# ORAL HEALTH-RELATED QUALITY OF LIFE OF 8-10 YEAR-OLD CHILDREN WITH TRAUMATIC DENTAL INJURY

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**Palavras-chave:** Saúde Bucal. Qualidade de Vida. Criança. Traumatismo Dentário.

**RESUMO**

**Introdução:** Crianças apresentam alta prevalência de traumatismo dentário (TD). **Objetivo:** Detectar o impacto do TD na qualidade de vida relacionada à saúde bucal (QVRSB) nessa faixa etária. **Métodos:** Um estudo transversal foi realizado com amostra de conveniência recrutando-se crianças de 8-10 anos com TD em dente permanente por um período de 18 meses em clínica pública. Dados sobre a QVRSB foram coletados através da versão brasileira do $CPQ_{8-10}$ ($B\text{-}CPQ_{8-10}$). O TD foi classificado de acordo com os critérios de Andreasen e agrupado de acordo com sua gravidade. As variações nos escores e o impacto do TD na QVRSB, de acordo com idade, gênero e gravidade do TD foram examinados por meio de testes estatísticos não paramétricos (teste de Kruskall-Wallis e Mann-Whitney, $p < 0,05$). **Resultados:** De uma amostra de 255 crianças, 41 crianças saudáveis que sofreram TD em dentes permanentes foram incluídas no estudo. O escore médio do $B\text{-}CPQ_{8-10}$ foi 29,7 (DP 14,3). Os domínios bem-estar emocional e social apresentaram maior impacto negativo com média de 8,8 (DP 5,9) e 9,8 (DP 6,3), respectivamente. A diferença de gênero e a gravidade do TD não apresentaram relação de impacto na QVRSB. Em relação a idade, crianças de 10 anos tiveram maior impacto na escala global da QVRSB ($p < 0,05$) e na subescala de limitação funcional ($p < 0,05$). **Conclusão:** O TD impacta negativamente a QVRSB de crianças de 8 a 10 anos de idade.

**Keywords:** Oral Health. Quality of Life. Child. Tooth Injuries.

**ABSTRACT**

**Introduction:** Children presents high prevalence of traumatic dental injury (TDI). **Objective:** It is very important to detect the impact on oral health related to quality of life (OHRQoL) in this age group. **Methods:** Based on this, a cross sectional study was carried out using a convenience sample. Children from 8-10 years with TDI in permanent teeth were recruited over an 18 month period, from a public University. Data about OHRQoL using the Brazilian version of $CPQ_{8-10}$ ($B\text{-}CPQ_{8-10}$) were collected. TDI were classified according to Andreasen criteria and grouped according to its severity. Variations in the scores and impact of TDI on OHRQoL according to age, gender and TDI severity were examined using nonparametric statistical tests (Kruskall-Wallis and Mann-Whitney test, $p<0.05$). **Results:** From a sample of 255 children, 41 healthy children that suffered TDI in permanent were included in the study. The mean $B\text{-}CPQ_{8-10}$ scores were 29.7 (SD 14.3). Emotional and social wellbeing domais had the highest negative score impact average 8.8 (SD 5.9) and 9.8 (SD 6.3), respectively. Gender or TDI severity did not present relation to impact on OHRQoL. In relation to age, 10-year-old children had more impact on their OHRQoL on the overall scale ($p<0.05$) and for the functional limitation subscale ($p<0.05$). **Conclusion:** TDI impacts negatively on OHRQoL of children aged from 8-10 years old.

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# INTRODUCTION

Traumatic dental injury (TDI) represents an acute transmission of energy to the tooth and supporting structures, which results in fracture and/or displacement of the tooth and/ or separation or crushing of the supporting tissues or tooth loss. These sequels are not associated only with biological factors, they are also associated with socio-economic conditions, psychological and behavioral factors[1] which can significantly affect the quality of life of parents and child alike[2,3]. Questionnaires designed to assess the impact of oral health related to quality of life (OHRQoL) have various interesting and important uses including research, and policies for public health clinics.[4]

According to WHO, TDIs are a public health problem.[5] The prevalence of TDI in Brazilian schoolchildren is high.[6] However, there are many studies that exist already documenting quality of life and impacts experienced by children with various dental problems, but reports of the TDI impact on quality of life in children aged from 8 to 10 years old are scarce.[2,7]

