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GLASSGOW COMA SCALE AND OUTCOME ON HEAD INJURY PATIENTS IN EMERGENCY ROOM AT GENERAL HOSPITAL OF PEMERINTAH ACEH

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Abstract

Level of conciousness on head injury patients is one of the initial assessment. Glassgow Coma Scale (GCS) is one of the methods to assess it through assessment of eyes responses, verbal responses, and motoric responses. Generally, Score of GCS related to outcome of the patients. The objective of this study was to identify score of GCS and outcome on head injury patients in emergency room at general hospital of Pemerintah Aceh. This study was quantitative and retrospective study using secondary data, medical documentation. Population are head injury patients during January to December in 2019. Sample consisted of 333 patients that identified by systematic random sampling. Tool for collecting data using observation checklist. Data analysis was using univariate analysis. Patients with GCS score 13-15 are 239 (71.8%), score 9-12 are 53 (15.9%), and score < 8 are 41 (12.3%). The mean of GCS score is 12.89 (3.19), at confidence interval 95% = 12.55-13.24. Majority outcome is inpatient about 256 (76.9%) and fewest outcome is patient back to home about 12 (3.6%). Majority of patients with the worst outcome are in GCS score <8 (82,4%). Majority score of GCS is 13-15 and inpatient outcome. Recommendation, always to conduct assessment of GCS to prevent worst outcome on patients.

Keywords: *Glassgow Coma Scale; Head Injury; Outcome*

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1. Introduction

Head injury is one of the health problem in the entire world and the biggest contributor of death and disability in the world, therefore it is called "silent epidemic". Each year there are 939 case of head injury per 100.000 people, which means there are 69 million people on earth suffering from head injury (Dewan et al., 2018). Traffic accident is one of the causes. According to World Health organization (WHO), 88% of the total death on the road in the low to middle income countries is due to head injury (WHO, 2014).

Head injury is classified based on Glasgow Coma Scale (GCS). As the research in Rumah Sakit Umum Zainoel Abidin (RSUDZA) in 2017 (Imran, 2017) shows, there are 166 cases of head injury which were hospitalized in neurology ward. Where minor head injury accounted for 102 cases or 61.4%, while moderate and severe head injury were 32 cases or 19.3%.

GCS could be used to describe patient's mental status and to interpret the changes in level of consciousness (Tscheschlog & Jauch, 2014). GCS could also be used as the tool to predict the outcome of the patient with head injury, stroke, cardiac arrest, and poisoning (Miah et al., 2009). Outcome is the result of the treatment given. Outcome is the condition of the patient post-trauma after receiving interventions. The prediction of the outcome in patient with head injury could have a long term effect post-trauma (Thais et al., 2014 in Suwaryo, Wihastuti & Fathoni, 2019). It is estimated that 1,7 million people sustained head injury during the year 2002-2006 in the United States with the outcome 51.538 people of them died, 275.146 are hospitalized, and 1.364.797 are in critical condition and treated in the ER (Marx, Hockbergem & Walls, 2014).

The primary assessment of the patient with head injury is very important. GCS score assessment is one of the most frequently used methods because it can be done easily and quickly. The observation of the patient's consciousness is expected to help the patient to have a good outcome. Yusmala (2019) reports that in the year 2018, there are approximately 1226 patient with head injury in her research location, 867 patients were treated and 106 of them died. The research problem is that the publication related to the data of GCS score and head injury patient outcome is very limited. Therefore, a study has to be done to find out the overview of GCS score and head injury patient outcome in the ER of Aceh Province hospital.

2. Method

This research was descriptive methods with the retrospective study design. The data was used secondary data from medical records. The researcher looks into the documentation of the patient's initial GCS score and the outcome after treatment in the ER. The population of this study is all of the head injury patient in the ER of the Pemerintah Aceh public hospital from the January to December of 2019, which amount to 1800 patients. The sampling method used the systematic random sampling. The inclusion criteria are 1) the patient is adult (≥18 years of age), 1) GCS score is obtained in the first 24 hours, 3) the patient is recorded on the medical record from January-December 2019. The exclusion criteria are 1) the data on the medical records are incomplete or not written and unclear 2) the patient has already died upon arrival to the ER (death on arrival). The instruments of the study is a content sheet consisting of two parts. The first part covers the medical record numbers as well as the characteristic data including gender, age, cause of head injury, complication and multiple trauma that accompany the head injury taken from the patient's medical record. The second part covers the initial GCS score and the outcome of the head injury patient.

This study was conducted after passing the ethical clearence from the Nursing Faculty of Universitas Syiah Kuala and the Ethical Committee of the hospital where the study conducted.

The data are analyzed using univariate analysis to explain and describe the characteristic of the research variables, which are the GCS score and the outcome.

3. Results and discussion

Age of Respondents

Table 1. Distribution of average age of respondents (n=333)

Mean	SD	Min-Max	95% CI	
			Lower	Upper
41,6	18,2	18-98	39.6	43.6

Table 1 shows that the average age of the head injury patients is 41,66 years with the deviation standard of 18,27 years. The youngest patient is 18 years and the oldest is 98 years. On the convidence interval of 95%, it is believe that the range of the patient's average age is 38,69 - 43,63 years. Head injury is frequent among patient with the productive age which is the patients with the age of 18-40 years. This is due to the maximum level of activities that require higher mobility rate such as when working or doing other activities (Coronado et al, 2011 in Ristanto, 2017).

