Journal of
Babol University of Medical Sciences
JBUMS
e-ISSN: 2251-7170 p-ISSN: 1561-4107

An Epidemiological Study of Head Injuries in Patients Referred to the Emergency Department

F. Ramezani (MD)[1], S. Kord (PhD)[*2], M. Fallah Bagher Shaidaee (MD)[3], Y. Hamedani (MD)[4], B. Zarasvand (MD)[5]

1.Department of Pathology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, I.R.Iran.
2.Department of Nursing, Faculty of Nursing, Dezful University of Medical Sciences, Dezful, I.R.Iran.
3.Clinical Research Development Unite, Ganjavian Hospital, Dezful University of Medical Sciences, Dezful, I.R.Iran.
4.Student Research Committee , Dezful University of Medical Sciences, Dezful, I.R.Iran.
5.Department of Neurosurgery, School of Medicine, Dezful University of Medical Sciences, Dezful, I.R.Iran.

[*]Corresponding Author: S. Kord (PhD)
Address: Department of Nursing, Faculty of Nursing, Dezful University of Medical Sciences, Dezful, I.R.Iran.
Tel: +98 (61) 42422710. **E-mail:** bahare.kord132@gmail.com

Article Type
Research Paper

Received:
Jun 6th 2025
Revised:
Jul 7th 2025
Accepted:
Aug 5th 2025

ABSTRACT

Background and Objective: Head injuries, with their detrimental consequences, can impose considerable costs on the health, treatment, and rehabilitation sectors for both patients and the healthcare system. Therefore, the implementation of appropriate preventive programs for the management of patients with brain injuries is essential, which requires initial epidemiological assessments. The aim of the present study is to investigate the epidemiology of head injuries in patients presenting to the emergency department of Ganjavian Hospital in Dezful.

Methods: The present cross-sectional study was conducted on all patients with head injuries presenting to the emergency department of Ganjavian Hospital in Dezful from 2019 to 2021. Demographic information and data pertaining to the time, cause, and outcome of the injury in terms of the duration of hospitalization were collected and examined using a checklist.

Findings: In the present study, a total of 996 patients with head injuries were evaluated. The main causes of injury included traffic accidents with a share of 66.46%, falls from height with 97%, and the smallest share was related to physical altercations with 4.61%. Of the 83 patients with head injuries, 69 were male and 14 were female. Males sustained head injuries approximately 4 times more frequently than females. In terms of the season of occurrence, most head injuries occurred in the spring and during the late hours of the night, and some secondary injuries and prolonged hospitalization were associated with the method of patient transfer from the scene of the accident to the emergency department. On average, patients were hospitalized for 8.5 days.

Conclusion: The results of the study demonstrated that the most common cause of head injury is traffic accidents. Therefore, health policymakers should reconsider the management of human resources and available facilities.

Keywords: *Head Injury, Emergency Department, Epidemiology.*

Cite this article: Ramezani F, Kord S, Fallah Bagher Shaidaee M, Hamedani Y, Zarasvand B. An Epidemiological Study of Head Injuries in Patients Referred to the Emergency Department. *Journal of Babol University of Medical Sciences*. 2026; 28: e53.

Copyright © 2026 Babol University of Medical Sciences. Published by Babol University of Medical Sciences. This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International license (https://creativecommons.org/licenses/by-nc/4.0/). Noncommercial uses of the work are permitted, provided the original work is properly cited.

Introduction

Trauma is the third leading cause of disability and death across all age groups, causing 16,000 deaths per day worldwide and resulting in more than five million deaths annually across the globe (1–3). The statistics for road accidents in Iran have been reported at an average of 24,000 people annually, which is a high rate (4, 5). In developing countries, the majority of deaths resulting from road accidents occur in the pre-hospital stage (6). Head injury accounts for the majority of injuries resulting from trauma (Traumatic Brain Injury= TBI) (7). Given that 85% of the world's population resides in low- and middle-income countries, TBI is considered one of the challenges of the healthcare system, as well as a socioeconomic burden (8-15). TBI is one of the common causes of mortality among youth and adults and, due to its associated complications, is considered one of the leading causes of disability among survivors (16, 17). Head injury includes damage to various layers of the head, including the scalp, skull, and brain, encompassing a wide range of injuries from mild to severe (18). In the United States, more than 7.1 million people present to hospital emergency departments each year following traumatic brain injuries (19). However, the reported statistics are likely lower than the actual rate, because in many cases, individuals do not seek medical attention following a head injury (20).

