ORIGINAL ARTICLE

Epidemiology of maxillofacial soft tissue injuries in an oral emergency department in Beijing: A two-year retrospective study

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Abstract

Background/Aims: Maxillofacial soft tissue injuries (STIs) may differ in epidemiological characteristics from other maxillofacial injuries. The aim of this study was to investigate the epidemiology of maxillofacial STIs in a public oral emergency department in Beijing, China, from 2017 to 2018.

Material and Methods: In this retrospective study, 5949 patients with maxillofacial STIs and complete medical records were evaluated. Gender, age, etiology, visit date and time, interval between accident and treatment, anatomic injury site, treatment modality, and the number of associated maxillofacial bone fractures or tooth injuries were analyzed.

Result: There were 3831 males and 2118 females (ratio 1.81:1). Patients younger than 10 years were the most frequently seen group (44.2%). Among adults, 20- to 29-years-old (16.2%) was the most prominent age group. The month of May (11.8%) had the highest incidence of maxillofacial STIs, and February (4.5%) had the lowest incidence. The average number of daily visits was significantly higher on holidays than on workdays. Of the 5949 patients, 45.9% attended at night, 2021 patients had dental trauma, and 31 had jaw fractures. The lips were the most common site of STIs, followed by the chin and gingiva. Lip and gingival STIs were more common in the 0- to 10-years-old group. Chin STIs were more common in the 20- to 39-years-old group. A fall was the leading cause of injury, especially in patients younger than 10 years and older than 70 years. Approximately 56.7% of the falls resulted in injuries to the lower one-third of the face. Sports injuries were more common among 10- to 29-years-old individuals.

Conclusion: STIs of the maxillofacial region were most likely to occur at night, in May and during holidays. Males, children younger than 10 years and 20- to 29-years-old adults were high-risk populations. Most maxillofacial STIs involved the lips, and one-third of the patients had dental trauma.

KEYWORDS
dental trauma, epidemiology, etilogy, maxillofacial trauma, soft tissue injury

1 | INTRODUCTION

Oral and maxillofacial trauma is a common condition in the maxillofacial emergency department. It can be classified into facial bone fractures, dento-alveolar trauma, and soft tissue injuries (STIs). The etiology and epidemiology of maxillofacial injuries varies widely in different regions of the world due to socioeconomic status and cultural aspects.[1,2] Most previous studies on maxillofacial trauma have concentrated on facial fractures and their distribution in relation to their etiology.[3-5] Maxillofacial STIs are more common and frequent in emergency departments, and they are minor injuries compared with jaw fractures. Therefore, they may have some different epidemiological characteristics. However few reports have focused on these minor injuries. Due to the possibility of scarring, maxillofacial STIs can cause not only esthetic problems but also psychological issues. [6] It is important to understand the epidemiological characteristics of STIs and to implement preventive public health policies. The aim of this study was to assess trauma patterns with oral and maxillofacial STIs and the characteristics of maxillofacial STIs in one of the two 24-h public emergency oral centers in Beijing, China. There are only two stomatology hospitals in Beijing. If trauma occurs in the maxillofacial region, especially when it is associated with dental trauma, most patients visit the stomatology hospital for treatment.

2 | MATERIALS AND METHOD

The study was approved by the Ethics Committee and was conducted under the guidance of international ethical standards (PKUSSIRB-202054051).

From January 1 2017, to December 31 2018, all patients with STIs were enrolled.

The inclusion criteria were as follows:

1. Patients with STIs due to oral and maxillofacial trauma at the initial visit;
2. Patients with all types and severity of maxillofacial injuries; the diagnoses of STIs in the electronic records were as follows: abrasion, laceration and avulsion, contusion, communication, puncture, incision, bite, animal bite, and blast injury.
3. Patients with complete electronic medical records, including gender, age, visit time, chief complaint, examination, diagnosis, and treatment.

The exclusion criteria were as follows:

1. Patents with incomplete electronic medical record.
2. Patients who had received treatment in other hospitals.
3. Patients who were returning after their initial visit.

