

The Role of Ecological Factors in Dental Trauma

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Summary

The analysis of dental traumas carried out in 731 patients showed the frequency of 59.8% in boys and 40.2% in girls. The frequency ratio between boys and girls was 1.5:1, which shows a greater susceptibility of boys to dental traumas. The place of trauma occurrence was analyzed in 585 (363 boys and 222 girls) school children. The highest frequency is found for school with 37.3% of traumas, while 20.5% of traumas happen in the street, 19.8% at home, 8.5% in the playground, 6.7% in the courtyard and 7.2% goes for other places. Regardless of the place of occurrence, traumas are mostly due to falls and strokes. Falls during bicycle rides should be particularly emphasized as they represent 10% of all traumas. A comparatively frequent cause of trauma is also the fall on the stairs at school or at home causing 5% of all traumas. Organized sport exercises rarely cause dental traumas (only 1.7% in boys and 2.2% in girls). The dental trauma frequency considerably varies in different months of the year. The lowest trauma frequency is found for July and the highest in October. In order to carry out efficient health education and prevention against traumas it is necessary to introduce children, parents and teachers at school with the most frequent places and causes of traumas.

Epidemiological investigations of dental traumas most often refer to the determination of incidence of traumatized teeth in different populations, specific types of traumas and risk age groups. However, they provide scarce information about the role of ecologic factors in the onset of dental trauma as well as of the role of psychological and emotional elements which are also important with respect to trauma (Mofenson and Greensher¹, Shaw and Sichel², Petz³). As it is known that dental trauma can induce emotional disturbances in children (Slack and Jones⁴), psychological aspects of dental traumas merit particular attention. In relation to this, it should be pointed out that according to the view of Macko et al.⁵ slight deviations from the normal, i. e. mild traumatic forms are tolerated by the majority of children.

An extremely important role in the appearance of the dental trauma is played by physical and social environments representing the place of interaction between the host (child) and different influential factors. This specific relationship between

the person and his environment is defined by Mofenson and Greensher¹ as the exposure to trauma resulting from the interaction of a number of factors such as exposure to danger, motoric functions, personality traits, judging capacity, experience, training and exposure to stresses.

Some epidemiologic studies of dental traumas have shown different frequencies of traumas with regard to the year season or particular months of the year (Eichenbaum⁶, Gelbier⁷) Different frequencies in particular months of the year have been established for street traumas (Jelčić⁸) while Mofenson and Greensher¹ mention the same for other types of traumas.

In literature different ratios of traumas between boys and girls are found for different populations. However, all these studies show a higher frequency of traumas in boys, i. e. their higher inclination to dental trauma. The frequency ratios of dental trauma between boys and girls vary from 1.3:1 found by Zadik et al.⁹ to 2.7:1 found by Eichenbaum⁶. Between these extreme values there are ratios 2.4:1 found by Grundy¹⁰, 1.9:1 found by Gelbier⁷, 2:1 found by Davis et al.¹¹ and 1.5:1 found by Gutz¹². Since this ratio is also subject to other factors specific for particular populations such as social, cultural, meteorological etc., this work is aimed at determining its value for the clinical population of the town of Zagreb. For the above mentioned reasons the goal of the present work is:

- to determine the frequency ratio of dental traumas between boys and girls for the analyzed clinical population,
- to identify environmental factors which are in favour of the onset of dental trauma, i. e. ecologic factors that can be directly related to the occurrence of trauma (its place and the way in which it occurs),
- to determine differences in frequency of traumas with respect to different months of the year,
- to point at possible ways of improvement in prevention of dental traumas and of promotion of health education.

MATERIAL AND METHODS

The analysis comprised 731 subjects with different forms of the dental trauma who were examined and treated at the Department for Child's and Preventive Dentistry of the Faculty of Dentistry in Zagreb during the period between 1972 and 1981. Their age ranged from 1 to 16 years. Out of the total number of children 437 were boys and 294 were girls. The analysis included the data on the place, time and way of the occurrence of trauma. Since there were no complete data for all subjects the distribution of traumas by the place and way of its occurrence was analyzed in 585 school children (363 boys and 222 girls). The significance of differences in the trauma frequency between boys and girls was tested by t-test for proportions. The distribution of dental traumas by particular months of the year was analyzed in 632 children for whom these data existed.

