

Pediatric Maxillofacial Trauma: Epidemiologic Study Between 2015 and 2020

Pediatric Maksillofasial Travma: 2015-2020 Yılları Arasında Epidemiyolojik Çalışma

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Öz

Maksillofasial travma en sık görülen travma tipidir ve yüksek morbidite ve mortalitenin önemli bir nedenidir. Çocuklarda yaralanmaların neden olduğu sekeller nedeniyle duygusal travmalar meydana gelmekte ve hayatlarının geri kalan kısmı olumsuz etkilenmektedir. Bu çalışmanın amacı, pediatrik maksillofasial travmaların etiyojisi, epidemiyolojisi ve yaralanma tipini araştırmak ve çocukların yaralanmasını önlemek için önerilerde bulunmaktır. Bu tanımlayıcı retrospektif çalışma, bir bölge üçüncü basamak hastanesinde yapıldı. Ocak 2015 ile Şubat 2020 arasında acil servise maksillofasial travmaya bağlı tüm başvuruların tıbbi kayıtları geriye dönük olarak incelendi. Travmanın etiyojisi, demografik özellikleri, travma tipi, kaza tipi, yaralanma yeri, uygulanan tedaviler ve mortalite kaydedildi. Çalışmaya 288'i kadın (%28) ve 741'i erkek (%72) olmak üzere 4 ay-18 yaş (ortalama 77.67±59.21 ay) 1029 hasta dahil edildi. Hastaların çoğu (n=390, %37.9) 13-18 yaş grubundaydı. Araştırma nüfusunun büyük çoğunluğu kentsel alanda (n=753, %73.2) yaşıyordu. Yaralanmaların çoğu yaz aylarında görüldü (n=438, %42.6). Kafa+servikal yaralanmalardan sonra en sık üst ekstremiteler yaralanmaları (n=171, %16.6), en az göğüs yaralanmaları (n=69, %6.7) görüldü. 57 (%5.5) hastanın hastaneye yatırılması gerektiği ve ölüm oranı %1.2 (n=12) idi. Pediatrik maksillofasial travmalar en çok erkek cinsiyette, yaz aylarında, kentsel alanlarda ve motosiklet kazalarına bağlı olarak meydana gelmektedir. Çocuklarda maksillofasial travmaların azaltılması için toplumsal farkındalık artırılmalı ve her yaş grubuna uygun oyun alanları oluşturulmalıdır.

Anahtar Kelimeler: Acil Tıp, Duygusal Travmalar, Mandibula Kırığı, Motosiklet Kazası, Pediatri

Abstract

Maxillofacial trauma is the most common type of trauma and is an important cause of high morbidity and mortality. Emotional traumas occur in children due to sequelae caused by injuries and the rest of their lives are negatively affected. The aim of this study is to investigate the etiology, epidemiology, and injury type of pediatric maxillofacial traumas, and to make recommendations to prevent child injuries. This descriptive retrospective study was conducted in a regional tertiary hospital. The medical records of all maxillofacial trauma-related admissions to the emergency department between January 2015 and February 2020 were retrospectively reviewed. Etiology of trauma, demographic characteristics, type of trauma, accident type, injury site, administered treatments, and mortality were recorded. 1029 patients aged 4 months-18 years (mean 77.67±59.21 months) including 288 females (28%) and 741 males (72%) were included in the study. Most of the patients (n=390, 37.9%) were in the 13-18 age group. The vast majority of the study population lived in the urban area (n=753, %73.2). Most injuries were seen in the summer (n=438, %42.6). After head+cervical injuries, upper extremity injuries (n=171, %16.6) were the most common and thoracic injuries (n=69, %6.7) least. 57 (5.5%) patients were required hospitalization and the mortality rate was 1.2% (n=12). Pediatric maxillofacial traumas occur mostly in the male gender, in summer, in urban areas, and due to motorcycle accidents. In order to reduce child maxillofacial traumas, public awareness should be increased and playgrounds suitable for all age groups should be created.

Keywords: Emergency Medicine, Emotional Traumas, Mandible Fracture, Motorcycle Accident, Pediatrics

Introduction

Maxillofacial trauma is the most common type of trauma and is an important cause of high morbidity and mortality (1). The incidence of maxillofacial injuries in children, which is less common than adults, is between 1% and 15%. Under 5 years old, it ranges from 0.87% to 1% (2, 3).

Pediatric traumas are important because the anatomical structures of children are different from adults. Facial bones in children are not completely

ossified and paranasal aeration is not fully established. Cheek oils in young children are protective. Although the head-to-body ratio is greater in children than adults, less trauma is seen than in adults. However, intracranial and other traumas may accompany maxillofacial trauma more frequently in children than in adults (4). Emotional traumas occur in children due to sequelae caused by injuries and the rest of their lives are negatively affected (5).