The Child Perceptions Questionnaires (CPQs) are a group of questionnaires developed to measure the functional and psychosocial outcomes of orofacial condition. The CPQs have been translated into several languages including Portuguese.[8-10] Each CPQ has been developed to measure children's perceptions regarding the impact of oral health on their quality of life (QoL) in terms of their cognitive, emotional and social feelings. The age is a key factor when choosing among the four recommended instruments for schoolchildren and adolescents.[11] The $CPQ_{8-10}$ has been shown to be an appropriate index for children aged from 8 to 10 years old.[12] In the literature, there is no specific instrument for assessing TDI[13] and therefore instruments already tested to assess the QHRQoL of children should be used.

Therefore, the aim of this study is to assess the impact of traumatic dental injury on oral health related to the quality of life of children aged 8-10 years old.

# MATERIALS AND METHODS

Ethical approval was obtained from the local Human Ethics Committee (Protocol n. 824/09). Informed consent was obtained from all parents/legal guardians.

## Type of Study and sampling

This crossectional study was composed by a convenience sample of children, aged from 8 to 10 years old. All children those search for treatment was recruited over an 18-month period (2011-2012) from a dental trauma center in a Public University in Rio de Janeiro-Brazil.

We included children that suffered TDI in permanent teeth until four weeks before the questionnaire application Children that did not who speak ûuent Brazilian Portuguese, with dental caries, malocclusions, undergoing orthodontic treatment, children with special needs (i.e. motor and mental disabilities or some type of syndrome) or with systemic disease were excluded.

## *Data collection*

### 1) Non clinical data

The following data were obtained: child's age and gender; TDI history (when, where, and how the trauma occurred; which tooth and dentition were affected; tissue affected and type of the more prevalent TDI).

OHRQoL was measured using the Brazilian version of the $CPQ_{8-10}$ which has 25 items distributed into 4 health domains (subscales): oral symptoms -OS (five items); functional limitations -FM (five items); emotional well-being -EWB (five items); and social well-being-SWB (10 items). The items addressed the frequency of events over the 4 previous weeks. The items have five response options: 'never = 0', 'once or twice =1', 'sometimes = 2', 'often = 3', 'every day or almost every day = 4'. $CPQ_{8-10}$ scores are calculated by summing all the item scores, giving a total score ranging from 0 (no impact) to 100 (maximal impact); higher scores indicate that the oral conditions have a greater negative impact on the child's OHRQoL. The questionnaire also contains two questions on the child's personal information (gender and age) and two global indicators concerning the child's oral health and the extent to which his/her orofacial condition affects his/her overall wellbeing.[10]

Before apply the OHRQoL questionaire a pretest study was conducted to detect reliability of the questionnaire in the population that we pretended to use and to detect the necessity to remove some question. A new convenience sample (not part of the study population) of parents/ caregivers and their children was recruited. The test-retest reliability analysis requires individuals' conditions remain stable between the two administrations of the questionnaire. The second questionnaire application, two weeks later, was done after asking parents/caregivers if the child's condition had no change since recruitment. All children answered the questionnaire by interview.

### 2) Clinical data (TDI diagnostic and severity)

The child's oral examination was by carried out by two previously calibrated examiners (LAA and EP). The

