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The Prevalence of Dental Trauma in Head and Neck Trauma Patients Referred to Shahid Beheshti Hospital in Babol during One Year

S. M. Esmaeilnezhad (DDS)[1], M. S. Ramezani (MD)[*2], A. Babaei Darzi (DDS, MS)[3], F. Abesi (DDS, MS)[4], M. Mohammadian Amiri (MD)[5], H. Gholinia (MSc)[6]

1. Student Research Committee, Babol University of Medical Sciences, Babol, I.R.Iran.
2.Clinical Research Development Unite of Rouhani Hospital, Babol University of Medical Sciences, Babol, I.R.Iran.
3.Oral Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, I.R.Iran.
4.Dental Materials Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, I.R.Iran.
5.Clinical Research Development Unit of Shahid Beheshti Hospital, Babol University of Medical Sciences, Babol, I.R.Iran.
6.Health Research Institute, Babol University of Medical Sciences, Babol, I.R.Iran.

•**Corresponding Author: M. S. Ramezani (MD)**
Address: Clinical Research Development Unite of Rouhani Hospital, Babol University of Medical Sciences, Babol, I.R.Iran.
Tel: +98 (11) 32398722. **E-mail:** mirsaeid2001@yahoo.com

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ABSTRACT

Background and Objective: Dental trauma is one of the most important problems related to dental health. The present study was conducted to investigate the traumatic dental injuries and the way their treatment was followed in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol.

Methods: This cross-sectional study was conducted on 81 patients with dental trauma caused by head and neck injury referred to the emergency department of Shahid Beheshti Hospital in Babol from September 2022 to August 2023. Patients were evaluated in terms of age, gender, cause of injury, number of injured permanent teeth, dental injury classification according to Ellis and Sanders classification, and the type of treatment.

Findings: A total of 192 teeth with 231 dental traumas were examined in 81 patients, including 61 men and 20 women. For each studied patient, 2.4 teeth were injured and 2.8 dental traumas were observed. The highest prevalence of trauma was seen in the maxillary left central incisor (19.5%). The most common traumas in this study were crown fracture (29%) and subluxation (22.9%). Accident (car occupant) with a prevalence of 22.9%, accident (pedestrian) with a prevalence of 18.6%, and accident (motorcyclist without a helmet) with a prevalence of 17.7% were the most common causes of injury. Of the total 81 patients, 21 patients referred to the dentist for follow-up treatment within ten days after the trauma and 29 patients within one month after the dental trauma, and 52 patients did not follow the complete treatment of their dental trauma.

Conclusion: The results of the study showed that the most common type of injury was crown fracture and the most common cause of injury was traffic accidents.

Keywords: *Dental Injury, Maxillofacial Injury, Classification of Dental Injury*.

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Introduction

Dental trauma is one of the most important dental health problems in terms of prevalence, cost, occurring at a young age, and treatment burden that may happen throughout a patient's life (1). The face is the main point of contact in personal interactions between humans, and therefore, dental trauma can cause aesthetic, psychological, and social problems in addition to functional problems (2). The most common factors responsible for dental trauma are road traffic accidents, assaults, falls, domestic violence, and sports injuries; considering these factors, the prevalence of dental trauma also depends on the cultural and social factors of the society (3). Immediate and appropriate management is required to reduce complications and preserve injured teeth (4). An important issue for successful treatment is accurate and complete assessment and adherence to instructions, as treatment immediately after injury has a major impact on the success of treatment, but immediate and appropriate management is not done in all cases. Due to people's lifestyle, the prevalence of dental trauma is higher in the late evening and on weekends, so insufficient knowledge of assessment and treatment protocols in hospital emergency departments (due to training by non-dental instructors instead of dentists and dental health care professionals) and the inactivity of dental clinics during these hours prevent many patients referred to emergency departments from receiving proper and immediate treatment (5).

