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Research Article

Risk Factors of Injury Severity Level in Foreign Tourists Visiting Bali

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ABSTRACT

Background: Injuries are the highest cause of death for international tourists, especially injuries caused by traffic accidents. The severity level of injury is the most cause of death. It is necessary to analyze the risk factor of injury severity among international travelers visiting Bali. **Purposes**: This study aimed to investigate the risk factors for injury severity in foreign tourists visiting Bali. **Methods**: This cross-sectional analytic study used foreign tourists visiting an international hospital in Bali as the research sample. This research was conducted by analyzing medical records using Injury Severity Score. Data on respondent characteristics, including age, gender, and injury characteristics, including location, type of injury, degree of severity, and injury mechanism, were analyzed using cross-tabulation. **Results**: The most types of trauma were closed fractures, 49 people (45.4%), and the most common causes were traffic accidents, namely 39 (36.1%) people. Based on the injury region, the lower Extremity is 36 (33.3%) mostly. **Conclusion**: Age, gender, type of injury, and mechanism of the accident was significant factor influencing the severity of injury among travelers visiting Bali ($p<0.05$).

Keywords: factor, injury, risk, severity

INTRODUCTION

It is estimated that 1.8 billion people will travel on tourism in 2030 (1). Injuries or injuries are the leading cause of death in international travelers worldwide (2). As many as more than one million people die and experience disability after injury, the cause of death in international tourists is injuries caused by traffic accidents (3). Injury is an unpredictable event and when traveling is sometimes ignored due to lack of prevention and protection against injury (4). The World Health Organization reports that injury prevention during pre-travel consultations is very important, especially understanding of the risks that could potentially result in injury should be emphasized to prospective tourists (5). The risk of death caused by injury is 25 times compared to infectious disease (6). WHO also confirmed that the case fatality rate caused by injury was mostly in developing countries. Bali is one of the international tourism areas located in developing countries which are included in the low-middle income countries mentioned by WHO (7).

Knowledge of risk factors for the severity of injury to international tourists is important for medical service workers to avoid the risk of death and disability in patients (8). Based on data released by Sanglah Hospital in 2012, the most common cause of death for foreign tourists is traffic accidents (9). Risk factors related to the severity of head injuries are gender, use of Indonesian National Standard (SNI) helmets, and vehicle speed. Hypotensive blood pressure

is the most dominant risk factor for unfavorable outcomes within 7 days of head injury patients treated at Sanglah Hospital in 2018-2019 (10). In Bali, no research has been conducted on the risk factors for the severity of injury to foreign tourists, because of the above, it is important for us to conduct research on the risk factors for the severity of injury to tourists visiting Bali in order to get clearer knowledge for academics, clinicians and government.

METHOD

The design of this research is cross-sectional analytic, tourists who are used as subjects are foreign tourists according to the identity listed in the passport who suffered bodily injuries. This study uses secondary data, namely medical records and identification in the form of a passport. Medical records are obtained by first applying for permission to borrow medical records and a letter of ethics to the hospital that will be the location of the study. The data should be nalysed such as age, gender, nationality, chief complain, history of present illness, vital sign, Glasgow coma scale, local status, admission diagnosis, type of trauma, mechanism of accident, body region affected. The severity level was analyzed by Injury Severity score of traumas that measure by coverage of the wide of body region affected. Inclusion criteria was foreign traveler, all age, complete medical record. The data was excluded if the medical record not sufficient. Several factors were analyzed to be determinant factor of injury severity was age, gender, mechanism of accident, and type of injury.

This research took place at BIMC Kuta International Hospital. This location was chosen because of the large number of foreign tourists visiting for treatment with a wide variety of cases and being a referral hospital for foreign tourists. This research was conducted in August-October 2022. The target population is all tourists visiting Bali who are injured. Samples was subject who came to BIMC international hospital with diagnose of injury.

All data were tabulated in SPSS 27 version and analysed by distribution frequency table. Bi variate analyses were made using cross-tab, and the degree of correlation was evaluated by pearson chi-square coefision. This research was approved by Ethic comitte of Warmadewa University number 280/UNWAR/FKIK/EC-KEPK/VIII/2022.

