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RESEARCH ARTICLE

Retrospective Investigation of Maxillofacial Fractures in Antalya Region

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ABSTRACT

Objective: The aim of this study was to investigate the relationship between fractures and mechanism of injury, age, gender, regional analysis of trauma patterns and to compare these findings with the existing literature in patients with maxillofacial fractures admitted to Antalya Training and Research Hospital.

Materials and Methods: For this study, a comprehensive review was conducted on the records of 209 patients diagnosed with maxillofacial fractures at Antalya Training and Research Hospital between 2017 and 2021. The analysis included various facets, such as gender distribution, age demographics, underlying causes of fractures, monthly distribution of fracture incidents, specific sites of fractures, and the classification of fracture types.

Results: The study involved 209 patients—142 males and 67 females—ranging in age from 5 to 79 years, with an average age of 33.75 years. The highest fracture incidence occurred in the 21-30 age group. Motor vehicle accidents, falls, and assaults were the primary causes of maxillofacial fractures across all ages. Notably, motor vehicle accidents led to the most hospital admissions, except for the 0-10 age group, where falls took precedence. Among patients aged 0-10, falls were the primary reason for admission; in all other age groups, they ranked second. Monthly analysis revealed subtle fluctuations in fracture incidence.

Conclusion: Our study effectively highlights the connection between maxillofacial fractures and several factors as injury mechanisms, age, and gender. Within our diverse society, regional trauma analysis enables the creation of tailored regulations for protective measures that align with our social structure.

Keywords: maxillofacial fracture, epidemiology, trauma

INTRODUCTION

A maxillofacial fracture involves the fractures of bones within the central region of the face. This type of injury commonly results from a powerful, blunt impact directed at the mid-facial area. Fractures occurring in these bones can impede functions such as breathing, eyesight, chewing, and speech. Maxillofacial injuries are prevalent among trauma patients, often occurring either as isolated incidents or with other severe injuries like cranial, spinal, upper, and lower body trauma.[1] Maxillofacial fractures have the potential to be exceedingly serious. The causes behind maxillofacial fractures vary based on age, gender, socioeconomic status, cultural norms, and geographic location. Although traffic accidents, falls, and assaults consistently rank as the top etiological factors worldwide, their order of prevalence may differ. Occupational accidents, sports-related injuries, and gunshot wounds contribute to the range of causes.[2–5]

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In the realm of maxillofacial trauma, mandibular fractures are the second most common type, succeeding nasal fractures. Other affected bones include the maxilla and zygomatic bone.

The method of treating maxillofacial fractures depends on the severity and location of the fracture. Initiation of treatment may occur within the emergency department to ensure that blood clotting or swelling do not obstruct the breathing process.[6]

The current literature contains several studies that investigate the demographic distribution of patients with maxillofacial trauma through different criteria. This study undertakes a retrospective analysis of patient data, specifically focusing on those diagnosed with maxillofacial fractures (excluding isolated nasal fractures). The analysis includes patients who sought treatment at Antalya Education and Research Hospital from 2017 to 2021. By comparing these findings with existing literature, the study aims to contribute valuable insights into the field.

MATERIALS AND METHODS

The ethics committee approval of the study was obtained with the decision of the Health Sciences University Antalya Training and Research Hospital Clinical Research Ethics Committee dated 30/06/2022 and numbered 13/10. For this study, a thorough examination of records was performed on 209 patients who had been diagnosed with maxillofacial fractures and had been admitted to Antalya Training and Research Hospital between the years 2017 and 2021. A comprehensive analysis was conducted, focusing on parameters such as gender, age, etiological causes of fractures, distribution of fracture cases across different months and fracture types among the patients. The scope of the study encompassed fractures occurring in the mandible, maxilla, and zygomatic complex. However, isolated nasal fractures were excluded from consideration. The investigation delved into several aspects, including gender distribution, age demographics, underlying causes of fractures, monthly distribution of fracture incidents, specific sites of fractures, and the classification of fracture types. The findings were then visually presented as graphs and charts.

