

Prevalence of dental trauma in 5- to 6-, 12-, and 15-year-old children in Iran

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(Submitted: 26 May 2019 – Revised version received: 09 June 2019 – Accepted: 23 June 2019 – Published online: 26 August 2019)

Objectives This study assessed the prevalence of dental trauma among the 5- to 6-, 12- and 15-year-old Iranian children. Age, sex and place of residence of children with dental trauma and the correlation between parental level of education and prevalence of dental trauma were also evaluated.

Materials and Methods In this descriptive, cross-sectional study, we used the 2012-national survey data on oral health, which included a sample of Iranian individuals recruited from all provinces of Iran. A cluster random sample of 26,000 children in three age groups were included in this study. SPSS software was used for statistical analysis after quality control and data clean up.

Results The overall prevalence of dental trauma was 4.1% for the total sample. This value was 5.4% in boys and 3.1% in girls. The most common age of occurrence was 15 years (6%) followed by 12 (4.9%) and 5–6 years (1.5%) of age. The highest percentage of dental trauma in 12- and 15-year-old children was noted in “Kohkiluyeh and Boyer-Ahmad” Province. Higher level of parental education was associated with lower frequency of trauma in all age groups. The prevalence of dental trauma was lower among those residing in rural compared with urban areas.

Conclusion This study demonstrated relatively high prevalence of dental traumatic injuries among 5- to 15-year-old Iranian children (4.1%). Based on the reported associations, more effort is necessary to educate all parents and children on trauma prevention with priority in urban areas.

Keywords dental trauma, prevalence, education, oral health, Iran

Introduction

Usually dental trauma occurs as a result of falls or various kinds of accidents. The maxillary anterior teeth are most vulnerable to dental trauma. The prevalence of dental trauma in boys is often twice the rate in girls due to their higher outdoor and sport activities.¹ Dental trauma may vary in severity from a small enamel crack to complete avulsion of involved teeth. In addition to pain and bleeding, dental trauma may result in tooth loss and create an unaesthetic facial appearance, which can negatively affect the children and their social interactions, and can leave psychological sequel.²

Dental trauma has a higher incidence rate in children with attention-deficit hyperactivity disorder. Based on a review study by Glendor et al.³ most ADHD patients are predisposed to dental trauma when they are between 8 and 17 years of age. Several classifications have been proposed for dental trauma based on its causes.⁴

Oral and dental problems in children may adversely affect their growth and development as well as their quality of life.⁵ Given the importance of oral health-related quality of life in these children, and high prevalence of dental trauma in these age groups, attempts must be made to prevent and control the occurrence of dental trauma in young children.^{6,7}

Evidence shows that dental trauma accounts for 5% of all traumas. It has also been reported that the risk of dental trauma is the highest before the age of 12 years with the annual incidence rate of 18/1000 population.^{2,8} Oral and dental trauma has been considered the third most common type of trauma.^{2,8}

The prevalence of dental trauma widely varies in different countries and in different age groups. Previous studies on this

topic were not large-scale and therefore were not suitable for national decision making and strategy planning. Also, different methodologies and different classifications have been used in previous studies which highlight the need for large-scale, comprehensive studies to determine the national prevalence of dental trauma and related factors in Iran. Therefore, this study aimed to assess the prevalence of dental trauma by using a large representative national sample of Iranian children of 5–6, 12 and 15 years old recruited from all provinces of Iran. This epidemiological study provides baseline information regarding the prevalence of dental trauma and selected factors involved. Such information is highly valuable for strategic planning to control dental trauma.

Materials and Methods

A World Health Organization (WHO) designed and recommended questionnaire (2013) for children were used for data collection.⁹ This questionnaire was translated to Persian language and standardized prior to use. A dental team (dentist and hygienist) was calibrated prior to perform oral examinations of children and completing the questionnaires. A calibrated dentist performed the oral examination and calibrated dental hygienists assisted the dentist in data entry.¹⁰

The national survey proposal was approved by the ethics committee of the Research Institute of Dental Sciences, School of Dentistry, Shahid Beheshti University of Medical Sciences with the reference number: (INOHS-2012). After obtaining informed consent from parents, a sample of 5- to 6-, 12- and 15-year-old children was recruited for this study. The exclusion criteria were oral and systemic diseases and any other

condition that could compromise the patient cooperation, unwillingness for participation in the study and children with non-Iranian ethnic background.

