

Prevalence of traumatic dental injuries to anterior teeth and its impact on oral health-related quality of life of 12-year-old schoolchildren in Kota, Rajasthan

Yogendra Gautam^{1*}, Manu Batra¹, Deeksha Gijwani¹, Mansoor Saify², Manish Jain³

¹Department of Public Health Dentistry, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan, India.

²Department of Dentistry, Government Medical College and Hospital, Jhalawar, Rajasthan, India.

³Department of Public Health Dentistry, SMBT Institute of Dental Sciences and Research, Nashik, Maharashtra, India.

Abstract

Background: Oral health-related quality of life (OHRQoL) is of significant importance for clinical dentistry and dental research. Children's OHRQoL and their parents' QoL were statistically significantly correlated with the presence of traumatized treated teeth. **Aim:** The aim of the study is to find the prevalence rate of traumatic dental injuries (TDIs) and their impact on QoL in 12-year-old school-going children of Kota city. **Materials and Methods:** The present cross-sectional research was done to assess the prevalence of TDI and its impact on QoL in 12-year-old school-going children in different schools of Kota, Rajasthan, India. The study population comprised of 630 schoolchildren aged 12 years of Kota, Rajasthan, India. The sample was chosen using a multistage sampling process. Statistical analysis was done using the Statistical Package for the Social Sciences (Version 26; Chicago Inc., USA). **Results:** The prevalence of trauma among the overall population was 17.46%. The trauma was present among 18.85% males and 14.82% females. The main etiology of trauma among the study population was fall (36.36%) and least due to violence (3.63%). Maxillary central incisors (92.19%) were the most commonly affected tooth. Enamel fracture (61.81%) was the most common type of injury reported. TDI affects QoL as it causes pain. Children become self-conscious, getting embarrassed in front of other people, and get irritated when interacting with another person. The social well-being area had the highest mean CPQ11-14 score (7.17 ± 1.35), followed by the emotional well-being area (6.52 ± 0.90). The oral indications domain had the lowest at 5.42 ± 1.27 . **Conclusion:** TDI can lead to functional limitations, oral symptoms, and impaired mental well-being in children, all of which have an impact on QoL.

Keywords: Children, CPQ, Oral health-related quality of life, Traumatic dental injuries.

INTRODUCTION

Oral health-related quality of life (OHRQoL) is recognized by the World Health Organization (WHO) as an integral part of "general health and well-being" and as a critical element of the Global Oral Health Program (WHO, 2003).^[1]

OHRQoL is of significant importance for clinical dentistry and dental research. OHRQoL is influenced by a number of areas, including oral impacts on daily performance, social relationships, environment, psychological health, and physical health.

Traumatic dental injuries (TDIs) and dental caries are the main causes of poor oral health in dentistry.^[2] Although dental injuries can happen at any age, they tend to become more common when children begin to crawl, stand, or walk and as they begin to go to school.

In terms of dental injuries, TDI is anticipated to come in sixth place worldwide. The occurrence of TDIs in primary and permanent teeth ranges from 15% to 22%, while dental trauma is more common in mixed and permanent teeth. While permanent tooth injuries usually occur between the ages group of 8–12 years,^[3,4] primary tooth injuries usually occur between the ages of one and three. Children are increasingly experiencing TDI to their anterior teeth or permanent incisors.

Address for correspondence: Dr. Yogendra Gautam, Department of Public Health Dentistry, Surendera Dental College and Research Institute, Sriganganagar, Rajasthan, India.
Email: yogendragautam.dr@gmail.com

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Children's OHRQoL and their parents' QoL were statistically significantly correlated with the presence of traumatized teeth.^[5,6] In Europe and the USA, the TDI prevalence among adolescents varied from 15% to 35%^[7,8] and 23% to 25%,^[9] respectively. However, a wide range of factors, such as study kinds, methodology, trauma classification, study size and population, geographic location, and cultural behavioral differences, can be responsible for the wide discrepancy in reported rates.