The mortality rate of severe brain injury is approximately 40%, and 60% of the remaining cases develop disorders such as cognitive deficits and behavioral problems that affect their functional status and quality of life. Most of these individuals experience prolonged periods of disability or die due to complications that could potentially be reduced or eliminated through early detection and appropriate treatment (21). Brain injuries are divided into two groups: primary and secondary (22). Scalp laceration, skull fracture, concussion, cerebral contusion, hematomas, subarachnoid hemorrhage, and diffuse axonal injury are categorized as primary injuries (23). In contrast, secondary brain injuries are a cellular and chemical response to the primary trauma that causes the destruction of brain tissue, resulting in ischemia, hypotension, increased blood carbon dioxide, cerebral edema, or even resistant hypertension (22).

In terms of the level of consciousness, patients who survive after trauma are divided, based on clinical examination, into four groups: normal, GCS>12, GCS=9-12, and GCS≤8 (24, 25). According to previous studies, 95% of patients have a normal level of consciousness or mild reduction (GCS>12) (26, 27). Classification of patients based on the level of consciousness can predict long-term outcomes in patients with head injury (28). One of the major factors affecting mortality in low- and middle-income countries is traumatic brain injury (TBI). Conducting epidemiological studies in different communities and at different times is essential for identifying the causes and factors underlying head injuries, in order to carry out precise and correct planning. Therefore, the aim of this study is to investigate the epidemiology of head injuries in patients presenting to the emergency department of Ganjavian Hospital in Dezful.

Methods

After approval by the Ethics Committee of Dezful University of Medical Sciences under code IR.DUMS.REC.1400.044, the present cross-sectional study was conducted on patients with head injuries presenting to the emergency department of Dr. Ganjavian Hospital (a total of 1,107 individuals) from 2019 to 2021. Sampling was performed using the census method, and patients who had not undergone CT scanning or whose other information was unavailable were excluded from the study. Ultimately, 996 patients were included in the study.

Data collection was carried out by a trained team using a checklist that included patients' demographic information (age, sex, weight, height, and BMI, marital status, drug and alcohol addiction, medical history), the mechanism of head trauma, the time of head injury, the level of consciousness upon arrival at the emergency department, the severity of head injury based on the Glasgow Coma Scale (mild, moderate, severe) (29, 30), the location and type of head injury, imaging findings, and laboratory findings (Na, K, Ca, Phosphorus, BUN, Cr, INR, WBC, RBC, PLT). Patient information (laboratory and imaging findings) was obtained through access to the comprehensive electronic information system of Dr. Ganjavian Hospital, and supplementary information (hour and season of injury, type of accident, etc.) was completed through review of patients' physical records available in the hospital's document archive department.

Following data extraction and categorization, SPSS software version 22 was used for data analysis, and descriptive statistics were calculated for each of the variables. To examine possible relationships among the variables, T-test, one-way analysis of variance (ANOVA), and chi-square tests were employed, and $p<0.05$ was considered statistically significant.

Results

During the study, 996 patients were enrolled, with a sex distribution of 83% (828 patients) male and 17% (168 patients) female, and a mean age of 33.63±2.03 years (range: 1 to 84 years). 72.5% of the participants were in the age range of 1 to 42 years, and 27.5% were in the age range of 42 to 84 years. 565 patients (56.72%) were married and 431 patients (43.27%) were single. The mean weight of patients was 65.96±1.93 kg, the mean height was 162.61±25.84 cm, and the mean body mass index (BMI) was calculated as 24.19±3.67 kg/m² (Table 1).

