

The Association Between ASPECTS Score and Dysphagia in Acute Ischemic Stroke Patients

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ABSTRACT

Introduction: The Alberta Stroke Program Early CT Score (ASPECTS) is a scoring system assessed from CT scans to investigate the involvement of brain regions experiencing early ischemic changes. Lower scores are known to be associated with worse conditions and the occurrence of complications such as dysphagia. This study aimed to assess the relationship between ASPECTS scores and the occurrence of dysphagia in patients with acute ischemic stroke.

Method: This cross-sectional analytical study was conducted at RSUP H. Adam Malik Medan from November 2022 to January 2023. ASPECTS scores were assessed based on CT scan results, while dysphagia was evaluated using the GUSS score. The Mann-Whitney U test was performed to assess the relationship between the two variables.

Results: A total of 34 subjects were included in this study. Among them, 11 (32.4%) subjects experienced dysphagia. The median ASPECTS score was 8 (range 3-9). The Mann-Whitney U test showed a significant association between ASPECTS scores and the occurrence of dysphagia ($p < 0.001$).

Conclusion: There is a significant relationship between ASPECTS scores and the occurrence of dysphagia.

Acute ischemic stroke, ASPECTS score, Dysphagia

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INTRODUCTION

Stroke is the second leading cause of death worldwide and a major cause of adult disabilities. The majority of strokes are ischemic strokes caused by reduced blood flow, usually due to arterial occlusion. Ischemic stroke is defined as a neurological deficit episode caused by acute focal damage to the central nervous system (CNS), such as the brain, retina, or spinal cord, due to vascular causes.[1,2]

Due to its widespread availability and relatively quick turnaround time, the preferred examination for diagnosing stroke is a non-contrast head computed tomography (CT) scan. A non-contrast head CT scan can help measure the extent of early ischemic changes in hyperacute anterior circulation ischemic strokes using the Alberta Stroke Program Early CT Score (ASPECTS). ASPECTS divides the territory of the middle cerebral artery into 10 regions and assigns points for areas with early ischemic changes, such as focal swelling or hypodensity of the parenchyma. This score assigns a value of 10 for a normal CT scan and a score of 0 for diffuse ischemic involvement throughout the territory of the middle cerebral artery. Furthermore, scores of 7 and below are known to correlate with poor outcomes.[3]

Regarding outcomes in stroke patients, one condition that can affect the outcome of ischemic stroke patients is the complication of dysphagia. Dysphagia in acute stroke is one of the most common complications and occurs in 39-81% of stroke patients. This condition is defined as difficulty swallowing after a stroke event and often affects patients within hours to days after the attack. It is associated with increased mortality and

morbidity due to aspiration, pneumonia, and malnutrition.[4,5] The risk of dysphagia is associated with ASPECTS scores. Patients with lower ASPECTS scores are associated with an increased risk of dysphagia.[6,7] Additionally, ASPECTS scores are also correlated with the severity of stroke. Various studies have shown a correlation between the two. Esmael et al., in their research, found an inverse correlation between NIHSS scores and ASPECTS in patients with ischemic stroke.[8-10] Based on the explanations above, this study was conducted to determine the relationship between ASPECTS scores and the occurrence of dysphagia in patients with acute ischemic stroke.

METHOD

This analytical study was conducted with a cross-sectional design at RSUP H. Adam Malik Medan from November 2022 – January 2023. The subjects were patients with acute ischemic stroke who were treated at the Stroke Corner of RSUP H. Adam Malik Medan. The inclusion criteria included confirmed cases of acute ischemic stroke based on non-contrast head CT scan with involvement of the Middle Cerebral Artery (MCA), age >18 years, and willingness to participate in the study. Patients with transient ischemic attack, hemorrhagic stroke, previous history of stroke, other diseases that could cause dysphagia, and patients with decreased consciousness were excluded from the study.

Data collection was conducted after informed consent was obtained and the study had been approved by the Ethical Committee of Health Research Faculty of Medicine University of Sumatera Utara/RSUP H. Adam Malik Medan (195/KEPK/USU/2023). ASPECTS scores were obtained when the patient was initially admitted. Dysphagia was determined based on the GUSS (Gugging Swallowing Screen) score, which was also obtained when the patient was initially admitted. Data analyses were conducted in univariate and bivariate. The correlation test between ASPECTS score and dysphagia was conducted with the Mann-Whitney U test. Statistical analysis was performed with the Statistical Product and Science Service (SPSS) program version 26. A p-value of <0.05 is considered statistically significant.

