RELATIONSHIP BETWEEN AGE AND INJURY MECHANISM TO OUTCOME IN HEAD INJURY IN NGUDI WALUYO WLINGI HOSPITAL

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ABSTRACT

Introduction: Head injury is one of the emergency conditions that can cause death in the world. The high mortality rate of head injury patients is related to the initial assessment that can predict patient outcome. Outcome of head injury patients can be influenced by several factors such as age and mechanism of injury. This study aimed to determine the relationship between age and mechanism of injury with head injury outcome at Ngudi Waluyo Wlingi hospital. **Methods:** This research was observational analytic study using a retrospective cohort approach with purposive sampling. A total of 295 medical records of patients with head injuries were taken using observation sheets. Bivariate statistical test used Spearman rank test. **Result:** The results of the *Spearman rank* analysis showed that there was a significant relationship between the mechanism of injury to the *outcome* of head injury patients with *p value* < 0.005. The results of the logistic regression test showed that the calculated value of Exp(B) the mechanism of injury was 5.766. **Discussion:** Mechanism of injury was related to the outcome of head injury patients.

Key words: Age, Head Injury, Mechanism of Injury, Outcome

Introduction

Head injury is one of the problems in the world with a high mortality rate (Iskandar, 2017). The incidence of head injury and patient mortality in the emergency room and inpatient rooms continues to increase from year to year. In the United States, head injury sufferers increased by 521 to 824 per 100,000 population from 2001-2010 (Centers For Disease Control And Prevention, 2014).

The incidence of head injuries in Indonesia is estimated at 500,000 cases annually. As many as 10% of cases died before arriving at the hospital, 80% were classified as minor head injuries, 10% included moderate injuries and 10% included severe head injuries (Schoeneberg, 2014). The main cause of head injuries is due to traffic accidents. In addition to traffic accidents, there are 2 causes of head injuries, namely collisions caused by falling and due to experiencing acts of violence (Rawis, 2016).

The incidence of head injuries in Indonesia has also increased significantly.

One of the causes of head injury is a motorcycle accident. The highest motorcycle accidents were found in Bengkulu (56.4%) and the lowest in Papua (19.4%). Meanwhile, the highest proportion of head injuries caused by land transportation was found in South Kalimantan (10.1%) and the lowest was found in Papua (2.5%). Furthermore, head injuries caused by falls were the highest in East Nusa Tenggara (NTT) (55.5%), while the lowest was Bengkulu (26.6%), and East Java ranked fourth (37%). (Balitbangkes, 2013).

The condition of the head injury is closely related to time. Every time that passes will be very meaningful for the safety of the patient's life. Patients with severe head injuries, the mortality rate will increase in the first 7 days, and continue to increase until the 30th day if complications occur during treatment in the ICU (Tjahjadi, 2013). The first hour of head injury management which includes assessment, resuscitation and definitive care that will be provided is very important for the patient (Kondo, 2011). The main challenge for emergency room nurses at this time is the accuracy of the initial assessment in the management of head injuries. The initial assessment of head injury patients can provide an estimate of the *outcome* of trauma patients, and also to support clinical decision making and appropriate and efficient treatment steps (Tjahjadi, 2013).

Appropriate and efficient head injury management will affect the *outcome*. *Outcome* is a change in situation from certain circumstances that occur because of an action. The word *outcome is* used as the final result or findings that occur due to head injury (Faqih, 2016). Factors that can affect the *outcome of* head injury are age, physiological factors such as severity of head injury as assessed by *Glasgow Coma Scale* (GCS), presence of hypotension, hypoxia; as well as anatomical abnormalities that can be seen from the CT scan (Rahmawati, 2013). In addition to these factors, the transportation used when taking patients to the hospital and the presence of trauma to other organs can also affect the *outcome* of head injury patients (Fitirana, 2017). In this study, researchers will examine the factors that can affect the *outcome* of head injury patients, namely age and the mechanism of injury.

The results of a preliminary study conducted by researchers show that the number of head injuries is quite a lot in Blitar Regency in 2025. These accidents are caused by roads that are not that big, driving methods are not good, and there are still few riders using safety equipment when driving. The patient was brought and referred to two Regional General Hospitals in Wlingi. The hospital is a type B hospital, which has complete facilities and can handle head injury patients.

