypertension, arteriovenous malformations, or head trauma.

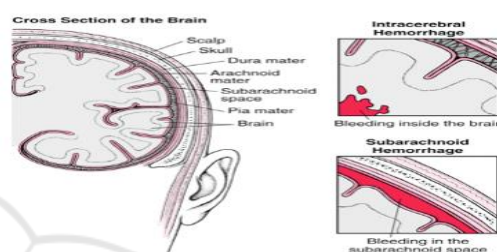


Figure 1: Haemorrhagic stroke.

Ischemic stroke (as figure 2 shows) two different conditions can be found relative to ischemic stroke:

- a. Embolism: it is the occlusion of a vessel by material floating in the arterial system. The emboli are usually formed from blood clots, but are occasionally comprised of air, fat, or tumour tissue;
- b. Thrombosis: is the formation of a blood clot (thrombus) inside a blood vessel, obstructing the flow of blood through the circulatory system.

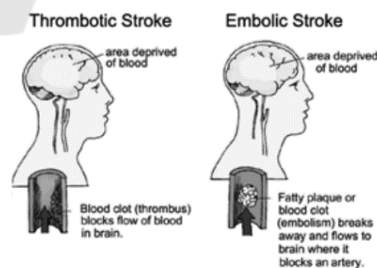


Figure 2: Ischemic stroke.

On the other hand, stroke can be classified based on anatomical pathology and the causes (Misbach, 2011), namely ischemic and hemorrhagic stroke. The incidence of ischemic stroke accounts for 70-80 % of the total incidences. Meanwhile, hemorrhagic stroke cases are low in number. The types of ischemic stroke, according to the pathology and its causes are transient ischemic attack (TIA), cerebral

thrombosis and cerebral embolism. Ischemic stroke is the major cause of the damage on left brain or left hemisphere. The damage on the left hemisphere of the brain causes communication disorder called as aphasia (dysphasia).

4 RESEARCH METHODS

This study was conducted to reveal the types of aphasia caused by ischemic stroke. In particular, this research attempts to obtain a clear description of their modality language disorder. This study was conducted at RSUD Subang, West Java, Indonesia. The site selection was based on several reasons. First, this hospital was very welcoming to the researcher who would like to undertake a research. Second, participants were cooperative and the researcher had little difficulties in collecting data from them. Also, with the patients' relatives who were in charge, they were really helpful. The participants of the study were 1 male and 2 female patients with ischemic stroke in RSUD Subang. This study was also assisted by a neurologist from RSUD Subang who diagnosed the disease suffered by the patients.

This study uses the case study as a research method. By using a case study, the data obtained are expected to fulfil criteria strictly in accordance with the research to be conducted. As Merriam (1988) suggests that a case study is a bounded system or a defined individual or entity (like a student, program, school, institution) that the researcher wishes to explore. However, Stake (1995) points out that what forms the boundaries and the context is not immediately apparent. Yin (2003) agrees, defining a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries and the contexts are not clearly evident.

The data for this case study were collected and analysed by using the TADIR by Dharmaperwira-Prins (2000). According to The TADIR (*Tes Afasia untuk Diagnosis, Informasi, dan Rehabilitasi*) or Aphasia Test for Diagnosis, Information, and Rehabilitation has four aims that are fulfilled by a combination of the subtests (Dharmaperwira-prins, 2000); (1) to diagnose individuals with or without aphasia, (2) to diagnose which aphasia syndrome is being suffered, (3) to provide information to patients, and their environment, (4) to provide a basis for therapy and rehabilitation. The participants tasks are (1) spontaneous speech in personal information, (2) listing some animals names in one

minute (3) naming in word and sentence level (4) spontaneous speech, elicited by a set of questions (5) reading aloud (6) word and sentence repetition (7) verbal language comprehension in word and sentence level (8) written language comprehension in word and sentence level (9) writing personal information (10) dictation word level (11) filling-in own personal information, (12) writing in word and sentence level.

The duration for administering the TADIR was set to be one hour, and the manual recommends the testing to be split into two separate sessions of thirty minutes. All the participants with ischemic stroke in this study were tested with the TADIR.

5 FINDINGS AND DISCUSSION

The test results showed that there were two types of aphasia caused by ischemic stroke, namely motor transcortical and broca's aphasia, as table 1 shows in Appendix. The detailed explanation is stated below. P1, male, achieved a normative score from the listing subtest (4) and word-level naming (4), therefore P1 got a score of 1-4 of both subtests, which meant P1 suffered aphasia. Next, from the verbal fluency score achieved from spontaneous speech subtest, P1 got 36 words per minute (below 76 words per minute), thus it was found that P1 suffered non-fluent aphasia. In order to disclose the types of non-fluent aphasia suffered by P1, it can be decided from verbal comprehension (word and sentence level) and sentence repetition. Normative score from verbal comprehension of P1 was 3, and the sentence repetition score was 5, thus it was certain that P1 suffered transcortical motor aphasia.

P2, female, achieved a normative score from listing (4) and word-level naming (4), therefore P2 got a score of 1-4 of both subtests, which meant P2 suffered aphasia. Then, from fluency score achieved from spontaneous speech subtest, P2 got 25 words per minute (under 76 words per minute), thus it was found out that P2 suffered non-fluent aphasia. To decide what type of non-fluent aphasia suffered by P2, it can be decided from verbal comprehension (word and sentence level) and sentence repetition. Normative score from verbal comprehension of P2 was 3, and the sentence repetition score was 3, thus it was certain that P2 suffered broca's aphasia.

