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# Prevalence and etiological factors related to dental injuries amongst 18–22-year-olds in United Arab Emirates

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Correspondence to: Dr Sausan Al Kawas, Associate Professor, Head of Oral and Craniofacial Health Sciences Department, College of Dentistry, University of Sharjah, P.O. Box: 27272 Sharjah, UAE Tel.: 00971 057929735 Fax: 00971 65585641 e-mail: sausan@sharjah.ac.ae Accepted 30 May, 2010 Abstract – Background: Dental injuries in children and adolescents living across the globe are a serious public health problem. There are no data on dental injuries in United Arab Emirates (UAE). For the development of effective preventive measures, the present study was conducted to investigate the etiology and environment where dental injuries occurred, and to assess the relationship between traumatic dental injuries and socioeconomic status. Material and Methods: This study was undertaken in different colleges of University of Sharjah, UAE. 412 participants aged 18–22years were screened using Dental Trauma Index (DTI), following the questionnaire phase of the study. Results: Prevalence of dental injury was 25.9%, mostly (46.9%) with restored teeth; followed by 42.3% of minor injury (untreated enamel fracture), affecting one upper central incisor (53%). The mean age at the time of dental injury was 10.5 years (SD = 1.52; range 8–13 years) in females vs 14 years (SD = 1.71; range 12-16 years) in males. Dental injuries among males mostly occurred at public places such as on streets (27%) with (19%) of injuries were related to motor bike/micro scooters followed by bicycles (17%) and traffic accidents (9%). Socioeconomic indicators chosen were not statistically significant with the exception of family income (P = 0.01). Conclusion: The findings of this study show that dental traumas are prevalent among middle and high socioeconomic groups. There is a need for potential interventions like educating parents, caretakers, and older siblings on how to reduce the risk factors related to dental injuries.

Dental injuries in children and adolescents living across the globe are a serious public health problem (1–7). According to Andreasen et al. (2009), (2) dental injuries are very frequent during childhood and adolescence, and present statistics shows that 2 of 3 children have suffered a traumatic dental injury before adulthood.

Within the last three decades, United Arab Emirates (UAE) has demonstrated a remarkable economic growth in the Gulf region. Dynamic advances in commerce, industry, and public thoroughfares have brought significant changes in transportation, family structure, education, and sport and leisure activities. Maxillofacial injuries constitute a substantial proportion of cases of trauma. A study from the Gulf region, Kuwait, reported that 'maxillofacial injuries to children in Kuwait have been the highest in the world (3), especially in the under-20-year-old age-group. According to this study, accidents from sports, play, or violence were minimal. The chief causes were road traffic accidents and falls in and around the house. Road accidents involved children both as passengers and as pedestrians. Accidents at home generally involved falls from stairs and heights (3).

A few studies of dental trauma have assessed socioeconomic indicators, and presented conflicting results.

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An Australian study has manifested an enhancing effect of high socio-economic status (SES) on the occurrence of Traumatic Dental Injury resulting from sports and leisure events (4). Conversely, Fakhruddin et al. (5) found the prevalence of dental injuries in the Canadian population to be (11.5%), but did not find any statistically significant association between dental injuries and parents' level of education, and employment status, or family income.

Currently, no UAE data on dental injuries exist. For the development of effective preventive measures, the present study was conducted to investigate the etiology and environment where dental injuries occurred, and to assess the relationship between traumatic dental injuries and SES.

#### Materials and methods

This population-based study was conducted at University of Sharjah in UAE. Over 3000 students enrolled in different colleges from year 1 through year 4 or 5 during the fall semester of 2008. Students enrolled in the first year n = 774 studying in eight different colleges (Arts and Sciences, Business administration, Dentistry,

Engineering, Fine Arts and Design, Health Sciences, Medicine and Pharmacy) of the University of Sharjah were invited to participate, of which 412 agreed to participate in this study by filling out questionnaires, giving the response rate of 53%. The participants' age ranged 18–22 years, representing the population of UAE, including national (Emiratis) and non-national (expatriates) residents of UAE comprising Arabs and non-Arabs, either born or raised in UAE. The students from these colleges also represent one another considering their SES.

