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A Retrospective Evaluation of Mandibular Fracture in Kabul, Afghanistan

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Background: The mandible, a key bone in the lower face, is prone to trauma. Although mandibular fractures are widely recognized as common and costly, there is a research gap on this topic in Afghanistan. This study explores the causes of lower jaw fractures and their link to demographic factors in the Afghan population.

Materials and Methods: A retrospective analysis of 535 medical records from a Kabul tertiary hospital (March 2021 to March 2022) examined lower jaw fractures, patient demographics (age, sex), and injury causes. Statistical methods, including chi-square tests and Pearson's contingency coefficient, were employed to explore correlations between mandibular fractures and demographic factors.

Results: In this study, we analyzed 579 mandibular fractures in 535 patients, with road accidents (33.08%), falls (22.61%), and interpersonal conflicts being the leading causes. Most patients were aged 21–30, with single fractures being the most common (92.3%) and parasymphyseal fractures being the most prevalent (28.5%). Although certain fracture types were significantly correlated with age, no notable association was found between age and injury cause.

Conclusion: This study reveals that road accidents, falls, and interpersonal conflicts are the main causes of lower jaw fractures in Kabul, with the highest incidence in individuals aged 21–30. These findings highlight the necessity for targeted public health interventions, such as improved road safety campaigns and stricter traffic regulation enforcement, to lower injury rates. Incorporating these insights into clinical practice can also help healthcare providers more effectively manage lower jaw fractures in affected populations.

Keywords: lower jaw fracture, fracture patterns, trauma, accidents, Afghanistan

Introduction

The mandible, or lower jaw, is a key skeletal element in the maxillofacial region, playing a vital role in facial structure and the chewing process. Its unique anatomy and mobility make it particularly susceptible to fractures from various forms of trauma, including vehicular accidents and physical altercations. Research consistently identifies the mandible as the most frequently fractured bone in maxillofacial injuries, especially in cases of interpersonal conflict.[1] In retrospective studies, lower jaw fractures are reported as the most common fractures in emergency departments in the US and the second most frequent fracture site in Taiwan.[2,3] Although there have been studies[4–7] on mandibular fractures among international forces in Afghanistan, there is a significant gap in the literature concerning fractures within the local Afghan population.

This study aims to address this gap by examining the epidemiological characteristics of lower jaw fractures among patients at the National Curative and Specialized Stomatology Hospital in Kabul, Afghanistan, providing valuable insights into regional trauma patterns.

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Material and Methods

Patients and Populations

This retrospective study was carried out at the National Curative and Specialized Stomatology Hospital in Kabul, Afghanistan, which is renowned for providing essential maxillofacial trauma treatment to a significant portion of the Afghan population. Drawing patients primarily from Kabul and various regions across Afghanistan, the hospital's accessibility influences patient choice for complimentary oral and dental care services. Medical records from March 2021 to March 2022 were examined, encompassing 535 patients with 579 lower jaw fractures who underwent treatment at the Oral and Maxillofacial Surgery Department.

Data Collection

The study included patients diagnosed with lower jaw fractures, whereas a total of 7 patients were excluded due to missing data. Detailed patient profiles were compiled, capturing key variables such as age, gender, and the cause of injury, spanning diverse incidents including road traffic accidents (RTAs), interpersonal conflicts (eg, altercations or domestic violence), explosions, falls, gunshot wounds, sports-related injuries, pressure cooker explosions, injuries during dental extraction procedures, instances of police violence, and occupational accidents. Lower jaw fracture locations were meticulously identified and classified on the basis Dingman and Natvig systems, encompassing regions such as condylar, subcondylar, coronoid process, ramus, angle, body, parasymphyseal, and symphyseal fractures.

Statistical Analysis

The chi-square test was used to analyze categorical variables, including sex, age, and fracture distribution across different causes of injury. Corresponding p-values were documented in Table 1, with statistical significance set at $p < 0.05$. Furthermore, Pearson's contingency coefficient was applied to evaluate the association between condylar or subcondylar fractures and various lower jaw fracture sites (Table 2). The findings are presented in the form of correlation coefficients.