The outcome of traumatic dental injuries depends on three factors: the severity of the injury, quality and timeliness of primary care, and follow-up care (6). It is generally accepted that all traumatic dental injuries should be treated as emergencies. This approach is intended to maintain patient comfort and reduce complications. First aid is simple and inexpensive and can significantly improve the outcome of future dental treatment; however, appropriate first aid is rarely provided (6). Studies have shown that only 4% of emergency treatments provided by hospital physicians are appropriate for knocked-out (avulsed) tooth (6). Good quality and timely primary care help to ensure a favorable outcome. A good example is a knocked-out tooth. If such a tooth is reimplanted within the first few minutes after being knocked out, the prognosis is good and the success rate is high (7). The condition of the tooth after treatment, in addition to the body's response to treatment, can also indicate the accuracy and correct timing of treatment (8). Depending on the type and extent of trauma, various treatments are performed, including crown restoration, pulpotomy, pulpectomy, pulp capping, root canal therapy, calcium hydroxide paste as a temporary medical dressing, orthodontic tooth movement, exposure of the remaining root by surgery, tooth extraction, splinting, managing the fractured alveolar fragment, removal from occlusion, tooth luxation, using MTA, apexification and apexogenesis, etc. (9).

There is little data about traumatic dental injuries in Iran to take effective preventive and therapeutic measures. The small number of specialists in the field of traumatic dental injuries and the lack of proper distribution of these specialists across the country have created a situation in which the treatment of traumatic dental injuries is mainly the responsibility of general dentists. In addition, the long treatment period and lack of follow-up of patients are important issues in Iran (6). Costantinides et al. conducted a study on the epidemiology of dental injuries associated with maxillofacial injuries. In this study, men and the age group of 21 to 40 years were more likely to experience dental injuries. Maxillary incisors and canines were the most commonly injured teeth. Luxation was the most common soft tissue injury, and fractures involving enamel and dentin were the most common hard tissue injuries (10). Gupta et al. also reported that men suffered more dental injuries than women, and crown fractures were more common in all teeth in the maxilla than in the same type of tooth in the mandible except for molars. In addition, intrusion, avulsion, and luxation were more common in maxillary teeth than in the mandible (3). In the study of Akhavan et al., in which 207 teeth in 127 dental trauma patients were examined, the most commonly involved tooth was

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the permanent maxillary central incisor, and the most common type of injury was crown fracture (6). Due to the limited education of the public on issues related to oral and dental health, public awareness about traumatic dental injuries should clearly express its message and clarify the role of the general public in preserving their teeth when traumatic injuries occur. Considering the fact that few studies have been conducted regarding traumatic dental injuries in Iran and long period of time required for patient follow-up, and since prevention always precedes treatment, it is important that these injuries, as well as their causes and factors, and how to follow them up are known so that their incidence can be reduced by applying preventive measures and more effective treatment can be provided. The aim of the present study was to investigate traumatic dental injuries and the way their treatment was followed in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol from September 2022 to August 2023.

Methods

After approval by the Ethics Committee of Babol University of Medical Sciences with the ethics code IR.MUBABOL.REC.1401.061, this cross-sectional study was conducted on 227 head and neck trauma patients referred to the emergency department of Shahid Beheshti Hospital in Babol from September 2022 to August 2023. Census sampling was adopted and subjects were first examined for the presence or absence of dental trauma. Patients under six years of age and with trauma to primary teeth were excluded from the study. Finally, 81 patients with dental trauma were included in the study. A form was prepared to collect information about patients with dental trauma, which included age, gender, cause of injury, number of damaged permanent teeth, classification of dental injury, patient follow-up, and type of treatment performed.

The dental injuries examined in this form included all dental injuries in both Ellis (3) and Sanders (11) classifications in a combined manner. The reason for choosing these two classifications was the special association between emergency medicine references and Ellis's classification as well as the special associations between oral and maxillofacial surgery references and Sanders's classification. In order to better examine and diagnose a number of dental injuries in this form, parallel periapical radiography was used, which was prescribed on the day of referral if the radiographs obtained in the emergency room, such as CT scans, which are prepared for most head and neck trauma patients, were insufficient. Therefore, the diagnosis of dental injuries was based on clinical observations and radiographic examinations.

Patient follow-up included timely referral to the dentist after emergency treatment for complete treatment of dental injury. The reason for lack of follow-up was also investigated by making phone calls with the patient or his/her family, ten days and one month after admission to the emergency department (12). Finally, the collected data were analyzed using SPSS 22 and descriptive statistical tests such as prevalence, percentage, mean and standard deviation.