Table 1. Demographic information and medical history of the study participants

Variable	Number(%)
Sex	
Male	828(83)
Female	168(17)
Total	996(100)
Age (years)	
1-42	722(72.5)
42-84	274(46.37)
1-84	996(100)
Marital status	
Married	565(56.72)
Single	421(43.27)
Medical history	
Hypertension	203(20.3)
Diabetes mellitus	179(17.91)
Cardiovascular disease	47(4.71)
Hypercholesterolemia	83(8.31)
Pulmonary disease	61(6.13)
Thyroid disease	59(5.91)
Cancer	49(4.81)
Family history of cancer	35(3.51)
Chemotherapy	46(4.61)
Immunosuppressive drugs	26(2.61)

662 patients (66.46%) of the study population sustained head injuries in traffic accidents, 199 patients (19.97%) from falls from height, and 46 patients (4.61%) following altercations. 65.7% of men sustained head injuries due to traffic accidents, 19.92% of men from falls from height, and 4.95% of men following altercations and conflicts. Additionally, 70.23% of women sustained head injuries in traffic accidents, 20.23% of women from falls from height, and 2.97% of women following altercations (Figure 1).

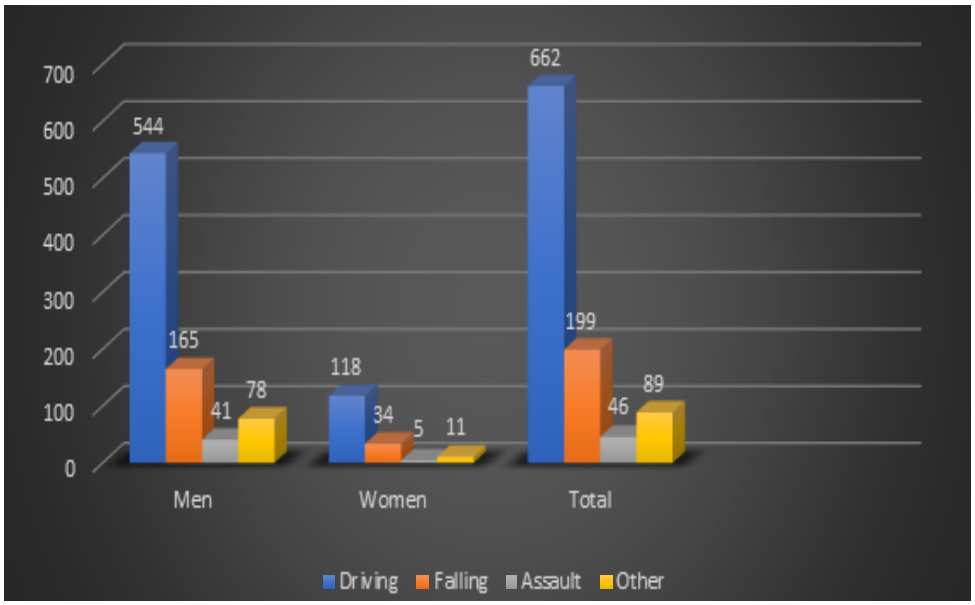


Figure 1. Frequency of each traumatic factor by sex

The mean number of days of hospitalization was 8.5 days, with a range of 1–92 days. Regarding the season of injury occurrence, the highest number of cases occurred in the spring, with 575 cases (57.73%), followed by autumn with 119 cases (11.94%). With respect to the hour of injury, approximately half of the injuries occurred in the morning and half in the afternoon until 8 p.m. 454 patients (45.58%) with head injuries were transferred to the center by pre-hospital emergency services, and 542 patients (54.41%) were transferred by private vehicle. Almost all patients had clinical symptoms of head injury at the onset of injury, the most common of which were, in order, decreased level of consciousness, headache, nausea and vomiting, and dizziness. 45.98% (458 cases) had mild injury (GCS>13), 22.99% (229 cases) had moderate injury (GCS=8-13), and 31.02% (309 cases) had severe injury (GCS<8). The mean GCS score upon arrival at the emergency department was 11.54±3.76, with a range of 4 to 15, and the mean GCS score three days after admission was 11.96±3.92, with a range of 3 to 15. 278 patients (27.91%) had GCS≤8 upon arrival, and 718 patients (72.08%) had GCS≥9. Three hours after admission, 291 patients (29.21%) had GCS≤8, and 704 patients (70.68%) had GCS≥9.