There were 5949 patients in total. All data were analyzed with SPSS Statistics, version 19.0 (IBM Corp., Armonk, NY, USA). Descriptive analyses were performed to obtain the distribution of gender, age, etiology, visiting date and time, time interval between the accident and treatment, the anatomic site of injury, treatment modality, association with maxillofacial bone fractures, and the numbers of associated bone fractures or associated tooth injuries. The Pearson Chi-square test, nonparametric Mann–Whitney test, and nonparametric Kruskal–Wallis test were used ($p \leq 0.05$). Further pairwise comparisons were performed using the Bonferroni correction method.

3 | RESULTS

There were 3831 men and 2118 women among 5949 total patients, with a male:female ratio of 1.81:1.

The minimum age of the 5949 patients was 6 months, the maximum age was 95 years, and the average was 21.60 ± 20.97 years. The highest incidence rates were found in the 0- to 10-years age group (2628, 44.2%) (Table 1). In the adult group, the 20- to 29-years-old age group was the most prominent group, with an incidence rate of 16.2%. In the adult group, with increasing age, the rate of trauma decreased (Table 1). The 10- to 19-years-old age group had the highest male:female ratio of 2.73:1. After 40 years, with increasing age, the ratio of males to females decreased (Table 2).

The month of May had the highest incidence of trauma (704 cases, 11.8%, 11.4 cases per day), followed by September and October. February had the lowest incidence (268 cases, 4.5%, 4.8 cases per day) (Figure 1). The differences in incidence between months were statistically significant (Kruskal–Wallis test, $X^2 = 132.365$, $p < 0.001$).

The average number of daily visits on holidays was 8.96 ± 4.3 per day (2080 patients, 232 days) and that on working days was 7.76 ± 3.4 per day (3869 patients, 498 days) (Table 1). The difference was statistically significant (Mann–Whitney U test, Z = −3.736, $p < 0.001$). A total of 45.9% of the patients visited from 18:00-24:00 (Table 1).

Among the 5949 patients, the time interval between the accident and treatment ranged from 15 minutes to 120 hours. The average time was 5.2 hours, and the median time was 3 hours. A total of 74.8% of the patients presented to the emergency department within 4 hours, and only 3.5% of the patients presented after 24 hours (Table 1).

Among the 5949 patients, 2021 patients (34%) had associated dental trauma. Thirty-one patients (0.5%) had associated maxillofacial bone fractures (excluding alveolar fractures).

Among the 5949 cases of STIs, 74.3% (4418) were single-site injuries, and 25.7% (1531) were multiple-site injuries. There were 7213 injury sites in 5949 patients. The lip (including the labial mucosa) (60.1%), followed by the chin (9.1%) and gingivae (8.7%) had the highest trauma incidence rates. Bivariate analysis comparing gender and anatomic trauma site showed significant correlations with some of the independent variables. Cheek STIs were more common in males, and gingival STIs were more common in females (Table 3). Bivariate analysis comparing age and anatomic trauma site showed significant correlations ($p < 0.001$) (Bonferroni correction was performed

TABLE 1 Sample distribution according to demographic characteristics, trauma, and independent variables. (N = 5949)

	Variables	N	%
Gender	Male	3831	64.4
	Female	2118	35.6
Age (21.60 y ± 20.97)	0 ~ 9 y	2628	44.2
	10 ~ 19 y	582	9.8
	20 ~ 29 y	966	16.2
	30 ~ 39 y	676	11.4
	40 ~ 49 y	402	6.8
	50 ~ 59 y	294	4.9
	60 ~ 69 y	187	3.1
	70 ~ 79 y	123	2.1
	above 80	91	1.5
Visiting day	workdays	3869	65.0
	holidays	2080	35.0
Visiting time	0:00-6:00	656	11.0
	6:00-12:00	677	11.4
	12:00-18:00	1885	31.7
	18:00-24:00	2731	45.9
Time interval between accident and treatment	within 4 hours	4449	74.8
	4 ~ 12 hours	1078	18.1
	12 ~ 24 hours	276	4.6
	After 24 hours	146	2.5
Associated dental trauma	Yes	2021	34.0
	No	3928	66.0
Associated jaw fractures	Yes	31	0.5
	No	5918	99.5
Single/multiple sites	Single	4418	74.3
	Multiple	1531	25.7
Sites	Lip	4333	60.1
	Chin	659	9.1
	Gingiva	626	8.7
	Cheek	534	7.4
	Tongue	320	4.4
	Orbit region	165	2.3
	Zygomatic region	178	2.5
	Forehead	107	1.5
	Others	291	4.0
Etiology	Fall	3206	53.9
	Traffic	592	10.0
	Sports	573	9.6
	Bump	442	7.4
	Cutting	266	4.5
	Fights	263	4.4
	Biting	198	3.3
	Others	409	6.9
Sutured	Yes	4256	71.5
	No	1693	28.5

