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An acute assessment of Post Stroke Aphasia- A Novel tool for Bengali population.

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ABSTRACT Rationale: This paper describes the preliminary study about the application of a novel, simple, quick and bedside aphasia assessment tool in post stroke patients. The tool is developed in native language (Bangla) and can be conveniently applied by the junior clinicians or speech and language pathologists. Methods: A retrospective quantitative study was conducted among 131 post stoke patients with aphasia. Initially aphasia was assessed by the new novel tool then validated by neuroimaging findings. Severity grading was done according to linguistic data and were presented to show that it was reliable, valid assessment. Results: 100% Wernicke's Aphasia and 54.2% global aphasia was assessed by "Hakim-Sadia's smart aphasia assessment tool" (H-SSAAT 19) coincide with the Neuroimaging interpretation with significant p value 0.000. Less severe Broca's aphasia showed more lacunar lesions and vice versa. Conclusion: This tool can be applied routinely for the quick and easy assessment of aphasia at the onset of cerebrovascular accident.

I. INTRODUCTION

Aphasia is most common clinical presentation after stroke (1, 2). An early and proper recognition of type of aphasia might bring proper management and good prognosis (3, 4). Various aphasia assessment tool is present e.g. Western Aphasia Battery (WAB) (5), Boston Diagnostic Aphasia Examination (BDAE), The European stroke scale (6, 7) . Neither they are suitable for easy, quick, bedside assessment, nor they are specifically validated for identification or severity assessment of post stroke aphasic patients(8). Some quick assessment tool is also available in various languages e.g. The Frenchay Aphasia Screening Test (FAST)(7, 9, 10), The Aachen Aphasia test (AAT)(11), Language screening test (LAST)(12), The mobile aphasia screening test (MAST)(13). The shortcomings were mainly, they were created by non- professionals, they assessed not only aphasia but also complete stroke profile, inconvenient, too short or too long for aphasia assessment. Lastly, assessment tools in native languages were found very advantageous e.g. KAAT(14). The aim of this study was to introduce a new novel tool Hakim & Sadia's Smart Aphasia Assessment Tool- 2019 (H-SSAAT 19) for routine application exclusively for the post stoke patients with aphasia and validation of the tool by neuroimaging.

1. Rationale for study

In context to Bangladesh, no initial assessment of aphasia is made for stroke patients and the speech and language pathologist gets the referral usually for about 2 weeks to 2 months later depending on patients' medical condition. As a result, no diagnosis is made for the initial aphasia state. However, early detection is necessary, otherwise significant psychological and physical disability develops directed to poor quality of life. Moreover, due to lack of a convenient assessment tool patients remain undiagnosed.

II. METHODOLOGY

A retrospective quantitative study was conducted among 200 patients came to stroke unit with suspicious stroke and speech impairment. All the patients who had no history of previous speech disorders underwent a simple, quick and bedside qualitative aphasia assessment with a novel tool   H-SSAAT 19. However, H-SSAAT 19 consists of 12 components comprehension, proficiency, recall of verbal material, word selection and semantics, fluency, concern about impairment, use of functional word, grammaticality, repetition, segmental phonology, comprehension of written material and production of writing only for literate patients. Patients were categorized in Broca's Wernicke's and Global Aphasia (15).

A severity grading was done for Broca's aphasia depending on their clinical linguistic presentations and classified as, a) Resolving, b) Mild- Syntactical impairment, c) Moderate- Syntactical & Morphological impairment, lastly, d) Severe- Syntactical, Morphological & Phonological impairments. This severity grading depends on few components e.g. fluency, absence of functional word & bound morpheme and segmental/ phonological problem.

All the patients underwent unenhanced Multislice 16 CT or 1.5 tesla MRI scans. Only 131 patients had ischemic stroke was included confirmed with CT or MRI. Rest of the patients had hemorrhagic stroke and ICSOL and were excluded. Imaging interpretation was done by specialist neuroradiologist following the institutional protocol. The neuroradiological finding will validate the clinical aphasia diagnosis and severity according to the presence of ischemia and site & size of the lesions. All the data were analyzed by IBM SPSS statistics (Statistical Package for Social Science, version 22, 2013; IBM Corp., Armonk, NY, USA). Quantitative data were presented as numbers and percentages. Ethical Approvals was taken from the respective authorities and informed consent from patients.

