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NEUROBEHAVIORAL AND IMAGING PROFILE OF VASCULAR APHASIC SYNDROMES WITH THEIR SHORT-TERM OUTCOME

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ABSTRACT **Objective:** To study the neurobehavioral pattern of aphasia due to stroke and to study the correlation of aphasia with the radiological imaging profile. **Setting:** This prospective analytical study is done in all stroke patients with acute language dysfunction attending the Neurology department, TVMCH, between February 2024 and December 2024. **Participants:** This prospective analytical study is done in 48 cases admitted to the neurology department who were diagnosed with acute language dysfunction secondary to stroke. **Results:** This study investigates the impact of vascular stroke syndrome on language functions, specifically comprehension, expression, and repetition, in 45 patients (35 males, 10 females) with varying literacy levels. Stroke location strongly correlated with language impairment severity, with basal ganglia infarcts linked to severe repetition deficits, while frontal lobe strokes (M1–M3) predominantly affected expression, and temporal/parietal strokes (M4–M6) impaired comprehension and repetition. Gender differences were noted, with male patients exhibiting greater deficits in comprehension and expression, while females showed better repetition abilities. Literacy significantly influenced recovery, as patients with higher education demonstrated better language function outcomes by Day 5 post-stroke. These findings underscore the role of stroke location and cognitive reserve in language recovery, highlighting the need for targeted rehabilitation strategies.

KEYWORDS : APHASIA, STROKE, LANGUAGE

INTRODUCTION:

Vascular aphasia syndromes arise from cerebrovascular events that disrupt blood flow to language-related regions of the brain, leading to impairments in language comprehension and production. The severity and characteristics of these language deficits are closely linked to the location and extent of the vascular lesions. Advancements in neuroimaging techniques have significantly enhanced our understanding of the neural mechanisms underlying these syndromes and their recovery trajectories. [1]

Aphasia is a language disorder resulting from damage to the brain's language centres, commonly due to stroke or other vascular incidents. The specific type and severity of aphasia depend on the affected brain regions. For instance, damage to the anterior language network, particularly the Broca's area, often leads to non-fluent aphasia, characterised by impaired speech production but relatively preserved comprehension. Conversely, lesions in the posterior language network, including Wernicke's area, result in fluent aphasia, where speech production remains fluid, but comprehension is significantly compromised [2].

Aphasia arises from the inability to understand and regulate language after injury to certain areas of the brain. Approximately 35–40% of adults admitted to the hospital because of strokes are diagnosed with aphasia. Furthermore, approximately 85% of stroke patients with aphasia recover from the aphasia within 3–6 months after onset; however, some may require additional time for recovery, and others may never fully recover. [3]

Brain imaging is essential for the initial diagnosis of stroke and the assessment of stroke severity and prognosis. Stroke location and extension are associated with different patterns of aphasia with diverse functional outcomes. So, in this study, we set out to investigate the correlation between the short-term outcome of aphasia and the radiological profile.

METHODOLOGY:

This potential analytical research is conducted in 48 patients admitted in the neurology department who were diagnosed with acute language dysfunction due to stroke (verified by CT or MRI). The severity of stroke was measured through clinical evaluation at admission. Baseline data, such as demographics, drug-taking medical history, previous CVA medical history, myocardial infarction, transient ischemic attack, hypertension, diabetes, angina, and atrial fibrillation, are gathered for all the above cases. Aphasia is categorized based on the Boston 6-part examination; on one-part, pharmacologic treatment is administered based on protocol, and speech therapy was initiated and performed by the carers. Repeat imaging was performed as required; aphasia evaluation (e.g., sensory aphasia becoming motor aphasia) is noted.

Patients have been scored according to three major variables: reception, expression, and repetition. Reception is graded from 0 to 5, with 0 showing no understanding and 5 near-normal understanding. Halfway scores gauge the patient's capacity to identify pointed objects around them (1), answer yes-no questions (2), complete a two-step command (3), and understand a three-step command (4). Expression is also rated on a 0 to 5 scale, 0 indicating zero-word output and 5 reflecting near-normal expression. The ratings encompass patients producing less than 10 words (1), using 10-30 words or jargon phrases (2), constructing two-word sentences (3), and persons able to utter three-word sentences (4). Repetition is graded on four levels: R-0 for no repetition, R-1 for less than 50% repetition, R-2 for 50-80% repetition, and R-3 for 80-100% repetition. These criteria for scoring offer a systematic method of assessing language and comprehension skills in patients. The short-term consequence of aphasia on day one, three, and five is measured and compared with imaging.