between pitch type). Lip and gingival STIs were more common in the age group younger than 10 years, chin STIs were more common in the 20- to 29-years-old and 30- to 39-years-old age groups and cheek STIs were more common in the 50- to 59-years-old and 60- to 69-years-old age groups (Table 3).

Accidental falls were the leading etiological factor, causing to injury in 3206 patients (53.8%). Bivariate analysis comparing gender and anatomic trauma site showed significant correlations with some of the independent variables. Most STIs in females (1327/2118, 62.7%) were caused by accidental falls. Most fight-related (82.9%) and sports-related (87.9%) injuries occurred in males. Bivariate analysis comparing age and anatomic trauma site showed significant correlations ($p < 0.001$) (Bonferroni correction was performed between pitch type). Fall-related injuries frequently occurred in the 0- to 10-years-old and older than 70 years age groups, traffic- and violence-related injuries were more common in the 30- to 49-years-old age group, sports-related injuries were more likely to occur in the 10- to 29-years-old age group and bump-related injuries were more likely to occur in the 10- to 19-years-old age group (Table 4).

Bivariate analysis comparing falls and anatomic trauma site showed significant correlations. A total of 56.7% of the falls resulted in injuries to the lower one-third of the face (Table 5).

In total, 4256 patients (71.5%) were treated with debridement and suturing, among which 66.9% were males. In the 0- to 10-years-old age group, the suture rate was the lowest. The age group above 80 years had the highest suture rate (Tables 1 and 4).

4 | DISCUSSION

Oral and maxillofacial trauma is classified into facial bone fractures, dento-alveolar trauma, and soft tissue injuries. As different studies focus on different aspects, the etiology and epidemiology vary widely.[7-9] The aim of this study was to assess trauma patterns in people with oral and maxillofacial STIs and the characteristics of maxillofacial STIs in one of the two 24-h public emergency oral centers in Beijing, China, and to recommend some public policy interventions.

The ratio of males to females suffering maxillofacial trauma is different between countries. Boffano et al reviewed all papers published in English between January 1980 and December 2013 and summarized that most African studies reported a male:female ratio of 4:1 or more. North American and Brazilian studies have reported male:female ratios between 2:1 and 4.3:1, and European studies have reported male:female ratios between 1.8:1 and 6.6:1, which have remained stable over the last three decades.[7] Affected by hormone levels and social roles, males are more involved in highly traumatic activities than females. Fractures are caused by a greater external force than are STIs. In reports of more traumatic activities, the male-to-female ratio is higher. In reports on STIs, the ratio of males to females is relatively low, such as Park et al.[8] (2.5:1), and Gassner et al.[9] (2.1:1). In the current study, the average ratio was 1.81:1, which was lower than the ratios reported in other studies. This may be because the leading etiology was falls in this study. In

TABLE 2 Age and gender distribution of maxillofacial soft tissue injuries.

	Gender		
	Male	Female	M/F
0 ~ 9 y	1622[a]	1006[b]	1.61
10 ~ 19 y	426[a]	156[b]	2.73
20 ~ 29 y	690[a]	276[b]	2.50
30 ~ 39 y	441[a]	235[a]	1.88
40 ~ 49 y	267[a]	135[a]	1.98
50 ~ 59 y	180[a]	114[a]	1.58
60 ~ 69 y	99[a]	88[b]	1.13
70 ~ 79 y	64[a]	59[b]	1.08
above 80	42[a]	49[b]	0.86
Total	3831	2118	1.81
P	<0.001		

Note: Each superscript letter denotes a subset of these categories, the same superscript lowercase letter ([a a]) whose column proportions do not differ significantly from each other at the .05 level; different superscript lowercase letter ([a b]) indicate statistical differences.

