INTRODUCTION

Maxillofacial injuries can be limited to superficial lacerations or abrasions of soft tissues of the face or they may involve multiple fractures of the facial bones with concomitant chest, head, cervical spine, pelvic, abdominal and extremity injuries. Fractures of the middle third of the facial skeleton and / or mandible are known as maxillofacial injuries. Of all injuries, none perhaps is of more concern to the patient than those involving the facial region (due to aesthetics).

The causes and incidence (reported) of maxillofacial injuries vary widely from one country to another because of social, cultural, and environmental factors. Although motor vehicle accidents were responsible for the majority of severe facial injuries in western countries, until rigorous auto safety measures were mandated about 20 years ago. Assaults currently account for approximately 70% of facial fractures in urban emergency departments, and domestic violence is responsible for at least 10% of all facial fractures among women. Falls are an important etiology in both the very young and the elderly. Many other result from industrial accidents, home accidents, sports injuries and missile wounds of war.

The aim of this study was to determine the relative frequency of various etiological factors and pattern of maxillofacial injuries in the Armed Forces of Pakistan.

PATIENTS AND METHODS

This descriptive study was carried out from January 2001 to January 2004 at Oral and Maxillofacial Surgery Department, Armed Forces Institute of Dentistry, Rawalpindi. Three hundred consecutive serving personnel of either gender of Armed Forces of Pakistan, reporting to AFID with maxillofacial injuries during the period directly or referred from peripheral hospitals, were included in this study. Isolated nasal bone and frontal sinus fractures were excluded from the study. Anatomical distribution, frequency and etiology of fractures, rank at job and occupational as well as personal hobbies were recorded. Descriptive analyses were used to determine mean, standard deviation, percentage and range values.

RESULTS: The most frequent bone fractured was the mandible, which accounted for 159 cases (53%). The zygomatic complex was fractured in 51 cases (17%), the maxilla in 12 cases (4 %), and the alveolar process in 21 cases (7%). The most common cause was road traffic accident (168 cases; 56%), followed by accidental fall (69 cases; 23%), gunshot injuries (27 cases; 9%), sports related injuries (15 cases; 5%), and injury associated with a fight (12 cases; 4%); there were only 9 cases of animals related injuries (3%).

Conclusion: In this series, mandible was the most commonly fractured facial bone, while road traffic accident was the most common etiological factor. Results could be influenced by the personal and working environment.

classified according to the classification suggested by Kruger.\(^5\)
The fractures of the midface were classified according to the maxillary-mid face system of Le Forte with some additions by Killey.\(^2\) The mandibular fractures were classified according to Killey\(^6\) and the zygomatic complex fractures according to Knight and North.\(^7\) In cases where there were more than one facial bone fractures, they were categorized as combination fractures.

All the patients of Armed Forces with maxillofacial injuries, whether admitted to the hospital or treated as outpatients in the oral surgery clinic, were included in this study. Isolated nasal fractures, naso-orbital-ethmoidal injuries and frontal sinus fractures which are routinely referred to the ENT department, were therefore, excluded from the study. As the study population included only the serving personals of Armed Forces of Pakistan, the following points are worth mentioning: The minimum age limit for service in the forces is 18 years, so a patient of age less than 18 years is not expected. Similarly, the maximum age limit is 60 years, so no patient could be older than 60 years in this study.

Statistical package SPSS was used for analyses of the data and for its depiction on graphs. Descriptive analyses were used to determine mean, standard deviation, percentage and range values.

**RESULTS**

During the 3 years study period, 300 patients with different types of maxillofacial injuries were treated. Patient age at the time of injury ranged from 18 to 43 years, with a mean age of 29.4 years \(\pm\) 5.67. In 258 cases (86%), the patients had the age range of 18-35 years; the peak incidence was seen in patients with ages 26 and 30 years. They accounted for 108 cases (36%). Only 24 patients (8%) were less than 20 years of age, and 9 patients (3%) were older than 40 years. Of the 300 patients, there were 294 male patients (98%), with a male to female ratio of approximately 49:1.

The sites of injuries are presented in Figure 1. The most frequent bone fractured was the mandible, which accounted for 159 cases (53%); the zygomatic complex was fractured in 51 cases (17%), the maxilla in 12 cases (4%), the alveolar process in 21 cases (7%) and soft tissues injuries in 15 cases (5%). The remaining 42 patients (14%) were combination fractures. The distribution of the mandibular fractures by site is detailed in Table I. The most common site was the body of the mandible (32.6%), and the least common was the coronoid process (1%). A significant proportion of the patients (32.5%) had more than one mandibular fracture sites.

There were only 12 patients with maxillary fractures, 6 of these patients sustained Leforte type II fractures, 4 of them sustained Leforte type III and 2 of them sustained Leforte type I fracture. Of the 51 zygomatic complex fractures, the arch was involved in 15 cases (29.4%) and the zygomatic bone in 36 cases (70.5%). Combination of fractures occurred in 42 cases (14%) as shown in Table II.

<table>
<thead>
<tr>
<th>Site of Fracture</th>
<th>No. of Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible And Maxilla</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Mandible, Maxilla And Zygoma</td>
<td>9</td>
<td>3</td>
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<tr>
<td>Maxilla and Zygoma</td>
<td>9</td>
<td>3</td>
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<tr>
<td>Mandible And Zygoma</td>
<td>15</td>
<td>5</td>
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The causes of injury are graphically shown in Figure 2. Road accident as the cause of injury was seen in 168 patients (56%), followed by accidental fall in 69 patients (23%). Soldiers of the ranks of Sepoy, Lance Naik, and Naik comprised the bulk of the victims i.e. 222 patients (74%).