Table 1 Statistics of Gender, Age and Number of Fractures, n (%)

	RTAs	Fall	Fighting	Family violence	Pressured cooker explosion	Sports related	Other[b]	Total
Sex[a]								
Male Female	149 (38.4) 28 (19)	89 (22.9) 32 (21.8)	94 (24.2) 7 (4.8)	5 (1.3) 59 (40.1)	4 (1) 16 (10.9)	20 (5.2) 0	27 (7) 5 (3.4)	388 (100) 147 (100)
P-value	*P* = 0.000							
Age[a]								
> 30 < 30	44 (33.8) 133 (32.8)	34 (26.2) 87 (21.5)	22 (16.9) 79 (19.5)	7 (5.4) 57 (14.1)	7 (5.4) 13 (3.2)	5 (3.8) 15 (3.7)	11 (8.5) 21 (5.2)	130 (100) 405 (100)
P-value	*P* = 0.103							
Number of fractures[a]								
Single fracture Two-side fracture	162 (32.8) 15 (36.6)	111 (22.5) 10 (24.4)	96 (19.4) 5 (12.2)	55 (11.1) 9 (22)	19 (3.8) 1 (2.4)	20 (4) 0	31 (6.3) 1 (2.4)	494 (100) 41 (100)
P-value	*P* = 0.255							
Total	177 (33.08)	121 (22.61)	101 (18.87)	64 (11.96)	20 (3.73)	20 (3.73)	32 (5.98)	535 (100)

Notes: [a]Chi-square test. [b]Other includes, gunshot, police violence, dental extraction related, explosions, occupational accidents.

Table 2 Lower Jaw Fracture Pattern Correlation

	Left-side mandible	Right-side mandible	Symphysis	Left and right mandible
Left condyle	0.196	− 0.155	− 0.069	0.073
Left subcondyle	0.239	− 0.212	− 0.094*	0.148
Right condyle	−0.076	0.031	− 0.045	0.152
Right subcondyle	−0.218	0.286	− 0.131	0.069
Left and right condyle/subcondyle	−0.091*	− 0.122	− 0.054	0.479

Notes: **P-value* < 0.05. The correlation coefficient was analyzed with Pearson's contingency coefficient.

Ethical Issues

This study complies with the Declaration of Helsinki. It was approved by the Research Ethics Committee of Khatam Al Nabieen University (Approval code: AF, knu.edu.af.rec 03, 14–04-2022). The ethics committee granted a waiver for obtaining consent from participants. The decision was based on the retrospective nature of the research, which involved the use of anonymized data from existing records. Since the study does not involve direct interaction with participants and the data is anonymized, obtaining consent was deemed unnecessary.

Results

Our study enrolled 147 female patients and 388 male patients, resulting in a male: female ratio of 2.6:1 (Table 1). The cohort's mean age was 25.47 years, ranging from 4 to 75 years. Among the 535 patients, medical records indicated a total of 579 lower jaw fractures. The age group spanning 21–30 years exhibited the highest incidence of lower jaw fractures, constituting 37.6% of the cases, followed by the age group between 11 and 20 years. Notably, most participants (75.7%) were below 30 years of age. Road traffic accidents (RTAs) were identified as the leading cause of lower jaw fractures, accounting for 33.08% of injuries, followed by fall-related incidents at 22.61% (Table 1).

The chi-square test showed a notable correlation between patient sex and the cause of injuries (P-value < 0.05). However, no significant correlation was observed between age category and the source of injuries (P-value > 0.05). Additionally, no statistically significant correlation was observed between the number of fractures and their respective causes (P-value > 0.05) (Table 1).

In terms of lower jaw fracture severity, 489 of 535 patients (92.3%) were diagnosed with a single lower jaw fracture, whereas 41 of 535 patients (7.7%) presented with two lower jaw fractures. Remarkably, no patient exhibited lower jaw fractures in more than two sites. The parasymphyseal area emerged as the most prevalent location, accounting for 165 out of the total 579 fracture sites (28.5%), followed by the angle at 21.9% (127 out of 579), and the subcondyle at 14.2% (82 out of 579).