Boffano et al.'s research, in an area where violence was the main cause of trauma, the ratio of males to females was higher than in an area with falls as the main cause. [7] In this study, the incidence of falls was as high as 53.9%, and the incidence of falls in women (62.7%) was higher than that in men (49.0%). In the 10- to 19-years-old age group, the ratio of males to females reached 2.73:1, and in the 20- to 29-years-old age group, it was 2.50:1. Hyperactivity of males in the 10- to 19-years-old age group plus high physical and social activities in males in the 20- to 29-years-old age group may increase their exposure to trauma.[3] From 40 years of age, the ratio decreased with age. Above 80 years of age, the number of female patients was progressively higher than the number of male patients. This result is consistent with the literature.[10,11] The former is probably related to reduced behavioral differences due to hormone levels and greater

longevity in the elderly female population than in the elderly male population, according to demographics.[12]

A low weight and small size favor inertia reduction, thus minimizing the impact force when a child collides with an object.[13] In addition, because of the characteristics of children's skeletons, the incidence of maxillofacial fractures is lower in children than in adults. Hence, most maxillofacial injuries in children are STIs.[14] In studies focusing on maxillofacial STIs, children younger than 10 years of age have the highest incidence, especially when falls are the main cause of trauma.[8,9,15] Park et al. found that patients younger than 10 years had the highest incidence, accounting for 20.7%, and the incidence of falls was 43.9%.[8] Gassner reported the incidence in this age group was 24.3% and the incidence of falls was 43.1%.[9] In this study, the age group younger than 10 years had the highest incidence of STI at 44.2%, and the incidence of falls was 53.9%. Further analysis found that 70.8% of STIs in this age group were caused by falls. The reasons for this high incidence might be that children are generally boisterous, spend a large amount of time outdoors and have poor self-protection reactions. Another reason may be that parents pay substantial attention to children of this age. Parents may choose to see a doctor in the event of a minor STI out of fear. According to the low rate of sutures, trauma in this age group may be more minor than trauma in the other age groups. Park et al. believed that lacerations among those under 10 years old were often minor injuries caused by parents or by the patients' own carelessness. [8] With age, the rate of trauma caused by sports, violence, and traffic accidents increases.[9,15] Gassner reported that the occurrence of sports injuries peaked in the second and third decades. Violence (assault), work, and traffic accidents were most prevalent in the third decade of life.[9] This study is basically consistent with Gassner's research. Sports-related injuries occur more frequently in the second and third decades. People in these age groups tend to engage in more social activities, are more interested in sports, and are more easily excited and aggravated than those in the other adult age groups.[3,16,17] In this study, traffic accidents occurred more frequently in the fifth decade, which may be due to the highest rate of private car ownership and
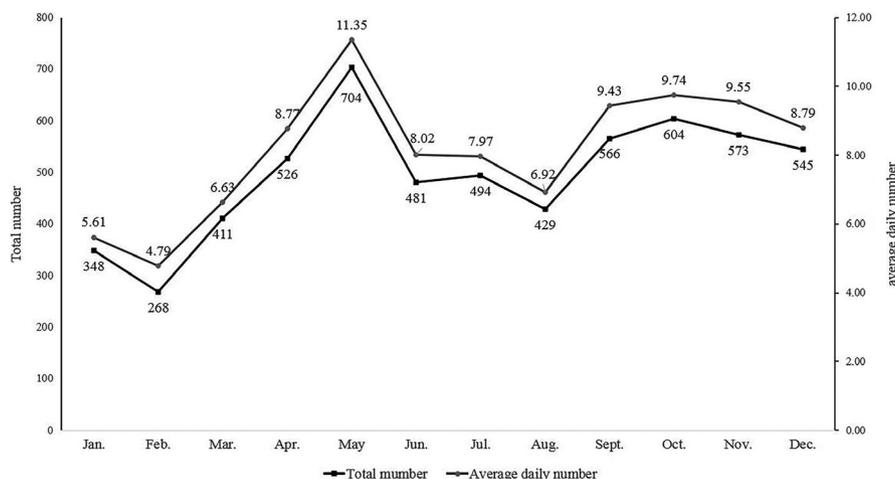

FIGURE 1 Month distribution of maxillofacial soft tissue injuries

TABLE 3 Distribution of trauma according to the anatomic site, gender and different age groups.