Results

Out of a total of 227 head and neck trauma patients who were referred to Shahid Beheshti Hospital in Babol, 81 patients had dental trauma. A total of 192 teeth with 231 dental traumas were examined in 81 patients, including 61 males (75.3%) and 20 females (24.7%). On average, 2.4 damaged teeth and 2.8 dental trauma were observed per patient. In 55 patients (67.9%), there was more than one damaged tooth (Figure 1).

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Of all dental traumas studied, 174 cases (75.3%) occurred in men and 57 cases (24.7%) occurred in women. The mean age of patients with dental trauma was 27.14±9.2 years, ranging from 12 to 68 years. The highest incidence was at the age of 18. Dental trauma occurred more frequently in the age group under 20 years and in men (Figure 2).

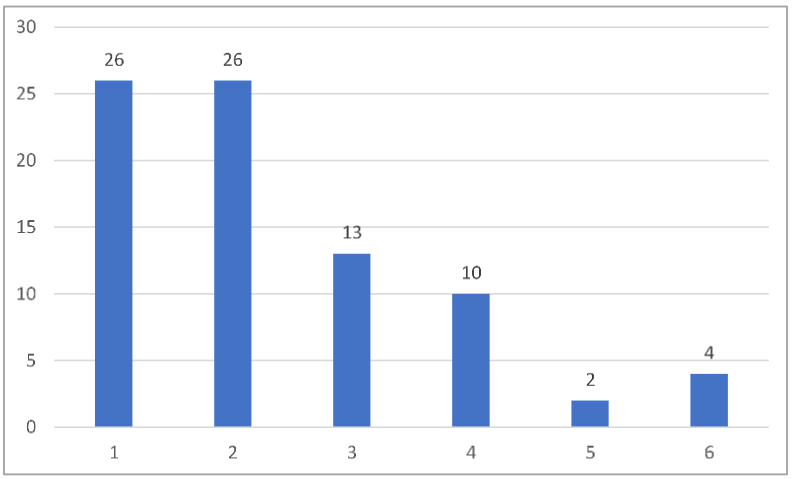

Figure 1. Prevalence of number of damaged teeth in patients with dental trauma referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023

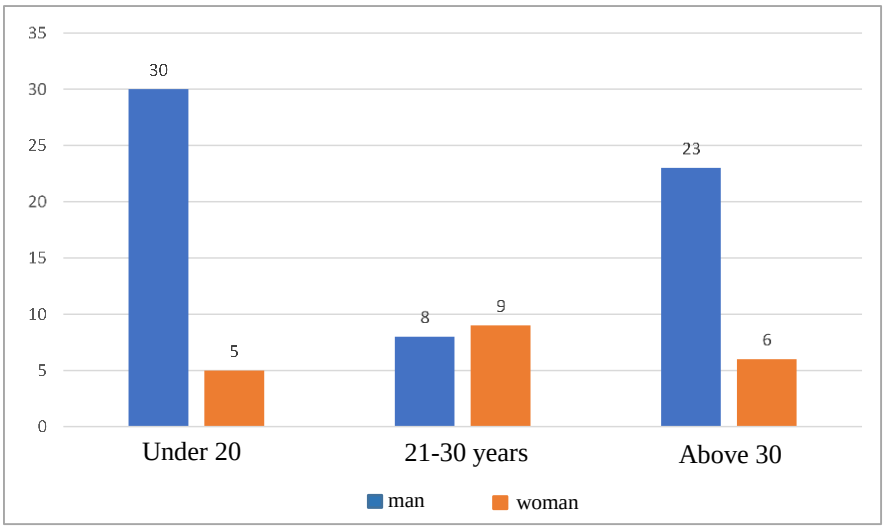

Figure 2. Age and gender distribution of patients with dental trauma in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023

A total of 231 cases of dental trauma were reported, with the highest number of dental injuries in the age group under 20 years old with 95 cases. In the age group 21-30 years old, 67 cases and in the age group over 30 years old, 69 cases of dental trauma were reported.

The highest prevalence of trauma was seen in the left maxillary central tooth with 45 cases (19.5%), followed by the right maxillary central tooth with 39 cases (9.0%), and the right maxillary lateral tooth with 23 cases (10%) (Image 1).