The incidence of head injuries in Blitar Regency, especially at the Ngudi Waluyo Wlingi Hospital, recorded 69 people with mild head injuries, 101 people with moderate head injuries, and 23 patients with severe head injuries in 2025. About 20% of head injury patients at the Ngudi Waluyo Wlingi Hospital were referred. Patients are dominated by patients with severe head injuries caused by poor patient conditions due to multiple traumas and inadequate facilities that the hospital does not yet have. Based on the above case, the researcher

wanted to study respondent is 65 years old and the youngest is 18 years old.

Table 2. Characteristics of RespondentsBased on Mechanism of Injury, Outcome, GCS, Education and Occupation

Variable	Category	%
Mechanism of Injury	Trauma	44,7
	Penetrating	55,3
	Blunt Trauma Total	100
Outcome	Died	4,7
	Vegetative State	8,5
	Lower Severe Disability	14,6
	Upper Severe Disability	3,7
	Lower Moderate Disability	1,4
	Upper Moderate Disabil	41,4

	ity Lower Good Recovery Upper Good Recovery Total	
GCS	CKR CKS CKB Total	30,5 50,5 19 100
Education	Elementary Junior High School Senior High School PT Jumlah	10,8 19,7 33,9 35,6 100
Employment	Employment Unemploymen t Total	44,1 55,9 100

further about the relationship between age and the mechanism of injury with the *outcome* of head injury patients.

Methods

This study utilized a retrospective cohort design to analyze factors associated with outcomes in patients with traumatic brain injury (TBI). Conducted at RSUD Ngudi Waluyo Wlingi, the research covered medical records of patients admitted to the emergency department (ED) between January 1, 2022 and November 30, 2024. A total of 1,122 medical records were initially screened. Through purposive sampling, a final sample of 295 patients was selected based on specific inclusion and exclusion criteria using *purposive sampling method* at Ngudi Waluyo Wlingi Hospital. Inclusion criteria included: medical records of patients diagnosed with head injury admitted through the ED and subsequently hospitalized, patients aged over 18 years, patients not discharged against medical advice, patients with trauma involving organs other than the head. Exclusion criteria were:patients transferred from or to other hospitals, patients under the influence of alcohol, patients who had taken sedative or narcotic drugs affecting consciousness. Data were collected from medical records using an observational checklist. The exposures measured included: Revised Trauma Score (RTS), consisting of Glasgow Coma Scale (GCS), systolic blood pressure (SBP), and respiratory rate (RR), age, prehospital time, presence of additional trauma to other organs, and echanism of injury (blunt or penetrating trauma). The outcome was assessed using the Glasgow Outcome Scale - Extended (GOSE), categorized into 8 levels ranging from death to upper good recovery. Outcome data were collected at the point of discharge or within a maximum of 7 days of inpatient care.

The research instrument was in the form of an observation sheet. Bivariate analysis using *Spearman's rank i for the* relationship between age and the mechanism of injury to other organs with the *outcome* of head injury patients. This research was conducted after obtaining ethical approval from the Research Ethics Commission of the Faculty of Medicine, Universitas Brawijaya Malang and the Research Ethics Commission of Ngudi Waluyo Wlingi Hospital.

Results

Tabel 1. Characteristics of Respondents Based on Age, RR, SBP and GCS

Variabel	Median	Min-Max
GCS	11	5-15
Systolic Blood Pressure (SBP)	90	68-134
RR	18	6-36
Age	34	18-65

Source: Primary Data (2025)

Based on table 1, the respondent's GCS was the highest with a value of 15 and the lowest with a value of 15. For the highest respondent's systolic blood pressure of 134 mmHg and the lowest of 68 mmHg. The highest RR is 36 times/minute and the lowest is 6 times/minute. The oldest Source: Primary Data (2025)

Table 2 shows the mechanism of injury, the most dominant respondents experiencing blunt trauma with a total of 163 people (55.3%). For the *outcome* , the most dominant respondent had *outcome* an *Upper Moderate Disability* with a total of 122 people (41.4%). For the GCS category, the most dominant respondent has a moderate head injury (CKS) category with a total of 149 people (50.5%). In terms of education, the most dominant respondent was educated in tertiary institutions with a total of 105 people (35.6%). For work, the most dominant respondents did not work as many as 165 people (55.9%).