Regarding disease status, 52.91% (527 cases) of patients achieved complete recovery, 28.81% (287 cases) partial recovery, 16.86% (168 cases) died, and 1.4% (14 cases) were transferred to other centers. Investigations showed that the majority of deceased patients (118 cases, with a frequency percentage of 11.84%) died due to cardiopulmonary arrest. Based on the results of the independent t-test, the mean GCS score upon arrival was 9.1 in deceased patients and 11.4 in recovered patients, and this difference was considered statistically significant ($p<0.001$). 279 patients (28%) had skull fractures. Subarachnoid hemorrhage was found in 229 cases (23%), subdural hematoma in 207 cases (21%), epidural hematoma in

206 cases (21%), cerebral edema in 205 cases (21%), cerebral contusion in 97 cases (10%), intraparenchymal hemorrhage in 85 cases (8%), intraventricular hemorrhage in 39 cases (4%), and pneumocephalus in 38 cases (4%), respectively (Figure 2).

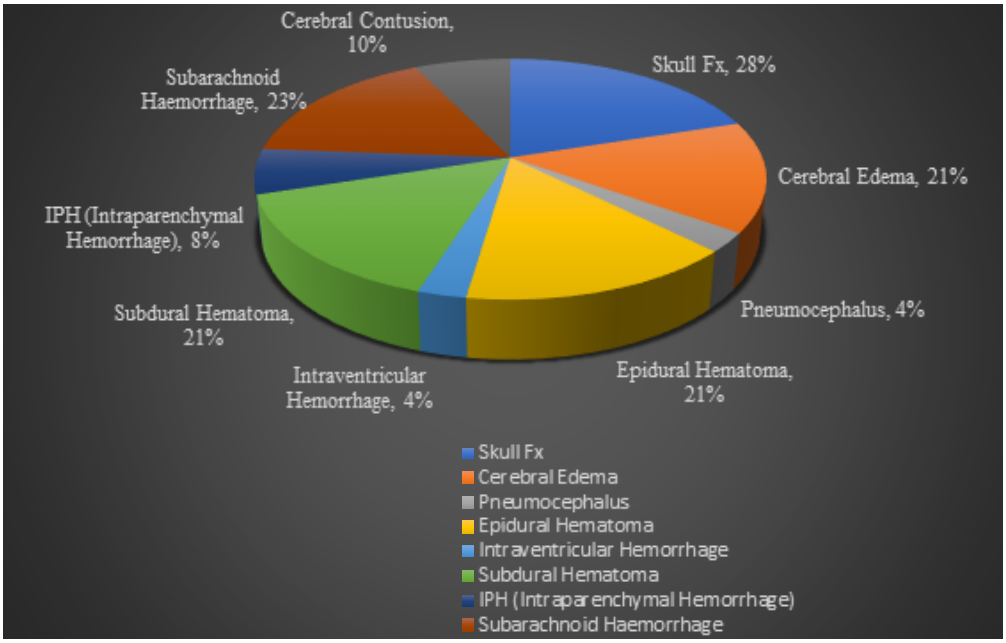


Figure 2. Frequency of types of head injury

Discussion

According to the present study, males sustain head injuries 4 times more frequently than females; this ratio in similar studies conducted in Iran has been 3 to 5 times (31-33), whereas this difference has been less pronounced in other countries than in Iran, and in some cases, head injuries have been reported more frequently in women than in men (34).

