

Association Between Place of Residence and Ocular Trauma Occurrence Among Patients at West Nusa Tenggara Provincial General Hospital from January 2024 to December 2025

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Abstract

Ocular trauma is a health problem that can cause visual impairment. This study aimed to analyze the association between place of residence and ocular trauma among patients at West Nusa Tenggara Provincial General Hospital from January 2024 to December 2025. An analytic observational study with a cross-sectional design was conducted using secondary data from medical records of 98 patients with ocular trauma. Analysis was performed using the chi-square test or Fisher's exact test, with the number of analyzed cases varying across variables. The results showed a significant association between place of residence and time to hospital presentation after trauma ($p = 0.022$), but no significant association with trauma type ($p = 0.740$), trauma mechanism ($p = 0.759$), trauma etiology ($p = 0.774$), or post-traumatic visual acuity ($p = 0.358$). In conclusion, place of residence was associated with time to hospital presentation after trauma but was not associated with trauma type, mechanism, etiology, or post-traumatic visual acuity.

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1. INTRODUCTION

Ocular trauma is an important health concern in both developing and developed countries [1]. Data from the Global Burden of Disease (GBD) study indicate that the number of ocular trauma cases worldwide increased by 24% in 2019 [2]. Ocular trauma can cause visual impairment and have long-term physical, psychological, and socioeconomic consequences [3]. In the United States, hospitalization costs associated with ocular trauma during the 2001–2014 period were estimated at USD 1.72 billion, excluding losses due to reduced productivity [4]. The substantial burden of ocular trauma highlights the importance of understanding its characteristics and factors associated with its occurrence.

According to the 2018 Basic Health Research (Riset Kesehatan Dasar) report, the national proportion of ocular trauma cases was 0.5% of all trauma cases, while in West Nusa Tenggara (NTB), it was 0.4% [5]. Indonesia's geographical characteristics as an archipelagic country contribute to disparities in the availability of healthcare workers between urban and rural areas, particularly in rural regions and eastern Indonesia, including

the Nusa Tenggara region [6]. Differences in regional conditions and access to healthcare services are therefore relevant aspects to consider when examining ocular trauma in relation to patients' place of residence.

Based on the Regulation of the Head of Statistics Indonesia Number 37 of 2010 concerning the Classification of Urban and Rural Areas in Indonesia, West Nusa Tenggara Province has 695 villages/urban villages classified as rural areas and 271 villages/urban villages classified as urban areas [7]. The proportion of patients with closed ocular trauma has been reported to be higher in rural areas, at 64.7%, compared with 35.3% in urban areas [8]. Consistent with this finding, the prevalence of blindness due to ocular trauma has also been reported to be higher in rural populations, at 4.5%, compared with 3.97% in urban populations [9].

These findings indicate that ocular trauma and visual impairment can occur among populations in both rural and urban areas. However, the association between place of residence and various characteristics of ocular trauma among patients in NTB has not been extensively studied. As the highest referral hospital in West Nusa Tenggara Province, West Nusa Tenggara Provincial General Hospital plays an important role in managing ocular trauma cases referred from various regions and therefore provides a source of data for describing ocular trauma occurrence at the provincial level.

Therefore, this study aimed to analyze the association between place of residence and ocular trauma occurrence among patients at West Nusa Tenggara Provincial General Hospital from January 2024 to December 2025. This study used an analytical observational design with a cross-sectional approach and secondary data from medical records. The characteristics analyzed included type of trauma, mechanism of trauma, etiology of trauma, time to hospital presentation, and post-traumatic visual acuity. The findings are expected to provide information on the association between place of residence and ocular trauma and serve as baseline data to support the understanding of ocular trauma prevention, healthcare services, and management in West Nusa Tenggara Province.

2. RESEARCH METHODS

This study was an analytical observational study with a cross-sectional approach using secondary data from the medical records of patients with ocular trauma at West Nusa Tenggara Provincial General Hospital from January 1, 2024, to December 31, 2025. The study commenced with the submission of research permission and ethical approval, followed by a review of medical records through the Medical Records Department of West Nusa Tenggara Provincial General Hospital.

Patients identified through ICD-10 code S05 were screened based on the consistency of the clinical diagnosis and the predetermined inclusion and exclusion criteria. The inclusion criteria were new patients diagnosed with ocular trauma who received medical care at West Nusa Tenggara Provincial General Hospital from January 1, 2024, to December 31, 2025. The exclusion criteria were patients with multiple trauma in whom the clinical impact on the eye could not be specifically identified. Each ocular trauma event was counted as one case, whereas follow-up or subsequent visits for the same event were not counted as new cases. Patients who met the study criteria were then recorded on a data collection sheet according to the predetermined variables and operational definitions.