Table-1: Reception, Expression, And Repetition Table

Score	Reception	Expression	Repetition
0	Nil comprehension	No word output	Nil repetition
1	Comprehension to pointed objects in environment	<10 words	<50% repetition
2	Comprehension to yes-no questions	10-30 words; jargon speech	50-80% repetition
3	Comprehension to 2-step command	2-word sentence	80-100% repetition
4	Comprehension to 3-step command	3-word sentence	
5	Near normal comprehension	Near normal expression	

RESULTS:

This research involved 45 participants with a gender composition of 35 males and 10 females. Age group classification indicated that no participant was aged less than 30 years, 10 were aged 31-50 years, 24 were aged 51-70 years, and 11 were aged 71-90 years. In terms of literacy level, 17 were illiterate, and the rest had different levels of education: 6 had reached 5th grade, 5 had reached 8th grade, 4 had reached 3rd grade, 3 each had reached 6th and 10th grade, 2 each had reached 7th, 9th, and 4th grade, and 1 had studied up to the 11th grade.

These results of the study show that comprehension, expression, and repetition are all positively related to one another, with correlation

coefficients between 0.60 and 0.68. Comprehension, however, shows the highest negative correlation with M6 (-0.58), which indicates that infarcts in this area are linked with poorer comprehension skills. Expression is negatively correlated with M1 (-0.26) and M4 (-0.34), which suggests that these infarcts could affect speech expression. In the same vein, repetition has the highest negative correlation with M4 (-0.52) and M5 (-0.38), indicating the significance of such areas in the capacity for repetition of speech.

The effect of vascular stroke syndrome on language functions, viz., comprehension, expression, and repetition, was studied in 45 patients (35 men, 10 women). Most were middle-aged to old, and their literacy levels varied from illiterate (17 patients) to secondary level. The basal ganglia (8 cases) were the most frequently involved area, followed by motor cortex strokes in areas M4, M5, and M6 (3 cases). Infarcts in various areas were associated with language impairments, with comprehension, expression, and repetition being positively correlated (0.60–0.68). Comprehension was most negatively correlated with M6 (-0.58), reflecting poorer comprehension skills in these infants, and expression was negatively correlated with M1 (-0.26) and M4 (-0.34). Deficits in repetition were most associated with M4 (-0.52) and M5 (-0.38). Additionally, M1 and M2 infarcts were moderately correlated (0.54), while M5 and M6 infarcts showed a strong correlation (0.50), possibly suggesting common infarct patterns.

Day 5 post-stroke language tests showed inconsistency, with comprehension being 2.11, expression 1.69, and repetition 1.22. Basal ganglia strokes, especially repetition scores of 0 or 1, showed greater deficits. Frontal lobe strokes (M1–M3) were mostly associated with expressive deficits, whereas temporal and parietal areas (M4–M6) involved repetition and comprehension. Gender comparison revealed more deficits in comprehension and expression for males and relatively preserved repetition skills for females. Literacy had a significant impact on recovery, with lower scores in all language areas for illiterate patients than for patients with formal education. Increased literacy, particularly secondary education, correlated with more adequate language recovery, possibly because of cognitive reserve.

These results emphasize the significance of stroke location and literacy in language impairment and imply that rehabilitation planning should take both infarct patterns and cognitive reserves into account for best post-stroke language recovery.

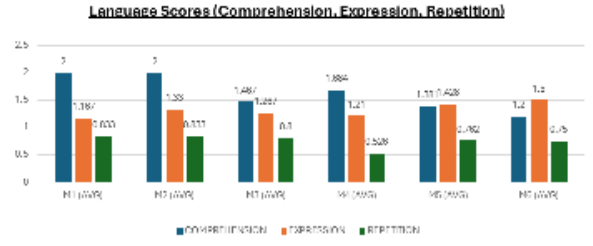

Table-2: Language Scores

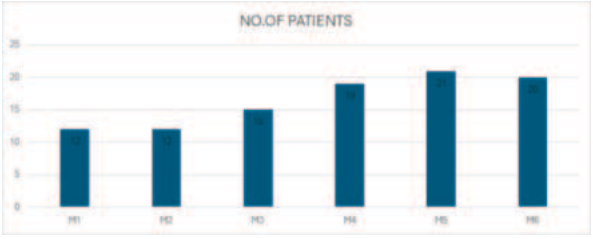

Table-3: Stroke Areas (M1-M6)

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