***Table 1:*** *Mean, standard deviation and median of B-CPQ$_{8-10}$ scores, according to type of TDI and its severity*

| Type of TDI (n=41) | TDI Severity | B-CPQ8-10 Overall Scores | | B-CPQ8-10 Domain Scores | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Oral Symptoms | | Functional Limitations | | Emotional Well-being | | Social Well-being | |
| | | Mean (SD) | Median | Mean (SD) | Median | Mean (SD) | Median | Mean (SD) | Median | Mean (SD) | Median |
| Support tissue injury without dislocation (n=1) | UC | 12.0 (- ) | 12.0 | 4.0 (-) | 4.0 | 6.0 ( -) | 6.0 | 0 | 0.0 | 2.0 (-) | 2.0 |
| Support tissue injury without dislocation (n=7) | C | 30.2 (18.7) | 22.0 | 4.5 (2.9) | 3.0 | 7.1 (3.8) | 6.0 | 9.0 (6.92) | 10.0 | 9.5 (8.3) | 7.0 |
| Fracture without pulp exposure (n=20) | UC | 31.3 (13.0) | 33.5 | 5.2 (3.2) | 5.0 | 6.0 (3.7) | 6.0 | 10.4 (5.6) | 12.5 | 9.7 (6.0) | 10.0 |
| Fracture with pulp exposure (n=1) | C | 18.0 (-) | 18.0 | 0 | 0.0 | 0 | 0.0 | 15.0 (-) | 15.0 | 3.0 (-) | 3.0 |
| Support tissue injury without dislocation / Fracture without pulp exposure (n=5) | UC | 28.0 (18.1) | 26.0 | 4.0 (3.2) | 4.0 | 5.8 (6.0) | 4.0 | 7.2 (5.8) | 10.0 | 10.6(6.4) | 10.0 |
| Support tissue injury with dislocation / Fracture without pulp exposure (n=7) | C | 30.2 (13.0) | 27.0 | 4.5 (3.6) | 3.0 | 7.4 (3.9) | 6.0 | 6.0 (5.1) | 4.0 | 12.2 (5.0) | 12.0 |

*Note: UC=uncomplicated; C= complicated. Support tissue injury without dislocation (concussion and subluxation); Support tissue injury with dislocation (lateral luxation, intruse luxation, extrusive luxation and avulsion).*

training exercise for TDI was performed using images of different clinical situations and the calibration was carried out with an oral examination of 20 children (not part of this study) on two separate occasions, with a 2-week interval between sessions. Intra- and inter-examiner reliability was assessed by kappa statistics. Intra- and inter-examiner results were between good to excellent; weighted kappa scores were between 0.66 and 1.00 for intra-examiner reliability (0.68-0.89 for support tissue; 0.66-1.00 for dental tissue) and between 0.77 and 0.89 for inter-examiner reliability (0.84-0.89 for support tissue; 0.77-0.88 for dental tissue).

The TDI classification/diagnostic was carried out following Andreasen's criteria as described by Jesus *et al*.[6] The clinical data were collected in dental equipment. Biosafety standards were obeyed.

The extent of TDI was classified into levels of severity according to Glendor *et al*.[14] as 'uncomplicated' (those in which the pulpal tissue was not exposed and the tooth was not dislocated) or 'complicated' (those involving exposure of the pulpal tissue and/or tooth dislocation). One or more diagnoses could be included, the classification on the individual level being determined by the most complicated diagnosis.

## *Data management and statistical analysis*

Statistical analysis was performed using the Statistical Package for Social Sciences (version 16.0; SPSS Inc., Chicago, IL, USA). The level of statistical significance was set at $p < 0.05$.

The socio-dental indicator psychometric properties were assessed through internal consistency and test-retest reliability. Internal consistency reliability was assessed by means of Cronbach's Alpha and test-retest reliability by means of the intraclass correlation coefficient (ICC). The construct validity was evaluated by means of associations between scale scores and the two global indicators of health status (general and oral) and well-being (the impact of dental trauma) using Spearman rank correlation coefficient.

The Kolmogorov-Smirnov test was used in order to check distribution of the values. It was observed that the values did not had normal distribution and non-parametric statistical procedures were used. Means and medians were obtained for items overall and subscale scores.

Variations in the scores and impact of TDI on OHRQoL according to age and gender and TDI severity were examined using statistical tests (Kruskall-Wallis and Mann-Whitney test).