	Lip n/%		Chin n/%		Gingiva n/%		Cheek n/%		Tongue n/%		Orbit region n/%		Zygomatic region n/%		Forehead n/%	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Gender																
Male	2813 60.30%	1852 39.70%	404 8.66%	4261 91.34%	376 8.06%	4289 91.94%	371 7.95%	4294 92.05%	221 4.74%	4444 95.26%	112 2.40%	4553 97.60%	110 2.36%	4555 97.64%	74 1.59%	4591 98.41%
Female	1520 59.65%	1028 40.35%	255 10.01%	2293 89.99%	250 9.81%	2298 90.19%	163 6.40%	2385 93.60%	99 3.89%	2449 96.11%	53 2.08%	2495 97.92%	68 2.67%	2480 97.33%	33 1.30%	2515 98.70%
P	0.593		0.058		0.012		0.016		0.093		0.384		0.416		0.328	
Age (years)																
0 ~ 9	1934[a] 63.40%	1117[b] 36.60%	277[a] 9.10%	2774[a] 90.90%	343[a] 11.20%	2708[b] 88.80%	171[a] 5.60%	2880[b] 94.40%	172[a] 5.60%	2879[b] 94.40%	28[a] 0.90%	3023[b] 99.10%	19[a] 0.60%	3032[b] 99.40%	23[a] 0.80%	3028[b] 99.20%
10 ~ 19	400[a] 60.20%	264[a] 39.80%	70[a] 10.50%	594[a] 89.50%	70[a] 10.50%	594[a] 89.50%	46[a] 6.90%	618[a] 93.10%	10[a] 1.50%	654[b] 98.50%	19[a] 2.90%	645[a] 97.10%	10[a] 1.50%	654[a] 98.50%	10[a] 1.50%	654[a] 98.50%
20 ~ 29	716[a] 60.80%	461[a] 39.20%	134a 11.40%	1043[b] 88.60%	60[a] 5.10%	1117[b] 94.90%	95[a] 8.10%	1082[a] 91.90%	33[a] 2.80%	1144[b] 97.20%	30[a] 2.50%	1147[a] 97.50%	38[a] 3.20%	1139[a] 96.80%	21[a] 1.80%	1156[a] 98.20%
30 ~ 39	479[a] 55.80%	380[b] 44.20%	98[a] 11.40%	761[b] 88.60%	41[a] 4.80%	818[b] 95.20%	84[a] 9.80%	775[b] 90.20%	25[a] 2.90%	834[b] 97.10%	36[a] 4.20%	823[a] 95.80%	33[a] 3.80%	826[b] 96.20%	16[a] 1.90%	843[a] 98.10%
40 ~ 49	292[a] 55.10%	238[b] 44.90%	30[b] 5.70%	500[a] 94.30%	42[a] 7.90%	488[a] 92.10%	41[a] 7.70%	489[a] 92.30%	25[a] 4.70%	505[a] 95.30%	19[a] 3.60%	511[a] 96.40%	30[a] 5.70%	500[b] 94.30%	18[a] 3.40%	512[b] 96.60%
50 ~ 59	209[a] 53.70%	180[b] 46.30%	23[a] 5.90%	366[b] 94.10%	26[a] 6.70%	363[a] 93.30%	43[a] 11.10%	346[b] 88.90%	18[a] 4.60%	371[a] 95.40%	15[a] 3.90%	374[b] 96.10%	19[a] 4.90%	370[b] 95.10%	10[a] 2.60%	379[a] 97.40%
60 ~ 69	139[a] 52.70%	125[b] 47.30%	15[a] 5.70%	249[b] 94.30%	18[a] 6.80%	246[a] 93.20%	31[a] 11.70%	233[b] 88.30%	19[a] 7.20%	245[b] 92.80%	10[a] 3.80%	254[a] 96.20%	13[a] 4.90%	251[b] 95.10%	6[a] 2.30%	258[a] 97.70%
70 ~ 79	94[a] 60.30%	62[a] 39.70%	5b 3.20%	151[a] 96.80%	14[a] 9.00%	142[a] 91.00%	16[a] 10.30%	140[a] 89.70%	12[a] 7.70%	144[b] 92.30%	3[a] 1.90%	153[a] 98.10%	7[a] 4.50%	149[a] 95.50%	2[a] 1.30%	154[a] 98.70%
≥80	70[a] 56.90%	53[a] 43.10%	7[a] 5.70%	116[a] 94.30%	12[a] 9.80%	111[a] 90.20%	7[a] 5.70%	116[a] 94.30%	6[a] 4.90%	117[a] 95.10%	5[a] 4.10%	118[a] 95.90%	9[a] 7.30%	114[b] 92.70%	1[a] 0.80%	122[a] 99.20%
P	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	