Children were selected by cluster random sampling of urban and rural, high and low socioeconomic classes of both sexes, in order to have a representative sample at the provisional national level. The sample size was calculated according to the WHO protocol. A total of 20 clusters ($n = 15$) from each province ($n = 300$) were recruited for each age group (5–6, 12 and 15 years) yielding a total sample of 28,800 children at the national level. This study was performed in accordance with the methodology suggested by the WHO.⁹ A standard protocol was used for clinical examination and data collection. The clinical examination was carried out by calibrated dentists and recorded by calibrated hygienists. The interview data were collected and recorded by calibrated hygienists as well.⁹ The questionnaire was translated to Persian language and standardized prior to its administration.

The collected data on oral health status of subjects were analyzed after proper quality control and data clean up using SPSS version 22.0 (SPSS Inc., IL, USA). The absolute and relative frequency of dental trauma in different age groups were reported for each province. Chi-square test was used to compare urban/rural and male to female ratios in each age group of children with dental trauma. The Mann–Whitney and Chi-square linear-by-linear association test were used to compare the level of education in parents and age distribution of subjects with and without dental trauma.

Descriptive statistics on distribution of age, sex and place of residence of patients with dental trauma and the correlation between the parental level of education and the prevalence of dental trauma were also evaluated.

Results

A total of 28,800 subjects from 31 provinces of Iran were recruited for this study. After elimination of incomplete questionnaires, a total of 26,407 subjects remained in the study. Table 1 shows the frequency distribution of subjects from each province. Table 2 shows the frequency distribution of males/females and urban/rural areas. As demonstrated in Table 2, the male/female distribution was almost the same in all three age groups. In relation to place of residence, about 60% of the sample were living in urban areas and about 40% were living in rural areas for all age groups. Table 3 presents the percentage of subjects with dental trauma in different provinces with notable variations. The national prevalence of dental trauma was 4.1%. The percentage of dental trauma in all three age groups was higher than the national mean in 13 provinces. The overall percentage of dental trauma was 1.5%, 4.9% and 6% in 5- to 6-, 12- and 15-year-old children, respectively. The comparison of dental trauma at the provincial level revealed that the highest prevalence of dental trauma was reported from “Kohkiloye and Boyerahmad” Province (7.6%) followed by “Fars” province (7%). The highest percentage of dental trauma in the entire country was observed in 15-year-old age group (6%), while the lowest percentage was reported for 5- to 6-year-old (1.5%) children. The mean prevalence at the national level for 12-year-old children was 4.9%. Based on these data, 13 provinces had a higher prevalence of dental trauma than the national mean value. The national mean was 6% in 15-year-old children. A higher mean prevalence rate of

dental trauma in 15-year-old children was shown in 13 provinces when compared with the national mean value. The highest prevalence of dental trauma in 15-year-old children was noted in “Kohkiloye and Boyerahmad” Province (11.2%).

The prevalence of dental trauma in 5- to 6-year-old children was 1.5%. Also, 10 provinces had a higher prevalence rate than the mean national value in this age group. The highest number of 5- to 6-year-old children with dental trauma was noted in “Fars” Province (3.4%) while the lowest prevalence was detected in “West Azerbaijan” (0%) Province.

The national mean prevalence of dental trauma in 12-year-old children was 4.9%. The mean was higher than the national mean value for 12-year-old children in 13 provinces. The highest prevalence of dental trauma in 12-year-old children was noted in “Kohkiloye and Boyerahmad” (10.4%) while the lowest prevalence was noted in “Kermanshah” Province (1.3%). The lowest prevalence was noted in “East Azerbaijan” Province (1.0%). Table 4 shows the distribution of children with dental trauma by sex. The prevalence of dental trauma was higher among boys (5.2%) when compared with girls (3.1%) of the same age with 68:1 ratio ($P < 0.0001$).