RESULTS

Out of the total sample of 731 subjects 59.8% were males and 40.2% were females. The testing of differences in trauma frequency between boys and girls showed a significantly higher frequency in males (Table 1). The frequency ratio of traumas between boys and girls was 1.5 to 1.

	N	%	t
Boys	437	59.8	
Girls	294	40.2	7.54*
Total	731		

* P < 0.01

Tab. 1. Frequencies of dental traumas for a clinic population.

Place of Occurrence	Boys (N = 363)		Girls (N = 222)		t
	f	%	f	%	
School	142	39.1	76	34.2	1.20
Home	66	18.2	50	22.5	1.28
Street	68	18.7	52	23.4	1.34
Courtyard	19	5.2	20	9.0	1.73
Playground	36	9.9	14	6.3	1.57
Other	32	8.8	10	4.5	—

f — frequencies

Tab. 2. Distribution of dental traumas according to the place of occurrence.

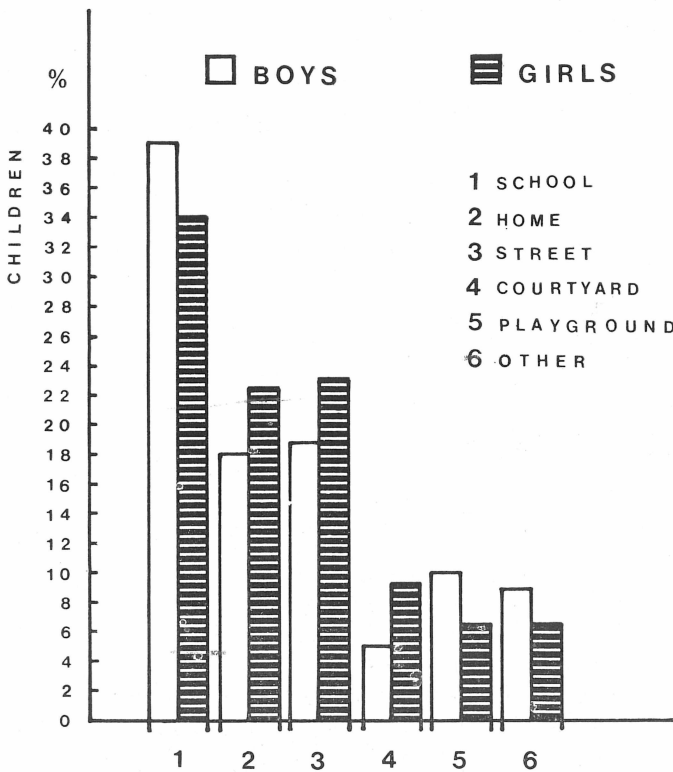


Fig. 1. Distribution of dental traumas according environment in which they occurred.

Place	Way	Boys (N = 363)		Girls (N = 222)	
		f	%	f	%
School	— fall	98	27.0	57	25.7
	— stroke	29	8.0	10	4.5
	— fall on stairs	9	2.5	4	1.8
	— organized sports	6	1.7	5	2.2
Home	— fall	29	8.0	29	13.0
	— fall on stairs	9	2.5	9	4.1
	— stroke	28	7.7	12	5.4
Street	— fall	21	5.8	23	10.4
	— stroke	7	1.9	3	1.4
	— fall from bicycle	36	9.9	23	10.4
	— traffic accidents	6	1.7	3	1.4
Courtyard	— fall	10	2.8	14	6.3
	— stroke	9	2.5	6	2.7
Playground	— fall	18	4.9	9	4.1
	— stroke	18	4.9	5	2.2
Ice	— ice-skating	7	1.9	1	0.4
Snow	— sledge	9	2.5	1	0.4
Amusement park	— minicar ride	4	1.1	5	2.2
Other		10	2.8	3	1.4

Tab. 3. Distribution of dental traumas by place and way of occurrence.