Note: Each superscript letter denotes a subset of these categories, the same superscript lowercase letters ([a a]) whose column proportions do not differ significantly from each other at the .05 level; different superscript lowercase letters ([a b]) indicate statistical differences.

TABLE 4 Distribution of trauma according to being sutured or not, etiology, gender and different age groups

	Sutured		Fall		Traffic		Sports		Bump		Cutting		Fights		Biting	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Gender																
Male	2848 / 74.3%	983 / 25.7%	1879 / 49.0%	1952 / 51.0%	368 / 9.6%	3463 / 90.4%	503 / 13.1%	3328 / 86.9%	304 / 7.9%	3527 / 92.1%	201 / 5.2%	3630 / 94.8%	218 / 5.7%	3613 / 94.3%	144 / 3.8%	3687 / 96.2%
Female	1408 / 66.5%	710 / 33.5%	1327 / 62.7%	791 / 37.3%	224 / 10.6%	1894 / 89.4%	70 / 3.3%	2048 / 96.7%	138 / 6.5%	1980 / 93.5%	65 / 3.1%	2053 / 96.9%	45 / 2.1%	2073 / 97.9%	54 / 2.5%	2064 / 97.5%
P	<0.001		<0.001		0.254		<0.001		0.012		0.002		<0.001		0.017	
Age (years)																
0 ~ 9	1694[a] / 64.5%	934[b] / 35.5%	1861[a] / 70.8%	767[b] / 29.2%	75[a] / 2.9%	2553[b] / 97.1%	68[a] / 2.6%	2560[b] / 97.4%	221[a] / 8.4%	2407[a] / 91.6%	57[a] / 2.2%	2571[b] / 97.8%	11[a] / 0.4%	2617[b] / 99.6%	81[a] / 3.1%	2547[a] / 96.9%
10 ~ 19	438[a] / 75.3%	144[a] / 24.7%	221[a] / 38.0%	361[b] / 62.0%	67[a] / 11.5%	520[b] / 89.3%	131[a] / 22.5%	451[b] / 77.5%	58[a] / 10.0%	524[b] / 90.0%	33[a] / 5.7%	549[a] / 94.3%	25[a] / 4.3%	557[a] / 95.7%	9[a] / 1.5%	573[b] / 98.5%
20 ~ 29	740[a] / 79.9%	226[b] / 20.1%	341[a] / 35.3%	625[b] / 64.7%	143[a] / 14.8%	823[b] / 85.2%	221[a] / 22.9%	745[b] / 77.1%	80[a] / 8.3%	886[a] / 91.7%	52[a] / 5.4%	914[b] / 94.6%	76[a] / 7.9%	890[b] / 92.1%	23[a] / 2.4%	943[a] / 97.6%
30 ~ 39	510[a] / 75.4%	166[a] / 24.6%	252[a] / 37.3%	424[b] / 62.7%	121[a] / 17.9%	555[b] / 82.1%	76[a] / 11.2%	600[a] / 88.8%	37[a] / 5.47%	639[a] / 94.5%	45[a] / 6.7%	631[b] / 93.3%	69[a] / 10.2%	607[b] / 89.8%	23[a] / 3.4%	653[a] / 96.6%
40 ~ 49	313[a] / 79.8%	89[b] / 20.2%	146[a] / 36.3%	256[b] / 63.7%	92[a] / 22.9%	314[b] / 78.1%	29[a] / 7.2%	373[a] / 92.8%	22[a] / 5.5%	380[b] / 94.5%	41[a] / 10.2%	361[b] / 89.8%	43[a] / 10.7%	359[b] / 89.3%	21[a] / 5.2%	381[a] / 94.8%
50 ~ 59	232[a] / 78.9%	62[b] / 21.1%	132[a] / 44.9%	162[b] / 55.1%	52[a] / 17.7%	242[b] / 82.3%	23[a] / 7.8%	271[b] / 92.2%	10[a] / 3.4%	284[b] / 96.6%	22[a] / 7.5%	272[b] / 92.5%	26[a] / 8.8%	268[b] / 91.2%	15[a] / 5.1%	279[b] / 94.9%
60 ~ 69	147[a] / 78.6%	40[b] / 21.4%	104[a] / 55.6%	83[a] / 44.4%	27[a] / 14.4%	155[a] / 82.9%	15[a] / 8.0%	172[b] / 92.0%	7[a] / 3.7%	180[a] / 96.3%	9[a] / 4.8%	178[a] / 95.2%	10[a] / 5.3%	177[a] / 94.7%	12[a] / 6.4%	175[b] / 93.6%
70 ~ 79	97[a] / 78.9%	26[a] / 21.1%	79[a] / 64.2%	44[b] / 35.8%	11[a] / 8.9%	105[a] / 85.4%	7[a] / 5.7%	116[a] / 94.3%	4[a] / 3.3%	119[a] / 96.7%	4[a] / 3.3%	119[a] / 96.7%	2[a] / 1.6%	121[b] / 98.4%	10[a] / 8.1%	113[b] / 91.9%
≥80	85[a] / 93.4%	6[b] / 6.6%	70[a] / 76.9%	21[b] / 23.1%	4[a] / 4.4%	87[a] / 95.6%	3[a] / 3.3%	88[b] / 96.7%	3[a] / 3.3%	88[a] / 96.7%	3[a] / 3.3%	88[a] / 96.7%	1[a] / 1.1%	90[b] / 98.9%	4[a] / 4.4%	87[a] / 95.6%
P	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	