The incidence of the head injury among adolescent and adults are affected by several factors. The most frequent one is the use of motor vehicle in activity. 18 years old teen and productive age adults of 39 years or older tend to do more activities outside of homes therefore the use of motor vehicle and activity is done more frequently. For this reason, injuries are of average productive age.

Characteristics of respondents, GCS score, and outcome of head injury patient's outcome

Table 2. The distribution and frequency of the respondents' characteristic, GCS score and outcome (n=333)

No	Characteristic	n	%
1	Gender		
	Female	136	40.8
	Male	197	59.2
2	Cause of injury		
	Traffic accident	228	68.5
	Non Traffic accident	105	31.5
3	Complication		
	Yes	57	17.1
	No	276	82.9
4	*Multiple Trauma*		
	Yes	72	21.6
	No	261	78.4
5	Temperature		
	> 37,5	111	33,3
	< 37,5	222	66.7
6	GCS Score		
	13-15	239	71.8
	9-12	53	15.9
	≤ 8	41	12.3
7	*Outcome*		
	Discharged	12	3.6
	Hospitalized	256	76.9
	Intensive Care	48	14.4
	Died	17	5.1

Table 2 shows that the majority of the patients with head injury are males with 197 (59,2%). According to a study on a head injury patient receiving care in an ER in the US, 54,6% of males are more often to have injuries compared to females or equals to 11,291 to 90,850 cases (Gaw & Zonfrillo, 2016). This is probably because the activities in which males more frequently done as well as the longer use of motor vehicle. Based on this and the previous study, the number of head injuries tends to be more common in males. Activities outside the home and various jobs that can be done by men such as construction works, driving, mining and others are believed to influence the incidence of head injuries in men.

Based on table 2, the number of head injuries caused by traffic accidents was 228 (68.5%), the rest were other causes. Traffic accidents cause more head injuries than other causes such as falls from heights, falls in showers and violence. Similar results were also

found in Ristanto, Indra, & Setyorini's research (2016) 88.5% of the causes of head injuries were traffic accidents followed by other causes such as falls from heights or blunt force collisions.

The high rate of head injuries is also influenced by region and community habits. In developing countries such as Indonesia, traffic accidents as a cause of death in head injury patients are estimated to continue to increase at 83 % from 2000-2020 (Widyaswara 2016 in Amila &Sariani, 2019). Meanwhile, for countries in the European and American regions, traffic accidents only amounted to 17.3% and the biggest cause of head injuries are falls amounted to 35.5%. (Farcy et al., 2011).

Based on table 2, there were 57 (17.1%) head injury patients who experienced complications due to head injuries, others did not experience complications. Complications include respiratory failure, increased intracranial pressure, infection and herniation. Severe respiratory failure occurs in 20-25% of patients with head injury and is associated with a 3-fold increase in mortality (Martindale, McGlone, Chambers, & Fennell, 2016). Apart from respiratory failure, another complication is herniation. A herniation is the result of increased pressure pressing the brain from one compartment to another. As many as 50% of cases of herniation have significant evidence of being associated with postoperative intracerebral hemorrhage (Kan, Chu, Koo & Chan, 2016). Increased intracranial pressure (ICP) is also associated as a cause of herniation. In this study, there were several patients who had increased ICP.

Another complication experienced by head injury patients is infection. It is possible to develop infection when there is an open wound or when the membrane surrounding the brain is torn.

The complications experienced by head injury patients can affect the GCS score and outcome of the injured patient. Complications of respiratory failure will be greatly affected by the patient's level of consciousness, patients with decreased consciousness can reduce the body's ability to maintain adequate breathing, and vice versa if the patient's breathing is disturbed and continues with ischemia, the patient's level of consciousness or GCS score will decrease.

Based on Table 2, there were 72 (21.6%) patients with head injury who experienced multiple trauma in the chest, abdomen, back, upper and lower extremities. Another study found that more than half, or 24,855 patients (58.6%) had an extremity injury and 4.9% had five or more extremity injuries. Fractures of the femur (16.5%), tibia (12.6%) and clavicle (10.4%) were the most common fractures. (Banerjee, 2013).

The mechanism or cause of the patient's trauma can determine whether or not the patient had more than one injury. In this study, out of 72 multiple trauma patients, 55 were injured due to traffic accidents. The process of traffic accidents allows injuries to other parts of the body.

Table 2 shows that 111 (33.3%) of the head injury patients had body temperature> 37.5 and 222 (66.7%) patients had body temperature <37.5. In the previous study, it was found that in head injury patients, 40 patients (62%) had hyperthermia and 26 (38%) normothermic patients. (Dewi, Sujuti, dan Yuliatun, 2014). Patients with hyperthermia tend to have poor outcomes (Suwaryo, Wihastuti & Fathoni, 2019).