Bivariate

Table 3. Relationship of Age and Mechanism of Injury to Outcome in Head Injured Patients at Ngudi Waluyo Wlingi Hospital

Variable	R	p
Age	0.022	0.713
Mechanism of Injury	0,176	0,002

Source: Primary Data (2025)

Table 3 shows that there is no relationship between age and *outcome* in head injury patients with p value = 0.713. There is a relationship between the mechanism of injury and *outcome* in patients with head injuries with p value =
0.002. The value of r = 0.176 indicates a positive correlation with a weak correlation strength where penetrating trauma can worsen the

outcome of head injury patients at Ngudi Waluyo Wlingi Hospital.

Discussion

1. **Relationship between age and outcome in head injury patients**

This study showed that there was no relationship between age and outcome in head injury patients with p value = 0.713. In this study, the youngest respondent was 18 years old and the oldest was 65 years old.

Age is one of the predictors that can affect the worsening of patients with head injuries. Age can affect healing in patients so that it affects outcomes in patients with head injuries. The healing process in head injuries can be judged by the absence of

patient disability. Ages over 65 years or older people show a decline in neurological function and are more likely to experience disability than those under 65 years of age. This is a degenerative process experienced in the elderly so that it affects healing and physiological improvement in cases of head injury (Sherwood, 2016).

The results of this study are not in line with research by Lingsma et al (2014) which states that the majority of patients with head injuries can recover completely within 3-6 months

although there are some who experience neurological deficits. Based on the number of 485 patients, the average age of 44 years with the elderly age or more than 65 years having a poor outcome after head injury (Lingsma, 2014).

However, research conducted by Llompart-Pou in 2016 explains that young people (less than or equal to 55 years of age) have a higher risk of death than those over 77 years of age. This is due to the activities of young adult patients who like to drive and use illegal drugs. In addition, patient mortality is not only influenced by age but also GCS, the mechanism of injury and other organ trauma greatly affects patient outcomes regardless of age, young or old (Joseph, 2015; Okasha, 2014

2. **Relationship between mechanism of injury and outcome in head injury patients**

The value of r = 0.176 indicates a positive correlation with a weak correlation strength where penetrating trauma can worsen the *outcome* of head injury patients.

This study is in line with research

conducted by Baghi (2015) which explains that the mechanism of injury which is a component of MGAP can be a predictor of death in trauma patients (Baghi, 2105). The mechanism of injury may influence the aggravation of a patient with a head injury. The mechanism of injury consists of two types, namely blunt object injury and sharp

object injury (Kowalak, Welsh, & Mayer, 2017). Research conducted by Akay, Oztrurk & Akay (2017) stated that patients with trauma suffered blunt injuries as many as 1670,075 patients (90.37%) with the incidence of falling accidents as many as 353,790 (42.06%). This illustrates that the mechanism of injury has an important role in mortality in trauma patients (Akay, Ozturk, & Akay, 2017).

Patients with injuries from falls and motorcycle collisions with pedestrians have *outcomes* poorin patients with head injuries. Sut & Memis (2010) stated that deaths due to head trauma were dominantly caused by motor vehicle accidents and falls with a value of 34% and 25%, respectively, of 126 patients (Sut & Memis, 2010).

Conclusion

There is a relationship between the mechanism of injury and *outcome* in head injury patients at Ngudi Waluyo Wlingi Hospital. There is no relationship between age and *outcome* in head injury patients at Ngudi Waluyo Wlingi Hospital.

Reference

Akay, Serhat, Ozturk, Ahmet Mucteba, & Akay, Huriye. (2017). Comparison of modified Kampala trauma score with trauma mortality prediction model and trauma-injury severity score: A National Trauma Data Bank Study. *The American Journal of Emergency Medicine, 35*(8), 1056-1059. doi: https://doi.org/10.1016/j.ajem.2017.02.035

Baghi, Iraj. (2105). Mortality Prediction of MGAP Scoring System (type of injury, GCS, age, and systolic blood pressure) in Trauma Patients. *Trauma Mon, 20*(3).