RESULTS

During the period spanning from January 2017 to November 2021, a total of 209 patients who were admitted to the hospital due to maxillofacial fracture were included in the study. The age range of the patients was 5 to 79 years, with an average age of 33.75 years. Among these individuals, 142 were male, while 67 were female. Within this patient cohort, 32 fell into the pediatric category, specifically those under 18 years of age. The male-to-female ratio within the pediatric patient group was 2.55:1, whereas in the adult patient group, it stood at 2.05:1. Overall, the male-to-female ratio in the entire patient cohort was 2.11:1 (Table 1).

Table 1. Breakdown of patients by gender and age period

	Pediatric patients (%)	Adult patients (%)	Total patients (%)
Female	9 (4)	58 (28)	67 (32)
Male	23 (11)	119 (57)	142 (68)
Total	32 (15)	177 (85)	209 (100)

Age groups were segmented into eight distinct blocks. An in-depth examination of these age groups unveiled that the highest incidence of fractures was observed in the 21-30 age group, accounting for 58 cases, followed closely by the 11-20 age group, which documented 46 cases. On the other end of the spectrum, the 0-10 age group exhibited the lowest number of fractures, with only 2 cases recorded. Notably, the age group that displayed the most balanced female-to-male ratio was the 41-50 age group, presenting a ratio of 1.38. (Figure 1)

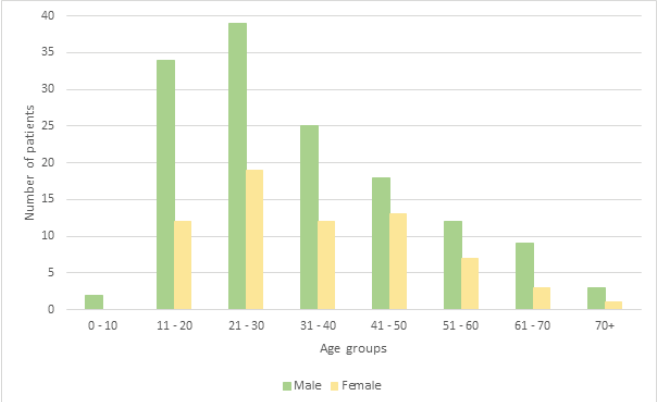

Figure 1. Distribution of male and female patients across each age group

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In terms of age groups, motor vehicle accidents, falls, and assaults emerged as the three predominant causes of maxillofacial fractures across all age ranges. Notably, research underscores that motor vehicle accidents constitute the leading cause of hospital admissions. This trend remains consistent across all age cohorts, except for individuals aged 0-10 years, where falls take precedence as the primary reason for admission. Interestingly, among patients aged 0-10 years, falls are the primary admission factor, while for all other age groups, they rank as the second most prevalent cause. (Figure 2)

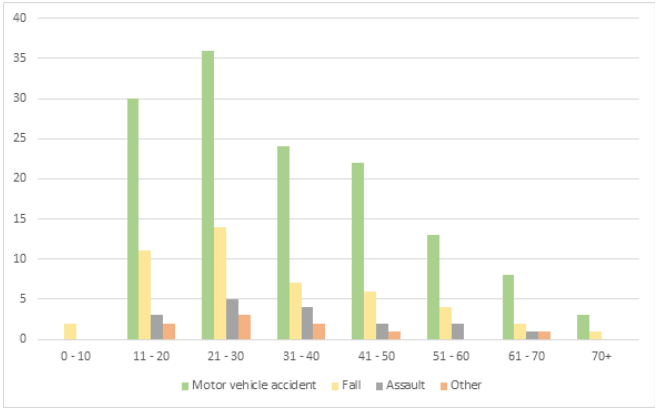

Figure 2. Breakdown of maxillofacial fracture causes within each age group

Upon closer examination of the monthly distribution, a subtle fluctuation in the incidence of maxillofacial fractures became apparent. March exhibited the highest incidence with 31 cases, closely trailed by May with 21 cases, and January with 19 cases. Conversely, November displayed the lowest frequency of fractures, recording only 11 cases. (Figure 3)