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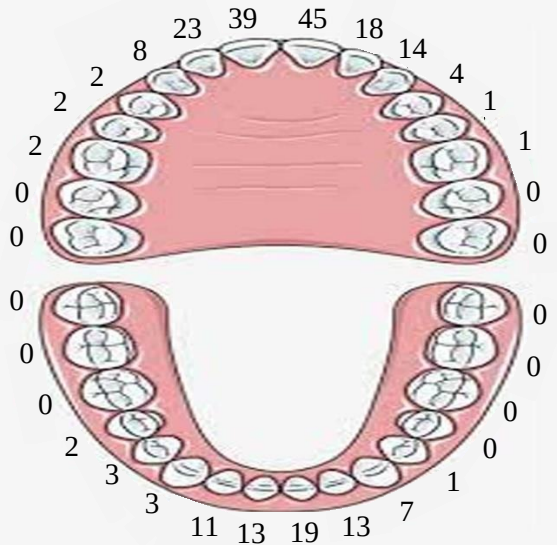

Image 1. Prevalence of dental trauma in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023 based on tooth type

The most common types of trauma in this study were crown fracture with a prevalence of 67 (29%), tooth dislocation (subluxation) with a prevalence of 53 (22.9%), concussion with a prevalence of 37 (16%), and tooth avulsion with a prevalence of 26 (11.3%) (Figure 3). The most frequent dental traumas according to the Ellis classification were extensive crown fracture without pulp exposure (class 2) with a prevalence of 38 (16.5%), complete displacement of the tooth from the alveolar socket (class 5) with a prevalence of 26 (11.3%), and tooth displacement without crown or root fracture (class 7) with a prevalence of 25 (10.8%) (Figure 4). 101 dental traumas (43.7%) included tooth subluxation, concussion, alveolar process fracture, and crown infraction, which were not defined in the Ellis classification.

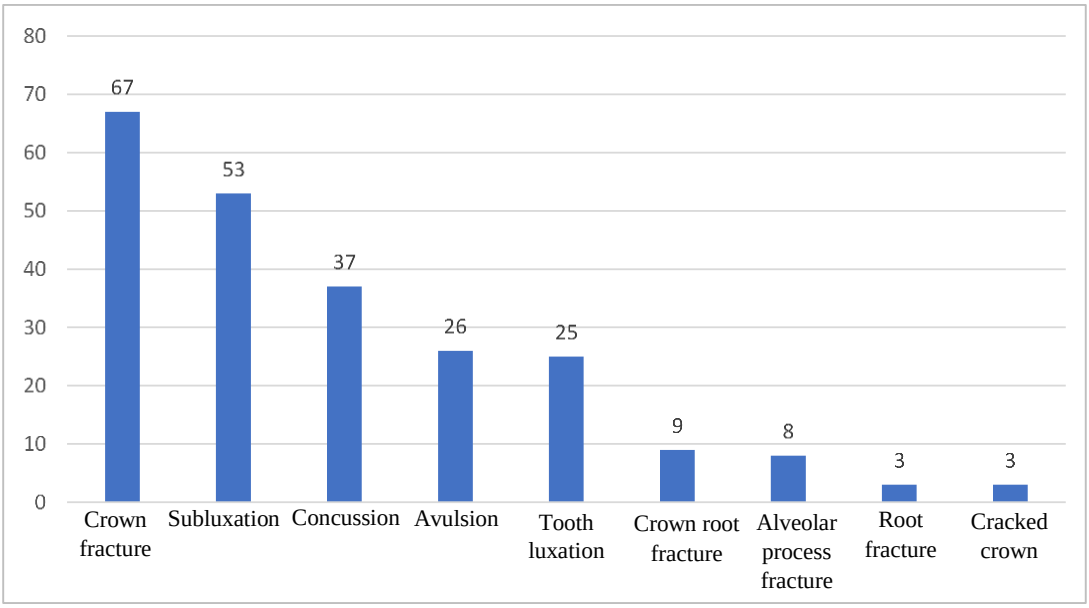

Figure 3. The overall prevalence of dental trauma in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023