Dental injuries with or without clinical evidence were identified. All participants with a DTI (6) code 1 (untreated enamel fracture) through 5 (restored fracture) for at least one anterior tooth were designated as a case. To avoid response bias, clinical examination was conducted, after the questionnaire phase of the study, by the trained dentist. The questionnaires along with a letter that explained the aims and objectives of the study, including an information sheet and a consent were given to volunteering participants (n = 412). The Research Ethics Board of the University of Sharjah approved this project.

DTI codes were defined in this investigation to reflect *minor injury* (untreated enamel fracture not involving dentin, DTI 1), *moderate injury* (untreated enamel and dentin fracture, DTI 2), *severe injury* (pulp involvement, sinus tract, swelling, discoloration, missing tooth due to trauma), and restored injury (injured tooth or fracture restored with a crown/pontic/composite restoration, DTI 3,4,5).

The questionnaire consisted of a section to be completed by injured participants that contained questions concerning their injury: age injury occurred, location where it occurred such as home, school, community places like (malls, parks, in the street, sport facility). In addition to this, participants were asked to specify any other place that was not listed as options. Questionnaire also includes queries related to causes of, or event responsible for the injury (sports, fall, collision, violence/ assault, road traffic accident). Information on SES of the participants included participant's birthplace, family size/composition, dental insurance coverage (private or government program), household income, and mothers' and fathers' educational level.

Parents' level of education was categorized into two groups: less than high school/high school, and completed college or university. Ethnicity assessed whether the child was born in UAE or elsewhere. Data on total annual family income (<AED 8000 to AED120 000 or over, 1US = 3.67 AED) were obtained. Incomes were dichotomized ( $\leq$ AED 8000) according to the method and classification used by the Federal National Council of United Arab Emirates to sponsor his/her family for those who are provided accommodation by the sponsor (7).

A total of 412 eligible 18–22 year-old young adults including 114 males (27.7%) and 298 females (72.3%) agreed to participate in the study. The sample data were analyzed using tests for Chi-Square test and multivariate logistic regressions. The variables were added to the regression model independent of whether they were statistically significantly related to the outcome, (all variables studied were forced into the model).

#### Results

Of 412 subjects, clinical evidence of dental trauma to the anterior dentition was observed in 107 (25.9%) young adults. Among those with evidence of dental injuries, male participants (n = 71, 66.4%) had more often dental trauma experience than the female participants (n = 36, 33.6%, OR = 1.59, 95% CI: 1.53, 2.04, P < 0.05).

Only (42.3%) of subjects had a minor injury 'untreated enamel fracture, DTI 1'. Moderate injury, 'untreated enamel and dentin fracture, DTI 2' had a prevalence of 6.9%, and severe injury (DTI 3–5) consisted of 46.9% with restored teeth; tooth discolored due to trauma 2.6%, and 1.3% with missing tooth/teeth due to trauma.

The number of injured incisors per subject ranged from 0 to 5, with over 50% of subjects had single tooth injury. Maxillary central incisors were at greater risk of injury from trauma. More males than females had more than one injured tooth, 40.6% and 23.4%, respectively as illustrated in Fig. 1. The mean number of injured teeth for males was 1.81 (SD = 0.77), and for females 1.56 (SD = 0.64). There was no significant difference between males and females for the prevalence of injured teeth, the mean number of injured teeth or the prevalence of treated and untreated dental injuries.

Dental trauma occurred at different ages for males and females as shown in Fig. 2. Among males, the majority of the dental trauma 88% occurred between the ages of 10 and 17 years, whereas for females, almost 95% of the injuries occurred in the ages between 8 and 13 years. The highest incidence of dental trauma occurred at 10 and 11 years of age in females (n = 17, 47%), and 12 and 14 years of age in males (n = 35, 49%). The mean age at time of injury was 10.5 years (SD = 1.52; range 8–13 years) in females vs 14 years (SD = 1.71; range 12–16 years) in males. The association between age and dental injuries was not found to be statistically significant at the bivariate and multivariate analysis.

The majority of injuries took place either at school or home for females (Fig. 3). Home was the most frequent location of injury followed by school and this was reversed for males. For males, most traumatic dental injury occurred at public places such as on streets (27%), malls (21%), followed by parks (18%).



*Fig. 1.* Percentages of subjects according to number of injured teeth, and gender.