Research focused on dental injuries among children in Kota, Rajasthan, can help to identify common causes and risk factors specific to this population. By doing so, it would be possible to develop targeted, localized preventive strategies to improve oral health outcomes for the community. Therefore, the purpose of this research was to find the prevalence rate of TDI and its impact on QoL in 12-year-old school-going children of Kota city.

MATERIALS AND METHODS

The present cross-sectional research was done to assess the prevalence of TDI and its impact on QoL in 12-year-old school-going children in different schools of Kota, Rajasthan, India. The study population comprised of 630 schoolchildren aged 12 years of Kota, Rajasthan, India. Ethical clearance was obtained from the institution ethical committee of Surendra Dental College and Hospital (IEC Ref. No-SDCRI/IEC/23/60). The individual school administrations granted permission to conduct the oral health survey among the chosen schools. The principals of each individual school provided their informed consent.

Sample size calculation

Since the study was conducted on schoolchildren from the four zones of Kota city – North-East, North-West, South-East, and South-West. A minimum of 140 samples will be needed in each cluster to determine the prevalence of traumatic oral injuries and their effects on QoL. Therefore, according to the equation (1), the minimal sample size that includes all four zones must be 560. Consequently, 630 schoolchildren, from the four zones of Kota city, were examined during the course of 1 month.

Sampling methodology

The sample for this study was selected using a multistage sampling process. First, we divided Kota City into four zones: North-East, North-West, South-East, and South-West. Next, we chose schools from each zone, giving larger schools a greater probability of being selected. A minimum enrollment of 100 students was required for a school to be considered for inclusion.

Method of data collection

First part will comprise sociodemographic data which will be recorded on a self-designed proforma including gender, academic performance, or Kuppaswamy Scale 2022. The second part will comprise OHRQoL which will be assessed using children perception questionnaire, i.e., CPQ11-14.

Various tools have been developed through the years to assess OHRQoL in children. One of the tools was the CPQ11-14, which was essentially a tool to assess the OHRQoL of children aged 11–14 during the 3 months before questionnaire administration. The questionnaire contained 37 questions organized into four health domains (oral symptoms, functional limitations, emotional well-being, and social well-being). To reduce the time and financial costs of data collection, shorter forms had been developed that eliminated non-responsive questions. One of those tools was the CPQ11-14 short form which included 16 items (4 questions in each domain).

The third part will comprise of clinical examination using a modified version of Ellis' classification of fractures (1960) which will be used to assess the type of fracture of teeth. This classification is a widely recognized system for categorizing tooth fractures based on the extent of damage to the tooth structure.

The anterior malocclusion was assessed by overbite, overjet, anterior open bite, crowding, spacing, and anterior crossbite. The presence or absence of anterior malocclusion is recorded as 1 or 0.

Statistical analysis

Statistical analysis was done using the Statistical Package for the Social Sciences (version 26; Chicago Inc., USA). Data comparison was done by applying specific statistical tests to find the statistical significance of the comparisons. Quantitative variables were compared using mean values and qualitative variables using proportions. Significance level was fixed at $P < 0.05$.

RESULTS

The present cross-sectional research was done to assess the prevalence of TDI and its impact on QoL in 630, 12-year-old school-going children in different schools of Kota, Rajasthan, India.

Out of 350 government schoolchildren, 260 (74.29%) were male and 90 (25.71%) were female. In private school, out of 280 children, 154 (55.00%) were male and 126 (45.00%) were female. Statistically significant difference was found in the distribution of study subjects according to sector as well as gender ($P = 0.04$) (Table 1). It showed that out of the total children examined, i.e., 630, only 110 children suffered from traumatic dental injuries. The prevalence rate of TDI was 17.46% (Table 2).

Out of 110 TDI, fall was the most common reason among children, i.e., 40 (36.36%), followed by collision and sports, i.e., 24 (21.81%) and 23 (20.00%), respectively. Violence was one of the least reasons, i.e., 4 (3.63%) (Table 3).