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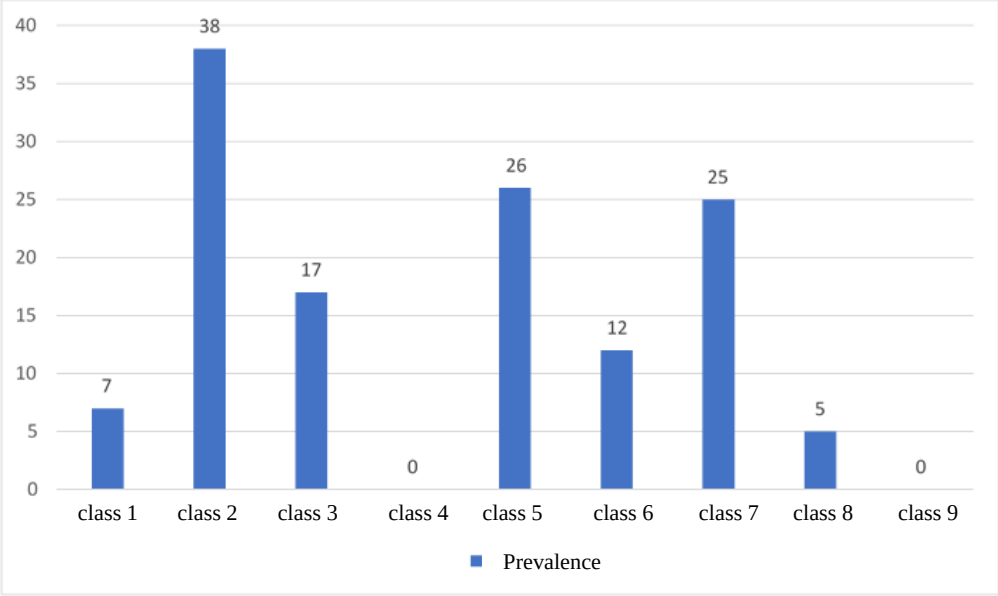

Figure 4. Prevalence of dental trauma in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023 based on Ellis classification

The most common dental traumas according to Sanders classification included dental subluxation with a prevalence of 53 (22.9%), crown fracture with enamel and dentin involvement (sum of horizontal, vertical and oblique fractures of enamel and dentin) with a prevalence of 38, concussion with a prevalence of 37 (16%), and dental avulsion with a prevalence of 26 (11.3%) (Figure 5).

