Incidence of Reported Dental Trauma Among Soldiers During Basic Training

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ABSTRACT The objective of this study was to assess the incidence, characterizations and etiologies of traumatic dental injuries among Israeli army soldiers during basic combat training. Dental files of soldiers (n = 11,053) from several combat military camps, who completed 8 months of basic training during 2006–2007, were analyzed for frequency, type and etiology of dental trauma. The study included 118 files. The incidence of dental trauma was 1.1% per 8 months (1.6% per year). The most frequently traumatized tooth was the right maxillary central incisor (46%), most prevalent type of injury was a noncomplicated crown fracture (45%), and most frequent etiology was the personal weapon (53%), with no statistical correlation toward a right-sided injury. The incidence of dental traumatic injuries during basic combat training was higher than among army personnel as found in other studies. A weapon impact can be a major risk factor for soldiers during basic training.

INTRODUCTION

Traumatic dental injuries are highly prevalent, mainly in children, ranging from 5.2% to 35% in different studies and in various age groups.[1] However, the incidence and severity of these injuries decrease with age.[2,3] In children the etiology includes falls, sports and violence.[4] However, in contrast to the abundance of information regarding the prevalence and etiology of dental injuries during childhood, only a few studies have estimated the incidence and high risk population for dental trauma in a healthy adult population, mostly focusing on athletes.[5–7]

The reported prevalence of dental injuries in adults as a result of sport-related activities varies from 6.4% (soccer accidents) to 10.6% (basketball players).[6,7] Facial injuries are most common in rugby, followed by soccer and cricket.[6] The most common cause of accidents is contact with another player (86.4%). Mean age of the injured players is usually 25.1 years.[7] Other etiologies include alcohol and drug abuse, and battering.[1] Many drug addicts suffer from molar and premolar crown fractures resulting from violent tooth clenching 3 to 4 hours after drug intake.[1]

Soldiers may be another adult population at risk for dental injuries. In an epidemiologic study, conducted in the 1970s,[8] the accidental dento-facial injuries during a 9-month period in the US Army was 0.4% per year (overall rate). However, this rate varied greatly for specific subgroups with high-risk factors that included young males, lower enlisted ranks, recent recruits, and combat training posts. Fistfights (nearly 30%), sports (over 20%), and vehicles (about 15%) were the primary specific causes of these injuries. Data clearly reveal that differential risks exist for various military subpopulations.[8]

Another possible high risk factor/situation in adults may include traumatic injury during basic military training, which usually lasts about 8 months among combats. During this time, soldiers handle heavy equipment, such as a weapon during most of their physical activities when their skills are poor. The aim of the present study was to evaluate the incident, types, and etiology of traumatic dental injuries during basic combat military training.

MATERIALS AND METHODS

Dental files (n = 11,053) of combat soldiers from several military camps, who completed basic training during 2006–2007, in the Israel Defense Forces, were analyzed. The duration was 8 months, which was divided into basic (4 months) and more advanced (4 months) stages. Relevant files were screened for documentation of any dental traumatic injuries that occurred during training. The study included 118 dental trauma reports.

Comprehensive clinical and radiographic examinations are mandatory by the dentist in charge before providing treatment or signing a dental report. The standard report includes data regarding time and place of injury, eye witnesses to the event, type and site of injury, diagnoses, kind of treatment provided, and additional comments, such as evidence of former tooth injury. All available data and radiographs were analyzed.

A structured form was designed to record information from the dental files regarding the frequency and variables associated with traumatic dental injury, as detailed below.

Type of Documented Past Dental Traumatic Injury

The information gathered from the screened files on past dental traumatic injury included: None, clinical or radiographic evidence for crack, complicated or noncomplicated crown fracture, root fracture, crown discoloration, luxation, vitality loss, periapical lesions, root resorption, or soldier's self-report which indicated former injury.

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Type of Traumatic Dental Injury Occurred during Basic Training

Types of traumatic dental injury recorded during basic training were: No evidence of pathology, evidence of pathology, enamel crack, simple crown fracture, noncomplicated crown fracture, complicated crown fracture, crown-root fracture, root fracture, luxation, avulsion, evidence of additional dental pathology unconnected to the current injury, damage to tooth restoration with root canal treatment.

Etiology

The types of etiology recorded were: Struck by personal weapon, another soldier, car or tank, a gurney, falling on the face during activity, other.

Evidence of Dental or Periodontal Pathology in Radiographs

The evidence from the analyzed radiographs included: None, peri-apical radiolucency, crown fracture, root fracture or crown/root fractures.