III. RESULTS

The study was conducted among 131 patients, 89 (67.9 %) male and 42 (32.1%) female. The average age was 60.52 of whom 77 (58.8 %) were hypertensive and 56 (42.7 %) were diabetic. 98.5 % people claimed to be righthanded. According to the H-SSAAT 19, among 131 patients 105 patients (80%) found Broca's Aphasia, 24 patients (18.3 %) with Global aphasia and the rest 2 patients (1.5%) with Wernicke's aphasia {Table 1}{ Figure 1}

All 131 patients (100%) had ischemic stroke was evident by 106 (80.9 %) CT scan and 25 (19.1 %) MRI scans. Clinically diagnosed Wernicke's Aphasia by H-SSAAT 19, 100% were coincided with the Neuroimaging interpretation with significant p value 0.000. Similarly, about 54.2% clinically assessed Global aphasia were supported by CT and MRI reports, with a significant P value 0.000. Lastly, imaging could only validate 20.95% clinically assessed Broca's aphasia. Rest 79.04% patients showed scattered ischemic changes throughout the brain apart from Broca's center {Table 2} {Figure 2}.

Among 105 patients with Broca's aphasia, 31 (29.52%) were resolving, 59 (56.19%) with mild Broca's Aphasia, 9 (8.57%) with moderate and 7(6.66%) had severe Broca's Aphasia {Figure 3}.

54.8% patient of resolving group had lacunar lesion. Similarly, 6.8 % patients with mild Broca's Aphasia had lacunar lesion. Whereas all the patients with moderate and severe Broca's Aphasia showed larger lesion more than 15 mm in size. P value 0.000 {Table – 3} {Figure 4}.

IV. DISCUSSION

Several type of language impairments is observed after an episode of stroke and aphasia type diversely changes with time (16, 17). Recovery from aphasia is mainly related and highly influenced by lesion location, size and type of aphasia (18, 19). Nowadays, a wide range of language tests are available for the post-stroke care (13, 20, 21). Baseline aphasia assessment is a good predictor of prognostics. There was a high correlation between early and late aphasia scores. The severity of the initial aphasia strongly associated with long term prognosis which suggests those with mild aphasia at onset are the most likely to recover completely (22). The informal assessment by local screening tools, subtests or non-standardized assessments over formal, standardized batteries is helpful for different language and culture (22). H-SSAAT 19 was the foremost assessment tool developed which evaluated 12 basic components of linguistics only by asking 6 questions in Bengali Language.

H-SSAAT 19 was validated by the most reliable neuroimaging techniques(23-25). 100% Wernicke's and 54.2% Global aphasia were assessed by H-SSAAT 19 coincided with the Neuroimaging interpretation with significant p value 0.000 (15, 26) Ischemic stroke affect large area in the left hemisphere are more prone to have global aphasia(27). On the other hand, imaging only validated 20.95% clinically assessed Broca's aphasia which correlate with existing literature about the existence of lesion in multiple areas apart from Broca's center (28-33).

Neuroimaging also correlated the severity grading of Broca's Aphasia. 54.8% patient of resolving group and 6.8 % with mild Broca's Aphasia had lacunar lesion. Whereas, all the patients with moderate and severe Broca' s Aphasia showed larger lesion more than 15 mm in size with a significant P value 0.000 (34)

Finally, H-SSAAT 19 only identified Broca's, Wernicke's and Global Aphasia keeping in the mind that other Aphasia couldn't be validate through unenhanced CT or MRI (35). . Further research can be done with large patients' group, categorized in all other types of aphasia and validate by both neuroimaging and Bangla version of WAB when referred to speech and language pathologist.

V. CONCLUSION

The H-SSAAT 19 is a novel, valid and reliable tool for detecting aphasia in patients with stroke. It may overcome the limitations and can be used routinely as a convenient baseline aphasia assessment tool for all Bangladeshi patients with stroke.

