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Analysis of Glial Fibrillary Acidic Protein (GFAP) serum levels on spontaneous intracerebral hemorrhage non-lesion patients

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ABSTRACT

Background: Stroke is one of the root causes of brain disorders at the height of the productive age and ranks second cause of death after heart disease in most countries in the world. Fairly large-scale study conducted by ASNA (ASEAN Neurological Association) in 28 Hospitals in Indonesia. This study was conducted in patients with acute stroke who were treated in hospital (hospital-based study) and conducted a survey of factors - risk factors, treatment duration and mortality and morbidity. **Method:** This is a cross sectional study, with intracerebral hemorrhage Head CT scan examination then examined serum levels of plasma GFAP her at the time of patient entry from RSUP. H. Adam Malik Medan from March 2014 -May 2014. **Results:** In this research, we found the frequency of male patients as many (62.5%), while as many women (37.5%). Predominant age range in patients encountered in this study were 46-51 years old and are the dominant ethnic Batak tribe (43.8%). **Conclusion:** There were no significant differences between groups in serum GFAP levels with bleeding volume ≥ 30 cc compared to those with bleeding volume <30 cc (p = 0.599). GFAP is a biomarker to distinguish whether stroke patients including intracerebral hemorrhage or ischemic stroke Further longitudinal study would be needed to confirm the role.

Keywords: Stroke, GFAP, Intracerebral hemorrhage.
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INTRODUCTION

Stroke is one of the causes of brain disorders at the height of the productive age and ranks second cause of death after heart disease in most countries in the world. Fairly large-scale study conducted by ASNA (ASEAN Neurological Association) in 28 Hospitals in Indonesia. This study was conducted in patients with acute stroke who were treated in hospital (hospital-based study) and conducted a survey of factors - risk factors, treatment duration and mortality and morbidity. The results showed that patients with more men than women with a profile under 45 years of age in quite a lot of that is 11.8%, age 45-64 years amounted to 54.7% and over the age of 65 years 33.5%. Neurological biomarkers showed clinically significant in some circumstances include head injury, anoxia, subarachnoid bleeding and ischemic stroke.[1,2]

Biological markers are also very useful in cases of acute stroke. Examination of blood samples examined by a particular method allows to quickly differentiate ischemic stroke and intracerebral hemorrhage in order to provide the possibility for immediate intervention. Furthermore, biological markers may provide prognostic information and may identify patients who have a high risk of side effects specific therapy. Glial fibrillary acidic protein (GFAP) is a specific protein filament in the brain which appears immediately on astrocytes. The new examination identified as a biological marker of intracerebral hemorrhage in the acute phase of stroke. Has an important role in maintaining the size and motility of astrocytic processes and contribute to the structure of white matter, myelination and integrity of the blood brain barrier. High levels of GFAP are found in specific parts of the brain.[3-9]

METHODS

The research methodology was cross sectional, with intracerebral hemorrhage Head CT scan examination then examined serum levels of plasma GFAP her at the time of patient entry from RSUP. H. Adam Malik Medan from March 2014 -May 2014. The BC patients must fulfill the criteria: Patients who suffer from ICH all sexes, aged adult (over 18 years), when the incident until arriving at the hospital less than 48 hours, the patient came directly from the scene and has not received any treatment, and the results of a CT scan of the brain of ICH. T-Test analysis was performed between those variable (GFAP levels with bleeding volume ≥ 30 cc compared to those with bleeding volume <30 cc) with p value of 0,005.[10-13]

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RESULT

In this research, we found the frequency of male patients as many (62.5%), while as many women (37.5%). Predominant age range in patients encountered in this study were 46-51 years old and are the dominant ethnic Batak tribe (43.8%).[14] From this study it was found that the location of bleeding most is the Basal Ganglia (34.3%). There are significant differences in serum GFAP levels among groups with ≥ 30 cc volume of bleeding compared to those with bleeding volume <30 cc (p = 0.599). This research also obtained mortality rate is high enough that as many as 19 research subjects died (59.4%) and only 13 research subjects who survived (40.6%). The results of this study are expected to become an input for further research that will be useful for the treatment of patients with intracerebral hemorrhage.[15-17]