*Fig. 2.* Percentages of subjects with dental injury according to age of occurrence of dental injuries, and gender.



*Fig. 3.* Percentages of subjects with dental injury according to the locations where dental injury occurred, and gender.

The frequency distribution of dental injury related events is presented in Fig. 4. Roller blading/skating were the major cause of dental injuries amongst both genders. Falls followed by accidents due to bicycles were the major cause of dental injuries amongst females. Whilst, in males, 19% of injuries were related to motor bike/ micro scooters followed by bicycles (17%), and traffic accidents (9%).

With the exception of family income (P = 0.01) none of the three socio-economic indicators chosen, father's level of education, mother's level of education, and nationality was statistically significantly associated with the occurrence of dental injuries (Table 1). Thus, dental traumas are prevalent among middle and high socioeconomic group.

The association between gender and high family income and dental injuries remained statistically significant after adjustment was made for gender and socioeconomic indicators using multivariate logistic regression (Table 2).

#### Discussion

Few population-based studies of dental trauma have presented frequencies of traumatic dental injuries in the permanent dentition in adolescents and youths (4, 8–12).



*Fig. 4.* Percentages of subjects with dental trauma according to the cause of dental injury, and gender.

The prevalence of dental trauma to anterior teeth in this population aged 18–22 years was approximately 26%, which is higher than reported prevalence in different population studies (3, 4, 9, 12), suggesting that dental injuries is a developing public health concern in UAE. A limitation of this study is the reliability of respondents' answers which was based on recalling of the incident, which is the case, even if asked about the current events or situations using questionnaire. The sample included students from the first year at University of Sharjah. The number of enrolled male students was smaller than the number of female students, which explains the skewed gender distribution in this study.

More than half of studied 18–22-year-olds had untreated enamel fractures, a finding reported by other studies (13–16). The most frequent types of crown fractures were those of enamel only followed by those involving both enamel and dentin. In addition, most injuries involved one upper central incisor, the tooth most likely to be injured (17, 18).

This study agrees with other epidemiological studies that reported that the prevalence of dental injuries was highest among females aged 9–14 years (19–21), and that dental injury incidence decreases with age (22) compared with the peak incidence of traumatic dental injuries among males in the age interval of 9–17-years. The incidence of two or more injured teeth was almost two times more frequent in males than in females. A possible explanation could be males' involvement in aggressive leisure or sports activities, hyperactivity or their more active nature (19, 20, 23).

This study shows that most dental accidents occurred either at home or at school. A higher proportion of dental injuries were because of involvement in sports and leisure activities as reported by Huang et al. (4). This is followed by falls and collisions as suggested by most researchers (14, 24, 25), while riding micro scooters and roller-blading without wearing protective gadgets. With fast pace industrialization in this region, significant changes were observed in UAE's infrastructure. Practical knowledge and cultural adjustments needed in parents and caregivers to inculcate a protective sense in the child have not been growing at the same pace (3). There is a need to educate parents on the importance of safety and

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	Dental injury				
Socio-economic indicators	Yes n (%)	No n (%)	Odds Ratio (95% Cl)	P value*	
Educational level of mother					
Less than high school/high school	51 (47.7)	109 (35.7)	0.84 (0.42-1.71)	0.396	
College/university education	56 (52.3)	196 (64.3)	, , , , , , , , , , , , , , , , , , ,		
Educational level of father	(	( )			
Less than high school/high school	34 (31.8)	42 (13.8)	0.54 (0.22-1.08)	0.060	
College/university education	73 (68.2)	263 (86.2)	, , , , , , , , , , , , , , , , , , ,		
Family income	<b>、</b>	, , , , , , , , , , , , , , , , , , ,			
Low income ( <aed 000="" 10="" month)<="" per="" td=""><td>37 (34.6)</td><td>46 (15.1)</td><td>3.86 (2.79-6.34)</td><td>0.02</td></aed>	37 (34.6)	46 (15.1)	3.86 (2.79-6.34)	0.02	
Middle/high income (>AED 10 000 per month)	70 (65.4)	259 (84.9)	, , , , , , , , , , , , , , , , , , ,		
Nationality	<b>、</b>	, , , , , , , , , , , , , , , , , , ,			
Emirati/Non-Emirati	35 (32.7)	87 (28.5)	0.51 (0.12-2.18)	0.324	
	72 (67.3)	218 (71.5)			
*Obtained using the Chi-square test.					