Month	Year											
	1976		1977		1978		1979		1980		1981	
	N	%	N	%	N	%	N	%	N	%	N	%
I	5	5.8	6	5.8	12	13.6	11	9.1	7	9.1	9	10.8
II	5	5.8	11	10.7	7	8.0	11	9.1	7	9.1	7	8.4
III	8	9.3	11	10.7	9	10.2	11	9.1	3	3.9	9	10.8
IV	6	7.0	9	8.7	3	3.4	9	7.4	5	6.5	7	8.4
V	6	7.0	9	8.7	4	4.5	9	7.4	5	6.5	6	7.2
VI	5	5.8	13	12.6	3	3.4	10	8.3	3	3.9	8	9.6
VII	2	2.3	5	4.8	4	4.5	11	9.1	3	3.9	7	8.4
VIII	5	5.8	5	4.8	8	9.1	5	4.1	6	7.8	8	9.6
IX	8	9.3	9	8.7	10	11.4	12	9.9	11	14.3	9	10.8
X	12	14.0	10	9.7	11	12.5	10	8.3	12	15.6	6	7.2
XI	7	8.1	8	7.8	10	11.4	6	5.0	7	9.1	4	4.8
XII	17	19.8	7	6.8	7	8.0	16	13.2	8	10.4	3	3.6
Total	86		103		88		121		77		83	

Tab. 4. Seasonal variations of dental traumas for the period from 1976 to 1981.

The analysis of trauma distribution by the place of occurrence showed that they most frequently happened in the school (Table 2). According to the occurrence frequency of dental traumas the school is followed by home, street, courtyard, playground and other places (Figure 1). No statistically significant difference was found between boys and girls with regard to the place of the trauma occurrence.

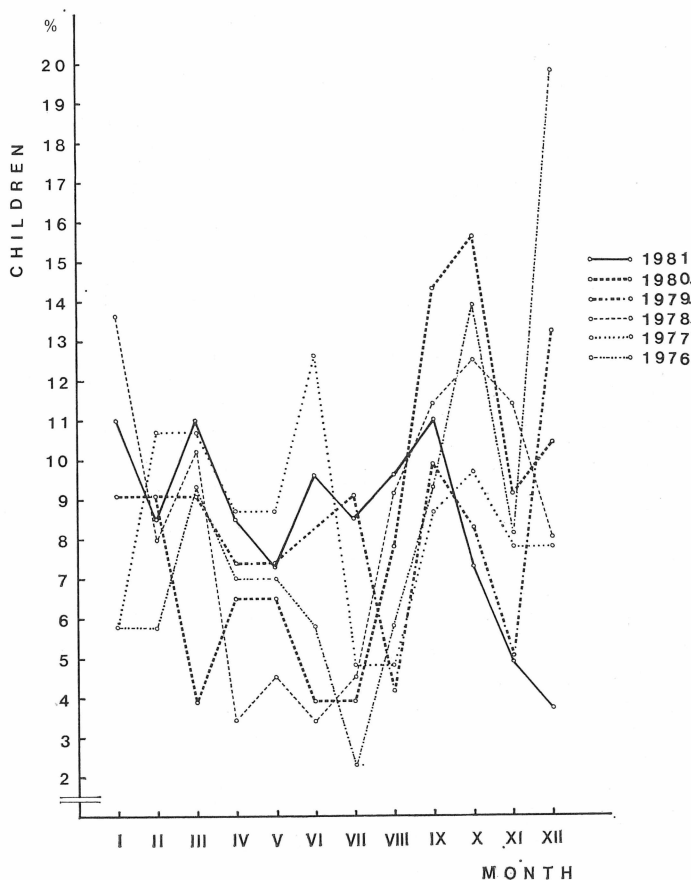


Fig. 2. Monthly distribution of dental traumas for the period from 1976 to 1981.

The trauma frequency for boys was significantly higher at school than at home ($t = 6.411$; $P < 0.01$). The same was found for girls ($t = 2.79$; $P < 0.01$).

Regardless of the place of occurrence traumas are most frequently the consequence of falls, hitting one's teeth against various objects or strokes produced by a thrown object (Table 3). Falls on the stairs at school or at home are particularly specified as they cause a comparatively high trauma frequency. Dental traumas due to organized sport exercises are rather rare. Only 1.7% of them were found in boys and 2.2% in girls. Among traumas that happen in the street, those resulting from traffic accidents are very rare (1.7% in boys and 1.4% in girls). Falls during bicycle rides frequently cause dental traumas (9.9% in boys and 10.4% in girls).