The results showed that urban living 5- to 6-year-old children experienced significantly higher dental trauma than rural living counterparts (1.7% vs. 1.2%, $P = 0.045$). Also, 5- to 6-year-old boys had significantly higher prevalence of dental trauma than girls of the same age group (1.91% vs. 0.99%, $P < 0.0003$).

The national prevalence of dental trauma in 12-year-old children was 4.9%. The urban living 12-year-old children had higher prevalence of dental trauma than rural living counterparts (5.1% vs. 4.6%, $P = 0.28$). Also, the prevalence of dental trauma in 12-year-old boys was significantly higher than girls of the same age group (6.45% vs. 3.39%, $P < 0.0001$). The urban living 15-year-old children had a higher prevalence of dental trauma in comparison with rural living 15-year-old children (6.1% vs. 5.7%, $P = 0.35$). Also, the prevalence of dental trauma in 15-year-old boys was significantly higher than that of 15-year-old girls (7.37% vs. 4.58%, $P < 0.0001$).

As demonstrated in Table 5, the prevalence of dental trauma decreased significantly as parental level of education increased ($P = 0.06$). Likewise, by increase in the maternal level of education, the prevalence of dental trauma decreased significantly ($P = 0.01$). The prevalence of dental trauma significantly decreased ($P = 0.03$), when considering the highest level of education for either parents (Table 5). Regarding the prevalence of different types of trauma, the results showed that enamel fracture had the highest prevalence (58.4%) followed by enamel and dentin fracture (19.4%) and pulp involvement (5.2%).

Discussion

This epidemiological investigation provides the latest prevalence data on WHO recommended three age groups of Iranian children (5-6, 12, and 15 years) using a large representative sample. A total of 26,407 children were recruited at the national level. The overall prevalence of dental trauma was 4.1% for the three age groups. This rate was reported to be 8% in 7–14 years old in a study conducted by Faghih Nasiri et al.¹¹ in 1995–1996. The rate reported by Ansari and Mobini¹² in 1996–1998 was 8.96% in patients presenting to a pediatric department in Tehran. Our reported value for the prevalence of dental trauma in Tehran was

Table 1 Frequency distribution of subjects recruited from each province

Province	Age group			Total
	5–6 years old	12 years old	15 years old	
Ardebil	280	289	290	859
Isfahan	301	299	300	900
Ilam	293	287	289	869
East Azarbaijan	301	300	299	900
West Azarbaijan	285	264	233	782
Alborz	300	300	300	900
Boushehr	297	299	297	893
Tehran*	593	569	569	1731
Chaharmahal and Bakhtiari	301	297	300	898
South Khorasan	275	281	267	823
Khorasan Razavi	300	296	299	895
North Khorasan	304	297	297	898
Khouzestan	286	299	275	880
Zanjan	299	288	291	878
Semnan	304	251	279	834
Sistan and Balouchestan	231	210	209	650
Fars	294	284	296	874
Qazvin	297	296	292	885
Qom	194	172	147	513
Kordestan	296	292	284	872
Kerman	247	250	250	747
Kermanshah	301	299	291	891
Kohkiloye and Boyerahmad	301	297	299	897
Golestan	271	262	224	757
Gilan	194	182	190	566
Lorestan	304	304	298	906
Mazandaran	251	243	249	743
Markazi	298	300	294	892
Hormozgan	165	157	176	498
Hamadan	299	300	300	899
Yazd	300	297	300	897
Total	8962	8761	8684	26407

*Sample size in Tehran province was considered double the rate in other provinces due to its population size.