Table 2. Logistic regression of explanatory variables for dental injuries

Indicators	Adjusted odds ratio (95% CI)	P value
Gender (female = 0; male = 1) Mother's educational level (less than high school/high school = 0; college/university level = 1) Father's educational level (less than high school/high school = 0; college/university level = 1) Family income (low income = 0; middle/high income bracket = 1)	1.65 (1.37–3.72) 0.71 (0.32–1.34) 1.59 (0.89–2.56) 1.98 (1.15–3.45)	0.04 0.302 0.07 0.01
Nationality (Non-Emirati = 0; Emirati = 1)	0.69 (0.32–1.44)	0.208

protective measures during sport and other physical activities. To reduce the incidence of dental injuries at home and public places, there is a need for potential interventions like educating parents, caretakers, and older siblings on how to reduce risk factors of falls; also increased supervision and implementation of safety measures to prevent falls; and provision of appropriate safety regulations in building codes. There is a need to educate parents of the importance of safety gadgets like protective helmets, etc.

In the present study, traumatic dental injuries resulting from traffic accidents were 9%, which is not very common compared with various epidemiologic studies (4, 25, 26). In this region, road safety regulations, although exist, are not strenuously enforced, and there are no strict penalties for violators. However, the most promising method to reduce injuries related to motor vehicles is legislation on the mandatory usage of lapshoulder seat belts. Observances of such laws have increased, which can be associated with a decrease in injuries and fatalities. Another important area to highlight is the availability of motorbikes with 50cc to 200cc power engine (27). Children and adolescents belonging to middle and high socio-economic families own them, and drive without licenses. On these small motorcycles, they stunt drive and race with peers endangering the lives of themselves and others.

This study showed significant results with respect to the family income indicators chosen, at the bivariate level, and also at the multivariate level of analysis. This significant relationship between dental trauma and SES is attributable to either the predominance of participants from high socio-economic categories who can afford sports, and other leisure activities, or psychosocial risk factors such as an individual's behavior. Family structure and family function, not selected for this study, may be more logically relevant to this matter, but is a limitation in the present study. Nicolau et al. (28, 29) have indicated that social factors such as family structure (step/single parent) and family environment could lead to the development of behavioral (emotional symptoms, hyperactivity, conduct disorder, peer relationship), and other health-related problems that could in turn lead to increased risk of dental injuries (10, 29).

The findings of this study show that dental traumas are prevalent among middle and high socio-economic groups. To reduce the incidence of dental injuries at home and public places, there is a need for potential interventions like educating parents, caretakers, and older siblings on how to reduce risk factors related to dental injuries. The data provided by this study could facilitate the development of preventive interventions and health promotion strategies by the relevant authorities, to reduce the prevalence of traumatic dental injuries in UAE.

### References

- 1. Tham RC, Cassell E, Calache H. Traumatic orodental injuries and the development of an orodental injury surveillance system: a pilot study in Victoria, Australia. Dent Traumatol 2009;25:103–9.
- Andreasen JO, Lauridsen E, Daugaard-Jensen J. Dental traumatology: an orphan in pediatric dentistry? Pediatr Dent 2009;31:153–6.

