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ORIGINAL ARTICLE

Impact of traumatic dental injury on the quality-of-life of children and adolescents: A case-control study

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Abstract

Objective. To evaluate the quality-of-life of students in Nova Friburgo, Rio de Janeiro, who suffered traumatic dental injury. ***Materials and methods.*** A case-control study was carried out by means of structured questionnaire for traumatic dental injury evaluation, clinical oral examination and application of a quality-of-life questionnaire (CPQ11–14), validated in the Portuguese version. This study consisted of 50 children/adolescents (17 cases of traumatic dental injury and 33 controls). Psychometric properties, like internal consistency (Cronbach's Alpha) and test–re-test reliability (ICC), were evaluated. The independent variables were collected for being of interest to the study (dental trauma) or for acting as potential confounding factors (malocclusion, caries). Descriptive and univariate analyses were performed. ***Results.*** The Cronbach's Alpha was 0.90 for case and 0.77 for controls. ICC was 0.99. When the groups were compared, confounding factors showed no statistical difference ($p > 0.05$). Among the cases CPQ11–14 mean score was 17.59 (SD = 14.01), median = 17.00, whereas among the controls it was 3.09 (SD = 4.42), median = 1.00 ($p < 0.01$, Mann-Whitney test). When the groups were compared, there was statistical difference frequencies between CPQ11–14 total scale and sub-scales ($p < 0.05$). The functional limitation and emotional well-being were the sub-scales most affected. The TDI impact was related to 'delay and difficulty in chewing', 'embarrassed or ashamed' and 'caring about what others were thinking of appearance'. ***Conclusions.*** One can observe a relationship between traumatic dental injury and its impact on quality-of-life. Children and adolescents who suffered traumatic dental injury showed negative experiences and greater functional and emotional impact.

Key Words: *adolescent, child, quality-of-life, oral health, tooth injuries*

Introduction

In our society, traumatic dental injury reaches a considerable part of the population and can result in irreparable dental loss at the moment of the event, during the treatment or even years later. Therefore, traumatic dental injury is among the major public problems worldwide, together with caries and oral cancer [1].

The World Organization Health Quality-of-Life Group has defined quality-of-life as being an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [2].

Therefore, the repercussions of diseases affecting individuals can no longer be explained uniquely by biological factors. The quality-of-life, which results from social, economic, political and cultural aspects of a society, is an essential determinant. Thus, the contemporary concepts of child health measures health by taking into account the quality-of-life from the child's perspective [3].

One study method for assessing traumatic dental injury is to use questionnaires to detect the impact it causes on the quality-of-life [4].

In the literature, there exist studies assessing the impact of traumatic dental injury on the quality-of-life of children and adolescents [4–17]. However, many questions on the impact of traumatic dental injury are

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still not elucidated and therefore more studies are needed in this area [18]. Oral health-related quality-of-life questionnaires for measuring the impact of traumatic dental injury on the quality-of-life should be used, since its prevalence is high among Brazilian children, ranging from 0.7–39.1% for deciduous [19–23] and 10.5–17.3% for permanent dentitions [24,25].

Therefore, in light of the epidemiological importance of traumatic dental injury, the measurement of the patients' quality-of-life becomes extremely relevant for planning public policies. So, the present study aims to assess the quality-of-life of students in Nova Friburgo, Rio de Janeiro, who suffered traumatic dental injury.

Materials and methods

The present study was approved by the local ethics research committee (CCM/HUAP no. 274/2010) according to ethical aspects regarding the research with human beings.

This is a case-control study that included children and adolescents aged between 10–15 years old studying in a public school in Nova Friburgo, Rio de Janeiro. The case group (T) consisted of students who suffered traumatic dental injury, whereas the control group (C) consisted of children and adolescents who never had such injuries. Children and adolescents of both groups, who have had orthodontic treatment or who wear fixed or removable prostheses, including those individuals whose traumatic dental injury could not be classified, were excluded from the study. After applying the inclusion and exclusion criteria, the final samples consisted of 17 cases of trauma and 33 controls. The decision in assessing about two controls *per* case was made in order to improve the study's statistical power.

