The Relationship of Post-Stroke Aphasia Types with Age, Sex and Stroke Type in a Group of Iraqi Patients

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ABSTRACT:

BACKGROUND :

Aphasia is a condition of Loss or impairment of the production or comprehension of spoken or written language because of an acquired lesion of the brain. Aphasia is most often caused by stroke.

OBJECTIVE:

To assess the relationship of post-stroke aphasia types with age, sex and stroke types

PATIENTS AND METHODS:

A hospital - based cross sectional survey study conducted at Baghdad teaching hospital and Al Imamain Al kadhmain medical city between October 2014 and September 2015. One hundred patients with different types of patients with proved diagnosis of stroke by clinical and radiological assessment in young age group and old one of both genders and both left and right handed were included. Data regarding the clinical and demographic characteristics of the patients were reported including: Age, gender, handedness, stroke types, stroke side, stroke site, and aphasia types.

RESULTS:

A total of 100 patients with different types of stroke were enrolled in this study. The mean age of the studied group was 62.1 ± 13.2 (range: 37-87) years, moreover, majority of the studied group aged more than 50 years. Females were relatively the dominant than males; 55 (55%) vs. 45 (45%) respectively. Ischemic stroke was the dominant type of stroke among cases it was reported in 76 cases (76%) compared to only 24 (24%) of hemorrhagic type. Global aphasia was found in 32 stroke cases (32%), Broca´s in 17 (17%), Thalamic 17 (17%), Putaminal 11 (11%), Werneck's 11 (11%), Motor transcortical 6 (6%), Conductive and anomia 4 (4%) and the Mixed transcortical in only two cases (2%)

CONCLUSION:

Post stroke Aphasia was more frequent among stroke patients older than 50 years. Ischemic stroke was the dominant type of stroke. Global aphasia was the dominant subtypes of aphasia among the studied group followed by Broca's. Thalamic and the other subtypes were less frequent.

KEY WORLDS: stroke, aphasia**.**

INTRODUCTION:

Aphasia is a condition of Loss or impairment of the production or comprehension of spoken or written language because of an acquired lesion of the brain [(1)].

Aphasia is most often caused by stroke. Although this figure does not include aphasia caused by neurodegenerative disease or other causes like tumor, infection, trauma) [(2)].Stroke is defined by World Health Organization ,as the clinical syndrome of rapid onset (usually seconds to minutes) of focal cerebral deficit, lasting more than 24 hours or leading to death, with no apparent cause other than a vascular one [(3)]. Stroke has been proposed by the American Stroke Association which is tissue-based and states that "stroke is an episode of acute neurological dysfunction presumed to be caused by ischemia or hemorrhage, persisting ≥24 hours or until death [(4)]

Incidence of stroke increases with age, with approximately two-thirds of all strokes occurring in those older than 65 years. Age-adjusted stroke risk

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is somewhat higher in men than in women and in blacks > whites [5–7]

Normal language function requires proper neural function over a wide geography of brain regions. % of individuals are left dominant for language, meaning that language function is localized to the left hemisphere. Lateralization of language is associated with handedness, with approximately 90% of right-handed individuals and 70% of left handed individuals being left hemisphere dominant for language, although some debate exists about exact percentages. In left-handed individuals, about a third are either right hemisphere dominant or have language represented bilaterally [8].

Aphasia can be divided into "central" syndromes, which result from damage to the two epicenters of the language network (Broca's and Wernicke's areas), and "disconnection" syndromes, which arise from lesions that interrupt the functional connectivity of those centers with each other and with the other components of the language network. [9]

There are a number of other aphasias syndromes in addition to classical aphasias which include:

Thalamic aphasia has been identified after left thalamic hemorrhage and ischemic stroke. Thalamic aphasia has been described as a fluent aphasia with normal repetition and more preserved comprehension than that seen in Wernicke aphasia. In this way, thalamic aphasia can resemble transcortical sensory aphasia [10,11].

This aphasia has also been associated with both hemorrhages as well as infarctions that involve the head of the left caudate nucleus, putamen, and surrounding white matter, including the internal capsule. Due to internal capsule involvement, a right-sided hemiparesis is often associated with this type of aphasia. A common syndrome associated with this type of aphasia is the anterior subcortical aphasia syndrome associated with lenticulostriate artery stroke, which produces a nonfluent aphasia often associated with dysarthria and paraphasic errors. Lesions of the body and tail of the caudate and putamen are not thought to cause aphasia [10].