Table 1 Demographic characteristics Research Subjects

Characteristics		n	(%)
Gender	Male	20	62.5
	Female	12	37.5
Age	34-39 years	5	15.6
	40-45 years	6	18.7
	46-51 years	11	34.3
	52-57 years	7	21.8
	58-64 years	2	6.2
Ethnicity	Batak	14	43.8
	Jawa	10	31.3
	Melayu	6	18.8
	Aceh	2	6.3
Location	Ganglia basal	11	34.3
	Thalamus	6	28.2
	Lobar	9	18.7
	Cerebellum	4	12.5
	Pons	2	6.2
Volume	< 30 cc	20	62.5
	≥ 30 cc	12	37.5
Outcome	Alive	13	40.6
	Death	19	59.4

Table 2 Analysis of serum GFAP levels between men and women

Gender	N	Mean	Median	SD	Range	p
Male	20	0,5919	0,4493	0,4767	0,1100 – 1,9200	0,235*
Female	12	2,0499	0,5750	2,3703	0,0800 – 6,3000	

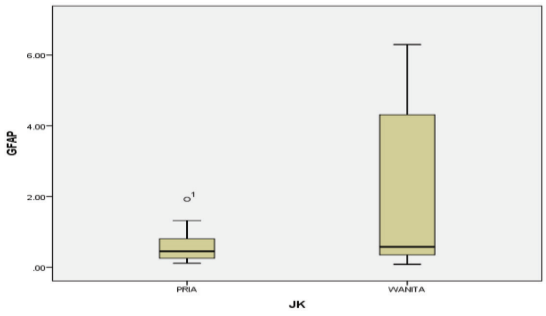

Figure 1 Analysis of serum GFAP levels between men and women

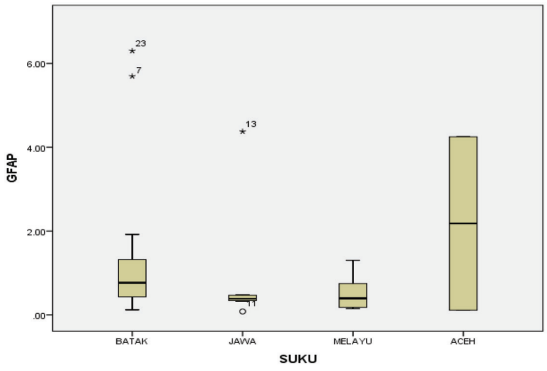

Figure 2 Analysis of serum GFAP levels based on ethnicity

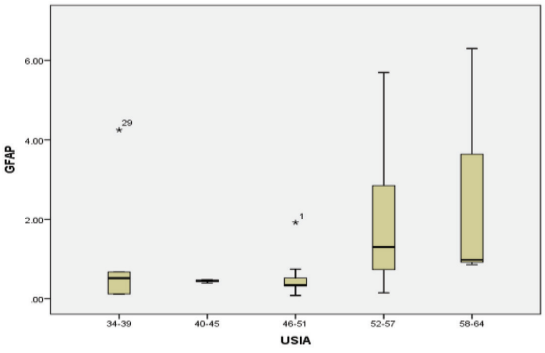

Figure 3 Analysis of serum GFAP levels with Age

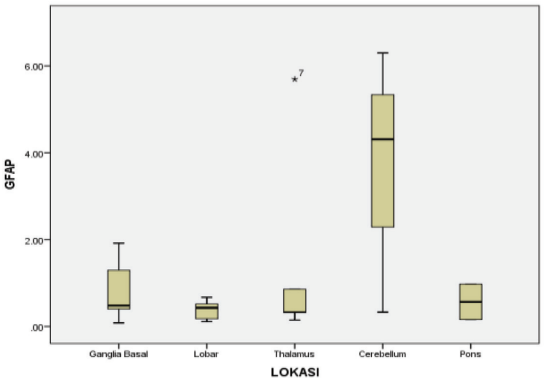

Figure 4 Analysis of serum GFAP levels by Location Bleeding

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Table 3 Analysis of serum GFAP levels based on ethnicity

Ethnicity	N	Mean	Median	SD	Range	p
Batak	14	1,5192	0,7660	1,9632	0,1200 – 6,3000	0,288*
Jawa	10	0,7640	0,3857	1,2738	0,0800 – 4,3800	
Melayu	6	0,5274	0,3943	0,4371	0,1500 – 1,3000	
Aceh	2	2,1821	2,1821	2,9244	0,1100 – 4,2500	