When examining the distribution of fracture sites based on different causes, it becomes evident that mandibular fractures consistently occupy the top spot across all etiologies—motor vehicle accidents, falls, and assaults—that lead to fractures. Following closely in the second position are zygoma fractures, with maxilla fractures securing the third position in this ranking. Among the 209 patients under study, mandibular fractures were noteworthy, emerging as the most prevalent facial fracture site, accounting for 128 cases of maxillofacial injury. (Figure 4)

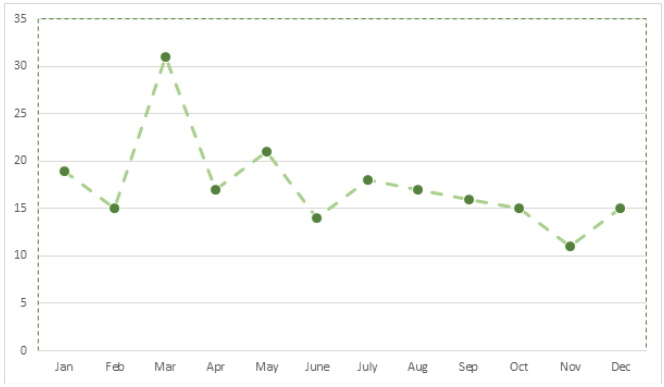

Figure 3. Patient distribution based on months

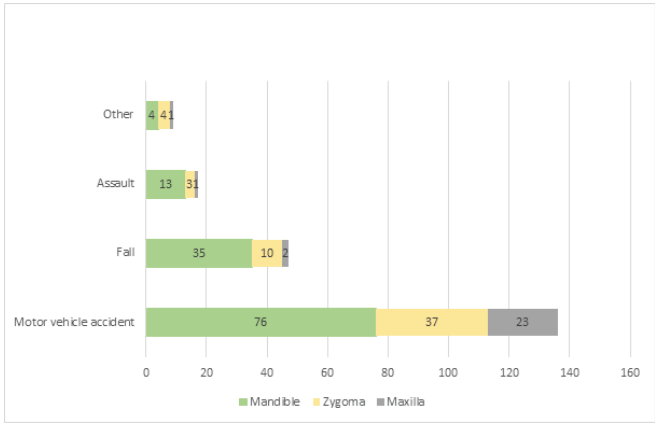

Figure 4. Notable fracture site prevalence within each etiology

DISCUSSION

Numerous studies have been conducted investigating injuries stemming from maxillofacial traumas. The majority of epidemiological studies focused on maxillofacial fractures have been conducted retrospectively. These studies have unveiled that the causes and occurrences of maxillofacial trauma vary depending on geographical location, socioeconomic status, cultural norms, and environmental factors. It is worth noting that there can be disparities in the outcomes of epidemiological studies on fractures across countries and even within different regions of the same country. These differences often reflect the impact of local conditions. Epidemiological studies play a pivotal role in documenting population variations over time, highlighting pressing issues, and implementing necessary preventive measures to avert accidents. Broadening the

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scope of trauma studies aids in developing databases that can define distinct case characteristics. This information assists in devising public health initiatives encompassing preventive strategies, treatment protocols, and legal procedures.[4,7–12]

While previous years have seen studies in this field, the current study was designed because of the absence of such research in the Antalya region. The study's primary goal is to retrospectively assess epidemiological data from patients diagnosed with maxillofacial fractures, specifically those who sought treatment at Antalya Education and Research Hospital between 2017-2022 and compare it with existing literature.

