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Case report

Language impairment among post stroke patients: Observation through neurolinguistic approach

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ABSTRACT

Language is vital to human beings, as it is a means of expressing thoughts, emotions and feelings. Impairments in the nervous system significantly affect the individual's language and behavior, bringing burdens on the family and the state. Stroke is the most common cause of language impairment, causing disorders due to specific brain injuries. We identified these disorders in the initial phase and intervened with speech therapy. Although the language problem in post-stroke patients is significant, this domain is poorly addressed in Bangladesh, which makes this work a pioneer. Large-scale studies are needed to better visualize the extent of the problem.

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Deterioro del lenguaje en pacientes que han sufrido un accidente cerebrovascular en Bangladesh: observación mediante un enfoque neurolingüístico

Palabras clave:
Accidente cerebrovascular
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RESUMEN

El lenguaje es vital ya que es un medio para expresar pensamientos, emociones y sentimientos humanos. Las deficiencias del sistema nervioso afectan el lenguaje y el comportamiento, lo que supone una carga para la familia y el estado. El accidente cerebrovascular es una

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causa común de deterioro del lenguaje, debido a lesiones cerebrales específicas. Identificamos trastornos del lenguaje en la fase inicial e intervinimos con logopedia. Aunque el problema del lenguaje en los pacientes que han sufrido un accidente cerebrovascular es significativo, este es un trabajo pionero en Bangladesh. Los estudios a gran escala dan una mejor noción del problema.

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Introduction

Language is one of the most vital domains of the human being. Through it the human being expresses thoughts, emotions and feelings. When the nervous system is significantly affected, language is impaired and behavioral problems arise. Sometimes, language impairment brings a burden to the family and the state. Stroke is the most common cause of language impairment worldwide and also in developing countries like Bangladesh. Post-stroke language disorders are common because neurolinguistic impairment results from a specific brain injury. During management, if we identify language disorders in the initial phase and intervene with speech language therapy, we can reduce the burden on the family and the state. The language consists of aspects such as understanding (Receptive), expressing (Speaking) and also finding the right words, reading and writing according to the situation and context (Pragmatic). The objective of this article is to verify the language impairment in post-stroke patients through the neurolinguistic approach. A cross-sectional study was conducted at the Department of Neuroscience Z. H Sikder Women's Medical College and Hospital, Dhaka, Bangladesh over a period of one year, from January 2018 to December 2018. One hundred and six stroke patients were selected for this study. After offering written consent, they were included in this study. They were interviewed individually and a pre-prepared questionnaire was filled out with the information collected. The data were presented in a table with the following result: The mean age of post-stroke patients is 60.28 ± 13.30 years. Men were more prevalent than women (2.78: 1). More than half of the patients in the study, 77.4%, were unable to understand other people's speech (receptive/conceptual disorder). Articulator deficiency is seen in 61.3% of patients who were unable to accurately produce the correct words or phrases during speech (due to paralysis of the joint muscles). During the conversation, 60.4% of the patients presented: (i) pragmatic disorder (use of language in a specific situation and context); (ii) Agrammatism in 46.2% (grammatical part of the sentences and disorder in the formation of the sentences); (iii) 45.3% could not remember the correct names and numbers of words (Anomia) during speech; (iv) and only 38.7% did not know how to read properly. When viewing the images, 38.7% could not describe the events (Vocabulary and Cognitive Linguistic Disorder), presenting proverbial disorder (linguistic cognitive disorder). 35.8% were unable to discover the strange when viewing the images (linguistic cognitive disorder). Due to the inability to express thoughts, emotions, feelings to others through language, 81.1% were destructive to family members in their sociolinguistic disorders. 43.4% of patients had diabetes mellitus, followed by hypertension (36.8%), and dislipidemia (25.5%). Almost one third of the patients were smokers. The language problem in post-stroke patients is significant, but this domain is poorly addressed in Bangladesh. To better inform the reader, this is the first neurolinguistic approach for post-stroke patients in Bangladesh. Large-scale studies are needed to better visualize the extent of the problem.