Hyperthermia can increase ischemic injury and consequent infarction of brain injury, the reason for this damage may be related to a 7 - 13% increase in metabolism in the brain every 1°C increase in body temperature. (Madden & De Von, 2015). Systemic hypothermia with a target temperature between 33 - 35 °C is one of the therapies used in trauma patients to avoid fever and has a therapeutic benefit. (Farcy et al., 2011).

Body temperature is influenced by and will affect the severity of the head injury in patients, therefore in patients with head injuries maintaining a normal body temperature is very important, in the study there were no patients with hypothermia, body temperature <37.5 °C was in the range 34 , 5 - 36.5 °C.

Based on table 2, it is found that out of 333 head injury patients, 239 (71.8%) had an initial GCS score of 13-15, 53 (15.9%) had an initial GCS score of 9-12 and 41 (12.3%) had an initial GCS score <8. Previous studies found the same thing with a smaller sample size, out of a total of 73 head injury patients, 28 (38%) of them were minor head injuries, 26 (36%) moderate head injuries, and 19 (26%) severe head injuries. (Yutami, Kenangan, & Asnawati, 2016).

Based on this study and several previous studies, head injury patients tend to experience a decrease in consciousness which is also influenced by the severity of the injury experienced. The cause of decreased consciousness in patients can be due to hypoxia. Study by Abdul (2006) suggests that if the level of O2 per 100 grams of brain per minute is less than 2 cc, it can cause a coma in the patient, therefore patients with severe head injuries take a long time to raise the consciousness (Abdul, 2006 in Lumbantobing & Anna, 2015).

Other studies suggest that the cause of decreased consciousness is not certain. This can occur due to loss of brain function or reticular activating system (RAS) function. RAS is in the retricular formation of the brain stem that extends from the top of the bone to the brain, RAS enters all the sensory around and transmits it to the cortex which results in general arousal and behavior, so the disruption of RAS function due to injury can interfere with consciousness (Blyth & Bazarian, 2011). The patient's GCS score can be influenced by several causes such as decreased oxygen levels, loss of brain function, and complications in injured patients. The GCS score will indicate the diagnosis of mild head injury, moderate head injury and severe head injury based on the GCS

score grouping, but of course to diagnose the patient's condition, other further assessment is needed.

Table 2 shows that the results of head injuries were 17 (5.1%) patients died, 48 (14.4%) received intensive care, 256 (76.9%) were hospitalized, and 12 (3.6%) patients went home. GCS is believed to affect the outcome of head injury patients. Several studies have suggested that a poor level of GCS is associated with a poor outcome. In a study on the mortality rate of head injury patients in France, it was shown that there was an association between severe GCS score and patient mortality (Tude Melo dkk, 2010 dalam Haryanto, Raharji & Budiyati, 2012).

GCS score and outcome

Table 3. Distribution of Patient GCS Scores and Outcomes (n=333)

GCS	Outcome				Total
	Discharged	Hospitalized	Intensive Care	Died	
13-15	11	222	4	2	239
9-12	1	30	21	1	53
<8	0	4	23	14	41
Total	12	256	48	17	333

Table 3 shows that patients with a GCS score of 13-15 had a discharge outcome of 11 patients and an inpatient outcome of 222 patients. Outcome of patients died with GCS score <8 are 14 patients and those transferred to intensive care are 23 patients. The research of Rawis, Lalenoh & Kumaat (2016) examined the outcome in the form of survival rate and mortality rate in head injury patients. Of the total 40 patients, 15 of them survived. These patients had moderate GCS scores of 8 patients and severe GCS of 7 patients. A total of 25 patients did not survive, of which 7 had moderate injury and 18 had severe injury. From this study it can be concluded that patients with poor GCS scores have a high mortality rate.

4. Conclusion

Based on a study of 333 head injury patients with medical record collection, the following results were obtained: 1). Head injury patients are more common in men of productive age between 39 - 43 years, 68.5% is due to traffic accidents, 40.2% of the patients underwent surgery, 9.6% of patients experienced hypotension, 33.3% of patients had hyperthermia, 17.1% had complications and 21.6% were multiple trauma patients. 2). Head injury patients had a mean to mild baseline GCS score of 12.89. A total of 71.8% had a baseline GCS score of 13-15, 15.9% baseline GCS score 9-12 and 12.3% baseline GCS score <8. 3). Outcome of head injury patients was 17 (5.1%) patients died, 48 (14.4%) received intensive care, 256 (76.9%) hospitalized, and 12 (3.6%) patients went home. The most patient outcome was hospitalization, which was dominated by patients with a mild initial GCS score. The mortality outcome and ICU care were predominantly patients with moderate to severe GCS scores.

Recommendations: 1). Nursing staff should continue to increase knowledge about the loss of consciousness in head injury patients, clinical signs of possible complications and vital signs that can affect patient outcomes. 2). Future researchers are expected to be able to use this study as a basis for further research on the factors that can affect the level of consciousness and patient outcomes by focusing on seriously injured patients and how nursing interventions are carried out in the process of treating head injury patients.

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