

EPIDEMIOLOGY OF TRAUMATIC DENTAL INJURIES AMONG ADULTS IN AN INDIAN SUB-POPULATION

Anupama RAMACHANDRAN

Chettinad Hospital and Research Institute

Sulthan Ibrahim Raja KHAN

King Saud bin Abdulaziz University for Health Sciences

Jagan Baskaradoss (✉ drjaganb@gmail.com)

Kuwait University Faculty of Dentistry <https://orcid.org/0000-0002-0032-0464>

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Abstract

Background The etiology, presentation and management of traumatic dental injuries (TDI's) varies significantly between the adult and the younger population. Most epidemiological studies on TDI's have focused on the pediatric age group. This study aims to report and compare the distributions of TDI's among adults in a sub-population in India. **Methods** This prospective observational study was performed on 1562 consecutively selected patients (1218 Males and 344 females) from a University dental hospital in India, between July 2014 to June 2018. The clinical examinations were performed by a single trained and calibrated Endodontist. Only TDI's to anterior teeth were recorded (canine to canine in the maxilla and mandible) and classified using a modified version of the WHO's classification. Intraoral periapical and panoramic radiographs were also taken for all the subjects. **Result** A total of 1562 patients aged between 20 and 73 years, with a mean age of 36 years were examined during the study period. The total number of teeth with TDI's were 3044. Males (78%) clearly outnumbered the females (22%) in all the age groups. The most common type of injury occurring in both the genders is uncomplicated crown fracture. Avulsion injuries are more likely to be seen by a dentist within 1 hour post-trauma. About two third of the TDI's were caused by road traffic accidents (RTA) followed by falls in about 20% of the patients. **Conclusion** Uncomplicated crown fracture was the most commonly observed type of TDI and RTA's were the primary cause of TDI.

Background

Traumatic dental injuries (TDI's) are very frequent with an estimated world average prevalence of 18% in the permanent dentition, with higher prevalence being reported from the Americas and South-East Asian Regions (about 22% and 16% respectively) [1]. Oral injuries are most frequent during the first 10 years of life, decreasing gradually with age, and are very rare after the age of 30 [2]. Almost ninety percent of TDI's occur before the age of 20 [3]. Data from the National Health and Nutrition Examination Survey (NHANES) -III showed that 1 in every 5 children aged 6-20 experienced trauma to their incisors [4].

Several epidemiological studies on TDI's have focused on the pediatric age group [5-7]. Very few studies have focused on describing TDI's in an adult population (>20yrs) [8-10]. Studies focusing on the adult population are required especially as the etiology of TDI's is different between adults and children. The main causes for dental trauma in children are falls and injuries sustained during play, whereas in adolescents and adults, more complex traumas may occur caused by sport accidents, fights, and road traffic accidents (RTA) [11]. As the etiology of TDI is different, the impact of trauma will manifest itself differently in children and adults. Equally important is the difference in the tooth and bone structure between a child and an adult, which plays a vital role in the mechanism and nature of the energy transmission following an impact to a tooth.

Studies from Europe have shown higher frequencies of crown-root fractures, root fractures, and lateral luxations among adults as compared to adolescents and children [11]. The NHANES-III study examined more than 7700 individuals in the age group of 5-60 years, reports higher prevalence of incisal trauma, of

both maxillary and mandibular incisors, in both the younger and older age groups.[4] Similar data on TDI's among adults in India is not available.

In India, RTA injuries and deaths have increased dramatically in the last two decades. There has been more than a three-fold increase in the number of persons injured per 100,000 of population from 13 in 1970 to 42.3 in 2011 [12]. India also tops the global list of fatalities from road traffic accidents with the State of Tamil Nadu topping the list by accounting for almost 11.5% of the total RTA fatalities in the country [13]. This study was initiated in a sub-population in the State of Tamil Nadu, India to report and compare the distributions of TDI's among adults in this population.