**DISCUSSION**

Maxillofacial injuries, like injuries elsewhere in the body, are
caused by a known and relatively constant set of etiological factors. The results of epidemiological surveys on the causes and incidence of maxillofacial fractures tend to vary with geographic region, socioeconomic status, culture, religion, and era.1-4,8-10 Road traffic accidents, assaults and fights, falls, sports injuries, industrial accidents, home accidents and domestic violence, gunshot/firearm injuries and animal bites/accidents are the commonly recognized and reported etiological factors.

The predominance of injured males in the age group 20-29 years is consistent with the findings of previous published work.2,8-10 Previous studies have also shown a lower incidence of maxillofacial fractures in females, with male:female ratio ranging from 5.2:1 to 5.4:1.4,14, 8-10 In this study, the ratio was 26:1, which is a reflection of the very limited number of females serving in the armed forces of Pakistan. Also it is evident from the results that the majority of injuries occurred due to road traffic accidents, gunshot wounds, and sports etc. where men are often exposed to such hazards.

Traffic accidents have been the most common cause of maxillofacial injuries worldwide as reported in most previous epidemiologic studies,2-4 and the present study supports the findings of these earlier studies. In England, the introduction of the compulsory use of seat belts had a significant effect with respect to reducing the number of facial injuries.11 In Pakistan, unfortunately, compliance is generally poor to such laws. Maryam et al. suggest that the use of seat belts reduces the number of midfacial injuries,12 but in the present study, the number of midfacial injuries was small. The relationship between use of seat belts and the incidence of midfacial injuries requires further study. There are general indications that interpersonal violence is the leading cause of maxillofacial injuries in developed nations and that traffic accidents are the main cause of such injuries in developing countries.13-16 This finding may be a reflection of the state of road safety and driving skills in some developing countries. Hill et al.13 and Voss14 reported assault as the predominant cause of maxillofacial fractures in England and Norway, respectively. The 3.17% incidence of facial bone fractures in our study caused by fighting contrast vividly with the figure of 55% reported from Scotland,4 a finding that may be related to differences in social customs and alcohol intake. Because of religious backgrounds, most Pakistanis do not drink alcohol. Also the armed forces of Pakistan are bound by very strict discipline and they are generally well-respected by the civil population. These factors may have been contributory to the significantly lesser number of victims of assault.

The percentage of gunshot injuries was higher than most of the epidemiological studies conducted elsewhere.17-19 The explanation for this diversity is that the armed forces of Pakistan have been in a continuous state of conflict with the Indian forces, although the same not reaching to the extent of an open war, thus accounting for a significant number of maxillofacial injuries.

Domestic violence is totally absent from our study, although, it is regularly reported as one of the etiological factors in other studies.20 The reasons are that majority of our study population is male. In a male dominated society, it is most unlikely for a male being beaten or hit by his wife. Also, alcohol abuse is almost non-existent in our Islamic society, which further reduces the chances of domestic violence and so of assaults. Children are usually the victims of domestic violence, but as they were not included in the subject study, the figure remained zero regarding domestic violence.

In this study, the body and the angle of the mandible were the most commonly involved sites, which is in contrast with figures obtained from developed communities21-23 but similar to those reported from Nigeria, and Jordan.2 In the present study, condylar neck fractures comprised 20% of the mandibular fractures; these rates agree with 20% to 36% rates reported from other centers.4,14,15 From Jordan and Nigeria2 a lower frequency of zygomatic complex fractures has been reported. This would have been because of the low incidence of fights. In this study, the frequency of zygomatic complex fracture is lower than the study from Lahore.8 This can be explained considering the low incidence of assaults in the present study. Le-Fort II and Le Fort III fractures were also relatively uncommon in this study, compared to others.13,14,24,25 One can speculate that inter population differences in the sites of maxillofacial fractures are partly related to the diverse etiologic factors involved.

Of the 162 patients in this series, 24 (14.5%) had fractures of both jaws and only 19.7% of mandibular fractures required open reduction.

The lower ranks of Sepoy, Lance Naik and Naik comprised the bulk of the study population and so were represented in the results. Also the lower ranks are frequently assigned to such duties where they have to travel for long distances in areas where the conditions of the road is very bad or in some areas proper roads do not even exist.

The present study indicates that although injuries of the facial skeleton are not infrequent in the armed forces of Pakistan, the injuries sustained are seldom severe. These findings support the view that both the causes and the incidence of maxillofacial fractures vary from one country to another.8,11,16,20 Although the use of CT Scan is very important in the evaluation of injuries to this complex region, it was not used in this study due to financial reasons and also for the reason that most of the injuries were not particularly severe and conventional radiography was considered sufficient for diagnosis and management.

CONCLUSION

In this study, the peak frequency of maxillofacial fractures in the armed forces of Pakistan occurred in the age group consisting of 18 to 35 years and the most frequent cause was traffic accidents (56%). The predominant site of fracture was the mandible (53%), 33% of the mandibular fractures were found in the body, and 24% in the angle. Only 14% of the patients had fractures of more than one jaw bone. Most fractures were neither severe nor complicated, and most were successfully treated by conventional means; the most commonly used treatment was closed reduction.

These findings support the view that both the causes and the incidence of maxillofacial injuries vary from one country to another.

REFERENCES