Type of Operative Treatment Provided

The types of operative treatments provided included: None (either unnecessary, or the patient objected), composite restoration, pulp capping, pulp extirpation, root canal treatment, extraction, medical treatment, fixation, reimplantation after avulsion, smoothing sharp enamel edges.

Descriptive analysis was used to evaluate the frequency of nominal variables. χ^2 tests were used to calculate the possible association between etiology and type of traumatic injury (SPSS 10.0, Chicago, Illinois, USA). The Ethics Committee of the Medical Corps, Israel Defense Forces approved the study.

RESULTS

Traumatic dental injury that occurred during basic training was found in 118 files (1.1%), an incidence of 1.6% per year. The right maxillary central and lateral incisors were the most frequently injured teeth compared with its counterparts on the left side (Table I).

A noncomplicated crown fracture (45%) was the most frequent dental injury followed by a simple crown fracture (27%), luxation injuries (9%), and complicated crown fracture (8%). Diagnoses included enamel cracks (3%), root fracture (2%), or a fracture to a restoration (2%), crown root fracture (1%), no evidence of any pathology (1%), and evidence of a previous dental injury (2%).

The most prevalent provided treatment was resin restoration (57.9%). Treatment also included smoothing sharp enamel edges (2.9%), pulp treatment (7.9%), in which, pulp extirpation (3.9%), root canal treatment (2.9%), and pulp capping (1%) were performed, as well as tooth fixation (2%), and other medical treatment (7.8%). In 21.6% of the cases no treatment was provided because it was either unnecessary or the soldier objected.

The most frequent etiology was the personal weapon (52.9%), followed by falling on the face during activity (15.7%), struck by another soldier (6.9%), a car or tank (2.9%). No statistical correlation was found between a personal weapon impact and dental injury at the right side of the arch.

TABLE I. Distribution of traumatized teeth (in %)

Right maxillary central incisor	45.8
Right maxillary lateral incisor	9.4
Left maxillary central incisor	27.1
Left maxillary lateral incisor	7.3
Left mandibular central incisor	6.3
Right mandibular central incisor	1.0
Right mandibular first premolar	1.0
Left maxillary lateral deciduous incisor	1.0
Right mandibular central deciduous incisor	1.0

DISCUSSION

The present study showed that the incidence of traumatic dental injuries during basic combat army training was relatively high, 1.1% during 8 months of training. The incident could be even higher since this study was retrospective and thus was based only on the documented reports. However, several soldiers could have experienced mild injuries and either disregarded them or referred directly to their personal dentist and not to the army dentist. It was not possible to compare the present data to the incidence of an adult population in the general population because the studies reported only the prevalence of dental injuries in an adult population.[2,3] Moreover, in an English language literature search, the incidence of dental traumatic injuries among army personnel was found in only two studies.[8,9] Katz et al.[8] found an incidence of 0.377 dental injuries per year among US Army personnel, which is 75% lower from the incidence per year found in the present study. This can be explained in that Katz et al.[8] evaluated soldiers in different camps, while in the present study, only inexperienced combat soldiers during basic training were evaluated. Interestingly, although the overall incidence in the former study was lower, Katz et al.[8] state that recruits at a recent training were at a higher risk for dental trauma (0.9%). No data were provided regarding the incidence of dental injuries among recruits in basic combat training. Moreover, the study by Katz et al. was conducted several decades ago; since then, the training schedule and the weapons used have changed considerably.

The study of dela Cruz et al.[9] evaluated the incidence of dental traumatic injuries in basic military training personnel at Fort Leonard Wood Missouri after using boil-and-bite mouthguards. The incidence varied from 0.0189 to 0.03 per year depending on the frequency of wearing the mouthguards during various training activities. Nevertheless, in the present study the reported incidence was 53–85 times greater than that of dela Cruz et al.

Although there is agreement that soldiers during basic combat training may be at a higher risk for dental trauma, no agreement exists regarding the etiology. Fistfights (nearly 30%), sports (over 20%), and vehicles (about 15%) have been reported by Katz et al.,[8] and a personal weapon (53%), with no

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statistical correlation toward a right-sided injury. Thus, even when the personal weapon is held in the right arm, it still can injure the teeth at the left side of the arch. Thus, the weapon may contribute significantly to the incidence of dental traumatic injuries among recruits.

Three approaches can be taken to minimize these dental injuries. One is the use of a mouthguard, which can prevent dental injuries during training.[10] A mouthguard significantly decreases the risk by 1.76 times.[9] The other approach is to cover the tip of the weapon with a rubbery cover. The efficiency of this approach should be examined in future studies. Notwithstanding, raising the awareness of soldiers and their superiors regarding prevention of dental trauma during basic training activities is recommended.

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