In the study by Yousefzadeh et al., aimed at investigating the epidemiology of head trauma in patients presenting to Poursina Hospital in Rasht, their mean age was 31.35 years and the male-to-female ratio was 3:1. The most common age group sustaining head injury was 25-44 years. In approximately 77% of cases, the cause of trauma was traffic accidents, and motorcyclists constituted approximately 48% of these. Most accidents occurred between the hours of 20:00 and 24:00, and summer was the most accident-prone season (38.75%). In 12% of patients, brain injury was severe. Approximately 13% of patients died, and motorcycles were the cause of injury in 55% of deceased patients (31).

The World Health Organization has identified motor vehicle accidents as the most common cause of head injury (35). In the present study, 8.7% (684 patients) of patients sustained head injuries due to accidents, and 20.5% (204 patients) following falls. The results of other studies conducted in Iran and other countries have also identified road accidents and falls as the most common causes of head trauma (31, 32, 36-38).

In the study by Aghakhani et al., aimed at investigating the epidemiology of head injury caused by falls, the results showed that falls are the second leading mechanism of head injury in Iran, and falls are more common in young children and the elderly. The prevalence of falls in men with head injuries was higher than in women. In other countries as well, falls constitute the first and second mechanisms of head injury

(39). Only one study in Iran has reported falls from a low height as the most common cause of head injury (40). In the present study, the frequency of falls did not differ significantly between women and men. The highest rate of head injury occurs in the spring and the lowest in the winter, which, given the volume of road travel in spring and summer, is consistent with similar previous studies (31). However, regarding the hour of accident occurrence in this study, the highest rate of head injuries was recorded in the afternoon before 8 p.m., which is contrary to the results of the study by Yousefzadeh et al. (31). However, it is consistent with the study by Esmailnejad Ganji et al. (41). Given the ratio of head injury rates between men and women, it can be concluded that, due to the greater social activity of men compared to women in Iran, accident-related injuries are also more frequent among them, leading to a significant increase in the ratio of head injuries in men compared to women.

The results of the study showed that the most common cause of head injury is traffic accidents. Therefore, health policymakers should reconsider the management of human resources and available facilities. Due to the high statistics of road accidents, large-scale measures are needed to reduce the incidence of accidents; furthermore, given pre-hospital injuries, the necessary facilities for referring patients from the scene of the accident to the hospital must be provided.

Among the limitations of the present study, the failure of some patients with head injuries to present to Dr. Ganjavian Hospital in Dezful can be mentioned, which, of course, includes a very small number of patients and can be referred to as unofficial statistics.

Acknowledgment

We hereby express our gratitude to the Vice-Chancellor for Research and Technology of Dezful University of Medical Sciences and the personnel of the emergency department and archive of Ganjavian Hospital in Dezful.

References

1.Rahimkhanli M, Ahmari Tehran H, Hamta A, Saadatmand V, Parvaresh-Masoud M. Evaluation of Clinical Skills of Emergency Medical Technicians in Jahrom in Caring for Trauma Patients, 2018, (Iran). Qom Univ Med Sci J. 2019;13(8):42-9. [In Persian]

2.Gupta A, Gupta E. Challenges in organizing trauma care systems in India. Indian J Community Med. 2009;34(1):75-6.

3.Dadashzadeh A, Dehghannejhad J, Shams Vahdati S, Soheili A, Sadeghi Bazarghani H. The nature of prehospital medical interventions delivered to traumatic patients in tabriz. Nurs Midwifery J. 2017;15(3):159-67. [In Persian]

4.Kashani AT, Shariat-Mohaymany A, Ranjbari A. Analysis of factors associated with traffic injury severity on rural roads in Iran. J Inj Violence Res. 2012;4(1):36-41.

5.Bhalla K, Naghavi M, Shahraz S, Bartels D, Murray CJ. Building national estimates of the burden of road traffic injuries in developing countries from all available data sources: Iran. Inj Prev. 2009;15(3):150-6.