In general, a common, although not universal, distinguisher between thalamic aphasia and striatal-capsular aphasia is that thalamic aphasias are fluent, whereas striatal-capsular aphasias are non-fluent [8].

The aim of study is to assess the relationship of post-stroke aphasia types with age, sex and stroke types.

PATIENTS AND METHODS:

Study design and setting

This was a hospital - based cross sectional survey study conducted at Baghdad teaching hospital and Al Imamain Al kadhmain medical city between October 2014 and September 2015 were seen at neurology wards and general medical wards.

Study Sample

One hundred patients with different types of patients with proved diagnosis of stroke by clinical and radiological assessment in young age group and old one of both genders and both left and right handed were included.

Patients with one or more of the following criteria were excluded from the study:

1. History of dementia, Parkinson's disease, psychological illnesses, learning disability.
2. Could not communicate with normal intensity of voice.
3. Disturbed consciousness.

The data were collected by using a pre-structured questionnaire filled by the researcher by taking a full history and doing the clinical examination. Data regarding the clinical and demographic characteristics of the patients were reported including: Age, gender, handedness, stroke types, stroke side, stroke site, and aphasia types.

Assessment of the patient according to the following rules for the clinical examination of language which include the following:

Assessment of naming, spontaneous speech, comprehension, repetition, reading, and writing [12].

The study protocol was approved by the scientific neurological council of the Iraqi board of medical specialization. Verbal consent was obtained from the patient prior to participation in the study. The data and information of the patients were kept confidentially and did not disclose to unauthorized personnel.

Statistical analysis:

Data of the 100 stroke cases were entered and analyzed by using the statistical package for social sciences (SPSS) software version 22, IBM, Chicago, US, for windows. Descriptive statistics were presented as mean, standard deviation (SD), range, frequencies (No.) and proportion (%). Chi square test was used to assess the association between different variables. Level of significance, Value was set at 0.05. Finally, results were presented in tables and or figures with an explanatory paragraph.

RESULTS:

A total of 100 patients with different types of stroke were enrolled in this study. The mean age of the studied group was 62.1 ± 13.2 (range: 37-87) years, moreover, majority of the studied group aged more than 50 years.

Females were relatively the dominant than males; 55 (55%) vs. 45 (45%) respectively. Regarding the handedness, (93%) of the cases were right handed. All these descriptive characteristics are presented in table 1.

Table 1:Baseline characteristics of studied group (N=100).

Basic characteristics		No.	%
Age (year)	≤ 50	23	23.0
	51 – 60	27	27.0
	61 – 70	26	26.0
	> 70	24	24.0
	Mean ± SD	62.1 ± 13.2	-
	Range	37 - 87	-
Gender	Female	55	55.0
	Male	45	45.0
Handedness	Right	93	93.0
	Left	7	7.0

Ischemic stroke was the dominant type of stroke among cases it was reported in 76 cases (76%) compared to only 24 (24%) of hemorrhagic type.

From other point of view cortical stroke was found in 73 cases (73%) and the deep stroke in the remaining 27 cases (27%).

Global aphasia was found in 32 stroke cases (32%), Broca´s in 17 (17%), Thalamic 17 (17%), Putaminal 11 (11%), Werneck's 11 (11%), Motor transcortical 6 (6%), Conductive and anomia 4 (4%) and the Mixed transcortical in only two cases (2%) (Figure 1).

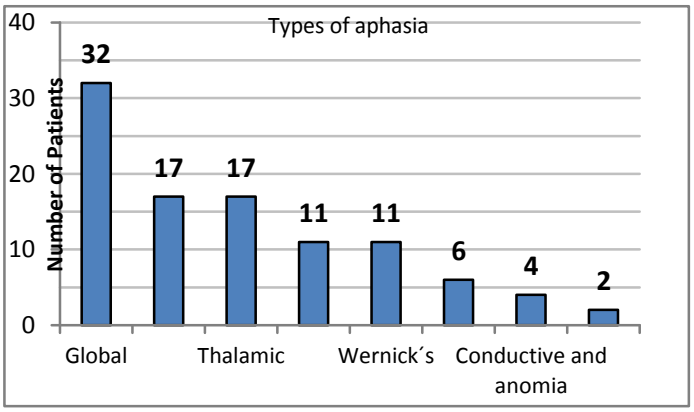

Figure 1:Types of aphasia among 100 stroke patients

The comparison of different types of aphasia across the age using 50 years as a cut point revealed that no statistically significant differences in frequencies of all types of aphasia across the age groups in both types of stroke except thalamic aphasia which was significantly more frequent in patients with Ischemic stroke and younger than 50 years compared to those older than 50 years' patients with the same stroke type, (P=0.001), (Table 2).