***Table 2**: B-CPQ$_{8-10}$ scores by categories of clinical data.*

| | B-CPQ8-10 Overall Scores | | | B-CPQ8-10 Domain Scores | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Oral Symptoms | | | Functional Limitations | | | Emotional Well-being | | | Social Well-being | | |
| | Mean(SD) | Median | p-value | Mean (SD) | Median | p-value | Mean (SD) | Median | p-value | Mean (SD) | Median | p-value | Mean (SD) | Median | p-value |
| Gender* | | | | | | | | | | | | | | | |
| Male(n=23) | 27.0(12.9) | 26.0 | ns | 4.5(3.1) | 4.0 | ns | 5.47(3.78) | 5.0 | ns | 7.9(5.6) | 7.0 | ns | 9.1(4.7) | 10.0 | ns |
| Female (n=18) | 33.1(15.5) | 34.5 | | 4.9(3.2) | 4.5 | | 7.27 (4.26) | 7.5 | | 10.1(6.1) | 11.5 | | 10.8(7.9) | 10.5 | |
| Age** | | | | | | | | | | | | | | | |
| 8 years (n=11) | 25.4(16.7) | 23.0 | p<0.05 | 3.6(2.2) | 4.0 | ns | 4.9(3.7) | 4.0 | p<0.05 | 9.0(6.8) | 10.0 | ns | 7.8(7.3) | 5.0 | ns |
| 9 years (n=16) | 25.2(10.2) | 24.0 | | 4.7(3.2) | 4.0 | | 4.3(2.9) | 4.0 | | 7.4(5.8) | 4.5 | | 8.6(4.9) | 9.0 | |
| 10 years (n=14) | 38.2(13.2) | 39.0 | | 5.5(3.5) | 4.5 | | 9.5(3.5) | 10.0 | | 10.3(5.2) | 11.0 | | 12.8(6.1) | 13.0 | |
| TDI severity* | | | | | | | | | | | | | | | |
| C (n=15) | 29.4(15.2) | 22.0 | ns | 4.2(3.3) | 3.0 | ns | 6.8(4.0) | 6.0 | ns | 6.8(4.0) | 6.0 | ns | 10.4(6.8) | 11.0 | 0.7 |
| UC (n=26) | 29.9(14.0) | 33.0 | | 5.0(3.1) | 4.5 | | 5.9(4.0) | 5.5 | | 9.3 (5.8) | 10.5 | | 9.5(6.0) | 10.0 | |

*Note: C = complicated UC= uncomplicated*

## RESULTS

From a sample of 255 children, 41 children that suffered TDI in permanent teeth until four weeks before the questionnaire application achieved the elegibilty criteria and presented from 8 to 10 years were included. The reasons for loss of sample were due to the specific elegibility criteria designed.

The B-CPQ$_{8-10}$ psychometric properties for this population reported a satisfactory reliability with 0.82 for Cronbach's alpha. The test-retest reliability was satisfactory (ICC 0.98). When the scores of the B-CPQ8-10 were correlated to global indicators there was no statistical relationship to oral and general health. The TDI well-being showed satisfactory construct validity evaluated by means Spearman correlation for the total scale (rho: 0.58, $p < 0.01$) and for subscales ($p< 0.01$; rhoOS: 0,40; rhoFF: 0.53; rhoEWB: 0.40; rhoSWB: 0.57).

The mean B-CPQ$_{8-10}$ scores were 29.7 (SD 14.3), while the median scores were 30.0. When the subscales (OS, FL, EWB, SWB) were analyzed in the present study, EWB and SWB had the highest score impact: mean 8.8 (SD 5.9) median 9.0 and mean 9.8 (SD 6.3) median 10.0, respectively. OS presented mean 4.7 (SD3.1) and 4.0 median. FL presented mean 6.2 (SD 4.0) and median 6.0.

Table I shows the mean B-CPQ$_{8-10}$ scores (overall and domains) according to type of TDI and its severity. Variations in the scores and impact of TDI on OHRQoL according to age, gender and TDI severity were analyzed (Table II). There was no statistical significance for gender and type of TDI severity. In relation to the age there was statistical significance. The children aged 10 years had more impact on their ORHQoL on overall scale ($p<0.05$) and for the functional limitation subscale ($p<0.05$).

## DISCUSSION

Dental trauma has epidemiological importance in the context of public health, since it occurs in 2 out of every 3 children before adulthood. However, the publication about TDI theme is less than 1% which is completely out of proportion to the size of the problem.[15] According to Antunes *et al*.,[13] the number of papers that evaluate the impact of dental trauma in pediatric patients is even much lower. A better understanding and detection of the impact of dental trauma on children's OHRQoL for different age groups (with different cognitive behaviors) is of paramount importance and is needed to develop measures that address not only preventive actions and how to deal with them, but also to emphasize the psychological care and social impact caused to the parents, family and the child.

The CPQ$_{8-10}$ instrument[8] used in this study has been validated in Portuguese[7] and in other languages.[16-18] It is a descriptive measure able to discriminate between groups with different levels of oral health problems. Instruments for specific conditions, symptoms, or treatments need further research on metric properties.[11] This study confirmed the validity and the reliability of this instrument. Thus it corroborates the aforementioned works and supports the Brazilian version of CPQ$_{8-10}$ and the scores that are shown to be satisfactory to detect the impact on OHRQoL in populations with TDI. Consequently, we suggest the use of this instrument on other Brazilian children with TDI to detect the impact of this injury on their OHRQoL.