Studies have reported that pediatric traumas differ according to social, cultural, and environmental factors (6). In a study conducted between the ages of 0-18, it was reported that the most common facial bone fractures in children were fractures of the mandible (32.7%), nasal bone (30.2%), maxilla, and zygoma (28.6%) (7).

The aim of this study is to investigate the etiology, epidemiology, and injury type of pediatric maxillofacial traumas, and to make recommendations to prevent child injuries.

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Material and Method

This retrospective descriptive study was carried out in the pediatric emergency department of a tertiary hospital in Aksaray, Turkey. In the period January 2015– February 2020, the medical records of patients admitted to the emergency department were retrospectively reviewed. The study was conducted in compliance with the principles of the Declaration of Helsinki and approved by the regional ethical committee (Aksaray University Ethical Committee; 14.04.2020; No: 2020/03-49).

The following patients were included in the study: 1) under 18 years of age; 2) those diagnosed with craniofacial trauma, including nasal bone fractures, teeth, jaw, lip, and oral cavity injuries, maxillary and maxillary bone fractures, and other intracranial trauma in the emergency department. The following patients were excluded: 1) Over 18 years old; 2) those with multiple trauma; 3) missing data.

Gender (female, male), age (0-5, 6-12 and 13-18), season, region of residence (rural, urban), time of trauma (weekdays, weekends), accident type (vehicle traffic accident, non-vehicle traffic accident, motorcycle accident, etc.), type of trauma (face, skull, both), injury site (frontal, maxillary, mandibular, nasal, etc.), hospitalization requirement, and mortality were recorded.

The whole data in this study were categorical and presented as a frequency (n) (percentage, %). The comparison between groups was performed using Chi-square test. In addition, Chi-square test was used for post-hoc analysis of subgroups which has more than 2 categories. All statistical analysis was performed using SPSS software for Windows (SPSS Inc., Chicago, IL). A P value under 0.05 was considered statistically significant.

Results

In the pediatric emergency department, 1275 children were diagnosed with maxillofacial trauma during the study period. 246 patients who had missing data were excluded from the study. Finally, 1029 patients aged 4 months-18 years (mean 77.67±59.21 months) including 288 females (28%) and 741 males (72%) were included in the study.

Most of the patients (n=390, 37.9%) were in the 13-18 age group. The vast majority of study population lived in the urban area (n=753, %73.2). Most injuries were seen in the summer (n=438, %42.6). After head+cervical injuries, upper extremity injuries (n=171, %16.6) were the most common and thoracic injuries (n=69, %6.7) least. 57 (5.5%) patients were required hospitalization and the mortality rate was 1.2% (n=12). Demographic characteristics of study population are shown in Table 1.

Table 1. Demographic characteristics of study population

Gender		
Male	741	72
Female	288	28
Age group		
0-5 years	300	29.2
6-12 years	339	32.9
13-18 years	390	37.9
Day of the week		
Week days	429	41.7
Weekend	600	58.3
Season		
Autumn	228	22.2
Winter	111	10.8
Spring	252	24.5
Summer	438	42.6
Place of residence		
Urban	753	73.2
Rural	276	26.8
Etiology or trauma		
In-vehicle accident	51	5
Off-vehicle accident	126	12.2
Motorcycle accident	369	35.9
Bicycle	156	15.2
Fall	129	12.5
Violence	93	9
Others	105	10.2
Facial area		
Mandible	72	7
Maxilla	240	23.3
Orbital	123	12
Zygomatic	96	9.3
Temporal	192	18.7
Nasal	198	19.2
Frontal	219	21.3
Other accompanying injuries		
Head + cervical	798	77.6
Upper limb	171	16.6
Thorax	69	6.7
Abdomen	147	14.3
Lower limb	132	12.8
Hospitalization	57	5.5
Death	12	1.2

Data were presented as n (%).

It was found that the males were more injured than females. Winter season injuries, maxillary and frontal area injuries, in-vehicle traffic accidents, and thoracic injuries were statistically significantly higher in males (p=0.024, p=0.031, p=0.005, p<0.001 and p=0.003 retrospectively). There was no significant difference in terms of hospitalization rate and mortality rates (p=0.230 and p=0.817). The comparison of male and female patients was summarized in Table 2.