It is worth mentioning that overall frequency distribution of types of aphasia across the age group revealed that Global, Putaminal, Wernicke and Conductive and anomia aphasia were more frequent among patients older than 50 years, and Broca´s. Thalamic, Motor transcortical and Mixed transcortical aphasia were more frequent in patients younger than 50 years, however, the differences didn't reach the statistical significance, (P>0.05), (Table 3)

It had been found that Global, Broca´s and Werneck's aphasia were significantly more frequent among patients with ischemic stroke than those with hemorrhagic, (P.value < 0.05), while thalamic aphasia, Putaminal and Conductive and anomia were significantly more frequent among cases with hemorrhagic stroke, (P< 0.05). On the other hand, Motor transcortical and Mixed transcortical were not significantly different with respect to the type of stroke, (P> 0.05) (Table 4).

Table 2:Relationship between type of aphasia and age according to the types of stroke.

	Ischemic		P.value	Hemorrhagic		P.value
	< 50 (n=17)	> 50 (n=59)		< 50 (n=6)	> 50 (n=18)	
Global	4	27	0.17	0	1	0.55
Broca´s	5	10	0.42	2	0	0.88
Thalamic	4	0	0.001	4	9	0.81
Putaminal	0	8	0.24	0	3	0.70
Werneck's	0	11	0.12	0	0	-
Motor transcortical	2	1	0.24	0	3	0.70
Conductive and anomia	0	2	0.92	0	2	1.0
Mixed transcortical	2	0	0.07	0	0	-

Table 3: Relationship between type of aphasia and age.

Aphasia	Ages				P.value
	≤ 50 (N= 23)		> 50 (N=77)		
	No.	%	No.	%	
Global	4	17.4	28	36.4	0.15
Putaminal	0	0.0	11	14.3	0.12
Wernick´s	0	0.0	11	14.3	0.12
Conductive and anomia	0	0.0	4	5.2	0.63
Broca´s	7	30.4	10	13.0	0.10
Thalamic	8	34.8	9	11.7	0.021
Motor transcortical	2	8.7	4	5.2	0.90
Mixed transcortical	1	8.7	0	0.0	0.53

Table 3.4: Relationship between type of stroke and type of Aphasia.

Type of Aphasia	Ischemic stroke (n= 76) No %		Hemorrhagic stroke (n=24)No %		P.value
Global	31	40.8	1	4.2	0.032
Broca´s	15	19.7	2	8.3	0.007
Wernick´s	11	14.5	0	0.0	0.001
Thalamic	4	5.3	13	54.2	0.001
Putaminal	8	10.5	3	12.5	0.045
Conductive and anomia	2	2.6	2	8.3	0.04
Motor transcortical	3	3.9	3	12.5	0.28
Mixed transcortical	2	2.6	0	0.0	0.12
Total	76	100.0	24	100.0	-

DISCUSSION:

The prevalence of aphasia in patients with first ischemic stroke in our population (42%) was rather high when compared with other countries (15%-40%)[13-20]

Aphasia in stroke patients is associated with increased mortality, decreased rates of functional recovery, and reduced work capability. Previous studies referred that many different factors might affect the type of aphasia including the age, gender, type of stroke, and the interval between onset and examination. [21]

The current study aims to further analyze the distribution of aphasia types in post-stroke patients and explore the relationship of the types of aphasia with sex, age and stroke types, therefore, a total of 100 patients with different types of stroke were enrolled and investigated in this study with a mean age of 62.1 ± 13.2 (range: 37-87) years, moreover, majority of the studied group aged more than 50 years, females were relatively the dominant than males, these findings go generally with the clinical picture of stroke where the incidence of stroke is increasing once again, primarily in relation to the aging population.

In the present study 93% of the patients were right handed, it is well documented that lateralization of language is associated with handedness, with approximately 90% of right-handed individuals and 70% of left-handed individuals being left hemisphere dominant for language, although some debate exists about exact percentages. In left handed individuals, about a third are either right hemisphere dominant or have language represented bilaterally [(9)].