Enamel fracture was the most common type of fracture with 61.96%. Enamel fracture was found to be more common in schoolchildren of government schools as compared to children of private schools. It was found among 42 government and 26 private schoolchildren. Hence, statistically no significant

Table 1: Frequency distribution of study subjects according to sector and gender

Sector	Male	Female	Total
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Government	260 (74.29)	90 (25.71)	350
Private	154 (55.00)	126 (45.00)	280
Total	414 (65.71)	216 (34.29)	630
Chi-square (χ^2) value		25.679	
<i>P</i> -value		0.04(S)	

Table 2: Prevalence of TDI among schoolchildren

Variable	Counts
Total children	630
Trauma	110
Prevalence rate (%)	17.46
TDI: Traumatic dental injuries	

Table 3: Frequency distribution of TDI according to the most common reported etiology

Etiology	Number (percentage)
Fall	40 (36.36)
Collision	24 (21.81)
Sports	23 (20.00)
Traffic	14 (12.72)
Violence	4 (3.63)
Miscellaneous	5 (5.17)
Total	110

TDI: Traumatic dental injuries

Table 4: Frequency distribution of TDI according to type of injury and sector

Types of fracture	Sector		Number (percentage)
	Government (%)	Private (%)	
Enamel	42 (60.87)	26 (63.41)	68 (61.82)
Enamel+dentine	15 (21.74)	12 (29.27)	27 (24.54)
Enamel+dentine+pulp involvement	12 (17.39)	3 (7.32)	15 (13.64)
Total	69	41	110
Chi-square (χ^2) value		2.535	
<i>P</i> -value		0.281 (NS)	

TDI: Traumatic dental injuries

difference was found in the type of fracture among government and private schoolchildren ($P = 0.281$) (Table 4).

Table 5 reveals that the maxillary central incisor is the most common fractured anterior tooth (92.19%). The maxillary central incisor was fractured among 62 government and 39 private schoolchildren. There was statistically no significant difference found in the distribution of different types of teeth involved for trauma among government and private schoolchildren ($P = 0.754$).

Table 5: Frequency distribution of TDI between maxillary and mandibular teeth

Tooth injured	Sector		Number (percentage)
	Government (%)	Private (%)	
Maxillary central incisor	62 (89.85)	39 (95.12)	101 (92.19)
Maxillary lateral incisor	4 (5.80)	2 (4.88)	6 (5.45)
Maxillary canine	1 (1.45)	0	1 (0.9)
Mandibular central incisor	1 (1.45)	0	1 (0.9)
Mandibular lateral incisor	1 (1.45)	0	1 (0.9)
Total	69	41	110
Chi-square value		1.90	
Significance " <i>P</i> " value		0.754 (NS)	

Table 6: TDI according to the presence of malocclusion

Malocclusion	Traumatic dental injury (TDI)		Total
	Present (%)	Absent (%)	
Present	85 (13.4)	155 (24)	240
Absent	21 (3.3)	369 (58)	390
Total	106	524	630
Chi-square (χ^2) value		76.530	

Table 6 reveals traumatic dental injury according to the presence of malocclusion. Anterior malocclusion was present in 240 schoolchildren. Out of 240 children with anterior malocclusion, the prevalence of TDI was 85 (13.4%) while only 21 (3.3%) had TDI among 390 children without anterior malocclusion. Hence, a statistically high significant association was found between the presence of anterior malocclusion and traumatic dental injury ($P = 0.001$).

The mean CPQ score was found to be significantly higher among government schoolchildren ($P < 0.05$). The mean social well-being score was highest among all domains in both government and private schoolchildren. The mean social well-being score was 7.50 ± 1.35 and 6.85 ± 1.29 among government and private schoolchildren ($P = 0.014$). The mean oral symptoms score was least and it was 5.95 ± 1.27 and 4.90 ± 0.87 among government and private schoolchildren ($P = 0.001$) (Table 7).

Table 8 reveals association between CPQ score and type of tooth injury. Mean CPQ domains, i.e., oral symptoms, functional limitation, emotional well-being, and social well-being, were found significantly higher among children with enamel + dentin + pulp tooth fracture and it was least among children with only enamel fracture. The mean social well-being score was highest among all domains in all types of fracture. It was 3.90 ± 0.95 , 4.35 ± 1.05 , and 6.10 ± 1.28 among the children for enamel, enamel + dentin, and enamel + dentin + pulp, respectively. Thus, a statistically high significant association was found in all four domains of CPQ and type of tooth injury ($P = 0.001$).

