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Relationship between socio-economic position and general, maxillofacial and dental trauma: A National Trauma Registry Study

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Because traumatic dental injuries are associated with biological, socio-economic, psychological and behavioral factors, they are a challenging public health problem for oral health professionals (1-4). The association between socio-economic factors and maxillofacial/dental injuries is inconsistent and needs clarification. Jamani and Fayyed (5) reported a higher prevalence of dental injuries in children attending private schools (higher social economic status) compared with children studying in state schools (lower social economic status). Similarly, a Brazilian study suggests that dental injuries are more frequent in populations with a higher socio-economic position (SEP) compared with those with a lower SEP. In contrast, Hamilton and others (6) found that significantly more children in lower socio-economic populations suffered from traumatic dental injuries compared with children living in higher socio-economic regions. To confuse the issue even more, several other studies found no statistically significant relationship between traumatic dental injuries and SEP (7, 8). Nicolau and others (4) found that adolescents who experience adverse psychological environments throughout their life have a greater risk of incurring traumatic dental injuries that their counterparts who experience more favorable environments. Social class, based on a father's education, has not been shown to be associated with traumatic dental injuries (9, 10).

Although researchers recently have investigated the problem of trauma in different populations, only a few studies have examined the relationship between dental trauma and socio-economic status. These few studies, however, have focused on childhood injuries and resulted in conflicting findings (6, 11, 12).

The aim of this study was to retrospectively investigate the occurrence of maxillofacial, dental and general traumatic injuries in Israel, and to examine the relationship between socio-economic status and trauma-related hospitalizations.

Materials and methods

All trauma patients hospitalized and recorded in the National Israel Trauma Registry (ITR) between January 1, 2003 and December 31, 2005, were included in the study. The ITR records data on all injury-related

hospitalizations, in-hospital deaths, and transfers to another trauma center in Israel. An average of 25 700 trauma-related hospitalizations is recorded annually in the ITR. In this study, data were collected from all six Level 1 and four Level II trauma centers in Israel. Each hospitalization record contained data on patient demographics, cause of injury and severity, hospital characteristics and patient outcome. Patients with dental and maxillofacial injuries were defined according to a diagnostic injury code and an abbreviated injury scale (AIS). Maxillofacial and dental injuries were separated and further analyzed by locality of residence. Descriptive analysis and multiple comparisons were conducted using SAS 8.12.

Socio-economic index

The socio-economic index, developed by the Statistical Analysis Sector of the Israel Central Bureau of Statistics and the Municipal Research Department of the Ministry of the Interior (13), is based on 14 variables, which reflect the socio-economic level of the population in different localities. It includes demography, education, standard of living, labor force characteristics and benefits. The 'socio-economic' index was calculated on the basis of widely accepted statistical methods (13-15). This index, which estimates the socio-economic level of the geographical unit, was calculated as a weighted average of variables, where weighting was based on the percentage of variance explained by each variable. Subsequently, each regional council was allocated to 1 of 10 clusters based on the value of its socio-economic index. This grade, on a scale of 1 to 10, reflects the socio-economic status of the population in a specific locality, with one (1) expressing a low socio-economic level of the population and 10 (10) expressing a high socio-economic population. Fifty localities, which were geographically near 1 of the 10 trauma centers included in the ITR, were selected for analysis and categorized according to the socioeconomic indexes. The localities were grouped into three categories: (i) low SEP (clusters 1–3), n = 13 localities, (ii) middle SEP (clusters 4–6), n = 23 localities and (iii) high SEP (clusters 7–10), n = 14 localities. Hospitalization (admission) rates for maxillofacial and dental injuries and general trauma were analyzed for the selected localities. In addition, maxillofacial and dental injuries were analyzed according to cause of injury and SEP.

Results

Between January 1, 2003 and December 31, 2005, 77 072 trauma-related hospitalizations were recorded in the ITR. Maxillofacial and dental injuries accounted for 5.2% (n = 3972) of the hospitalizations (an average of 1324 hospitalizations annually). The majority of maxillofacial and dental injuries were among adults (71%), and among males (75%). Among the localities, 42 303 trauma-related hospitalizations were reported, of which 4.5% (n = 1886) were maxillofacial and dental injuries (Table 1).