Figures and Tables

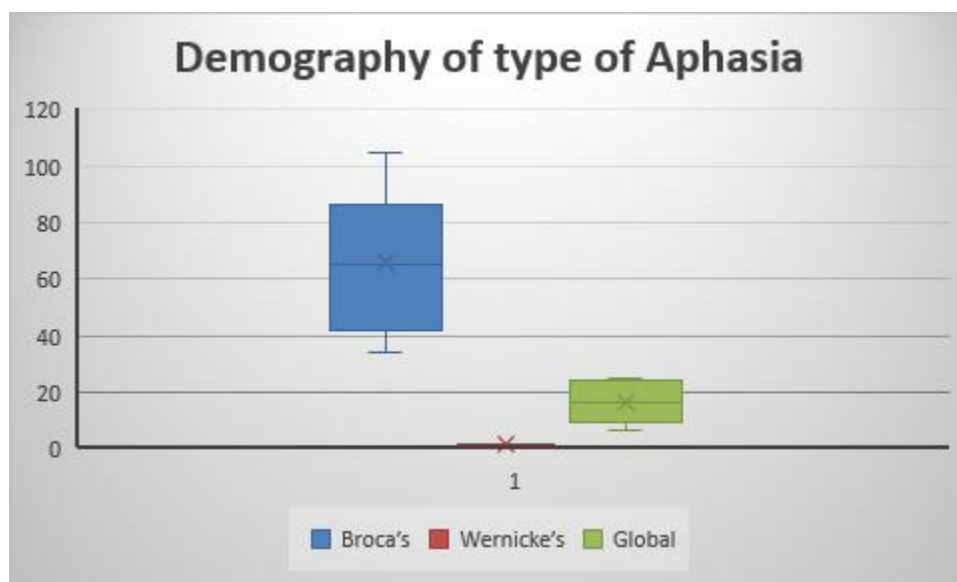### Table 1 Demography and clinical type of Aphasia

Serial	Variables	Broca's	Wernicke's	Global	P value
1	Total N	105	2	25	
2	%	80	1.5	24	
3	Male	71	1	17	0.822
4	Female	34	1	7	0.822
5	HTN	59	2	16	0.315
6	DM	45	1	10	0.973

Table 2 Neuroimaging validation of H-SSAAT 19

Serial No	Type Of Aphasia	Aphasia diagnosed by H-SSAAT 19		Neuroimaging validation		P value
		N	%	N	%	
1	Broca's	105	80	22	20.95	0.676
2	Wernicke's	2	1.5	2	100	0.000
3	Global	24	24	13	54.2	0.000

Table: 3 Severity grading is associated with lesion size

Serial	Severity grade	Lesion size less than 15mm		Lesion size more than 15 mm	
		N	%	N	%
1	Resolving	17	54.8	14	45.2
2	Mild	4	6.8	55	93.2
3	Moderate	0	0	9	100
4	Severe	0	0	7	100

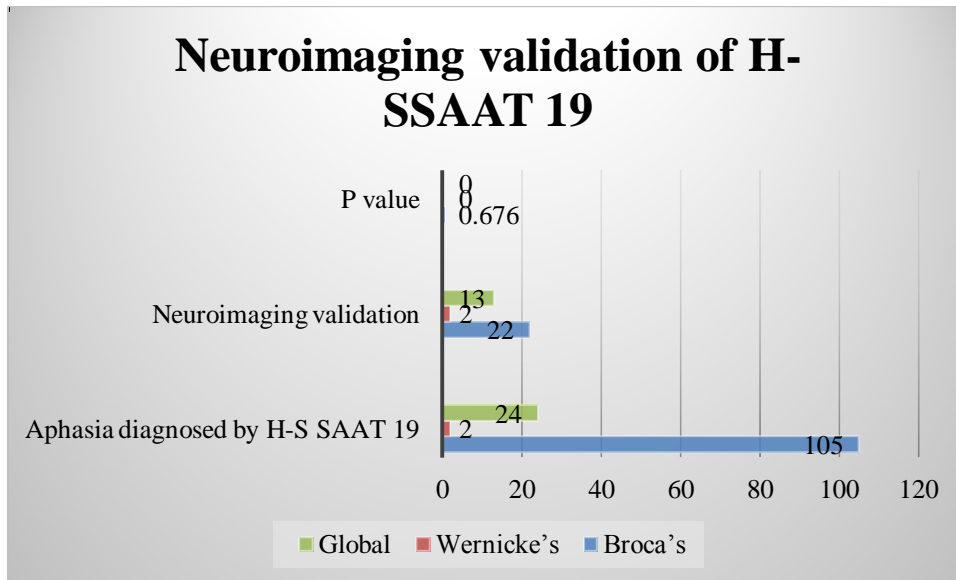**Figure- 1 Demography of type of Aphasia**