Table 2 Frequency distribution of male and female participants

Age groups	Gender		Place of residence		Total
	Male (%)	Female (%)	Urban (%)	Rural (%)	
5–6 years	4549 (50.8)	4413 (49.2)	5608 (62.6)	3354 (37.4)	8962
12 years	4403 (50.3)	4358 (49.7)	5402 (61.7)	3359 (38.3)	8761
15 years	4079 (47.0)	4605 (53.0)	5448 (62.7)	3236 (37.3)	8684
Total	13031	13376	16458	9949	26407

Table 3 Percentage of subjects with dental trauma in different provinces

Province	5–6 years old		12 years old		15 years old	
	Percentage of children with dental trauma [†]	Mean number of traumatized teeth	Percentage of children with dental trauma [†]	Mean number of traumatized teeth	Percentage of children with dental trauma	Mean number of traumatized teeth
Ardebil	0.7	1.00	3.5	1.00	5.6	1.07
Isfahan	1.3	1.25	4.7	1.29	4.3	1.13
Ilam	2.0	1.33	1.7	1.25	1.4	1.46
East Azarbaijan	0.7	1.00	2.7	1.14	1.0	1.32
West Azarbaijan	0.0	–	1.9	2.50	2.6	1.03
Alborz	1.7	1.40	5.3	1.56	7.0	1.27
Boushehr	1.3	3.00	3.7	1.30	5.2	1.24
Tehran*	2.4	1.64	6.5	1.32	10.8	1.13
Chaharmahal and Bakhtiari	1.3	1.00	7.1	1.24	9.1	1.50
South Khorasan	1.5	2.25	3.2	1.33	4.9	1.22
Khorasan Razavi	1.0	0.67	2.7	1.20	4.3	1.21
North Khorasan	0.7	1.50	7.7	1.30	8.1	1.20
Khouzestan	1.7	1.20	5.0	1.57	8.8	1.49
Zanjan	1.4	1.50	5.9	1.29	3.5	1.29
Semnan	1.0	1.00	2.9	1.14	2.6	1.14
Sistan and Balouchestan	1.7	1.75	1.9	1.25	6.7	1.37
Fars	3.4	1.70	8.3	1.30	9.5	1.17
Qazvin	2.4	1.29	5.2	1.36	4.2	1.33
Qom	1.0	2.50	4.7	1.43	8.3	1.39
Kordestan	1.0	7.50	2.4	1.17	3.5	1.58
Kerman	1.6	1.33	5.2	1.33	10.8	1.20
Kermanshah	0.3	1.00	1.3	1.00	1.7	0.82
Kohkiloye and Boyerahmad	1.3	1.25	10.4	1.13	11.2	1.07
Golestan	1.5	1.00	5.0	1.31	2.7	1.49
Gilan	1.0	2.50	2.8	1.20	8.8	1.22
Lorestan	1.3	1.00	7.9	1.38	6.4	1.20
Mazandaran	0.8	1.00	2.9	1.29	2.8	2.22
Markazi	2.7	2.13	5.4	1.31	8.1	1.44
Hormozgan	1.8	1.00	1.9	1.00	4.1	0.63
Hamadan	1.4	1.67	8.4	1.12	6.1	1.30
Yazd	3.0	1.33	9.1	1.15	7.7	1.26
Total	1.50	1.60	4.9	1.29	6.0	1.2

Table 4 Distribution of males and females with dental trauma based on their place of residence in different age groups

Age group	Gender	Place of residence		Total (%)
		Urban (%)	Rural (%)	
5–6 years	Male	2.2 (61)	1.5 (26)	1.91 (87)
	Female	1.3 (36)	0.9 (14)	1.13 (50)
12 years	Male	7.1 (194)	5.3 (90)	6.45 (284)
	Female	3.1 (83)	3.9 (65)	3.39 (148)
15 years	Male	7.3 (194)	7.5 (107)	7.37 (301)
	Female	5.1 (141)	4.2 (76)	4.71 (217)
Total	Male	5.47 (449)	4.61 (223)	5.2 (672)
	Female	3 (254)	2.91 (149)	3.1 (415)

Table 5 Level of education of parents of subjects with dental trauma

Level of education	Elementary school or illiterate, n (%)	Middle school and high school, n (%)	College or university education, n (%)
Father	4.9 (344)	4.5 (392)	4.1 (122)
Mother	4.9 (437)	4.4 (353)	3.7 (77)
Highest level of education for either parents	4.9 (299)	4.6 (431)	3.9 (145)