P3, female, achieved a normative score from the listing subtest (4) and word-level naming (4), therefore P3 achieved scores of 1-4 of both subtests, which meant P3 suffered aphasia. Then, verbal fluency score achieved from spontaneous speech

subtest, P3 got 13 words per minute (under 76 words per minute), thus it was found that P3 suffered non-fluent aphasia. In order to determine the type of non-fluent aphasia suffered by P3, it can be decided from verbal comprehension (word and sentence level) and sentence repetition. Normative score from verbal comprehension of P3 was 4, and the sentence repetition score was 4, thus it was certain that P3 suffered motor transcortical aphasia.

P1 obtained a normative score 3 for spontaneous speech with personal information, 4 for listing, 4 for word level naming, and 3 for sentence level naming. P2 achieved normative score 4 for spontaneous speech in personal information, 4 for listing, 4 for word level naming, and 3 for sentence level naming. While, P3 achieved a normative score 4 for spontaneous speech in personal information, 4 for listing, 4 for word level naming, and 3 for sentence level naming. Therefore, it can be concluded that the participants with broca's aphasia and motor transcortical aphasia had a disorder in spontaneous speech in personal information, listing, word and sentence naming, and not only in verbal, but also in writing comprehension.

P2 with broca's aphasia had verbal paraphasia, P2 called "segitiga" (triangle) on card 1 with "persegi" (square). Literal paraphasia also occurred in P3, female motor transcortical aphasia patient, in this case P3 changed the syllables of 'gelas' (glass) into 'beras' (rice).

Reading aloud and repetition disorder in broca's aphasia was more severe than in motor transcortical. The patient with broca's aphasia gained a normative score 1 (reading aloud) and 3 (repetition), which meant the participant with broca's aphasia was having great difficulty in reading aloud and disturbed in repeating.

On the other hand, the male participant with motor transcortical obtained a normative score 3 (reading aloud) and 5 (repetition), which meant the male participant with motor transcortical suffered difficulty in reading aloud but was able to repeat normally. A better score was achieved by the female participant with motor transcortical who got a normative score 4 (reading aloud) and 4 (repetition), which meant either in reading aloud and repetition, the participant with motor transcortical had only a little difficulty. In writing ability, the male participant with motor transcortical was able to write, although suffering from paragrammia literal, as figure 3 shows.

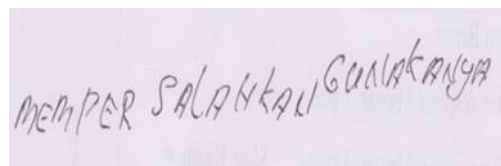


Figure 3: Paragrammia literal in P1.

Conversely, the female participants were unable to write because they had weaknesses on the right side of the body, as figure 4 and 5 show.

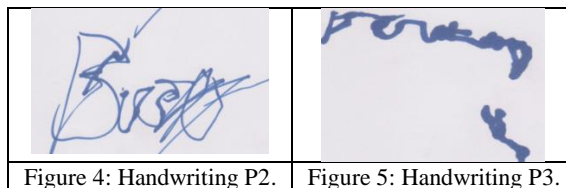


Figure 4: Handwriting P2. Figure 5: Handwriting P3.

6 CONCLUSIONS

The objectives of the research are to analyze the types of aphasia caused by ischemic stroke and their modality language disorder. Benson (1979) mentioned eight types of aphasia i.e. global aphasia, broca aphasia, aphasia wernicke, anomic aphasia, aphasia conduction, aphasia motor transcortical, sensory transcortical aphasia and mixed transcortical aphasia. However, the type of aphasia found in 3 patients suffering from ischemic stroke is only broca aphasia and motor transcortical aphasia. To answering the second research question about the partisipants modality language disorder, the participants with aphasia broca and motor transcortical had a disorder in spontaneous speech in personal information, listing, word and sentence naming, and not only in verbal, but also in written comprehension. The participants with aphasia broca had verbal paraphasia, and literal paraphasia also occurred to female transcortical motor. Aphasia broca and transcortical motor uttered fewer than 76 words per minute (P1-36, P2-25, dan P3-13). It showed that they suffered from non-fluent aphasia. Reading aloud and repetition disorder in aphasia broca was more severe than in motor transcortical. The male motor transcortical participant was able to write although suffering from paragrammia literal. Conversely, the female participants were unable to write because they had a weakness on the right side of the body.

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APPENDIX

Table 1: Analysis of aphasia types and language modality disorder of ischemic stroke patient.

Type of Aphasia	Language Impairment													
	Comprehension		Production											
	Listening	Reading	Speaking								Writing			
	Word and Sentence Level	Word and Sentence Level	Personal Information	Personal Information	Listing	Naming Word Level	Naming Sentence Level	Spontaneous Speech	Reading Aloud	Repetition	Personal Information	Dictation	Word Level	Sentence Level
Broca (Female)	3	3	4	4	4	4	3	Average 25 words/minute (non-fluent)	1	3	1	1	1	1
Transcortical Motoric (female)	4	4	3	4	4	4	3	Average 13 words/minute (non-fluent)	4	4	2	1	1	1
Transcortical Motoric (male)	3	3	3	3	4	4	3	Average 36 words/minute (non-fluent)	1	5	2	4	3	3