Methods

The study received ethical approval from the Institutional Ethics Committee of the Chettinad Academy of Research and Education, Tamil Nadu, India and is reported based on the guidelines of the strengthening the reporting of observational studies in epidemiology (STROBE) statement [14]. The study was conducted in accordance with the World Medical Association Declaration of Helsinki and written consent was obtained from each of the participants before commencement of the study. The study was performed on 1562 consecutively selected patients (1218 Males and 344 females) at the Chettinad Dental College and Research Institute, Tamil Nadu in India during the period from July 2014 to June 2018.

The clinical examinations were performed by a single trained and calibrated Endodontist. Excellent intra-examiner reliability ($\kappa=0.90$) for TDI classification was observed, as assessed in a subsample of 10 patients. The following data were obtained from each patient: 1) age; 2) gender; 3) cause of TDI; 4) tooth involved; 5) classification of TDI's; and 6) and time elapsed before seeking dental care. Only TDI's to anterior teeth were recorded (canine to canine in the maxilla and mandible) and classified using a modified version of the WHO's classification [15]. Intraoral periapical and panoramic radiographs were also taken for all the subjects.

TDI data was tabulated as frequency distributions in percentages. The data management and analysis were carried out, using statistical software SPSS 22.0 (Statistical Package for the Social Sciences for Windows; SPSS Inc., Chicago, IL, USA).

Results

A total of 1562 patients aged between 20 and 73 years, with a mean age of 36 years were examined during the study period. The total number of teeth with TDI's were 3044. Males (78%) clearly outnumbered the females (22%) in all the age groups (Fig.1). The number of TDI's in conjunction with other bodily injuries was 42.2% (n= 662).

The most common type of injury occurring in both the genders is uncomplicated crown fracture (Table 1). Table 2 presents the distribution of TDI's among 1562 patients by cause of injury and teeth involved. The

most commonly affected teeth was the upper left maxillary incisor (38.5%) followed by the upper right maxillary incisor (33.9%). About two third of the TDI's were caused by road traffic accidents (RTA) followed by falls (20%). Fight/ interpersonal violence and sports related injuries accounted for approximately 6% and 7% of the patients respectively. Other causes of TDI's included epileptic seizures, drowsiness due to prescription medications and unknown etiology which comprised only a small fraction of the total TDI's.

The type of injury most frequently seen within the first hour post-trauma was avulsion (Table 3). Uncomplicated crown fracture was mostly seen after 1 week and most of the complicated crown fractures were seen within 1-6hr post-trauma. Most tooth fractures were reported to the dentist after a considerable delay and most of the luxation injuries were seen within the first 24hours post-trauma.

Discussion

This study reports the distributions of TDI's among adults in a sub-population in Southern India. Several epidemiological studies investigating traumatic injuries are retrospective studies [8, 16-19]. However, the present study is a prospective observational study, conducted over a period of 4 years. The advantage of such study over a retrospective one is that the data is more reliable as the data is collected as the incident occurs and therefore recall bias is less [20].

This study found out that TDI is more prevalent in males than in females. Similar results have been reported from studies across the world [18, 19, 21]. This underscores the fact that outdoor activities/ travel and sports are promoted more among males rather than females, more so in India. Maxillary central incisor is the most frequent injured teeth in our study and our finding is in accordance with several previous studies [4, 8, 17]. The primary reason for higher incidence of trauma in the central incisors is due to its position in the jaw, especially in cases with an increased overjet [22].

The results reveal that the commonest etiology of TDI in this population is due to road traffic accidents. Chaotic traffic and poor implementation road safety rules in the developing countries contributes towards the high incidence of TDI's. Driving under the influence of alcohol and infrequent use of protective headgear/helmet can contribute towards the higher incidence of TDI's in this population [23]. Another possible explanation of RTA topping the etiology of TDI's are linked to the prevalence of higher number of motorcycles in India eventually leading to increased number of two wheeler RTA [24].