Table 2. Comparison of male and female patients

	Male n (%)	Female n (%)	P value
Age group			
0-5 years	207 (27.9)	93 (32.3)	0.013
6-12 years	264 (35.6)*	75 (26)	
13-18 years	270 (36.4)	120 (41.7)	
Season			
Autumn	156 (21.1)	72 (25)	0.171
Winter	90 (12.1)	21 (7.3)	0.024
Spring	186 (25.1)	66 (22.9)	0.464
Summer	309 (41.7)	129 (44.8)	0.368
Place of residence			
Urban	552 (74.5)	201 (69.8)	0.126
Rural	189 (25.5)	87 (30.2)	
Day of the week			
Week days	321 (43.3)	108 (37.5)	0.089
Weekend	420 (56.7)	180 (62.5)	
Presence of mandible injury	51 (6.9)	21 (7.3)	0.817
Presence of maksilla injury	186 (25.1)	54 (18.8)	0.031
Presence of orbita injury	84 (11.3)	39 (13.5)	0.328
Presence of zygoma injury	69 (9.3)	27 (9.4)	0.975
Presence of temporal injury	141 (19)	51 (17.7)	0.626
Presence of nazal injury	153 (20.6)	45 (15.6)	0.067
Presence of frontal injury	141 (19)	78 (27.1)	0.005
Etiology or trauma			
In-vehicle accident	48 (6.5)	3 (1)	<0.001
Off-vehicle accident	90 (12.1)	36 (12.5)	0.876
Motorcycle accident	267 (36)	102 (35.4)	0.853
Bicycle	105 (14.2)	51 (17.7)	0.155
Fall	93 (12.6)	36 (12.5)	0.982
Violence	63 (8.5)	30 (10.4)	0.336
Others	75 (10.1)	30 (10.4)	0.888
Other accompanying injuries			
Head + cervical	564 (76.1)	234 (81.3)	0.076
Upper limb	126 (17)	45 (15.6)	0.594
Thorax	39 (5.3)	30 (10.4)	0.003
Abdomen	108 (14.6)	39 (13.5)	0.671
Lower limb	102 (13.8)	30 (10.4)	0.149
Requirement of hospitalization	45 (6.1)	12 (4.2)	0.230
Mortality	9 (1.2)	3 (1)	1

*Indicates the statistically different group in post-hoc analysis

Summer and spring season injuries (n=165, %48.7 and n=66, %19.5, respectively) were statistically more common in the 6-12 age group male (p=0.02 and p=0.018). Vehicle traffic accidents were less common in the 12-18 age group (n=6,

%1.5). In the etiology of trauma, all age groups are statistically significantly different than others about the motorcycle, bicycle, fall, violence, and other injuries (p<0.001). All age groups are statistically significantly different than others about

accompanying abdomen injuries ($p < 0.001$). Comparison of patients according to the age groups were summarized in Table 3.

Discussion

In our study, we investigated the etiology, epidemiology, and injury type of pediatric maxillofacial trauma patients. There were significant differences in terms of age, gender, place of residence, season, trauma etiology, injury site, day of the week, and other accompanying injuries. The results of our study may be important in terms of raising awareness about pediatric maxillofacial

traumas, preventive and health promotion strategies for the population.

It is reported that maxillofacial traumas are more common in males with ratios of 4:1, 3:1, and 2:1 (8-12). This rate was approximately 3:1 in this study. It is known that this male dominance is generally related with the fact that girls are more restricted and boys are more free in some developing countries such as Turkey. The etiology of maxillofacial traumas varies according to age groups (13-16). While the most common etiologies are traffic accidents and terrorism in the 13-18 group, children in the 0-5 group are curious, energetic but had a poor body balance and they generally fall (2, 12, 16-18).

Table 3. Comparison of patients according to the age groups

	0-5 years n (%)	6-12 years n (%)	13-18 years n (%)	P value
Gender				
Male	207 (69)	264 (77.9)*	270 (69.2)	0.013
Female	93 (31)	75 (22.1)	120 (30.8)	
Season				
Autumn	72 (24)	81 (23.9)	75 (19.2)	0.210
Winter	36 (12)	27 (8)	48 (12.3)	0.122
Spring	75 (25)	66 (19.5)*	111 (28.5)	0.018
Summer	117 (39)	165 (48.7)*	156 (40)	0.020
Place of residence				
Urban	225 (75)	237 (69.9)	291 (74.6)	0.251
Rural	75 (25)	102 (30.1)	99 (25.4)	
Day of the week				
Week days	123 (41)	117 (34.5)	189 (48.5)	0.001**
Weekend	177 (59)	222 (65.5)	201 (51.5)	
Presence of mandible injury	21 (7)	27 (8)	24 (6.2)	0.633
Presence of maksilla injury	69 (23)	78 (23)	93 (23.8)	0.953
Presence of orbita injury	36 (12)	51 (15)	36 (9.2)	0.054
Presence of zygoma injury	33 (11)	36 (10.6)	27 (6.9)	0.115
Presence of temporal injury	57 (19)	66 (19.5)	69 (17.7)	0.815
Presence of nazal injury	63 (21)	60 (17.7)	75 (19.2)	0.572
Presence of frontal injury	66 (22)	72 (21.2)	81 (20.8)	0.926
Etiology or trauma				
In-vehicle accident	21 (7)	24 (7.1)	6 (1.5)*	<0.001
Off-vehicle accident	36(12)	39 (11.5)	51 (13.1)	0.802
Motorcycle accident	12 (4)	129 (38.1)	228 (58.5)	<0.001***
Bicycle	99 (33)	36 (10.6)	21 (5.4)	<0.001***
Fall	72 (24)	48 (14.2)	9 (2.3)	<0.001***
Violence	6 (2)	27 (8)	60 (15.4)	<0.001***
Others	54 (18)	36 (10.6)	15 (3.8)	<0.001***
Other accompanying injuries				
Head + cervical	222 (74)	267 (78.8)	309 (79.2)	0.213
Upper limb	54 (18)	63 (18.6)	54 (13.8)	0.172
Thorax	6 (2)*	24 (7.1)	39 (10)	<0.001
Abdomen	78 (26)	51 (15)	18 (4.6)	<0.001***
Lower limb	33 (11)	48 (14.2)	51 (13.1)	0.483
Requirement of hospitalization	18 (6)	18 (5.3)	21 (5.4)	0.917
Mortality	9 (3)*	0 (0)	3 (0.8)	0.001