The data collected included place of residence, type of trauma, mechanism of trauma, etiology of trauma, time to hospital presentation, and post-traumatic visual acuity. The data were checked for completeness and consistency, followed by recording, coding, and analysis. The analysis was performed to determine the association between place of

residence and ocular trauma characteristics using the chi-square test or Fisher's exact test according to the characteristics of the data. The analysis was performed based on the completeness of the data for each pair of variables analyzed.

3. RESULTS AND DISCUSSION

3.1. Research Results

Based on a review of medical records at West Nusa Tenggara Provincial General Hospital from January 1, 2024, to December 31, 2025, a total of 109 patient records with ocular trauma were identified. After screening based on the inclusion and exclusion criteria, 98 patients met the study criteria. Data on the mechanism of trauma, etiology of trauma, and time to hospital presentation were available for 94, 92, and 77 patients, respectively. Of the 98 patients, 68 had ocular globe trauma. In this group, data on the type of trauma were available for 61 patients, while post-traumatic visual acuity data were available for 31 patients.

Table 1. Association Between Place of Residence and Mechanism of Trauma, Etiology of Trauma, and Time to Hospital Presentation

	Place of Residence			<i>p</i> -value
	Urban	Rural	Total	
	<i>n</i> (%)	<i>n</i> (%)	<i>N</i> (%)	
Mechanism of Trauma				0.759
Blunt	22 (23.4)	37 (39.4)	59 (62.8)	
Sharp	12 (12.8)	18 (19.1)	30 (31.9)	
Chemical	2 (2.1)	1 (1.1)	3 (3.2)	
Thermal	1 (1.1)	1 (1.1)	2 (2.1)	
Etiology of Trauma				0.774
Industrial	1 (1.1)	1 (1.1)	2 (2.2)	
Recreational	3 (3.3)	6 (6.5)	9 (9.8)	
Traffic Accident	15 (16.3)	25 (27.2)	40 (43.5)	
Criminal	1 (1.1)	1 (1.1)	2 (2.2)	
Agricultural	0 (0.0)	3 (3.3)	3 (3.3)	
Casual	16 (17.4)	20 (21.7)	36 (39.1)	
Time to Hospital Presentation				0.022
≤6 hours	13 (16.9)	9 (11.7)	22 (28.6)	
>6 hours	17 (22.1)	38 (49.4)	55 (71.4)	

Based on Table 1, the analysis of the association between place of residence and mechanism of ocular trauma included 94 patients, while the analyses of the associations between place of residence and etiology of ocular trauma and time to hospital presentation included 92 and 77 patients, respectively. Patients with data recorded as “not documented” were excluded from the analysis of the respective variables. There was no significant association between place of residence and mechanism of ocular trauma ($p = 0.759$) or etiology of ocular trauma ($p = 0.774$). In contrast, a significant association was found between place of residence and time to hospital presentation ($p = 0.022$).

Table 2. Association Between Place of Residence and Type of Trauma and Post-Traumatic Visual Acuity

	Place of Residence			<i>p</i> -value
	Urban	Rural	Total	
	n (%)	n (%)	N (%)	
Type of Trauma				0.740
Open Globe Injury	13 (21.3)	16 (26.2)	29 (47.5)	
Closed Globe Injury	13 (21.3)	19 (31.1)	32 (52.5)	
Post-Traumatic Visual Acuity				0.358
Unchanged	3 (9.7)	6 (19.4)	9 (29.0)	
Improved	6 (19.4)	7 (22.6)	13 (41.9)	
Worsened	6 (19.4)	3 (9.7)	9 (29.0)	

Based on Table 2, the analysis of the association between place of residence and type of ocular trauma included 61 patients, while the analysis of the association between place of residence and post-traumatic visual acuity included 31 patients. For the analysis of type of ocular trauma, the “unspecified” category was excluded, whereas for the analysis of post-traumatic visual acuity, the “not documented” and “not followed up” categories were excluded. The results showed no significant association between place of residence and type of ocular trauma ($p = 0.740$) or post-traumatic visual acuity ($p = 0.358$).