Most of the patients with tooth fractures reported to the dental hospital after substantial delay. The more severe injuries like complicated tooth fracture and avulsion are more likely to be reported to the dentist within 24hrs than the less severe injuries like enamel-dentin fractures. Lack of affordability and accessibility to quality dental care can be one of the reasons for the delay/ reluctance of the patients to seek treatment. Also, this institution is located in a semi-rural area catering to people with lower income group. This urban - rural divide is also very prominent in a developing country like India. The comparatively faster reporting of complicated tooth fracture in our study might be attributed to possible pain and esthetics experienced by patients over uncomplicated tooth fracture injuries reiterating the

insufficient knowledge status of the patients over long term effects of dental injuries. Research conducted in several other countries also demonstrated that the information regarding management of TDI is insufficient among the lay people [25, 26]. Several studies show that the knowledge of emergency treatment of dental trauma is inadequate even among health care professionals [27, 28]. Awareness of first aid and importance of reaching the dental office without delay has to be reinforced.

The need for these studies stems from the fact that the data collected about the traumatic injuries will help in identifying the risk groups, which in turn will assist the public health authorities to implement strong preventive programs in the state. Furthermore, awareness about TDI and its immediate management should be integrated into the public health system. Efforts should also be directed towards raising the community's awareness about the various preventive measures.

Conclusion

Uncomplicated crown fracture was the most commonly observed type of TDI and RTA's were the primary cause of TDI. The more severe injuries like complicated tooth fracture and avulsion are more likely to be reported to the dentist within 24hrs than the less severe injuries like enamel-dentin fractures.

Abbreviations

RTA – Road Traffic Accidents

TDI - Traumatic Dental Injury

NHANES - National Health and Nutrition Examination Survey

Declarations

Ethics approval and consent to participate: Written informed consent were obtained for study participation. The research was conducted in accordance with the World Medical Association Declaration of Helsinki and approved by the Institutional Ethics Committee of the Chettinad Academy of Research and Education, Tamil Nadu, India.

Consent for publication: Not Applicable

Availability of data and materials: The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Competing interests: The author declare that he has no competing interests.

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Authors' contributions: AR and SIRK designed the study and have taken an active role in data collection, analysis and drafting and revising the manuscript. JKB took an active role supervising the study and drafting the manuscript. All the authors have read and approved the final manuscript.

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Tables

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Figures

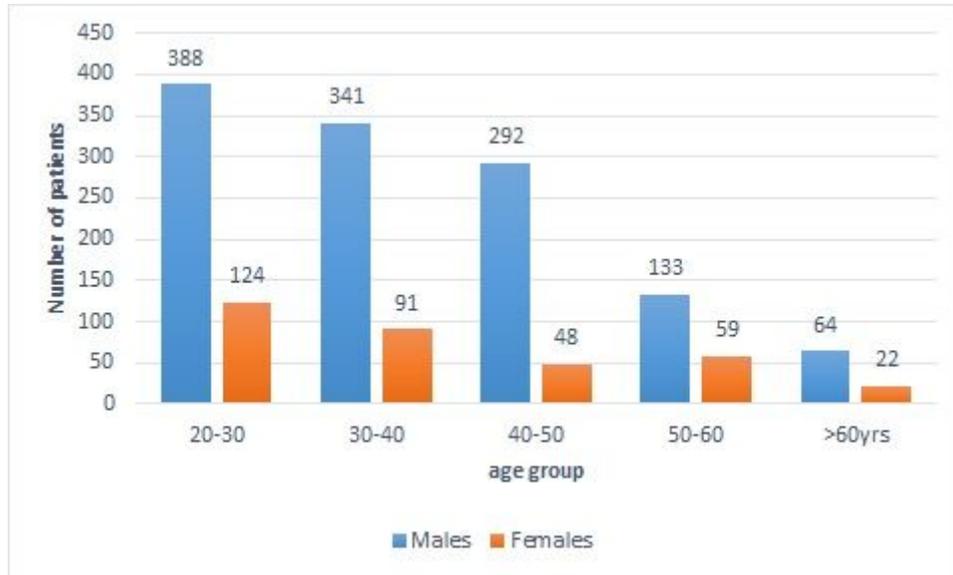


Figure 1

Age distribution of male and female participants

Supplementary Files

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