Despite significant advancements in automobile technology, transportation infrastructure, and economic growth, the prevalence of road traffic accidents as the primary cause of maxillofacial injuries remains substantial. This is notable given the increased utilization and development of protective mechanisms for vehicle occupants. Extensive research spanning various regions supports that motor vehicle accidents stand as the primary etiological factor for maxillofacial fractures.[13] A systematic review conducted by Boffano P et al., which analyzed articles on maxillofacial trauma epidemiology between January 1980 and December 2013, identified 69 studies across Africa, North America and Brazil, Asia, Europe, and Oceania. The findings revealed that motor vehicle accidents predominated in studies from America, Africa, and Asia. In European studies, a more varied etiological landscape emerged, where assaults and traffic accidents played vital roles. In Oceania, assaults are the dominant factor.14 In an epidemiological analysis of maxillofacial fractures in Italy by Bonavolont P et al., the leading etiological factor was traffic accidents (57.1%), followed by assaults (21.7%), falls (14.2%), occupational accidents (3.5%), sports accidents (3.3%), and other causes (0.2%).[15] In a retrospective study by Erol B et al., focusing on maxillofacial fractures, it was observed that motor vehicle accidents and falls shared the top position with similar frequencies.[16] In developing countries, inadequate traffic infrastructure, lax enforcement of traffic regulations, and insufficient adoption of protective measures such as seat belts and helmets contribute to motor vehicle accidents ranking as a leading etiological factor. Additionally, falls, occupational accidents, and sports injuries hold significant roles in the etiology of maxillofacial fractures.[17] Over time, shifts in the occurrence and causes of maxillofacial fractures reflect transformations in societal structures and variations across different societies.[18] Aligning with existing literature, our study also established motor vehicle accidents as the foremost cause among the examined etiological factors.

In a retrospective epidemiological study focused on mandibular fractures, Er Y et al. noted noteworthy trends in the male-to-female ratio among patients. Between 1980 and 1995, this ratio stood at 3.9, decreased to 2.78 during 1995-2001, and further declined to 2.28 for the years 2005-2009, indicating a gradual reduction over the years.[19] Numerous studies conducted both domestically and internationally have consistently revealed a higher incidence of maxillofacial fractures in male patients compared to female patients across all age groups.4,20 Al-Habbab RY et al. highlighted that recent reports indicate a shift towards a more balanced male-to-female ratio. This change could be attributed to evolving workforce dynamics, with an increasing number of women engaged in higher-risk outdoor occupations that expose them to the causes of maxillofacial fractures.[21] In another study, male-to-female ratio was 1.8, and significant variations in etiology were observed between Italians and individuals of other nationalities.[15] In our study, although the proportion of males was higher than the proportion of females in accordance with the literature, it was proportionally lower than many studies in the literature.

Mandibular fractures were the most frequently occurring (36%), followed by zygoma fractures (20.4%), orbital wall fractures (16.1%), and maxilla fractures (11.8%).15 Kanala S et al. noted that the mandible exhibited the highest susceptibility to fractures among facial skeleton regions (47%). Among midface fractures, the zygomatic complex fracture accounted for the predominant subtype (17%), while fractures of the maxillary bone comprised 12% of the cases. Similar findings have been reported by other researchers, with zygomatic fractures consistently emerging as the primary subtype of midface fractures across various age groups, encompassing both pediatric and adult populations.[6] Similar to the literature, the mandible had the highest fracture rate among the facial bones in our study.

Erol B et al. found that the highest frequency of fractures occurred during the summer, followed by fall, spring, and winter.[16] Er Y et al.'s study indicated that patient admissions did not exhibit significant variations across different months of trauma.[19] In regions like Egypt, where there's minimal change in weather conditions between seasons, it has been noted that the number of mandibular fracture cases remains

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consistent throughout the year.[22] When analyzing the monthly distribution of maxillofacial fractures in our study, there is a slight fluctuation in the incidence of fractures.

Limitations: Due to the retrospective design of our study, we could not draw conclusions regarding the influence of social background on maxillofacial fractures.

CONCLUSION

Our study has effectively highlighted the correlation between maxillofacial fractures and a diverse range of factors, including the mechanism of injury, age, and gender. Within our multicultural society, a regional analysis of trauma studies paves the way for the enactment of regulations that encompass tailored protective measures aligned with the prevailing social structure. Moreover, it stimulates the advancement of preventive medical research. The realm of Public Health emerges as a pivotal player in tackling the challenges highlighted by our study.

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