Hospitalization rates for general trauma were lower for localities with a high SEP (clusters 7–10), whereas localities with a low SEP (clusters 1–3) showed higher hospitalization rates. The hospitalization rate for localities with a high SEP was 42.6 admissions per 10 000. In contrast, the low SEP localities had an admissions rate of 58.7 per 10 000. Similar to the general trauma category, hospitalization rates for maxillofacial and dental injuries were higher in low SEP localities (2.6 per 10 000) compared with high SEP localities (2.0 per 10 000). Although the difference in hospitalization rates for general trauma was statistically significant (P < 0.01), the difference in hospitalization rates for maxillofacial and dental injuries was not significant (P > 0.05) (Fig. 1).

A comparison of maxillofacial trauma, dental injuries and general trauma-related hospitalizations revealed differences in cause of injury. Although falls caused 36% of the maxillofacial and dental injuries, they were a major cause of general trauma (51%). Intentional injuries constituted 22% of maxillofacial-related

Table 1. Characteristics of maxillofacial/dental and general trauma-related hospitalizations (data from the National Israel Trauma Registry, 2003–2005)

	Maxillofacial trauma		Dental trauma		General trauma		Total	
Characteristics	п	%	n	%	п	%	n	%
ITR-total	3595	4.7	377	0.5	73 100	94.8	77 072	100
Children, ages 0–17	954	3.7	181	0.7	24 432	33.4	25 567	33.0
Adults, ages 18+	2627	5.1	193	0.4	48 393	66.2	51 213	67.0
Males	2703	5.5	276	0.6	45 896	62.8	48 875	63.0
Females	892	3.2	101	0.4	27 185	37.2	28 178	37.0
For selected localities $(n = 50)$	1713	4.1	173	0.4	40 417	95.5	42 303	100
Children, ages 0–17	415	3.1	95	0.7	13 105	96.3	13 615	32.0
Adults, age 18+	1295	4.5	77	0.3	27 183	95.2	28 555	68.0
Males	1270	4.9	132	0.5	24 372	94.6	25 774	61.0
Females	443	2.7	41	0.3	16 036	97.1	16 520	39.0
Low SEP (1–3)	302	4.2	28	0.4	6819	95.4	7149	17.0
Middle SEP (4-6)	755	3.8	77	0.4	18 648	95.7	19 480	46.0
High SEP (7-10)	656	4.2	68	0.4	14 950	95.4	15 674	37.0
ITR, Israel Trauma Registry; SEP, socio-eco	onomic position.							



Fig. 1. All trauma and maxillofacial/dental-related hospitalization rates by socio-economic position group (rates per 10 000 population) (data from the Israel Trauma Registry 2003–2005).

hospitalizations, but only 8% of dental injuries and general trauma hospitalizations. Road accidents (33%) and falls (35%) were equally responsible for maxillofacial injuries, whereas road accidents were the major cause (50%) of dental injuries. (Table 2)

Differences were found between age groups when comparing causes of maxillofacial injuries. Among children, falls (44%), followed by road crashes (37%), were the primary causes of maxillofacial and dental injuries. In this age group, violence caused 6% of the maxillofacial and dental-related hospitalizations compared with 26% for adults. Among adults, road crashes (34%) and falls (32%) contributed equally to admissions for maxillofacial and dental injuries.

The cause of injury also differed by SEP of the localities. Intentional injuries occurred more frequently among adults living in low SEP localities as compared with those in middle and high SEP areas (7.0, 5.7 and 5.0 per 10 000, respectively). The greatest differences between causes of injury were for fall-related trauma among children.

In low SEP localities, 56% of facial injuries (12.2 per 10 000) were due to falls compared with 39% in middle (6.9 per 10 000) and low (5.8 per 10 000) SEP localities (Table 3).

Discussion

It should be noted that in this National Israel Trauma Registry study, only hospitalized patients were included. Visits to other healthcare facilities and dental clinics were not included, which could affect the results. It can be hypothesized that the relationship between trauma and SEP would remain about the same although the additional injuries (non-hospitalizations) were added to the overall sample.