Figure 2 Neuroimaging validation of clinically diagnosed aphasia by H-SSAAT 19
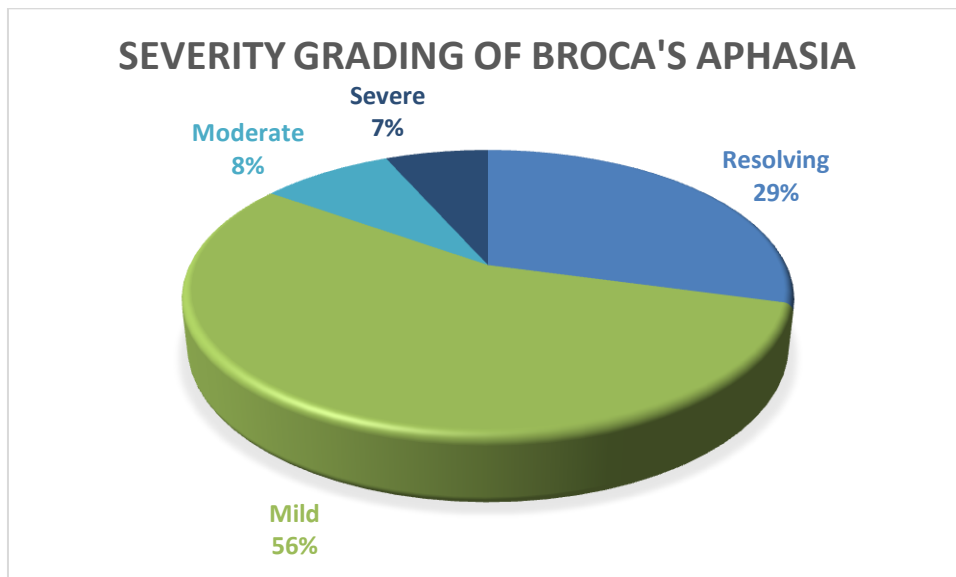

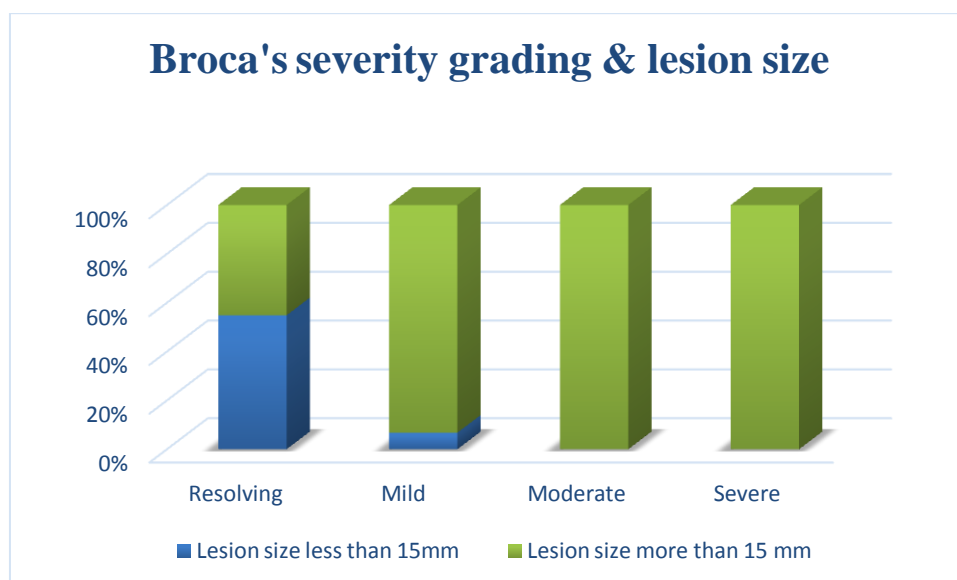**Figure 3- Severity grading of Broca's Aphasia by H-SSAAT 19**

Figure:4 Correlation with Broca's severity grading and lesion size in CT/MRI

Abbreviation
WAB- Western Aphasia Battery
BDAE-Boston Diagnostic Aphasia Examination
CT- Computed Tomography
MRI- Magnetic Resonance Imaging
H-S SAAT 19- Hakim- Sadia's smart aphasia assessment tool 2019

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