The trauma frequencies by particular months during a period of six years (from 1976 to 1981) vary considerably from year to year (Table 4). In the graphic presentation of the trauma distribution by months for these years (Figure 2), it can

Month	Children with dental trauma	
	N	%
January	53	8.4
February	56	8.9
March	53	8.4
April	47	7.4
May	45	7.1
June	48	7.6
July	36	5.7
August	44	7.0
September	67	10.6
October	72	11.4
November	47	7.4
December	64	10.1
Total	632	

Tab. 5. Frequencies of dental trauma in the individual months for the period from 1972 to 1981.

be seen that the highest frequency is during autumn, particularly in September and October, while the lowest values are found in summer, more precisely in August and July. The period from 1972 to 1975 is not presented separately because

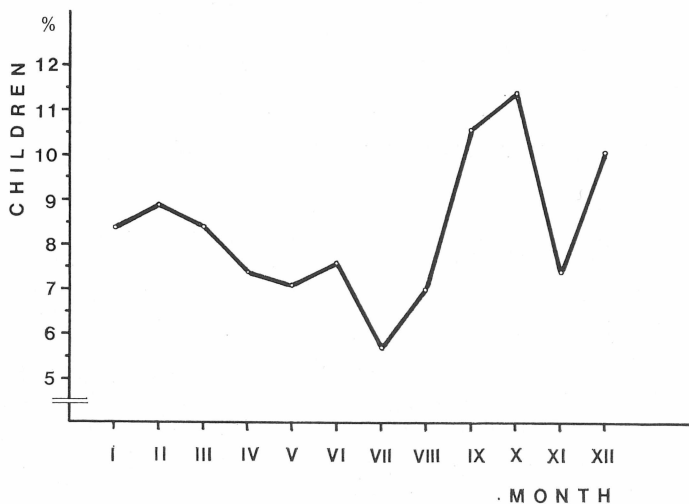


Fig. 3. The total distribution of dental traumas during the period of six years.

of rather insufficient data for these years, but it has been taken into account for the total trauma distribution by months for the whole period from 1972 to 1981 (Table 5). There is a statistically significant difference ($t = 3.56$; $P < 0.01$) between

the lowest trauma frequency recorded for July (5.7%) and the highest value recorded for October (11.4%). Figure 3 clearly shows a comparatively low trauma frequency during summer months and a high frequency in autumn.

DISCUSSION

The frequency ratio of dental traumas between boys and girls vary considerably in different populations (Eichenbaum⁶, Gelbier⁷, Zadik et al.⁹, Grundy¹⁰, Davis et al.¹¹, Gutz¹²) reflecting in part specific features of particular populations. It is highly probable that, in addition to social, cultural and other factors, populations living in different climatic zones are also subject to the influence of meteorological factors which affect considerably the psychomotoric activity (Tromp¹³). We think that the ratio of dental traumas between boys and girls of 1.5:1 found for the analyzed population can be regarded as a real indicator since it is based on a sufficiently high number of examined subjects. Identical data are given in the literature by Gutz¹². A similar ratio between boys and girls in Jerusalem amounting to 1.3 for boys to 1 for girls is explained by Zadik et al.⁹ as a consequence of an increased sport activity of girls.

The results of the analysis related to the place of the occurrence of traumas clearly show that they most frequently happen at school (Table 2). Out of the total number of traumas even 39.1% in boys and 34.2% in girls happen at school. This finding indicates that prevention measures against traumas should be most intensely carried out in schools.

In addition to the data on places with the most frequent trauma occurrence, the comprehension of its causes and ways of occurrence is also required for an efficient application of prevention measures. The most frequent causes of traumas happening at school or other specified places (Table 3) are falls and strokes against some object or strokes produced by a thrown object. Falls on the stairs at school or at home are separately presented because of their comparatively high frequency. The fall on the stairs causes 5% traumas in boys and 6% traumas in girls. For this reason it should be particularly pointed out in health education. Organized sport exercises very rarely cause dental traumas in the analyzed population. In this respect our finding is very similar to that obtained by Macko et al.⁵ who also mention a low frequency of dental traumas due to organized sport exercises. In this work the organized sport exercises imply supervised sport trainings or physical training at school. Gelbier⁷ to the contrary mentions a high frequency of dental traumas during organized sport exercises which contradicts our finding and the results obtained by Macko et al.⁵

Among other causes of traumas the greatest attention should be undoubtedly given to traumas due to the falls from the bicycle, as even 10% of all traumas happen in this way. Dental traumas resulting from other traffic accidents are rather rare, their percentage being in boys 1.7% and in girls 1.4%. Among them more frequent traumas occur during minicar rides in the amusement park.