The analysis aimed to investigate the correlation between condylar or subcondylar fractures and other lower jaw fracture sites, as depicted in Table 2. The findings revealed a slight but notable correlation. In particular, a statistically significant correlation was observed between symphyseal fractures and left subcondylar fractures ($r = -0.094$, $P = 0.029$), as well as between left lower jaw fractures and left and right subcondylar/condylar fractures ($r = -0.091$, $P = 0.036$).

Discussion

The Nationalized Curative and Specialized Stomatology Hospital is situated in a district with a high population density, notable for its diverse demographic profile, which encompasses various age groups, occupations, and socioeconomic statuses. Furthermore, the area is abundant in taxi stations and is frequented by motorcyclists. The distinctive geographic and population features offer rich data for exploring the epidemiology of lower jaw fractures.

Studies have indicated that the epidemiology of lower jaw fractures can be influenced by geographic and population attributes, such as Demographic structure, legal frameworks, and transportation modes.[2,8–18] The findings from this study unveiled that the highest incidence of lower jaw fractures occurred among individuals aged between 21 and 30 years. Interestingly, these results align closely with those of a study carried out previously in central Taiwan, which also identified the peak occurrence of lower jaw fractures among individuals aged 21 to 30 years.[8] Contrastingly, a study

conducted in India showed the highest prevalence of lower jaw fractures among adults, with an average age of 36 years.[9] Another research carried out in the United Kingdom showed that most patients with fractures were between the ages of 10 and 40. According to the results of that study, the highest occurrence of fractures was noted among men in their twenties and women in their thirties.[10] These variations in fracture patterns suggest that geographic, cultural, and infrastructural factors play a significant role in the etiology of mandibular fractures, with road traffic accidents being more prominent in countries with higher vehicular density and limited enforcement of traffic laws.

The elevated prevalence of lower jaw fractures is significantly affected by social determinants of health, especially concerning gender-based violence and road safety. In Afghanistan, women face a heightened risk of fractures due to domestic violence, while men are more commonly involved in road traffic accidents, which are a major cause of mandibular fractures. Addressing these social determinants is essential for comprehensively understanding and reducing the factors contributing to lower jaw fractures within the Afghan population.

The repercussions of lower jaw fractures extend beyond physical injury, significantly impacting patients' quality of life and socioeconomic status. These fractures can impair essential daily activities like eating and speaking, resulting in social isolation and psychological distress. Additionally, the financial burden of medical treatment and rehabilitation can worsen existing socioeconomic disparities, underscoring the necessity for comprehensive healthcare interventions.

The etiology of lower jaw fractures varies across regions but is predominantly attributed to traffic accidents, falls, and incidents of assault.[3,8,11–15] Our study findings indicated that road traffic accidents (RTAs) accounted for 33.08% of lower jaw fractures, subsequently by falls and fights, which are aligned closely with findings from prior studies conducted in Taiwan.[2,8,16,17] Additionally, fall-related injuries emerged as the second major cause of fractures. Our results did not reveal a significant difference in the overall fracture incidence across different age groups or in terms of the number of fractures. However, a significant disparity was observed in fracture incidence between genders. This disparity could be attributed to social and cultural factors, such as the higher likelihood of men being involved in road traffic accidents and women facing a higher risk of domestic violence-related injuries.

The location of mandibular fractures varies based on the cause of injury, leading to differences in reported fracture sites across studies.[15] The mechanism of injury is significantly correlated with fracture location ($P = 0.020$), which should inform diagnostic approaches for head and neck trauma. Automobile accidents often result in condylar and body fractures, while victims struck by vehicles may have condylar and subcondylar fractures due to force on the underside of the mandible.[10] Falls are associated with symphysis, parasymphysis, and body fractures, while interpersonal violence typically causes fractures at lateral sites, such as the parasymphysis, angle, and condyle. Coronoid fractures are more common in victims of assault.