Note: Each superscript letter denotes a subset of these categories, the same superscript lowercase letters ([a, a]) whose column proportions do not differ significantly from each other at the .05 level; different superscript lowercase letters ([a, b]) indicate statistical differences.

TABLE 5 Distribution of trauma according to anatomic region and falls.

	Fall		
Anatomic region	Yes n (%)	No n (%)	p
Middle of the lower one-third of face[*]			
Yes	2924(56.7)	2232(43.3)	<0.001
No	282(35.6)	511(64.4)	
Lateral part[**]			
Yes	353(40.3)	524(59.7)	<0.001
No	2853(56.3)	2219(43.7)	
Others			
Yes	136(30.4)	312(69.4)	<0.001
No	3070(55.8)	2431(44.2)	

*Lips, gingiva, chin.

**Cheek, mandibular region, zygomatic region, parotid region.

utilization in this age group in China. In recent years, there has been a decreasing trend in road traffic accident-related facial trauma and assault-related trauma in several countries due to changes in road safety legislation and public security. However, there has been an increase in the incidence of falls.[7,18] In general, the rates of sports injuries, road traffic accidents and assault-related injuries were lower than those in other studies. As the capital of China, Beijing has a high degree of urbanization and is relatively safe in terms of urban traffic and violent crime.

Gassner proposed that the rate of accidents from activities of daily life such as falls increased with age, becoming the prevailing cause from the sixth to the tenth decades. As shown in this study and other studies, most of the injuries in the elderly were caused by falls.[11,19] In this study, more than 50% of trauma in the older adults was caused by falls, and in the elderly it was as high as 76.9%. They also had the highest suture rate of up to 83%. Factors such as poor proprioception, weakness, and impaired reflexes may be responsible for the occurrence of maxillofacial injuries in the elderly. Therefore, preventive measures, such as the installation of handrails on stairs, in bathrooms and wrapping hard edges and corners of furniture with soft materials, similar to the measures taken for toddlers, should be applied. In some countries, environmental changes have been shown to be effective in reducing the number of falls.[20-22]