Table 3 Analysis of serum GFAP levels with age

Age	N	Mean	Median	SD	Range	p
34 – 39	5	1,1352	0,5200	1,7584	0,1100 – 4,2500	0,100*
40 – 45	6	0,4460	0,4493	0,0320	0,4000 – 0,4800	
46 – 51	11	0,5125	0,3400	0,5046	0,0800 – 1,9200	
52 – 57	7	2,0444	1,3000	2,1397	0,1500 – 5,6900	
58 – 64	2	2,7121	0,9764	3,1077	0,8600 – 6,3000	

Table 4 Analysis of serum GFAP levels by Location Bleeding

Bleeding Location	N	Mean	Median	SD	Range	p
Ganglia Basal	11	0,7984	0,4800	0,5704	0,0800 – 1,9200	0,230*
Lobar	9	0,3969	0,4300	0,2167	0,1100 – 0,6700	
Thalamus	6	1,2813	0,3316	2,1754	0,1500 – 5,6900	
Cerebellum	4	3,8145	4,3127	2,5036	0,3300 – 6,3000	
Pons	2	0,5682	0,5682	0,5772	0,1600 – 0,9800	

Table 5 Analysis of serum GFAP levels by Volume Hemorrhage

Volume Hemorrhage	N	Mean	Median	SD	Range	p
< 30 cc	20	1,4402	0,4750	1,97278	0,08 – 6,30	0,599*
≥ 30 cc	12	0,6360	0,4493	0,54550	0,11 – 1,92	

Table 6 Analysis of serum GFAP levels by Outcome

Outcome	N	Mean	Median	SD	Range	p
Alive	13	1,1958	0,7469	1,6285	0,1500 – 6,3000	0,431*
Death	19	1,0995	0,4300	1,6695	0,0800 – 5,6900	

* Uji Mann-Whitney U

DISCUSSIONS

From this study it was found that the location of bleeding most is the Basal Ganglia (34.3%). There are significant differences in serum GFAP levels among groups with ≥ 30 cc volume of bleeding compared to those with bleeding volume <30 cc (p = 0.599). This research also obtained mortality rate is high enough that as many as 19 research subjects died (59.4%) and only 13 research subjects who survived (40.6%). The results of this study are expected to become an input for further research that will be useful for the treatment of patients with intracerebral hemorrhage.[18-21]

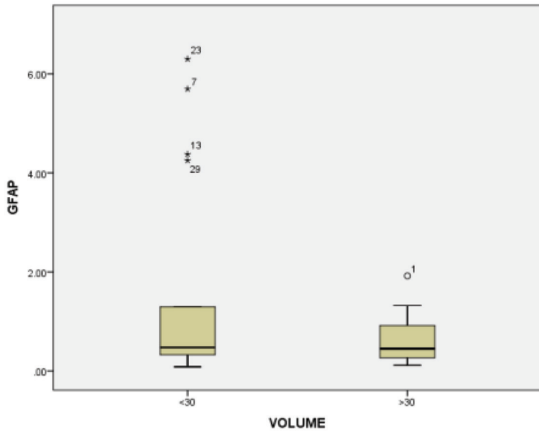

Figure 5 Analysis of serum GFAP levels by Volume Hemorrhage

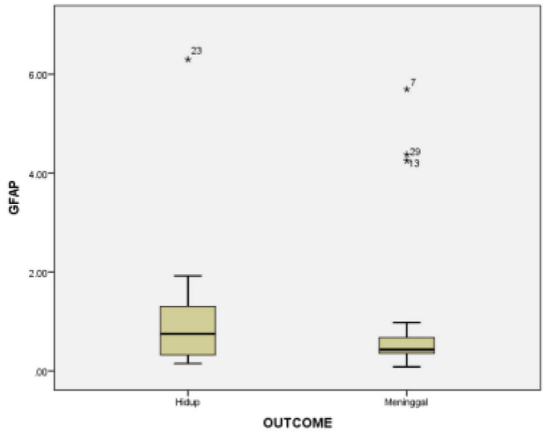

Figure 6 Analysis of serum GFAP levels by Volume Hemorrhage

CONCLUSIONS

There were no significant differences between groups in serum GFAP levels with bleeding volume ≥ 30 cc compared to those with bleeding volume <30 cc (p = 0.599). GFAP is a biomarker to distinguish whether stroke patients including intracerebral hemorrhage or ischemic stroke Further longitudinal study would be needed to confirm thus role.

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