The study was conducted in three phases, as follows:

Identification of traumatic dental injury cases

The questionnaire and an informed consent form were sent to the caregivers of the students, the former for identification of traumatic dental injury cases and the latter for participation of their children in the study.

Clinical examination

The individuals were examined during school activities by only one calibrated examiner. The clinical examination was conducted with the patients seated on a school chair under lantern light by using mouth mirror, nippers and probe (all properly sterilized) followed by cleaning and drying of the teeth with gauze. The resulting data were then annotated properly.

Oral examination was performed in order to assess the similarity between case and control groups as well as the potentially confounding factors in the quality-of-life evaluation, such as caries and malocclusion. The cases of traumatic dental injury were classified according to criteria based on the dental trauma index (DTI) proposed by the World Health Organization [26]. Presence of caries was evaluated by using the DMFT index [26], whereas occlusion and dentition were evaluated by using the dental aesthetic index [26].

Application of questionnaire for quality-of-life evaluation

Initially, a pre-test study was conducted with seven children in order to determine the clarity and the stability of the questionnaire. It was assessed using the test–re-test reliability.

The short-form of the Child Perceptions Questionnaire (CPQ11–14) is used for children/adolescents aged from 11–14 years old to assess the impact of oral health conditions on their quality-of-life. This version of the questionnaire was evaluated by Jokovic et al. [27] and validated for Brazilian children by Torres et al. [28]. It consisted of 16 questions divided into four domains: oral symptoms (four questions), functional limitations (four questions), emotional well-being (four questions) and social well-being (four questions). Each answer has a Likert-type score ranging from 0–4 (0 = 'never', 1 = 'once or twice', 2 = 'sometimes', 3 = 'often', 4 = 'every day or almost every day'). The scores of all questions are then summed to give a total score ranging from 0–64 points; the greater total, the greater the impact of oral health on the child's quality-of-life.

Data analysis

For quantitative analysis of the results, data were tabulated by using statistical software (SPSS 16.0) at significance level of $p < 0.05$.

The relative frequency (%) of all variables was obtained (sample characterization, traumatic dental injury, clinical examination and items of the quality-of-life questionnaire).

The scores for CPQ11–14 index were calculated with the additive method by summing the numeric answer codes regarding each item.

Means and medians of total scores were compared, including the sub-scales for both situations included in the study. Once items were obtained by using the ordinal scale, non-parametric statistical procedures (Mann-Whitney test) were used for scale and sub-scale.

Psychometric properties were evaluated by using internal consistency, test–re-test and construct validity. Internal consistency reliability was evaluated by means of Cronbach's alpha and test–re-test reliability by means of intra-class correlation coefficient (ICC).

Table I. Traumatic dental injury (TDI) characterization case group.

	n (%)
Where happened?(*n* = 17)	
House	10 (58.8)
Street	2 (11.8)
School	3 (17.6)
Park	2 (11.8)
How it happened? (*n* = 17)	
Fall	10 (58.8)
Sport accident	2 (11.8)
Car accident	3 (17.6)
Abuse	10 (58.8)
Dash	2 (11.8)
Teeth affected (*n* = 17)	
Anterior teeth	10 (58.8)
Posterior teeth	2 (11.8)
Type of TDI (*n* = 17)	
Enamel fracture	10 (58.8)
Enamel and dentin fracture	2 (11.8)
Enamel and dentin fracture with pulp exposure	3 (17.6)

Results

Group T's mean age was 12 ± 2.89 years old, whereas Group C's was 13 ± 1.95 years old. With regard to gender, 64.7% of the subjects were male in Group T, whereas 54.5% were female in Group C. Table I lists the results for traumatic dental injury in the affected population (*n* = 17).

In Table II, no statistically significant differences ($p > 0.05$) were observed between Groups T and C regarding variables such as caries, malocclusion and factors favouring traumatic dental injury.

With regard to psychometric properties of the questionnaire, we can observe a satisfactory reliability as Cronbach's alpha values (0.90 and 0.77 for Groups T and C, respectively). The test–re-test reliability was satisfactory (ICC = 0.99).