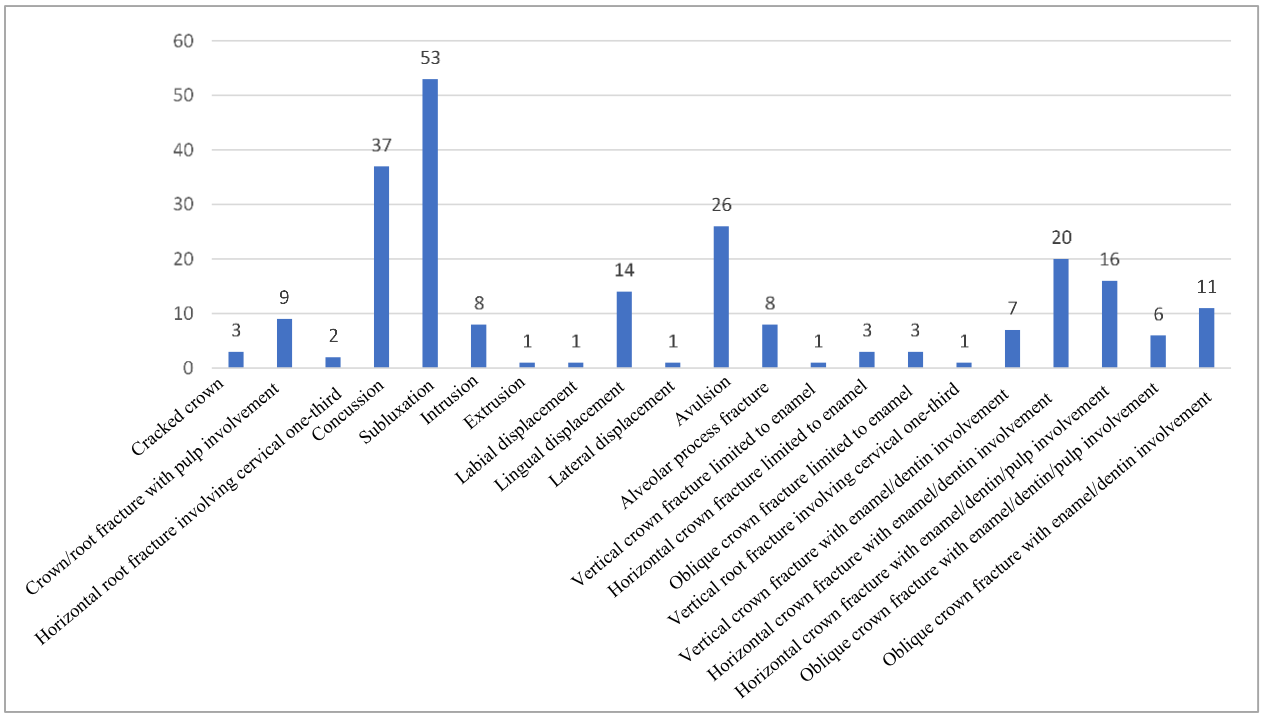

Figure 5. Prevalence of dental trauma in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023 based on Sanders classification

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Of the total 231 dental traumas, the most common causes of injury were accidents (car occupants) with a prevalence of 53 (22.9%), accidents (pedestrians) with a prevalence of 43 (18.6%), and accidents (motorcyclists without helmets) with a prevalence of 41 (17.7%) (Figure 6).

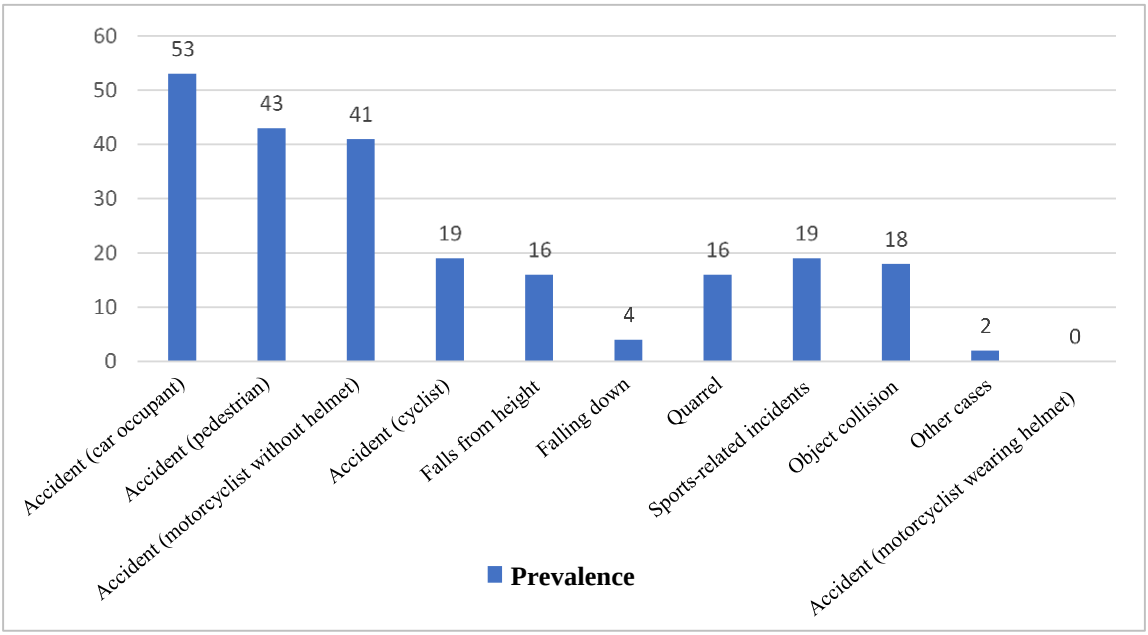

Figure 6. Prevalence of dental trauma in head and neck trauma patients referred to Shahid Beheshti Hospital in Babol in the academic year 2022-2023 based on the mechanism of injury

All patients with dental trauma were ultimately referred to the dentist for completion of treatment after immediate treatment in the emergency room. Of the total 81 patients, 50 patients (61.7%) did not require emergency treatment and were referred to the dentist only. 14 patients (17.3%) were referred to the dentist after fixation of the teeth with sutures, 8 patients (9.9%) after removal of the broken fragment, and 6 patients (7.4%) after sutures. 3 patients (3.7%) were referred to the dentist for completion of treatment after placement of the avulsed tooth in the socket.