Regarding the types of aphasia among stroke patients in the present study, global aphasia was found (32%), Broca´s in (17%), Thalamic(17%), Putaminal 11 (11%), Werneck's 11(11%), Motor transcortical 6 (6%), Conductive 2%(2%) and anomia (2%) and the Mixed transcortical in only(2%). These findings consistent with that reported in 2011 by Vidović et al that among patients with aphasia, global aphasia was most common, followed by motor aphasia (Broca's aphasia) and nominal aphasia [(22)].

On the other hand, Brkic et al reported in 2009, that the most frequent type of aphasia was global (48,5%), then Broca's (23,3%), and Wernicke's (8.4%). Transcortical sensory, transcortical motor and conductive aphasia were diagnosed in small number of patients [(23)].

Nearly similar findings were also reported by Sinanović et al in 2011 [(24)].

Kang and his colleagues supported the previous findings and they found that an in frequency order, aphasia types were; 27.8% global, 21.6% anomic, 20.6% Broca's, 12.4% Wernicke's, 7.2% transcortical sensory, 6.2% transcortical motor, 3% mixed transcortical, and 1% conduction [(25)].

In 2012 Kadojic et al, documented that the most frequent clinical type of aphasia was expressive-receptive aphasia (68%), followed by expressive aphasia (29%) and receptive aphasia (3%) [(21)].

It had been suggested that thalamic aphasia patients are known to develop partial fluency and good repetition, but highly variable listening comprehension. Most lesions involving the left frontal or temporal lobes include specific language areas (such as, Broca's or Wernicke's area), although cortical lesions that do not involve these areas have been encountered , furthermore, Kang et al study describes relations between post-stroke aphasia severity and lesion type and location.[(25)]

The main findings of the present study were the higher proportion of the patients with post stroke aphasia aged > 50 years, this finding consistent with previous studies that suggested the probability of suffering from aphasia after stroke rises with age [(21,26)].

From other point of view, the overall distribution of the types of aphasia across the age revealed that Global, Putaminal, Wernicke and Conductive and anomia aphasia were more frequent among patients older than 50 years, while Broca´s, Thalamic, Motor transcortical and Mixed transcortical aphasia were more frequent in patients younger than 50 years, despite this clinically significant differences, it didn't reach the statistical significance. Despite the insignificant differences in the frequencies of types of aphasia across the age group, one exception was with thalamic aphasia which was significantly more frequent in patients with Ischemic stroke and younger than 50 years compared to those older than 50 years' with the same type of stroke.21

Furthermore, it is well documented that the probability of suffering from aphasia after stroke rises with the advancing age, and the older people with stroke are more liable to have aphasia, where in patients up to 65 years, the prevalence of aphasia was 25% in males and 11% in females, and in the group of patients above 85 years, the prevalence of aphasia increased twofold in males and 7.5 times in females [(21)]

Recently, it's well acknowledged that age had the following characteristics of the effect on the types of aphasia: patients of Broca's aphasia were younger than that of Wernicke's aphasia, and this difference only can be seen in ischemic stroke [(26)]. However, our study found that the age has no significant effect on aphasic types in both types of stroke, this result may be explained by the small sample size resulted from further subdivision of the studied group by types of aphasia, types of stroke and age group which lead to small number of

patients at each subgroup, and on the other hand, we didn't have a further analysis about the specific lesions, which may lead to the different results, nonetheless our findings supported by recent study of Yao et al in 2015 [26]. However, previous studies reported conflicting findings about the relationship of age and types of aphasia and this subject still under debate. Although, Aphasia was more frequently seen in patients with hemorrhagic stroke, compared to the ones with the ischemic stroke, Sinanović et al found that the difference is not statistically significant. [24].