Table II. Sample characterization according to caries, malocclusion and associated factors to traumatic dental injury.

Variables	Group, *n* (%)		*p*-value
	Case (*n* = 17)	Control (*n* = 33)	
Caries			
DMFT = 0	3 (17.6)	2 (6.1)	0.20**
DMFT > 0	14 (82.4)	31 (93.9)	
Malocclusion			
Present	6 (35.3)	17 (51.5)	0.27*
Absent	11 (64.7)	16 (48.5)	
Associated factors to TDI			
Present	2 (11.8)	5 (15.2)	0.55**
Absent	15 (88.2)	28 (84.8)	

* Qui-square test; ** Fisher exact test.

The mean scores for CPQ11–14 were 17.59 (SD = 14.01) and 3.09 (SD = 4.42), whereas median values were 17.00 and 1.00 ($p < 0.01$), respectively, in Groups T and C (Table III).

In Table IV, we can observe a statistically significant difference in total CPQ11–14 frequencies of the sub-scales when children with traumatic dental injury were compared to controls.

In Table V, we can observe no statistically significant difference regarding both caries and malocclusions when children with traumatic dental injury were compared to controls.

Discussion

There exists literature about studies evaluating the impact of traumatic dental injury on the quality-of-life of children and adolescents [4–17]. According to these works, we can observe that children with untreated dental fracture of permanent teeth suffered more impact than those with no type of traumatic dental injuries [4,6]. Dissatisfaction with the appearance of fractured incisors reduces the smile and

Table III. Comparison of total scale mean and sub-scales means on case group and control group.

$CPQ_{11–14}$ (variation)	Case group		Control group		*p*-value*
	Mean ± SD	Median	Mean ± SD	Median	
Total scale (0–64)	17.59 ± 14.01	17.00	3.09 ± 4.42	1.00	<0.01
Sub-scales					
Oral symptoms (0–16)	3.82 ± 2.60	3.00	1.30 ± 2.02	0.00	<0.01
Fuctional limitation (0–16)	5.29 ± 4.03	6.00	1.33 ± 1.94	0.00	<0.01
Emocional well-being (0–16)	5.00 ± 6.34	2.00	0.24 ± 1.22	0.00	<0.01
Social well-being (0–16)	3.47 ± 4.36	2.00	0.21 ± 0.59	0.00	<0.01

* Mann-Whitney Test.

Table IV. Frequency distribution of CPQ11–14 among children/adolescents with TDI (case) and absent of TDI (control).

Variable	Group		*p*-value
	Case (n = 17)	Control (n = 33)	
$CPQ_{11–14}$ total			
$CPQ_{11–14} = 0$	1 (5.9)	15 (45.5)	0.004**
$CPQ_{11–14} \geq 1$	16 (94.1)	18 (54.5)	
Oral symptoms			
$CPQ_{11–14} = 0$	1 (5.9)	19 (57.6)	0.000 4**
$CPQ_{11–14} \geq 1$	16 (94.1)	14 (42.4)	
Fuctional limitation			
$CPQ_{11–14} = 0$	4 (23.5)	19 (57.6)	0.02**
$CPQ_{11–14} \geq 1$	13 (76.5)	14 (42.4)	
Emocional well-being			
$CPQ_{11–14} = 0$	7 (42.1)	31 (93.9)	0.000 08**
$CPQ_{11–14} \geq 1$	10 (58.8)	2 (6.1)	
Social well-being			
$CPQ_{11–14} = 0$	7 (42.1)	29 (87.9)	0.000 4**
$CPQ_{11–14} \geq 1$	10 (58.8)	4 (12.1)	

* Qui-square test; ** Fisher exact test.

affected the subject's social well-being [6]. In addition, treatment of coronal fractures does not eliminate the impact of trauma on the adolescents' daily life, but possibly reduces it [5].

All instruments used to measure quality-of-life need to be tested in terms of psychometric properties as follows: age group, population involved (parents, family, children with specific diseases or conditions) or adaptations to other languages. This is not different for instruments to measure children/adolescents' oral health-related quality-of-life. Therefore, such instruments should have their versions and respective psychometric properties tested to demonstrate their degree of reliability, validity and reproducibility for application of the questionnaires. Validity of an instrument can be defined as the ability of measuring what is intended to be measured. For example, a valid questionnaire for measuring intelligence should measure intelligence rather than memory.