*Indicates the statistically different age group in post-hoc analysis. **Only 6-12 age group is statistically significantly different then 13-18 age group in post-hoc analysis. ***All age groups are statistically significantly different than others in post-hoc analysis.

It is reported that maxillofacial traumas are more common in males with ratios of 4:1, 3:1, and 2:1 (8-12). This rate was approximately 3:1 in this study. It is known that this male dominance is generally related with the fact that girls are more restricted and boys are more free in some developing countries such as Turkey. The etiology of maxillofacial traumas varies according to age groups (13-16). While the most common etiologies are traffic accidents and terrorism in the 13-18 group, children in the 0-5 group are curious, energetic but had a poor body balance and they generally fall (2, 12, 16-18).

In this study, most of cases were recorded in summer in line with the literature. There is a limited data about the gender distribution according to the seasons (11, 19). In this study, contrary to general thought, male gender was statistically higher than female only in winter. In addition, 6-12 age group was significantly less injured in spring and summer than the other age groups.

Environmental factors play an important role in pediatric maxillofacial traumas. It can be estimated that children in rural areas play and have entertainment in open-air places which has less concrete. In addition, less traffic density in rural areas contributes to this idea. Joachim et al. reported that pediatric maxillofacial traumas were more common in urban areas and especially on weekends (11, 20). During the weekdays, children in urban areas spent their time mostly at a kindergarten or at school. Our study results have supported this idea. Maxillofacial traumas were more common in urban areas, and at weekends, especially, among the game-age children.

Traffic accidents, especially automobile accidents and motorcycle accidents, are the leading cause of pediatric maxillofacial traumas with a range of 20% to 40% (16, 21-24). In line with the literature, motorcycle accidents were the leading cause of all maxillofacial traumas in our study. In addition, while motorcycle accidents and violence were the main causes in adolescents (13-18 age group) as expected, surprisingly, bicycle accidents and falls were the leading cause among the 0-5 age group. In our region, motorcycle usage is very common and generally without security precautions. On the other hand, despite the security problems of motorcycle use, it is surprising that deaths are more common in young children.

The results of our study were shared with the governorship, police department, provincial gendarmerie regiment command, provincial and district municipalities, provincial directorate of sports and youth, provincial directorate of national education, and other public institutions. Necessary information was given on the prevention of pediatric maxillofacial traumas and what to do after trauma. In addition, it was planned to increase public awareness through social responsibility projects and academic studies.

Limitations: This study has limitations specific to a retrospective cross-sectional design using patient records available from a hospital emergency department. Data were collected by scanning the medical records with codes with injury codes. In general, the most common injury type may be considered as head+cervical injuries, since facial injury does not have a specific code (bruise, hematoma, swelling, etc.) and is recorded under head and neck trauma. Whether the person driving the car in automobile accidents is an adolescent or a parent could not be found in the records and the etiology was not fully understood. Future research is needed to investigate these factors and their possible relationships.

As a result, in our study, it was found that pediatric maxillofacial traumas occur mostly in the male gender, in summer, in urban areas, and due to motorcycle accidents. It was found that the 6-12 age group was injured less in the summer and winter seasons. In order to reduce child maxillofacial traumas, public awareness should be increased and playgrounds suitable for all age groups should be created.

Ethics Committee Approval: The study was conducted in compliance with the principles of the Declaration of Helsinki and approved by Aksaray University Ethical Committee; 14.04.2020; No: 2020/03-49.

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