The socio-economic level of a population reflects a combination of basic characteristics of a specific geographical unit. The concept is intuitively understood regarding its extreme manifestations, including poverty at one end of the spectrum, wealth at the other end. The central feature of the socio-economic level is financial resources, although other elements are also important to a given financial situation (16).

Socio-economic gradients have been identified for the most common causes of injury in hospital accident and emergency departments (17–20). Recently, socio-economic inequalities regarding serious injuries were reported throughout England, particularly among child pedestrians. The rate of serious injury varies by settlement type and the cause of injury varies between rural and urban settings (20). The present study showed that maxillofacial/dental injuries and general trauma were influenced by SEP. Although the small numbers of maxillofacial and dental injuries presented obstacles in analyzing the influence of SEP, differences were observed. Further long-term, larger scale studies are warranted.

Compositional characteristics of the population in a residential area affect injury to varying degrees and direction according to the type of injury (21). In areas with low SEP, health promotion and prevention programs should be implemented using culturally appropriate tools aimed at reducing all injuries with a special emphasis on home- and traffic-related injuries (22–24).

In this study, maxillofacial and dental injuries constituted 5% of all trauma-related hospitalizations. Primary care providers (*e.g.*, family physicians, pediatricians, nurses and physician assistants.) could play a crucial role in the provisional primary care for dental injuries. Special emphasis should be given to provide these caregivers with the relevant education to improve their knowledge and ability to deal with the diagnosis and treatment of dental injuries (25–27).

Finally, most injuries are preventable. As motor vehicle crashes, falls and violence are the major causes of general, maxillofacial and dental injuries (2, 3, 20, 28), public health programs aimed at increasing knowledge

Table 2. Causes of injury for maxillofacial, dental and general trauma-related hospitalizations (data from the National Israel Trauma Registry, 2003–2005)

	Maxillofac	Maxillofacial trauma		Dental trauma		General trauma		Total	
Cause of trauma	п	%	n	%	N	%	п	%	
Road collisions	569	33.2	87	50.3	9097	22.5	9753	23.1	
Driver/passenger	253	44.4	33	37.9	3875	42.6	4161	42.6	
Pedestrian	163	28.6	25	28.7	2442	26.8	2630	26.9	
Bicycle	72	12.6	21	24.1	1346	14.8	1439	14.7	
Other	181	31.8	8	9.2	1434	15.7	1623	16.6	
Falls	603	35.2	64	37.0	20 692	51.2	21 359	50.5	
Other non-intentional injuries	169	9.9	9	5.2	7372	18.2	7550	17.9	
Intentional injuries	370	21.6	13	7.5	3190	7.9	3573	8.5	
Other/unknown	2	0.1	0	0	66	0.2	68	0.2	
Total	1713	100	173	100	40 417	100	42 303	100	

Table 3. Rates of hospitalization for maxillofacial-dental trauma by SEP, cause of injury and age (data from the National Israel Trauma Registry, 2003–2005) (Rates per 10 000 population)

	SEP			P-values*				
	L (1–3)	M (4–6)	H (7–9)					
	<i>n</i> = 330	<i>n</i> = 831	<i>n</i> = 723	L vs M	L vs H	M vs H		
MVC								
0–17	6.7	7.5	5.3	NS	NS	<0.001		
18+	9.7	7.1	6.9	<0.001	<0.001	NS		
Falls								
0–17	12.2	6.9	5.8	< 0.001	<0.001	NS		
18+	6.7	5.9	8.0	NS	NS	<0.001		
Other non-intentional								
0–17	2.1	2.3	2.3	NS	NS	NS		
18+	2.8	1.9	1.3	<0.05	<0.001	<0.01		
Intentional								
0–17	0.7	1.1	1.4	NS	< 0.05	NS		
18+	7.0	5.7	5.0	NS	<0.001	NS		
SED socio-aconomic position: L Low: M Middle: H High: MVC motor vehicle								

SEP, socio-economic position; L, Low; M, Middle; H, High; MVC, motor vehicle crashes.

*Chi-squared test with Tukey's correction for multiple comparison.

and changing behaviors are required for preventing these injuries.

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