The findings of this study highlight that single fractures are the most common pattern among lower jaw fractures, followed by fractures occurring at two sites. This aligns with the results of Saravanan et al[16] and Ghodke, M H et al,[17] where the majority of fractures occurred at a single site, with the parasymphysis being the most frequently affected area, accounting for 58% and 62.85% of cases, respectively. However, a study conducted in central Taiwan reported that 57.1% of patients presented with multiple lower jaw fractures, suggesting regional variability in fracture patterns.[12]

Among individuals with a single fracture, parasymphyseal fractures were the most frequent, followed by angular fractures. Upon reviewing pertinent literature, it was found that the angle was the most common site of lower jaw fracture in the US, whereas in Turkey, it was the body.[18] The condyle was identified as the most commonly affected region in Italy, followed by the parasymphyseal area and angle.[15] Another study conducted in southern Taiwan found that the area's most commonly affected in lower jaw fractures were the condylar neck and head, subsequently by the parasymphyseal and symphyseal regions.[2] Regardless of the cause, studies have consistently identified the symphyseal and parasymphyseal regions, along with the condyle and subcondyle, as the most common sites of lower jaw fractures.[2,8,11,15,17,19] Some authors have indicated that the fracture site may be associated with the type of impact, which can be classified as either Low-velocity blunt force or high-velocity impact trauma. Lower jaw angle fractures were found to be the predominant site of injury resulting from low-velocity blunt force trauma, encompassing incidents such as assault and falls. On the other hand, high-velocity blunt force trauma, such as that induced by road traffic accidents (RTAs), may lead to increased occurrence of condylar fractures subsequently symphyseal fractures.[19] Our study findings indicated that road traffic accidents (RTAs) were the leading cause of lower jaw fractures, with the

parasymphyseal area being the most common fracture site, followed by angular fractures. Research has established a connection between mandibular angle fractures and instances of assault.[9,19,20] In our study, out of the one hundred thirty-five patients who experienced assault, forty-four presented with angular fractures. These findings highlight a significant correlation between assault and lower jaw angle fractures. The most frequent combination of two fractures observed in this study involved bilateral parasymphysis fractures, followed by bilateral subcondylar fractures. Additionally, no complex fractures were observed in the study. In another study, it was noted that the most common combination of two fractures comprised fractures of the left mandibular body and right mandibular condyle, followed by fractures of the right parasymphyseal region and left condyle.[21]

We employed Pearson's contingency coefficient to investigate the correlation between condylar or subcondylar fractures and the side of lower jaw fractures (Table 2). Our results indicated a correlation between left subcondylar fractures and symphysis, as well as between left and right subcondylar/condylar fractures and fractures on the left mandible. However, no correlation was observed between right or left lower jaw fractures and right or left condylar or subcondylar fractures. These findings may be associated with certain types of trauma, such as falls or assaults, which tend to exert greater force on specific areas of the mandible, leading to fractures on one side of the mandible and corresponding subcondylar or condylar fractures.

However, the limitations of the study include its single-center nature, potentially limited generalizability to other regions or populations within Afghanistan, the narrow temporal scope focusing on data from March 2021 to March 2022, and the exclusion of cases with incomplete registration data, which may introduce selection bias. Additionally, the absence of a power analysis may limit the interpretation of the statistical findings and their validity. While correlations were found, further research, including prospective studies and larger, multi-center datasets, is necessary to establish causality and validate these findings across different regions and populations.

Conclusion

This retrospective study provides important insights into the epidemiological features of lower jaw fractures in Kabul, Afghanistan. Our findings indicate that road traffic accidents (RTAs) are the leading cause of these fractures, accounting for 33.08% of cases, followed by falls at 22.61%. The study highlighted significant demographic trends, with the highest incidence of lower jaw fractures occurring among individuals aged 21 to 30 years, reflecting broader societal factors influencing injury patterns in this age group.

These results suggest a need for targeted public health interventions focused on injury prevention, including enhanced road safety campaigns and improved enforcement of traffic regulations. Additionally, increasing awareness of domestic violence and implementing community-based prevention programs are essential to address the heightened risk of fractures among women. Collaborative efforts involving local organizations and policymakers can help create a supportive environment for these initiatives.

Understanding the etiology of mandibular fractures can inform future research and preventive measures. In summary, this study underscores the necessity for comprehensive data collection and analysis to better understand the trends and patterns of lower jaw fractures in this region, paving the way for effective public health strategies.

Data Sharing Statement

Data are available from the corresponding author upon request.

Disclosure

The authors report no conflicts of interest in this work.

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