Stroke and language impairment

Stroke is the most common cause of mortality worldwide and the third most common cause in developed countries.[1] According to the latest statistics of American Heart Association, about 700,000 peoples are affected by strokes in the United States and 163,000 people died due to stroke annually.[2] Individually who survives this potentially deadly event is often left with physiologic and neurolinguistic complication.[3] Many researchers focus mainly on physical problems, leaving neurolinguistic problems aside.[4] But post stroke language disorders are frequent and a common neurolinguistic disability resulting from specific brain lesion. The disruption of language processing skills is the consequence of brain dysfunction which manifests the difficulties in understanding spoken, reading and writing language.[5–7]

Although stroke is a neurologic deficit it has a strong correlation with significant language impairment. Sometimes language problems may lead to complicated clinical presentation and poor response to treatment. Recovery of language impairment which is caused by ischemic stroke occurs earlier in the first two weeks. Language impairment which is caused by hemorrhagic stroke has a slow spontaneous recovery.[8] Language impairment is influenced by stroke and depends greatly on the type of stroke. A significant number of language impairment spontaneously improves if identifying the impairment speech language therapy starts as soon as possible. Otherwise, the patients develop disability after stroke. That can be frustrating for the patient family members and caregivers who support people with these difficulties.[9] The objective of the study is to examine the frequency and pattern of language impairment presented in post stroke patient in a Medical College Hospital of Dhaka Bangladesh, to encourage professionals in the field to seek training and solutions that reduce injuries or interfere with behavior of patients providing socialization for the latter.

Table 1 – Demographic profile of the study subjects (*n* = 106).

	Frequency (*n*)	Percentage (%)
Age (years)		
35–40	8	7.5
41–50	27	25.5
51–60	21	19.8
61–70	30	28.3
>70	20	18.9
Mean ± SD	60.28 ± 13.30 (35–85)	
Gender		
Male	78	73.6
Female	28	26.4
Education level		
Formal	34	32.1
Primary	33	31.1
SSC	20	18.9
HSC	10	9.4
Graduate or above	9	8.5

Table 2 – Stroke related information of the study subjects (*n* = 106).

	Frequency (*n*)	Percentage (%)
Paralysis		
Right side of the body	61	57.7
Left side of the body	34	32.1
Both side of the body	11	10.4
Hemisphere affected due to stroke		
Right hemispheric lesion	34	32.1
Left hemispheric lesion	61	57.7
Both hemispheric lesion	11	10.4

Method

This cross-sectional study was carried out at the Department of Neuroscience Z.H Sikder Women's Medical College and Hospital during the year 2018, from January to December. One hundred and six stroke patients were selected for this study. Anonymity of participants and details of confidentiality were explained to each patient and their caregiver. After obtaining written and verbal consent from the patient and their caregiver, sociodemographic data were obtained, and the diagnosis was made by a Neurologist and Clinical Linguists. The collected data were classified, cleared and analyzed. After obtaining written consent, they were included in this study. Patients were interviewed individually. A pre-prepared questionnaire was filled out with the information collected and the data were presented in a Table 1.

Results

Maximum patients were in age group 61–70 years followed by 41–50 years (25.5%), 51–60 years (19.8%), >70 years (18.9%) and 35–40 years (7.5%). Males were predominant over females (2.78:1). Maximum patients had formal education (32.1%) followed by 31.1% who had primary, 18.9% had SSC, 9.4% had HSC and 8.5% had graduate or post graduate degree (Table 2).

Table 3 – Risk factors of the study subjects (*n* = 106).

	Frequency (*n*)	Percentage (%)
Diabetes mellitus	46	43.4
Hypertension	39	36.8
Dislipidemia	27	25.5
Smoking	33	31.1
Betel nut chewing	1	0.9
Alcoholism	1	0.9

Among patients with left cerebral hemisphere affected by stroke, there are 55.7%. With the right side paralyzed it is 57.7%. With the left side of the body paralyzed, 32.1% of patients are affected because they were affected in the right cerebral hemisphere. With both sides of the body paralyzed, we counted 10.4% of patients with both brain hemispheres injured. The maximum reached in the left cerebral hemisphere was 55.7%, followed by 32.1% in the right hemisphere and both hemispheres in 10.4% of cases (Table 3).

Maximum patients had diabetes mellitus (43.4%) followed by hypertension (36.8%) and dislipidemia (25.5%). Almost one third of the patients were smoker (Table 4).

More than half of the patients in the study, 77.4%, were unable to understand other people's speech (receptive/conceptual disorder); 64.2% were unable to accurately produce the correct words or phrases during speech (expressive language disorder); 45.3% of patients were unable to remember the correct names and numbers of words; 38.7% of patients had phonological disorders. As for the behavior toward family members, in 81.1% of the cases it was destructive (Sociolinguistic disorder) (Table 5.