Of the total 81 patients, 21 patients (25.9%) followed the complete treatment of their dental injury within ten days after the trauma. 29 patients (35.8%) referred to the dentist for the complete treatment of their dental trauma within one month after the trauma, and 52 patients (64.2%) did not follow the complete treatment of their dental trauma. The reasons for not following the treatment were financial problems with a prevalence of 35 (67.3%), not caring about the issue with a prevalence of 8 (15.38%), and lack of time with a prevalence of 6 (11.53%). 3 patients also did not follow the treatment of their dental injury for other reasons.

Discussion

The results of the present study showed that an average of 2.4 teeth per person had dental trauma. In the study of Akhavan et al., there were 1.6 teeth (6), in the study of Bücher et al., there were 1.7 teeth (14), and in the study of Mahmoodi et al., there were 1.8 teeth (5) per person with trauma. The reason for this difference is probably due to the statistical population studied in the mentioned studies. The statistical population of the present study included head and neck trauma patients referring to hospital emergency

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departments, which was usually due to more severe trauma, while the statistical population of the mentioned studies was patients with dental trauma referring to dental clinics, most of which experienced isolated dental trauma. This shows the importance of familiarity of emergency medicine specialists and emergency room residents with traumatic dental injuries and related emergency measures. Moreover, more than half of the patients had more than one affected tooth, which is consistent with the study by Guedes et al. (15) as well as the study by Mahmoodi et al. (5).

Traumatic dental injuries are considered as medical emergencies and should be treated promptly to relieve pain and restore function and esthetics. Since the prognosis of some traumatic lesions is highly dependent on prompt and appropriate treatment, the treatment plan should be determined at the time of trauma. In addition, long-term follow-up should be considered for these lesions because they have several complications (13).

75.3% of patients were male and 24.7% were female; therefore, the rate of traumatic dental injuries was higher in men than in women, hence the results of the present study are consistent with most studies (3-6, 13-16). The results of this study also showed that in most age groups, the prevalence of traumatic dental injuries was higher in men than in women. This is probably related to the greater presence of boys and men in society and on the streets, showing risky driving behaviors and jobs with high risk of trauma.

The most commonly involved teeth in the present study were the permanent centrals and then the permanent laterals of the maxilla; therefore, the results of the present study are consistent with most studies (5, 6, 16-19). This is probably because the maxillary anterior teeth, especially the centrals, have a prominent position and are more likely to be vulnerable than other teeth of the arch and are often protruding and therefore are protected by less protective layers. The most common types of trauma in this study were crown fracture (28%) and subluxation (22.9%), respectively, which is consistent with the studies of Antipovienė et al. (4) and Mahmoodi et al. (5).

The most common types of dental trauma based on Ellis classification were extensive crown fracture without pulp exposure (class 2) with a prevalence of 38 (16.5%) and complete displacement of the tooth from the alveolar socket (class 5) with a prevalence of 26 (11.3%). However, in a study of Gupta et al. (3), the most common types of trauma were extensive crown fracture without pulp exposure (class 2), simple crown fracture with little or no dentin involvement (class 1), and complete displacement of the tooth from the alveolar socket (class 5), respectively. In the study of Alkhadra et al. (20), the most common types of trauma were simple crown fracture with little or no dentin involvement (class 1), extensive crown fracture without pulp exposure (class 2), and complete displacement of the tooth from the alveolar socket (class 5). The reason for this difference is probably the statistical population of the mentioned studies. The statistical population of the study by Gupta et al. and Alkhadra et al. included patients with dental trauma referring to dental clinics, who in many cases had milder and isolated tooth trauma. Therefore, simple crown fracture with little or no dentin involvement (class 1) is considered one of the most common types of trauma. However, the statistical population of the present study included head and neck trauma patients referring to hospital emergency departments, who were usually hospitalized due to more severe trauma.