6.Bigdeli M, Khorasani-Zavareh D, Mohammadi R. Pre-hospital care time intervals among victims of road traffic injuries in Iran. A cross-sectional study. BMC Public Health. 2010;10:406.

7.Pfeifer R, Schick S, Holzmann C, Graw M, Teuben M, Pape HC. Analysis of Injury and Mortality Patterns in Deceased Patients with Road Traffic Injuries: An Autopsy Study. World J Surg. 2017;41(12):3111-9.

8.Hyder AA, Wunderlich CA, Puvanachandra P, Gururaj G, Kobusingye OC. The impact of traumatic brain injuries: a global perspective. NeuroRehabilitation. 2007;22(5):341-53.

9.Roozenbeek B, Maas AI, Menon DK. Changing patterns in the epidemiology of traumatic brain injury. Nat Rev Neurol. 2013;9(4):231-6.

10.Boniface R, Lugazia ER, Ntungi AM, Kiloloma O. Management and outcome of traumatic brain injury patients at Muhimbili Orthopaedic Institute Dar es Salaam, Tanzania. Pan Afr Med J. 2017;26:140.

11.Peeters W, van den Brande R, Polinder S, Brazinova A, Steyerberg EW, Lingsma HF, et al. Epidemiology of traumatic brain injury in Europe. Acta Neurochir (Wien). 2015;157(10):1683-96.

12.Li M, Zhao Z, Yu G, Zhang J. Epidemiology of traumatic brain injury over the world: a systematic review. General Med: Open Access. 2016;4(5):e275.

13.Kuo BJ, Vaca SD, Vissoci JRN, Staton CA, Xu L, Muhumuza M, et al. A prospective neurosurgical registry evaluating the clinical care of traumatic brain injury patients presenting to Mulago National Referral Hospital in Uganda. PLoS One. 2017;12(10):e0182285.

14.Hofman K, Primack A, Keusch G, Hrynkow S. Addressing the growing burden of trauma and injury in low- and middle-income countries. Am J Public Health. 2005;95(1):13-7.

15.Elahi C, Rocha TAH, da Silva NC, Sakita FM, Ndebea AS, Fuller A, et al. An evaluation of outcomes in patients with traumatic brain injury at a referral hospital in Tanzania: evidence from a survival analysis. Neurosurg Focus. 2019;47(5):E6.

16.Andelic N, Sigurdardottir S, Brunborg C, Roe C. Incidence of hospital-treated traumatic brain injury in the Oslo population. Neuroepidemiology. 2008;30(2):120-8.

17.Staton CA, Msilanga D, Kiwango G, Vissoci JR, de Andrade L, Lester R, et al. A prospective registry evaluating the epidemiology and clinical care of traumatic brain injury patients presenting to a regional referral hospital in Moshi, Tanzania: challenges and the way forward. Int J Inj Contr Saf Promot. 2017;24(1):69-77.