DISCUSSION

The current understanding of health necessitates the addition of psychosocial elements, such as problems with QoL, which

Table 7: Comparative evaluation of CPQ11-14 score between schoolchildren of the government and private sector

CPQ among schoolchildren				Student “t” test value	Significance “P” value	
CPQ domains	Government		Private			
	Mean	SD	Mean			SD
Oral symptoms	5.95	1.27	4.90	0.87	4.677	0.001 (HS)
Functional limitation	6.10	1.10	5.50	1.27	2.609	0.010 (S)
Emotional well-being	6.90	0.90	6.15	1.34	3.508	0.007 (S)
Social well-being	7.50	1.35	6.85	1.29	2.482	0.014 (S)
Total	6.61	1.23	5.85	0.95		

Table 8: Association between CPQ11-14 score and type of tooth injury

CPQ domains	Enamel <i>n</i> =68		Enamel+dentin <i>n</i> =27		Enamel+dentin+pulp <i>n</i> =15		ANOVA "F" value	Significance "P" value
	Mean	SD	Mean	SD	Mean	SD		
Oral symptoms	3.0	0.27	3.65	0.87	4.25	0.98	32.185	0.001(HS)
Functional limitation	3.10	0.65	3.90	0.75	4.60	1.10	29.800	0.001(HS)
Emotional well-being	3.45	0.90	4.10	0.66	5.50	0.56	40.696	0.001(HS)
Social well-being	3.90	0.95	4.35	1.05	6.10	1.28	28.421	0.001(HS)

ANOVA: Analysis of variance, SD: Standard deviation

is strongly linked to interpersonal relationships in modern society. Disruptions to regular physical, psychological, and social functioning are, therefore, crucial factors to take into account when evaluating oral health. In addition to the underlying aesthetic, physical, social, psychological, functional, and therapeutic negative implications on a person's QoL, TDI to permanent incisors or anterior teeth is becoming astonishingly common among children and frequently results in the partial or complete loss of oral hard tissues. Thus, the impact of severe dental injury on a sample of 630, 12-year-old students from both private and public schools while maintaining vision was investigated using a 16-item CPQ11-14.

Demographics

Of the 350 students at government schools, 90 (25.71%) were female and 260 (74.29%) were male. In contrast, 126 (45.00%) of the 280 private school students were female, and 154 (55.00%) were male. The distribution of research participants by gender and sector exhibited statistically significant variations ($P = 0.04$). The prevalence of females in private schools was approximately 1.4 times greater than that of government schools.

Prevalence of traumatic dental injury

In the current study, 17.46% of the entire study sample had a history of trauma. Although students attending government schools had a higher prevalence rate (19.7%) than those attending private schools (14.6%), the incidence of TDI did not differ statistically significantly between the 2 student groups. Rajesh *et al.*^[10] in Brazil observed a similar finding. In Davangere, Ravishankar *et al.*^[11] reported a lower prevalence rate, with 15.1% of 12 years old. In Manaus, Brazil, Bezerra *et al.*^[12] found that 17.6% of 12 years old who lived in

underprivileged neighbourhoods had TDI. Six percent of 12-year-old students in Kerala were stated by David *et al.*^[13]

Etiology for traumatic dental injury

36.36% of schoolchildren in Kota city had TDI to their permanent incisor teeth due to falls, 21.81% to collisions, 20.23% to sports, 12.72% to traffic accidents, 3.63% to violence/fights, and 5.17% to other reasons. The most common cause of TDI in government schools was falls, which were followed by sports and collisions. However, there was no statistically significant change in the distribution of trauma-related reasons between government and private schools. ($P = 0.570$). According to Traebert *et al.*,^[14] falls accounted for 66.9% of the cases, collisions with objects for 11.9%, traffic accidents for 9.2%, violence for 6.2%, and sports for 5.6%. According to Meadow D *et al.*,^[15] falls of various kinds accounted for 62% of trauma (59% of falls took place indoors and 41% outside). According to Gupta *et al.*,^[16] falls accounted for 54.5% of tooth injuries, with sports-related injuries coming in at 18.2%, collisions with inanimate objects including walls and doors at 9.1%, violence at 4.5%, and other causes at 13.6%.