During the conversation, pragmatic disorder was observed in 60.4% of patients; 46.2% of the patients had agrammatism; proverbial disorder can be seen in 38.7%; alteration in vocabulary and cognitive linguistic disorder was noticed in 38.7% of patients; 35.5% were unable to discover the stranger by viewing the pictures.

Discussion

In our study, male predominance is obvious (73.6%) which is consistent with other studies.[10,11] In this study, maximum patients have diabetes mellitus (43.4%) followed by hypertension (36.8%) and dislipidemia (25.5%). Almost one third of the patients are smoker (31.1%). In a study in China, Yao et al.[10] found 38.0%, 66.2% and 22.2% of the stroke patients had smoking habit, hypertension, and diabetes mellitus respectively.

Among the stroke patients in this study, right side was paralyzed in 57.5% patients; left side in 32.1%; and in both sides 10.4% of them. Sinanović et al.[8] found in their study 55.7% of patients with affected cerebral left hemisphere; followed by the right by 34.0%; and in 10.4% both hemispheres were affected. Language impairment was common consequence of left hemispheric lesion and most common neuropsychological consequence of stroke, with a prevalence of one-third of all stroke patients in acute phase. Post-stroke language disorders are frequent and include aphasia, alexia, agraphia and acalculia. Aphasia is a loss or impairment of verbal communication, which occurs as consequence of brain dysfunction.

Table 4 – Language impairment due to stroke (*n* = 106).

	Frequency (*n*)	Percentage (%)
Unable to accurately produce the correct words or phrases during speech (expressive language disorder) which is joint impairment due to paralysis of the joint muscle.	68	64.2
Unable to remember the names and numbers of the correct words (Anomia) during speech	48	45.3
Unable to understand any speech of other people (receptive/conceptual disorder)	82	77.4
Unable to read properly (Phonetics and Phonological Disorder)	41	38.7
Behavior toward family members (sociolinguistic disorder)		
Destructive	86	81.1
Constructive	20	18.9

Table 5 – Language impairment due to stroke (*n* = 106).

	Frequency (*n*)	Percentage (%)
During conversation pragmatic disorder (use of language in a specific situation and context)	64	60.4
Agramatism (disorder of sentence formation or grammar)	49	46.2
Proverbial disorder (Cognitive linguistic Disorder)	41	38.7
When viewing the images unable to describe the events (Vocabulary and Cognitive Linguistic Disorder)	41	38.7
Unable to discover what is strange when viewing images (cognitive linguistic disorder)	38	35.8

It manifests as impairment of almost all verbal abilities, e.g., abnormal verbal expression, difficulties in understanding spoken or written language, repetition, naming, reading, and writing. In our study, more than half of the patients (77.4%) were unable to understand the speech of others. 64.2% were unable to accurately produce the correct words or phrases during speech, which is an articulating disability. 60.4% had a pragmatic disorder during the conversation, and 46.2% had a grammatical disorder in part of the sentences or in their formation. Proverbial disorder was observed in 38.7% of patients. Vocabulary and Cognitive Linguistic Disorder were verified in 38.7% of the patients and Inability to discover the stranger seeing the photos was verified in 35.5% of the patients. Language impairment was present in 23.0% and 54.3% of stroke patients.[12,13] It was observed in our study that the behavior toward the family member was destructive (sociolinguistic disorder) in 81.1% of the cases. In the study by Stein et al.[11] post-stroke sociolinguistic disorder was listed as a common element. Language impairment and sociolinguistic disorder are common results after a stroke.[14,15]

Conclusion

This study provides details about stroke patients and explains what reflexes stroke has on their abilities. According to our findings, it can be concluded that language disorders are common among post-stroke patients. Language disorders also impair the individual's quality of life. If language impairments are screened earlier in patients, along with screening for neurological disorders, it is possible to intervene in language skills and work through speech therapy.[16] In this way, the patient is given the opportunity to develop language skills that he had lost, improving his quality of life, and reducing the burden on the family and the state. There are studies on the complexity of the cognitive system demonstrating the mechanism of brain plasticity, which allows the researcher to intervene with strategies that recruit previously underused brain areas so that these less active areas can perform new functions states that brain cells and neuronal circuits are not immutable: in addition to the change in cell loss reducing brain volume, the researchers were able to demonstrate that experience and learning reshape brain circuits. This configures neuronal plasticity, which enhances, in the long run, learning by generating new neuronal circuits. It follows that the brain would be able to repair itself and develop despite the obstacles of the stroke.[17–19]

Conflict of interest

The authors declare that they have no conflict of interest.

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