The most frequent dental trauma based on Sanders classification included subluxation with a prevalence of 53 (22.9%), crown fracture involving enamel and dentin (sum of horizontal, vertical and oblique fractures of enamel and dentin) with a prevalence of 38, concussion with a prevalence of 37 (16%), and avulsion with a prevalence of 26 (11.3%). However, in the study of Borin-Moura et al. (21), enamel and dentin fractures, subluxation and avulsion were the most common injuries, respectively. In the study of Rodrigues Campos Soares et al. (22), enamel and dentin fractures, avulsion and subluxation were the most common injuries, respectively.

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The present study showed that the most common cause of dental trauma was traffic accidents (car occupants, pedestrians, and motorcyclist without a helmet), which is consistent with the studies by Yosefnia Pasha et al. (23) and Gupta et al. (3). This finding is not unexpected since road accidents are one of the most important causes of injuries and even deaths in our country (23). Considering that Mazandaran province is one of the main tourism destinations in the country due to its special geographical location and the presence of a water border and dense forest texture, it has a high rate of urban and extra-urban traffic and a huge volume of road traffic can be seen in this province, especially during holidays. Therefore, the highest rate of dental trauma was caused by motor and non-motor vehicle accidents in this study.

Regarding the type of treatment performed in the emergency room, it is also important to note that all patients with dental trauma were ultimately referred to the dentist after immediate treatment in the emergency room for completion of treatment. Out of a total of 81 patients, 50 patients (61.7%) did not require emergency treatment and were referred to the dentist only. 14 patients (17.3%) were referred to the dentist after fixation of the teeth with sutures, 8 patients (9.9%) were referred to the dentist after removal of the broken part, and 6 patients (7.4%) were referred to the dentist after sutures. 3 patients (3.7%) were referred to the dentist after placement of the avulsed tooth in the socket for completion of treatment.

It is important not to use calcium hydroxide to cover exposed dentin and pulp in patients with tooth fractures with dentin and pulp involvement as an emergency treatment, and these patients were referred only to the dentist. While this has been emphasized in specialized references in emergency medicine and oral and maxillofacial surgery, this action was not taken due to the lack of calcium hydroxide in the relevant center. Therefore, since all patients with dental trauma ultimately need to see a dentist immediately to prevent more severe and prolonged complications of the trauma, it seems essential to inform patients about the importance of the issue and the need for prompt and timely follow-up.

Regarding the follow-up process of patients in this study, out of a total of 81 patients, 21 patients (25.9%) followed the complete treatment of their dental injury within ten days after the trauma. 29 patients (35.8%) referred to the dentist for the complete treatment of their dental trauma within one month after the trauma, and 52 patients (64.2%) did not follow the complete treatment of their dental trauma. The reasons for not following up on the treatment included financial problems with a prevalence of 35 (67.3%), not caring about the issue with a prevalence of 8 (15.38%), and lack of time with a prevalence of 6 (11.53%). 3 patients did not follow the treatment of their dental injury for other reasons.

Since financial problems, unlike other factors, are the main reason why patients do not pursue dental trauma, thinking of solutions such as having health insurance cover the costs, setting up a center to provide free services to patients with dental trauma caused by accidents, etc. can be effective in preventing severe complications of dental trauma, which have a significant impact on the patient's personal and social life. Of the total of 227 head and neck trauma patients, 81 patients, including 61 men and 20 women, had dental trauma. The most common type of injury was crown fracture and the most common cause of injury was traffic accidents.

Since in many dental traumas, patient follow-up in the early days after the injury plays an important role in the diagnosis and appropriate and effective treatment plan (11), and since a large number of patients admitted to the emergency department due to head, neck, and other injuries spend the first few days after the trauma in the hospital, the presence of a resident dentist in the emergency department can be effective in providing the best treatment plan at the right time with higher chance of success. Considering that the most common cause of dental fractures in the present study is traffic accidents, including motorcycle and other motor vehicle accidents, strict compliance with traffic regulations and mandatory wearing of seat belts and helmets can greatly reduce the prevalence of dental injuries. On the other hand, a suitable solution

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to reduce the number of road accidents and conflicts leading to injuries is proper education of the community. Proper and principled education can create and shape a correct driving culture and anger management.

The high number of accidents among young people, who are the most active and efficient segment of society, indicates the necessity of serious planning in this regard. On the other hand, in order to better manage injuries caused by trauma, the role of hospital emergency rooms and their equipment should be considered.

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