3.2. Discussion

Based on the findings, there was no significant association between place of residence and the mechanism of ocular trauma ($p = 0.759$). The mechanism of ocular trauma is related to the form of exposure and the energy causing the injury, which may include sharp or blunt trauma, high-energy injuries such as explosions, intraocular foreign bodies, animal bites or stings, and chemical or thermal burns [10]. Various agents and activities that can cause such exposure are found across different living environments, including domestic settings, workplaces, agricultural areas, sports facilities, roads or traffic environments, and public places [11]. This indicates that exposure to agents causing ocular trauma is not limited to a particular type of environment, allowing individuals living in both rural and urban areas to be exposed to various causes of ocular trauma.

There was no significant association between place of residence and the etiology of ocular trauma ($p = 0.774$). This finding may be related to the increasingly blurred geographical and functional boundaries between urban and rural areas [12]. Consequently, exposure to causes of ocular trauma is not entirely determined by the characteristics of the residential area. The distribution of activities at the time of ocular trauma did not differ significantly between rural and urban populations ($p = 0.16$), consistent with the findings of this study [13]. That study reported agricultural activities as the most common etiology, including among individuals living in urban areas. In the present study, however, traffic accidents were the predominant etiology. Differences in the etiology of ocular trauma may be influenced by variations in population characteristics and exposure to risk factors in each area [11,14].

In contrast to the mechanism and etiology of ocular trauma, a significant association was found between place of residence and time to hospital presentation ($p = 0.022$). Nevertheless, most patients from both urban and rural areas presented more than 6 hours after sustaining the trauma. Differences in presentation time may be influenced by access to healthcare services available in each area. People living in rural and remote areas generally face geographical barriers, including greater distances, terrain conditions, and limited transportation and infrastructure. In addition, travel costs, socioeconomic conditions, and the availability of healthcare facilities may affect the time required for patients to access healthcare services [15]. Limited healthcare infrastructure and geographical barriers remain challenges to healthcare access in rural areas of Indonesia [16]. In contrast to the findings of this study, a previous study found no significant association between time to hospital presentation and place of residence ($p = 0.369$) [17]. Differences in these findings may be influenced by variations in socioeconomic conditions, healthcare systems, and access to healthcare facilities across different areas [14]. These findings are consistent with the Andersen Behavioral Model, which explains that healthcare utilization is influenced by predisposing, enabling, and need factors. These factors include individual characteristics, resource availability, and health conditions that influence a person's decision to utilize and access healthcare services [18].

Based on the findings, there was no significant association between place of residence and type of ocular trauma ($p = 0.740$). The absence of a significant association indicates that differences in place of residence do not necessarily determine the type of ocular trauma experienced by patients.

Closed-globe injuries include contusions, which are generally caused by blunt objects, and lamellar lacerations, which involve partial-thickness wounds of the ocular wall. Open-globe injuries include ruptures caused by a transient increase in intraocular pressure that results in disruption of the ocular wall from the inside outward, as well as lacerations caused by sharp objects [19]. Various sources of ocular trauma, such as blunt or sharp objects, metal objects, vegetative materials, and exposure to heat, electricity, ultraviolet radiation, and chemicals, may be encountered in daily activities, including traffic accidents, sports, and recreational activities [20,21]. These conditions allow both closed- and open-globe injuries to occur among populations living in urban and rural areas [22].

In this study, there was no significant association between place of residence and post-traumatic visual acuity ($p = 0.358$). This finding indicates that post-traumatic visual acuity did not differ significantly between patients from urban and rural areas. Post-traumatic visual acuity may improve, remain unchanged, or worsen compared with the previous condition [23]. Final visual outcomes after ocular trauma are influenced by various clinical factors, including initial visual acuity, the location and extent of the injury, globe rupture, retinal detachment, vitreous hemorrhage, lens dislocation, relative afferent pupillary defect, traumatic cataract, and hyphema [24]. These factors may contribute to visual outcomes regardless of the patient's place of residence. In addition, the influence of place of residence on the risk of ocular trauma has been reported to be relatively small compared with other factors involved in the occurrence of trauma [25].

4. CONCLUSION

This study demonstrated a significant association between place of residence and time to hospital presentation after trauma, but no significant association between place of residence and type of trauma, mechanism of trauma, etiology of trauma, or post-traumatic visual acuity among patients with ocular trauma at West Nusa Tenggara Provincial General Hospital from January 2024 to December 2025. The findings are expected to provide additional information on the association between place of residence and ocular trauma occurrence and serve as a consideration for the Government of West Nusa Tenggara Province in developing policies for ocular trauma prevention and healthcare services. Further studies are expected to involve multiple hospitals across different areas of West Nusa Tenggara and analyze the association between place of residence and other variables to obtain a more comprehensive picture.

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