Riset Kesehatan Dasar (2013). Centers For Disease Control And Prevention, CDC. (2014). Rates Of Tbi Related Emergency Department Visits, Hospitalizations, And Deaths – United States, 2001-2010

Faqih, Moh. Ubaidillah Faqih., Ahsan., dan Tina Handayani Nasution. (2016). Analisis Faktor Yang Mempengaruhi Outcome Pasien Cedera Kepala Berdasarkan Functional Independence Measure (Fim). | *J.K.Mesencephalon, 2*.

Fitirana, Nurul Fatwati., Sri Poeranto., dan Tina Handayani Nasution. (2017). Analisa Faktor Yang Mempengaruhi Prognosis Pasien Cedera Kepala Berat Di Rsud Margono Soekarjo Purwokerto.

Jurnal Keperawatan, 3(2). Iskandar. (2017). *Diagnosis Dan Penanganan Cedera Kepala Di Daerah Rural*. Paper presented at the National symposium & workshop "Aceh Surgery Update 2", Banda Aceh.

Joseph, B., Pandit, V., Aziz, H.,Kulvatunyou, N., Zangbar, B., Green, D., . . . Rhee, P. (2015). Mild traumatic brain injury defined by Glasgow Coma Scale: Is it really mild? *Brain Injury, 29*(1).

Kondo, Yukuta., Toshikazu Abe, Kiyotaka Kohshi, Yasuharu Tokuda, E Francis Cook dan Ichiro Kukita (2011). Revised Trauma Scoring System To Predict In-Hospital Mortality In The Emergency Department: Glasgow Coma Scale, Age, And Systolic Blood Pressure Score. *Bio Med Central, 15*.

Kowalak, P. J, Welsh, W, & Mayer, B. (2017). *Textbook on Pathophysiology*. Jakarta: EGC.

Lingsma, H., Rozzenbeek, B., Steyerberg, E., Murray, G., & Maas, A. (2014). Early Prognosis In Traumatic Brain Injury: From Prophecies To Predictions. *Lancet Neuro, 9*(543).

Okasha, A., Fayed, A., & Saleh, al, Ehsai M R et. (2014). The FOUR Score Predicts Mortality, Endotracheal Intubation and ICU Length of Stay After Traumatic Brain Injury. *Neurotrical Care, 21*.

Rahmawati, Ika., M. Hidayat., Yulian Wiji Utami. (2013). Analisis Faktor- faktor yang Berhubungan Dengan Nilai Revised Trauma Score Dalam Memprediksi Mortality Pasien

Cedera Kepala Berat Di RSD Mardi Waluyo Blitar. *1*.

Rawis, Maria. L., Diana Ch. Lalenoh., Lucky T. Kumaat. (2016). Profil Pasien Cedera Kepala Sedang dan Berat Yang Dirawat di ICU dan HCU. *Jurnal e-Clinic (eCl), 4*.

Schoeneberg, Carsten. (2014). Reduction In Mortality In Severely Injured Patients Following The Introduction Of The ‘‘Treatment Of Patients With Severe And Multiple Injuries’’ Guideline Of The German Society Of Trauma Surgery – A Retrospective Analysis Of A Level 1 Trauma Center (2010–2012). *International Care Injured, 45*, 635-638.

Sherwood, L. (2016). *Fisiologi Manusia dari Sel ke Sistem* (Vol. 8). Jakarta: EGC.

Sut, N., & Memis, D. (2010). Intensive care cost and survival analyses of traumatic brain injury. *Ulus Travma Acil Cerrahi Derg, 16*(2), 149-154.

Tjahjadi, M., Arifin, M.Z., Gill, A.S dan Faried A. (2013). Early Mortality Predictor of Svere Traumatic Brain Injury: A Single Center Study of Prognostic Variables Based on Admission Charactersitic. *The Indian Journal of eurotrauma, 10*