RESULT

Table 1. Characteristics of the subjects

Table 1. Characteristics of the subjects		n=34
Characteristics		
Gender, (n, %)		
Men		19 (55.9)
Women		15 (44.1)
Ethnic (%)		
Batak		25 (73.5)
Jawa		7 (20.6)
Melayu		1 (2.9)
Nias		1 (2.9)
Age*, (mean ± SD)		58.4 ± 10.1
Occupation (%)		
Entrepreneur		14 (41,2)
Housewife		9 (26,5)
Retiree		4 (11,7)
Civil servant		3 (8,8)
Farmer		2 (5,9)
Employee		2 (5,9)
Education level (%)		
Elementary school		3 (8,8)
Middle school		3 (8,8)
High school		21 (61,8)
Bachelor		7 (20,6)

A total of 34 subjects were included in this study. Most subjects were male (55.9%) compared to female (44.1%), and most subjects belonged to the Batak ethnic group (73.5%). The mean age was 58.4 ± 10.1 years. The median ASPECTS score in this study was 8, with a range of 3-9. Additionally, a total of 11 (32.4%) subjects experienced dysphagia. The characteristics of the subjects are presented in Table 1.

The association between ASPECTS score and dysphagia was analyzed with the Mann-Whitney U test. In the dysphagia group, a lower median of ASPECTS score was obtained compared to the non-dysphagia group. This result was statistically significant, with a p-value of <0.001 (Table 2).

Table 2. The Association Between ASPECTS Score and Dysphagia

	Dysphagia		Nilai p
	Dysphagia Median (min-max)	Non-dysphagia Median (min-max)	
ASPECTS	5 (3 – 7)	9 (7 – 9)	$<0.001^*$

DISCUSSION

The ASPECTS score is a simple scoring system that utilizes non-contrast CT scans. This system is used worldwide to make decisions regarding thrombolysis and mechanical thrombectomy in acute anterior circulation ischemic stroke. In this study, the median ASPECTS score of the subjects was 8, indicating a relatively localized lesion extent. The highest ASPECTS score among the subjects was 9, while the lowest score was 3. The mean ASPECTS score in our study was 7.5 ± 1.7 . These findings are consistent with other literature, where a study by Esmael et al. reported a mean ASPECTS score of 6.82 ± 2.32 . Another study by Esmael et al. in 2021, which investigated 120 patients with acute ischemic stroke, showed a mean ASPECTS score of 7.11 ± 2.43 . The ASPECTS score was initially developed to assess the severity of early ischemic changes in cases of acute ischemic stroke. Evaluation using this scoring system has increasingly been involved in the selection of endovascular therapy. A cutoff value of ASPECTS 6 or higher is currently incorporated in the American Heart Association guidelines as an imaging qualification measure for endovascular therapy within a time window of under six hours. The ASPECTS score is widely used in clinical practice to determine treatment options and has been reported to predict neurological outcomes. Specifically, stroke patients with higher ASPECTS scores have better prognoses and are treated with intravenous thrombolysis.[9,11] Amalia et al. reported that 29.3% of subjects had ASPECTS scores ≤ 7 , while 70.7% had scores ≥ 8 . The study included 58 subjects with acute ischemic stroke, and the mean ASPECTS score was found to be 7.8 ± 2.2 . [12]

A total of 11 out of 34 patients (32.4%) experienced dysphagia. This result is higher compared to a study conducted by Cui Yang and Yun Pan, who found that 25.51% of a total of 4637 ischemic stroke patients experienced dysphagia. Several conditions that contribute to the occurrence of dysphagia include advanced age, hypertension, and diabetes.[13] The presence of dysphagia in stroke patients is associated with an increased risk of aspiration pneumonia and higher mortality.

Our study results showed a significant association between the ASPECTS score and the occurrence of dysphagia ($p < 0.001$). We found a lower median ASPECTS score in the group of patients with dysphagia compared to the group without dysphagia. This finding is consistent with other studies, such as the study by Lapa et al., which reported lower ASPECTS scores in patients with dysphagia compared to those without dysphagia. In the dysphagia group, the median score was 7, while in the non-dysphagia group, the median score was 8. This significant result indicates that a lower ASPECTS score is associated with a higher risk of dysphagia. In normal conditions, the full score of ASPECTS is 10. However, as the extent of ischemic lesions increases, the score decreases, indicating an increased risk of dysphagia.[6]

Differences in lesion volume, location, and laterality are known to be associated with the severity and dysfunction of swallowing in dysphagia. ASPECTS score indicates the topographic areas affected by ischemia corresponding to the MCA territory. A study using fiberoptic endoscopic evaluation of swallowing (FEES)

conducted in 2021 showed that patients with dysphagia had lower ASPECTS scores. Lapa et al. explained that the neuroanatomical lesion map based on ASPECTS scores in the acute phase of stroke could identify ischemic "hot spots" associated with dysphagia.[6,7] Additionally, several regions, including the precentral gyrus and insular cortex, play important roles in the chewing and swallowing process. The insular cortex is associated with swallowing and nutritional functions, including the coordination of oral muscle chewing and autonomic functions.[6,7]

CONCLUSION

Based on our results, it can be concluded that there is a significant association between ASPECTS score and dysphagia. In patients with dysphagia, there is a lower median ASPECTS score compared to non-dysphagia patients.

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and Haji Adam Malik General Hospital.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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All authors significantly contribute to the work reported, whether in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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