Type of traumatic dental injury (Ellis classification)

The most often reported damage in the current study was enamel fracture (61.81%), which was followed by enamel and dentin fracture (24.54%) and pulp involvement (13.63%). The type of fracture between children attending government and private schools did not differ statistically significantly ($P = 0.281$). This result was nearly identical to the findings of the research by García-Godoy *et al.*,^[9] which found that the most common wound was enamel fracture (51.1%), and by Ravishankar *et al.*,^[11] which found that the most common type of TDI in both arches was enamel fracture (74.1%), followed

by fractures connecting both enamel and dentine (17.8%), and only 5% involving pulp.

Type of teeth involved in traumatic dental injury

The maxillary central incisor (92.19%) and maxillary lateral incisor (5.45%) were the most frequently traumatized teeth in this study. The distribution of the various tooth types affected by trauma in children attending government and private schools did not differ statistically significantly ($P = 0.754$). This consequence was similar to the findings of other investigations.^[11,17,18] According to a study by Nagarajappa *et al.*,^[19] the maxillary central incisor is the teeth that sustain trauma the most frequently among schoolchildren aged 12 years.

Transition of malocclusion on traumatic dental injury

240 school-age children had anterior malocclusion. 85 (13.4%) of the 240 children with anterior malocclusion had a TDI. Of the 390 children without anterior malocclusion, only 21 (3.3%) suffered acute oral injuries. The presence of anterior malocclusion and traumatic dental damage was revealed to be statistically significantly associated ($P = 0.001$).

QHRQoL

QoL evaluation is becoming a crucial component of health program evaluation. A number of tools for enhancing children's and teenagers' QHRQoL have surfaced in recent years.^[5] The current study measured the QHRQoL of schoolchildren in both public and private schools using a self-reported 16-item CPQ11-14. According to the examined main CPQ11-14 result, the social well-being area had the highest mean CPQ11-14 score (7.17 ± 1.35), followed by the emotional well-being area (6.52 ± 0.90). The oral indications domain had the lowest, at 5.42 ± 1.27 . In addition, it demonstrated that the mean CPQ11-14 score was greater in government schools. For both public and private schools, the mean CPQ11-14 score that corresponds to the "social well-being" area had the highest score. In every CPQ11-14 domain, there is a statistically significant difference between students attending government and private schools ($P < 0.05$).

Furthermore, regardless of the type of school, children with enamel + dentin + pulp tooth fractures had significantly higher mean scores in CPQ domains such as oral symptoms, emotional well-being, functional limitation, and social well-being, according to the correlation between the CPQ11-14 score and the type of tooth injury. Children with simple enamel fractures had the lowest score. All four CPQ11-14 categories showed a correlation with the type of tooth injury ($P = 0.001$).

This conclusion was corroborated by another study by Traebert J *et al.*,^[10] which found that TDI can lead to functional limitations, oral symptoms, and impaired mental well-being in children, all of which have an impact on QoL. Similar results were observed by Abanto *et al.*,^[20] who found that TDI negatively impacts the symptoms domain, disrupts emotional and social interactions, and affects QoL.

The current study suggests an educational program for patients that cover topics such as the significance of dental trauma,

trauma prevention strategies, the advantages of prompt attention, and how to preserve broken and avulsed teeth. This would lessen the effects of acute injuries as well as the general frequency of oral injuries.

CONCLUSION

TDI has an impact on QoL. Children feel self-conscious, humiliated in front of others, and angered when they engage with others because it hurts them. It also aids in the creation of educational campaigns to educate educators, parents, and medical professionals on the best emergency protocols and shorten the time between dental trauma and prompt dental care, which is extremely important for the success of treatment.

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