18.Ghoneim NI, Elden SA, Okab ME, Elsaay OE. Impact of implementing nursing care protocol on moderate head injured patient's outcome. Rehabilitation. 2012;9(10):649-64.
19.Escobedo LV, Habboushe J, Kaafarani H, Velmahos G, Shah K, Lee J. Traumatic brain injury: A case-based review. World J Emerg Med. 2013;4(4):252-9.
20.Gean AD, Fischbein NJ. Head trauma. Neuroimaging Clin N Am. 2010;20(4):527-56.
21.Smith DH, Meaney DF, Shull WH. Diffuse axonal injury in head trauma. J Head Trauma Rehabil. 2003;18(4):307-16.
22.Hardman JM, Manoukian A. Pathology of head trauma. Neuroimaging Clin N Am. 2002;12(2):175-87.
23.Davis PC; Expert Panel on Neurologic Imaging. Head trauma. Am J Neuroradiol. 2007 28(8):1619-21.
24.Hellawell DJ, Taylor RT, Pentland B. Cognitive and psychosocial outcome following moderate or severe traumatic brain injury. Brain Inj. 1999;13(7):489-504.
25.Teasdale G, Jennett B. Assessment and prognosis of coma after head injury. Acta Neurochir (Wien). 1976;34(1-4):45-55.
26.Stein SC, Spettell C, Young G, Ross SE. Delayed and progressive brain injury in closed-head trauma: radiological demonstration. Neurosurgery. 1993;32(1):25-30.
27.Dunning J, Batchelor J, Stratford-Smith P, Teece S, Browne J, Sharpin C, et al. A meta-analysis of variables that predict significant intracranial injury in minor head trauma. Arch Dis Child. 2004;89(7):653-9.
28.Ono J, Yamaura A, Kubota M, Okimura Y, Isobe K. Outcome prediction in severe head injury: analyses of clinical prognostic factors. J Clin Neurosci. 2001;8(2):120-3.
29.Pülhorn H, Westmoreland L, McMahon C. The management of minor head trauma (GCS 15-13) across a Trauma Network. Br J Neurosurg. 2016;30(5):536-40.
30.Hasanin A, Kamal A, Amin S, Zakaria D, El Sayed R, Mahmoud K, et al. Incidence and outcome of cardiac injury in patients with severe head trauma. Scand J Trauma Resusc Emerg Med. 2016;24:58.
31.Yousefzadeh S, Safaei M, Hemati H, Mohammadi H, Ahmadi DM, Kouchakinezhad L, et al. Epidemiology of head injury in patients who were reffered to Poorsina hospital. J Guilan Univ Med Sci. 2008;16(64):112-9. [In Persian]
32.Fakharian E, Taghaddosi M, Masoud SA. Epidemiology of head trauma in Kashan. Feyz Med Sci J. 2003;7(1):64-70. [In Persian]
33.Askarishahi M, Rezazadeh Z, Vakili M. Trend in the Deaths of Road Accidents in Iran in Years 2006-2017. J Babol Univ Med Sci. 2020;22(1):318-25. [In Persian]
34.McMillan TM, Teasdale GM, Stewart E. Disability in young people and adults after head injury: 12-14 year follow-up of a prospective cohort. J Neurol Neurosurg Psychiatry. 2012;83(11):1086-91.
35.Jaja BN, Eghwrudjakpor PO. Effect of demographic and injury etiologic factors on intensive care unit mortality after severe head injury in a low middle income country. Ann Afr Med. 2014;13(4):204-9.
36.Tagliaferri F, Compagnone C, Korsic M, Servadei F, Kraus J. A systematic review of brain injury epidemiology in Europe. Acta Neurochir (Wien). 2006;148(3):255-68.
37.Fazel MR, Fakharian E, Tabesh H, Forghani Z, Yeganehmoghaddam A, Mousavi SGA. Traumatic brain injury in Kashan during 2004-2005. Feyz Med Sci J. 2009;12(5):21-2. [In Persian]
38.Karim N, Mumporeze L, Nsengimana VJP, Gray A, Kearney A, Aluisio AR, et al. Epidemiology of Patients with Head Injury at a Tertiary Hospital in Rwanda. West J Emerg Med. 2021;22(6):1374-8.

39.Aghakhani K, Eslami SH, Khara A, Bijandi M. Epidemiologic study of fall-related head injury in Iran and its comparison with other countries: review article. Tehran Univ Med J. 2018;76(7):437-45. [In Persian]
40.Ebrahimi Fakhar HR, Zand S. The Epidemiology of Hospitalized Head Injury in Arak. Iran J Epidemiol. 2011;6(4):61-5. [In Persian]
41.Esmailnejad Ganji SM, Bahrami M, Poorghaz N, Kamali Ahangar S. The Frequency of Road Accident Injuries among Victims Admitted to Shahid Beheshti Hospital of Babol, Iran in 2010-2012. J Babol Univ Med Sci. 2015;17(9):29-33. [In Persian]