CONCLUSION:

Post stroke Aphasia was more frequent among stroke patients older than 50 years. Ischemic stroke was the dominant type of stroke in patients with post-stroke aphasia. Global aphasia was the dominant subtypes of aphasia among the studied group followed by Broca's. Thalamic and the other subtypes were less frequent

REFERENCES:

1. O'Donnell MJ, Xavier D, Liu L Zhang H, et al. Risk factors for ischemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study). Lancet 2010; 376:112–23.
2. LaPointe LL. (2005). Aphasia and related neurogenic language disorders. New York: Thieme Medical Publishers.
3. Warlow C, Sudlow C, Dennis M, Wardlaw J, Sandercock P. Stroke. Lancet 2003; 362:1211–24.
4. Sacco RL, Kasner SE, Broderick JP, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013;44:2064-89.
5. National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group: Tissue plasminogen activator for acute ischemic stroke. N Engl J Med 1995;333:1581–87.
6. Jennifer LD and Louise DM. Perception of risk and knowledge of risk factors in women at high risk for stroke. Stroke 2009; 40:1181-86.
7. Urabe T. Prevalence of abnormal glucose metabolism and insulin resistance among subtypes of ischemic stroke in Japanese patients. Stroke 2009; 40:1289-95.
8. Caplan L. Caplan's stroke: a clinical approach. 3rd Ed. Woburn: 2000.
9. Lopez AD, Mathers CD, Ezzati M, et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet 2006;367:1747-57.
10. Asplund K, Karvanen J, Giampaoli S, et al. Relative Risks for stroke by age, sex, and population based on follow-up of 18 European populations in the MORGAM Project. Stroke. 2009;40:2319-26.
11. Seshadri S, Beiser A, Kelly-Hayes M, et al. The lifetime risk of stroke: estimates from the Framingham Study. Stroke. 2006;37:345-50.
12. Shibasaki H. and Hallett M. The neurologic examination: Scientific Basis for Clinical Diagnosis. 1st ed. Oxford University Press 2016.
13. Bulla in SS, Chriki LS, Stern TA. Aphasia: associated disturbances in affect, behavior, and cognition in the setting of speech and language difficulties. Psychosomatics 2007;48:258-64.
14. Berthier ML. Poststroke aphasia: epidemiology, pathophysiology and treatment. Drugs Aging 2005;22:163- 82.
15. Bersa no A, Burgio F, Gattinoni M, Candelise L, PROSIT Study Group. Aphasia burden to hospitalized acute stroke patients: need for an early rehabilitation programme. Int J Stroke 2009;4:443-47.
16. Tsoul i S, Ky ritsis AP, Tsagal is G, Virvida ki E, Vemmos KN . Significance of aphasia after first-ever acute stroke: impact on early and late outcomes. Neuroepidemiology 2009;33:96-102.
17. Dickey L, Kaga n A, Lindsay MP, Fang J, Ro wla nd A, Blac k S. Incidence and profile of inpatient stroke-induced aphasia in Ontario, Canada. Arch Phys Med Rehabil 2010;91:196-202.
18. I natomi Y, Yonehara T, Omiya S, Has himoto Y, Hirano T, Uchino M. Aphasia during the acute phase in ischemic stroke. Cerebrovasc Dis 2008;25:316-23.
19. Oliveira FF, Avela r WM , Bichuetti DB, Felicio AC, Ma rin LF, Mo rita ME , *et al.* Semantic aphasia as a sole manifestation of acute stroke. Arq Neuropsiquiatr 2010;68:965-67.

20. E ngelter ST, Gos tynski M, Papa S, Frei M, Born C, Ajdac ic-Gross V, *et al*. Epidemiology of aphasia attributable to first ischemic stroke. Incidence, severity, fluency, etiology, and thrombolysis. Stroke 2006;37:1379- 84.

21. Kadojić D, Bijelić BR, Radanović R, *et al*. Aphasia in patients with ischemic stroke. Acta Clin Croat. 2012;51:221-25.

22. Vidović M, Sinanović O, Sabaskić L, *et al*. Incidence and types of speech disorders in stroke patients. Acta Clin Croat. 2011;50:491-94.

23. Brkić E, Sinanović O, Vidović M, Smajlović D. Incidence and clinical phenomenology of aphasic disorders after stroke. Med Arh. 2009;63:197-99.

24. Sinanović O, Mrkonjić Z, Zukić S, *et al*. Post-stroke language disorders. Acta Clin Croat. 2011;50:79-94.

25. Kang EK, Sohn HM, Han MK, *et al*. Severity of Post-stroke Aphasia According to Aphasia Type and Lesion Location in Koreans J Korean Med Sci. 2010; 25:123–27.

26. Yao J, Han Z, Song Y, *et al*. Relationship of Post-Stroke Aphasic Types with Sex, Age and Stroke Types. World Journal of Neuroscience, 2015;5:34-39.