It has been noticed that the trauma frequency varies in different months of the year (Eichenbaum⁶, Gelbier⁷). Since such studies have been carried

out only in comparatively small samples and during short periods, their results, as Gelbier⁷ himself states, can be taken only as an orientation. Our results show high variations in dental trauma frequency recorded for different months from year to year, and for this reason it is rather difficult to identify one month as a month with a low or high dental trauma frequency. However, the analysis of the distribution of all traumas by months through a longer time period (Figure 3) shows that the lowest frequency values are found for July and the highest for October. The difference in trauma frequency between these two months is statistically highly significant. On the basis of the trauma distribution the period from January to April can be characterized with moderate frequency, the period from May to August with a low frequency and the period from September to December with a high frequency. The highest inclination to traumas is found for September and October. Since the greatest number of traumas occurs at school, it seems that the reduced trauma frequency during summer months can be attributed to summer holidays. Although a certain effect of holidays is possible, it cannot explain the variations occurring in other months of the year.

It is known that psychological factors play an important role in the trauma occurrence (Mofensen et al.¹, Shaw and Sichel², Petz³, Mlačić¹⁴). Lower psychomotoric activity, intellectual deficiency, aggression and psychopathic personality traits are in favour of the trauma occurrence (Shaw and Sichel², Petz³, Mlačić¹⁴). The effects of some meteorological factors can greatly change human behavior. Thus, for example, unfavourable meteorological conditions considerably decrease working capacity and reaction time (Tromp¹³), which might be decisive in the occurrence of trauma. A considerable fluctuation of restlessness and ability to comprehend has also observed in school children during day time and period characterized with strong atmospheric turbulence (Tromp¹³).

Meteorological factors can be regarded as partly responsible for the variations in the trauma frequency in different months of the year as well as for the differences in one month for several years. The studies of variations in dental trauma frequency in particular months of the year (Eichenbaum⁸, Gelbier⁷) which have been carried out so far show the highest frequency in November, while Gelbier⁷ finds the lowest number of traumas for January. Since these studies have been carried out in small samples, these results might reflect an insufficient number of subjects and therefore cannot be used for drawing final conclusions. The explanation of the variations in trauma frequency occurring in different months or more frequent traumas on particular days and shorter periods of one months, requires further studies of meteorological factors and their possible effects on the occurrence of traumas.

The data on the most frequent places, ways and time of trauma occurrences, i. e. their frequency in particular months can be used for planning and application of health education and prevention against traumas. We think that particular attention should be given to health education at school which seems to be the most suitable place for this purpose being the most frequent place of trauma occurrences. Pupils and teachers should be given an insight into the most frequent places and causes of dental traumas through lectures, films and publications. In relation to this, months with a high trauma frequency should be particularly emphasized.

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Sažetak

ULOGA EKOLOŠKIH FAKTORA U NASTANKU ZUBNE TRAUME

Ključne riječi: zubna trauma, ekološki faktori, epidemiologija

Analizom zubnih trauma 731 ispitanika, utvrđena je učestalost od 59,8% u dječaka i 40,2% u djevojčica. Omjer učestalosti u dječaka i djevojčica je bio 1,5:1, što govori o većoj sklonosti dječaka zubnim traumama. Mjesto nastanka trauma ispitanika je u 585 ispitanika (363 dječaka i 222 djevojčice) školskog uzrasta. Na prvom se mjestu nalazi škola s 37,3% trauma, dok se 20,5% trauma dogodi na ulici, 19,8% kod kuće, 8,5% na igralištu, 6,7% u dvorištu, a 7,2% otpada na sva ostala mjesta. Bez obzira na mjesto nastanka, traume najčešće nastaju zbog pada ili udarca. Posebno treba izdvojiti pad s bicikla, koji je uzrok čak 10% svih trauma zubi. Relativno čest način nastanka traume je i pad na stepenicama, u školi ili kod kuće, koji dovodi do traume u 5% slučajeva. Organizirano bavljenje sportom je rijedak razlog nastanka zubne traume (svega 1,7% u dječaka i 2,2% u djevojčica). Učestalost zubnih trauma značajno varira u pojedinim mjesecima godine. Traume su najrjeđe u srpnju, a najčešće u listopadu. U svrhu provođenja zdravstvenog odgoja i prevencije trauma, treba djecu, roditelje i nastavnike u školi, putem predavanja, filmova i brošura, upoznati s mjestima i načinima najčešćeg nastanka zubnih trauma.

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