- Al-Mahmeed BE, Morris RE, Al-Yassin IM, Belal MS, Al-Ramzy A, Al-Rasheed B et al. Maxillofacial Trauma In Kuwait: a Retrospective Study (1985–1989). Saudi Dent J 1994;6:13–6.
- 4. Huang B, Marcenes W, Croucher R, Hector M. Activities related to the occurrence of traumatic dental injuries in 15- to 18-year-olds. Dent Traumatol 2009;25:64–8.
- Fakhruddin KS, Lawrence HP, Kenny DJ, Locker D. Etiology and environment of dental injuries in 12- to 14-year-old Ontario schoolchildren. Dent Traumatol 2008;24:305–8.
- O'Brien M. Children's Dental Health in the United Kingdom 1993. Office of Population Censuses and Surveys. London: HMSO; 1994.
- Federal National Council UAE, sanctions recommendations on foreign labour. http://www.uaeinteract.com/docs/FNC\_sanctions\_ recommendations\_on\_foreign\_labour/33518.htm [accessed on 3 March 2009].
- Skaare AB, Jacobsen I. Etiological factors related to dental injuries in Norwegians aged 7–18 years. Dent Traumatol 2003;19:304–8.
- Locker D. Self-reported dental and oral injuries in a population of adults aged 18–50 years. Dent Traumatol 2007;23:291–6.
- Odoi R, Croucher R, Wong F, Marcenes W. The relationship between problem behavior and traumatic dental injury amongst children aged 7–15-years old. Community Dent Oral Epidemiol 2002;30:392–6.
- Ivancic JN, Bakarcic D, Fugosic V, Majstorovic M, Skrinjaric I. Dental trauma in children and young adults visiting a University Dental Clinic. Dent Traumatol 2009;25:84–7.
- Baldava P, Anup N. Risk factors for traumatic dental injuries in an adolescent male population in India. J Contemp Dent Pract 2007;8:35–42.
- Cortes MIS, Marcenes W, Sheiham A. Prevalence and correlates of traumatic injuries to the permanent teeth of school children aged 914 years in Belo-Horizonte, Brazil. Dent Traumatol 2001;17:2226.
- Marcenes W, Alessi ON, Traebert J. Causes and prevalence of traumatic injuries to the permanent incisors of schoolchildren aged 12 years in Jaragua do Sul, Brazil. Int Dent J 2000;50: 87–92.
- Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. Dent Traumatol 2001;17:17–21.
- Kahabuka FK, Plasschaert A, van't Hof M. Prevalence of teeth with untreated dental trauma among nursery and primary school pupils in Dar es Salaam, Tanzania. Dent Traumatol 2001;17:109–13.

- 17. Al-Jundi SH. Dental emergencies presenting to a dental teaching hospital due to complications from traumatic dental injuries. Dent Traumatol 2002;18:181–5.
- Bastone EB, Freer TJ, Mc Namara JR. Epidemiology of dental trauma: a review of the literature. Aust Dent J 2000;45:2–9.
- Onetto JE, Flores MT, Garbarino ML. Dental trauma in children and adolescent in Valpariso, Chile. Endod Dent Traumatol 1994;10:223–7.
- Delattre JP, Resmond-Richard F, Allanche C, Perrin M, Michel JF, Le Berre A. Dental injuries among schoolchildren aged from 6 to 15, in Rennes (France). Endod Dent Traumatol 1994;11:186–8.
- Petti S, Tarsitani G, Arcadi P, Tomassini E, Romagnoli L. The prevalence of anterior tooth trauma in children 6–11 years old. Minerva Stomatol 1996;45:213–8.
- 22. Hamilton FA, Hill FJ, Holloway PJ. An investigation of dentoalveolar trauma and its treatment in an adolescent population. Part 1: the prevalence and incidence of injuries and the extent and adequacy of treatment received. Br Dent J 1997;182:91–5.
- Çalişkan MK, Türkün M. Clinical investigation of traumatic injuries of permanent incisors in İzmir, Türkye. Endod Dent Traumatol 1995;11:210–3.
- 24. Traebert J, Peres MA, Blank V, Boell Rda S, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-old school children in Florianopolis, Brazil. Dent Traumatol 2003;19:15–8.
- Nicolau B, Marcenes W, Sheiham A. Prevalence, causes and correlates of traumatic dental injuries among 13-year-olds in Brazil. Dent Traumatol 2001;17:209–13.
- Marcenes W, al Beiruti N, Tayfour D, Issa S. Epidemiology of traumatic injuries to the permanent incisors of 9–12-year-old schoolchildren in Damascus, Syria. Endod Dent Traumatol 1999;15:117–23.
- Report from the Police department Ras Al Khaima United Arab Emirates. http://www.gulfnews.com/nation/Police\_and\_The\_ Courts/10314534.html [accessed on 15 June 2009].
- Nicolau B, Marcenes W, Sheiham A. The relationship between traumatic dental injuries and adolescents' development along the life course. Community Dent Oral Epidemiol 2003;31:306– 13.
- 29. Nicolau B, Marcenes W, Bartley M, Sheiham A. A life course approach to assessing causes of dental caries experience: the relationship between biological, behavioural, socio-economic and psychological conditions and caries in adolescents. Caries Res 2003;37:319–26.

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