RESULT

Medical record data of foreign tourist patients collected from January 2021 through July 2022 obtained a total number of 5589 foreign patient visits, 416 of these patients were admitted to the hospital with a trauma diagnosis. A total of 108 patients with a diagnosis of injury or trauma were then taken as research samples. Characteristics of research subjects can be seen in tables 1.

A total of 108 medical records of foreign tourists who were used as research subjects were 50 men (36.3%), while 58 others were women (53.7%). Most of the types of trauma experienced by tourists are closed fractures as many as 49 people (45.4%), open fractures as many as 15 (13.9%), multiple excoriations as many as 6 (5.6%) people, multiple injuries as many as 17 (15.7%) people, 4 (3.7%) other injuries, 4 (3.7%) dislocations and 13 (12.0%) minor head injuries.

Based on the mechanism of injury, the most common causes were traffic accidents, namely 39 (36.1%) people, sports accidents 18 (16.7%) people, self-injury due to slipping or

falling alone as many as 48 (44.4%), injuries caused by crimes such as theft or robbery of 3 (2.8%) people. Based on the injury region, it is divided into 6 regions, namely Head neck 22 (20.4%) people, Upper Extremity 29 (26.9%) people, Lower Extremity 36 (33.3%) people, Thorax 5 (4.6%) people, Whole body 14 (13.0%) people, Spine 2(1.9%) people.

Airworthiness was assessed based on the severity of trauma, physiological conditions such as vital signs, and affected organs, as many as 87 (80.6%) were allowed to fly using commercial aircraft or air ambulances and as many as 21 (19.4%). The distribution of severity of injury was mild as many as 51 (47.2%) people, moderate as many as 36 (33.3%), severe 21 (19.4%). The level of consciousness when the patient first came to the hospital was fully aware 95 (87.96%) and as many as 13 (12.03%) had decreased consciousness. Complete data can be seen in table 1.

Table 1. Characteristic of Research subject

Characteristic	n	%
Gender		
Male	50	(46,3)
Female	58	(53,7)
Type of trauma		
Close fracture	49	(45.4)
Open fracture	15	(13.9)
Multiple excoraiation	6	(5.6)
Multiple injury	17	(15.7)
Other injury	4	(3.7)
Dislocation	4	(3.7)
Mild head injudy	13	(12.0)
Mechanisme of accident		
Traffic accident	39	(36.1)
Sport injury	18	(16.7)
Self injury	48	(44.4)
Violence	3	(2.8)
Body Region		
Head and neck	22	(20.4)
Upper extremity	29	(26.9)
Lower extremity	36	(33.3)
Thorax	5	(4.6)
All body	14	(13.0)
Back	2	(1.9)
Severity		
Mild	51	(47.2)
Moderate	36	(33.3)
Severe	21	(19.4)
Level of consciousness		
Compos mentis	95	(87.96)
Decrease of consciousness	13	(12.03)

Factors Affecting the Severity of Injury among Travelers

Table 2. Correlation of Age with severity of injury

Age (years)	Severity of Injury			P	*r*
	Mild n(%)	Moderate n(%)	Severe n(%)		
0-18	5 (83,3)	1 (16,7)	0 (0)		
19-60	29 (38,2)	26 (34,2)	21 (27,6)	*0.007*	*14,16*
>60	27 (65,4)	9 (34,6)	0 (0)		

Based on the results of the cross-tabulation analysis, there was a significant relationship between the age category and the severity of the injury with p 0.007 and the correlation coefficient r 14.16, where major injuries were suffered mostly by tourists aged 19-60 years. This is because the cause of the injury is an accident using a motorized vehicle that occurs on the road or a traffic accident.

Table 3. Correlation of Gender with severity of injury

Gender	Severity of Injury			P	r
	Mild n(%)	Moderate n(%)	Severe n(%)		
Male	25 (50)	11 (22)	14 (28)		
Female	26 (44,8)	25 (43,1)	7 (12,1)	0.027	7,24
Total	51 (47,2)	36 (33,3)	21 (19,4)		

Based on the results of the cross-tabulation analysis, there was a significant relationship between gender and the severity of injury r 7.24 with p 0.027. Where severe injuries are mostly suffered by men compared to women. This could be because men tend to be brave tourists and try various natural challenges and the desire to explore tourist sites is higher than women.