According to Antunes et al. [18], there is no specific instrument cited in the literature to measure the impact on quality-of-life in individuals that suffered traumatic dental injury. Other instruments for evaluation of the oral health-related quality-of-life for children and adolescents have to be used. So, in this paper, we opted to use one already validated in the Portuguese language: the short-form of CPQ11–14, which is a valid, reliable and reproducible instrument for the Brazilian population following some studies [28,29]. Nevertheless, even when using a questionnaire with proven psychometric properties, it is important to assess the questionnaire in order to ensure a good methodological quality of the study [30]. Therefore, the present instrument was also found to be valid and reliable, showing satisfactory internal validity (Cronbach's alpha of 0.90 and 0.77 for Groups T and C, respectively) and good understanding of the questionnaire being applied (ICC = 0.90), which was detected after replication of the instrument. In fact, it is suggested that this instrument can be applied to other populations of the same age group who had suffered traumatic dental injury.

Methodologically, it is important to emphasize that the variables caries and malocclusion were not confounding factors for the result found in the present study. After analysing the oral exam data, a similarity between Groups T and C was found, thus allowing a comparison.

With regard to the quality-of-life evaluation, the results obtained in the present study showed a statistically significant relationship between Groups T and C regarding total CPQ11–14 frequencies and sub-scales ($p < 0.05$). Therefore, we can observe that children and adolescents with traumatic dental injury were more likely to have a greater impact on their life than those with no injuries, as reported by Cortes et al. [4].

There is no study applying CPQ11–14 to patients with traumatic dental injury using case-control methodology to compare our results to. In the literature, CPQ11–14 was applied in studies conducted by Locker [7,8] in 2007 and 2008 in order to obtain social-economical differences in the oral health-related quality-of-life, assess the validity of only one question on oral health asked to parents in a study by Fakhruddin et al. [6] and evaluated the quality-of-life of treated and untreated individuals in a study by Bendo et al. [11]. Also, Berger et al. [10] assessed the effects of severe dental injuries on the oral health-related quality-of-life of children and adolescents,

Table V. Association between independent variables (interest and confounding factors) and CPQ11–14.

	CPQ 11–14 Impact		*p*-value
	$CPQ_{11–14} = 0$	$CPQ_{11–14} \geq 1$	
TDI			
Present	1	16	0.004**
Absent	15	18	
Caries			
DMFT = 0	2	3	0.51**
DMFT > 0	14	31	
Malocclusion			
Present	6	17	0.40*
Absent	10	17	

* Qui-square test; ** Fisher exact test.

including their families, by using child oral health quality-of-life questionnaires, among them the CPQ11–14, 6 and 12 months after traumatic dental injury, whereas Bendo et al. [11] and Traebert et al. [16] used CPQ11–14 in a cross-sectional study. Based on this information, one can suggest that further studies should be carried out to corroborate or refute our results.

With the results obtained in the present research, we can observe that traumatic dental injury actually affects the quality-of-life of children and adolescents and, consequently, it is not enough to treat only its signs and physical symptoms. In fact, oral symptoms but also functional limitations and emotional and social well-being should be considered.

The applicability of this study to other populations can be considered. However, it is suggested that a representative sample with a higher number of participants is needed in order to make the extrapolation of our results more reliable, since our study used a convenience sample with a small number of children, mainly due to their refusal in participating in the research.

This research can be considered as being preliminary because it investigates the impact of traumatic dental injury on the quality-of-life of the population by means of a control-case study. Based on the results found here, further information will be provided for other broader mapping studies and new research aimed to elaborate preventive and curative actions, including improving the quality-of-life of the population being investigated.

Conclusion

According to the methodology used in the present study, one can observe a relationship between traumatic dental injury and its impact on quality-of-life. Children and adolescents who suffered such a trauma, compared to those who did not, reported more negative experiences and greater impact on their functional limitation and emotional well-being.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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