In this study, 60.1% of the injuries occurred on the lips (including the lip mucosa), followed by the gingiva and chin, which is consistent with the literature.[3,14] In different studies, the proportion of injuries at each site is different, but the lips are always the most commonly affected site. Because the lip area is a protruding structure and is near hard structures (i.e., teeth), it carries a high risk of injury and it is the most easily perceived area of intraoral lacerations at the time of the initial diagnosis in the ER.[8] In Malaysia[16] among STI, the rate of lip (including the lip mucosa) injuries was as high as 62%. In the study by Manodh et al,[3] lip injuries accounted for 45% of maxillofacial STIs. In Korea, lip injuries accounted for 34% of maxillofacial lacerations,

while among extra-oral lacerations, the chin area was most frequently injured.[8] In this study, the lips were also the main injury site, followed by the chin. In addition, lip and gingival STIs were more common in children younger than 10 years, and chin STIs were more common in the third and fourth decades. Other studies focused on maxillofacial trauma have reported that the mandible region in the lower third of the face was the most vulnerable region.[2,4] Accidental falls often affect the lips and chin in the lower third of the face and even the gingiva in the mouth, as shown in this study.

When patients visit a medical facility for STIs, attention should also be paid to the teeth. In different studies, the incidence of concomitant tooth trauma is different. In the Park et al. study of maxillofacial soft tissue lacerations, approximately 17% were accompanied by tooth trauma.[8] There were 38.2% in Grassner's study[9], which was close to the rate of 34% in this study. Only 5.6% maxillofacial injuries were associated with dental trauma in the study by Rêgo et al.[23] That was a study about oral and cranio-maxillofacial trauma, which included more trauma sites, making the proportion of dental trauma relatively low. The causes of trauma in this study were similar to those in the Park et al. study, namely falls and bumps, but the rate of tooth trauma was higher. This difference may be related to the proportion of injured sites.[8] Here, simple STIs that do not involve teeth may be sutured in general hospitals. However, they do not have the ability to diagnose and treat tooth trauma. More maxillofacial trauma patients with tooth trauma will be referred to the stomatology hospital, which may result in this bias. Only 0.5% of the patients had jaw fractures, which was quite different from other published reports. The possible reasons are: 1). In this study, the causes of major trauma, such as sports and traffic accidents, were relatively rare; therefore, the incidence of maxillofacial fractures was lower than the incidence in reports of traffic accidents and violent attacks, and 2). In this study, the emergency department and trauma clinic are two independent departments; thus, many patients who were sutured in other hospitals and had maxillofacial fractures may have gone directly to the trauma clinic. This can be inferred because the number of patients with maxillofacial fractures in the trauma clinic was higher than the number of fractures in this study.[24]

In this study, daily visits on holidays were significantly higher than on workdays. The incidence of STIs in warm seasons was higher than in cold seasons. The month with the highest incidence of trauma was May, followed by September and October. February and January had the lowest incidence. May, September, and October are the most comfortable months in northern China, while January and February are the coldest months. In very hot or cold periods, people are inclined to stay indoors. Some studies have described a higher incidence of maxillofacial trauma in summer months, at night, and on weekends.[8,25-27] However, in Brazil, which has a tropical climate and no drastic temperature changes throughout the year, the monthly dṇistributions were similar in all seasons.[28] In this study, almost half of the patients visited at night. After school and after work, people have more activities leading to an increase in trauma.

In this study, 74.8% of the patients presented to the emergency department within 4 hours after injury, and more than 90%

presented within 12 hours. Trauma is more likely to attract patients' attention than other dental diseases; thus, there were few delayed cases. There are only two stomatology hospitals in Beijing. When maxillofacial injuries occur, most patients do not know to go to the stomatology hospital directly, and they go instead to the nearest general hospital to seek medical services. If trauma occurs in the maxillofacial region and especially when it is associated with dental trauma, the general hospital will recommend that the patient visit the stomatology hospital for further examination and treatment. Therefore, in this study, the median time interval between accident and treatment was 3 hours, rather than immediately. Sometimes, intraoral injuries are overlooked by patients. As a result, some patients will go to the hospital more than 12 hours or even 24 hours after the injury.

5 | CONCLUSIONS

STIs of the maxillofacial region are most likely to occur at night, in May and during the holidays. Males, young children and 20- to 29-years-old adults had a high incidence of maxillofacial STIs. Falls were the leading etiology, and the highest proportion of injuries occurred on the lips. Because STIs of children and the older adults are most likely to be caused by falls, and the elderly are more severely injured, the protection measures for these groups in their living environment should be strengthened. Sports injuries are more common among people aged 10-29 years. It is recommended to use protective gear to protect the lips and teeth during sports activities.

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