6.5%, which is lower than the rate reported by Ansari and Mobini,¹² which may be related to the population type. One being the pediatric department which is a referral center for children with specific problems, and the current study was a population based study on mostly disease-free subjects. The prevalence of dental trauma was reported to be 34% in North Ireland in 1998.¹³ 21% in Brazil in 2009¹⁴ and 10.2% in India in 2014.¹⁵ These values are all higher than the rate reported in the current investigation. This controversy may be due to methodologic differences, sampling distribution and sample size, geographical size and location or differences in trauma classifications, diagnoses as well as participants' age groups. Moreover, cultural, social, geographical, educational and behavioral differences of individuals living in different communities may play an important role in prevalence of dental trauma. For instance, aside from accidents, participation of children in specific high-risk sports such as American football, Rugby, etc. may be higher in some countries resulting in different rate of traumatic injuries due to level of engagement in such sports activities.¹⁶

It has been reported that age 10 is a common period for occurrence of the most dental traumas.^{11,12} However, Marcenes et al.⁵ from Syria reported the highest prevalence of trauma (11.7%) at age 12. Al-Majed et al.¹⁷ in Saudi Arabia reported the highest rate of trauma in 12- to 14-year-old (34%) children. Differences in the reported rates are due to using different age groups in addition to the level of involvement and participation of children in different sport activities in different countries.¹

Although Faghih Nasiri et al.¹¹ from Iran, Traebert et al.⁷ from Brazil and Marcenec et al.⁵ from Syria reported equal or found no difference in prevalence of trauma in the two genders, the rate of dental trauma in our study was significantly higher (5.4%) in boys when compared with girls (3.1%). This is in line with the percentages reported by Ansari and Mobini¹² with 60% dental trauma in boys and 40% in girls. Asnaashari et al.¹⁸ reported the 2.1:1 ratio for the prevalence of trauma in boys to girls. Also, Afshar and Mozaffari¹⁹ reported that the prevalence of trauma in boys was 3.4 times the rate in girls. Navabazam and Farahani²⁰ reported that the prevalence of trauma in boys was 5.1 times the rate in girls. A report from Taiwan shows the prevalence data 1.4:1 on trauma in boys compared with girls in 1999.²¹ In another study from Brazil, the prevalence of trauma in boys was higher than that in girls

in 2009.¹⁴ Chopra et al.¹⁵ from India reported that the prevalence of trauma in boys was higher than that in girls.

The higher prevalence of dental trauma in boys was probably due to their greater participation in either sport activities, fighting or accidents. The prevalence of dental trauma in boys is often twice the rate in girls due to their higher activities.¹ Adolescent boys are more susceptible to trauma than girls due to their increased outdoor activities.

Cultural differences in different countries may also explain the prevalence rates of dental trauma in girls. For example, in Iran, girls are less involved in outdoor sport activities, which can decrease the rate of dental trauma in them. Some studies have shown increasing prevalence of dental trauma in girls compared with previous years. For instance, Burden²² reported that at present, girls are more interested in sports and outdoor activities; thus, the difference in prevalence rates of dental trauma in boys and girls is decreasing. However, it remains for other countries to report such differences.

Given the high prevalence of dental trauma, extensive educational programs are recommended at the national level to enhance the public knowledge regarding the risks of dental trauma and its adverse consequences. This can be done by the media and Internet as well. These programs should also include proper management of injured patients. Also, continuing education courses on this topic are required to provide up-to-date information for dental clinicians, which is imperative to improve the children's health status and quality of life, increase their satisfaction rate and decrease treatment costs by appropriate management.

Conclusion

The prevalence of dental trauma was relatively high in the three selected age groups. There should be a priority to enhance public knowledge to better prevent and control this condition. Media as well as educational programs of other types involving parents, children and school teachers can be instrumental in decreasing the prevalence of dental trauma at the local, national, and international levels.

Conflicts of interest

None. ■

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