The studies dealing with CPQ$_{8-10}$ instruments are applied on validation studies [10,12,16-19] or studies about: specific oral conditions (dental caries, fluorosis; malocclusion; temporomandibular; oral habits); disorder or disorders such as cleft lip/cleft palate; or in a group of childhood cancer survivors[20-27] ; and also in a population that has suffered dental trauma.[2,7,28,29]

In the present study, TDI has a significant impact on child's OHRQoL, which was supported by previous studies.[2,7] Schuch *et al*.[7] observed that children aged from 8 to 10 years old with TDI had significantly more negative impact on their OHRQoL than those without TDI. In our study, the overall score of the CPQ$_{8-10}$ (29.7) was similar to findings in previous study (31.2),[2] but higher than found by Schuch's *et al*. study (16.8).[7] A possible explanation would be that our study and Berger's *et al*. study[2] were performed at a dental trauma reference center and Schuch's *et al*. study[7] was at schools.

Identifying the factors that affect the OHRQoL of a population, allows clinicians to prioritize action and interventions as soon as possible. It also allows not only to act on the disease, but also on the psychosocial aspect that the affection of the mouth may be causing. Thus, the present study becomes extremely relevant in the evaluation of the negative impact of TD in the OHRQoL of young children and their families, supporting pediatric dentistry and health professionals in the planning and decision making process

Comparing the scores of children with TDI with children with other dental conditions that were obtained from other studies using CPQ$_{8-10.}$ [10,12,16-23] we observed that trauma had a greater impact on OHRQoL: our study (overall score 29.7), Berger's *et al*.study[2] (overall score 31.2), as well as Schuch's *et al*. study[7] (overall score 16.8). These scores are just below the scores for some oral conditions in Barbosa's *et al*. study.[22] However, these findings demonstrate that dental trauma is one of the oral conditions that generate the worst impact on OHRQoL, so it deserves more attention from the clinician when it happens[3].

As in previous TDI studies, using other QoL instruments, we could detect the impact of TDI on children's OHRQoL.[2,3,30-34] We opted to analyses by gender and age to confirm the hypothesis that women complain more than men; as well to detect the variability of perceptions by the age. This study found that the interference of TDI on the OHRQoL of children aged from 8 to 10 years of age mainly affected the emotional (EWB) and social (SWB) relations. In this study the TDI had a greater impact on the OHRQoL of 10-year-old children; however this was not affected by gender or TDI severity.

Regardless of the fact that the severity of child TDI shows a high impact on OHRQoL, the absence of statistical significance may be justified because the majority of the population studied showed fractures of enamel or enamel / dentin (52.2%). These injuries are not considered complicated; however, they present significant interference with the aesthetic dentofacial and contribute to affect the children's emotional and social relationships.

Considering the sample size, we opted to take a consecutive sample over a set period (18 months) at a dental trauma and pediatric center. This study consisted of a sample of convenience, as characterized by there is a concern with the design of a particular sampling plan. Considering the potential selection bias, the purpose was not to generalize findings. So we aimed to describe the main characteristics of the study group. To solve this limitation we agree that larger, population-based studies on representative groups of children should be needed to confirm or refute our findings.

Generalizing our results, which confirm that the trauma affects the quality of life for children aged 8 to 10 years, it is not enough to treat their physical signs and symptoms. We should also consider issues beyond oral symptoms, functional limitations and especially the emotional and social well-being factors. According to Schuch *et al*.[7] the effect of behavioral and psychosocial characteristics on oral health perception should be taken into consideration. Thus the applicability of this study is to extrapolate the results to the population studied in order to generate the development of health strategies to include not only the clinical treatment of traumatic injuries, but with a holistic view of the patient's treatment plan covering the psychosocial context. The results also confirm that the B-CPQ$_{8-10}$ can be used on Brazilian populations with TDI and that the score impact detected in the present study can be used to compare with other studies.

# CONCLUSION

TDI impacts negatively on the OHRQoL of children aged 8 to 10 years old. The TDI impact was not influenced by gender but 10 year-old children were more affected. The type of TDI severity did not influenced the impact on OHRQoL

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