Table 4. Correlation Mechanism of Injury with severity of injury

Mechanism of Injury	Severity of Injury			P	r
	Mild n(%)	Moderate n(%)	Severe n(%)		
Personal error	31 (60,8)	16 (31,4)	4 (7,8)		
Road traffic accident	11 (29,7)	16 (43,2)	10 (27,0)	0.006	14,4
Sport injury, etc.	7 (38,9)	4 (22,2)	7 (38,9)		
Total	49 (46,2)	36 (34,0)	21 (19,8)		

Based on the results of the cross-tabulation analysis, there was a significant relationship between the mechanism of injury and the severity of injury r 14,462 with p 0.006. Where major injuries are mostly due to traffic accidents. Traffic accidents are the most common cause of injury to tourists in various countries. Mobility during travel causes a very high level of motor vehicle use and also increases the risk of driving accidents. Congested traffic, compliance in the use of helmets and other personal protective equipment, high speeds and driving conditions also contribute to the risk of this accident.

Table 5. Correlation Type of Injury with severity of injury

Type of Injury	Severity of Injury			P	r
	Mild n(%)	Moderate n(%)	Severe n(%)		
Fracture	38(59,3)	24 (37,5)	2 (3,12)		
Multiple injury	0 (0)	2 (11,7)	15 (88,2)		
Head injury	4 (30,7)	6 (46,1)	3 (23,0)	0.00	66.3
Other injury	9 (64,2)	4 (28,5)	1 (7,1)		
Total	51 (47,2)	36 (34,0)	21 (19,8)		

Based on the results of the cross-tabulation analysis, there was a significant relationship between the type of injury and the severity of the injury r 66,396 with p 0.00. Where major injuries are mostly caused by multiple locations throughout the body. The occurrence of injury to the whole body cannot be directly related to the physiological function of internal organs. However, it can be assumed that the more locations of injury, the more blood loss, thus disrupting the physiological functions of the body. Based on research conducted by Lee et al, 2010 stated that severe injuries are caused by the location of the injury that affects various parts of the body or is said to be multiple injuries. However, it is necessary to evaluate the occurrence of injuries to internal organs that also affect the hemodynamic function of the body.

DISCUSSION

In this study, most of the subjects suffered injuries to the lower extremities. Previous research stated that the most injuries in children were on the arms and legs. The most common cause of accidents is traffic accidents (11). The potential risk factors for the severity of injury were human factors, the environment, roads, and so on were examined (12,13). Years of driving, type of pavement, road slope and alignment, terrain, time and type of accident, condition of street lights, type of vehicle, speed limit, number of vehicles involved, and whether seat belt use were significant factors influencing the severity of the injury (14,15). Identifying high risk factors that influence the severity of injuries from fatigue-related accidents helps prevent driver fatigue and improve road safety conditions (16,17). Another study investigated the impact of various factors on injury severity, this study revealed important findings, drivers driving at high speed through the work zone at night (18,19). In addition, research also shows that young male drivers who travel at night on weekends are more likely to suffer fatal injuries (13,20).

Other factor also contributes to severity of injury, the age of the driver is older than 55 years, male drivers, drivers under the influence of alcohol, drowsiness, suddenly turning left/right on a straight road increase the likelihood of a fatal accident, while other factors were found to reduce the severity such as the age of the driver between 26-35 years old, using seat belts, properly installed traffic signs (13). This study recommends the need to increase education about travel safety, enforcement of traffic law rules, and roadside safety features that have the potential to reduce the severity of drivers involved in single accidents (20,21). Previous study in Pakistan also mention that age was strongly correlated with the severity of injury (22).

In Western countries, severe blunt trauma is common, caused by road crashes, falls and, less frequently, blows and assault. Severe penetrating trauma, usually from stabbings and gunshots, is less common except in larger cities of the USA, South Africa and war zones. Blunt

trauma is often more difficult to treat than penetrating trauma. Assessment is more difficult, because injuries are frequently internal, multiple and not obvious initially. The risk of missing serious injuries can only be lessened by a systematic approach and repeated assessments (22).

CONCLUSION

Several factors were analyses to obtain the significant factor influencing severity of injury among travelers visiting international hospital in Bali. There was found age 19-60, gender male, mechanism of injury was caused by road traffic accident and type of injury was multiple injury region were significat factor influencing the severity of injury among travelers visiting international hospital in Bali.

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CONFLICT OF INTEREST

None declared.

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