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Dental trauma and oral health-related quality of life in schoolchildren from public schools of a southern Brazilian city

Trauma dental e o impacto na qualidade de vida de escolares da rede pública em uma cidade no sul do Brasil

Abelardo Nunes LUNARDELLI[1]
ORCID iD 0000-0002-3052-8020
Sandra Espíndola LUNARDELLI[1]
ORCID iD 0000-0002-7836-6083
Keila Cristina Raush PEREIRA[2]
ORCID iD 0000-0002-1614-7854
Simone Costa XAVIER[2]
ORCID iD 0000-0002-9204-6035
Luiz Gustavo Teixeira MARTINS[1]
ORCID iD 0000-0003-0898-1440
Eliane Azevedo TRAEBERT[1]
ORCID iD 0000-0001-9667-7216
Jefferson TRAEBERT[1]
ORCID iD 0000-0002-7389-985X

ABSTRACT

Objective
To study the impact of dental trauma on the oral health-related quality of life among Brazilian students.

Methods
A cross-sectional study involving a representative sample of students of the public schools (n = 435) in a city in southern Brazil was carried out. Data on dental trauma were collected through oral examinations using the O'Brien's criteria (1993) restricted to fractures and avulsions. The Brazilian version of the Oral Impacts on Daily Performances (OIDP) was used in order to collect data on the impact of oral health-related quality of life. Bivariate and multivariate analysis were performed through Poisson log-linear regression with robust estimator with significance levels set at p <0.05. Prevalence ratios (PR) and confidence intervals (95%) were estimated.

Results
The prevalence of dental trauma was 7.2%, and it was associated with the following dimensions: performing daily activities [(PR = 3.52 (95% CI, 1.06-11.75)] (p = 0.040), and speaking [(PR = 3.67 (95% CI, 1.24-10.86)] (p = 0.019) after adjusting for sex, age, dental caries and malocclusion.

Conclusion
The prevalence of dental trauma found among this population was low, but significantly associated with oral health-related quality of life.

Indexing terms: *Child health. Health evaluation. Quality of life. Surveys and questionnaires. Tooth injuries.*

RESUMO

Objetivo
Estudar o impacto do trauma dental na qualidade de vida relacionada a saúde oral entre escolares brasileiros.

Métodos
Foi realizado estudo transversal envolvendo uma amostra representativa de escolares (n = 435), em uma cidade no sul do Brasil. Os dados sobre trauma dental foram coletados através de exames orais utilizando os critérios do O'Brien (1993), restritas a fraturas dentais e avulsões. A versão brasileira dos impactos no desempenho diário (OIDP) foi utilizado para recolher dados sobre o impacto na qualidade de vida relacionada à saúde bucal. O teste do qui-quadrado foi utilizado para a análise bivariada com níveis de significância de p <0,05. As razões de prevalência (RP) e intervalos de confiança (95%) foram estimados utilizando regressão de Poisson log-linear com um estimador robusto.

Resultados
A prevalência de trauma dental foi de 7,2%, e foi associado com as seguintes dimensões: realização de atividades cotidianas [(RP = 3,52 (IC 95%, 1,06-11,75)] (p = 0,040), e falar [(PR = (IC 95%, 1,24-10,86) 3,67] (p = 0,019) após o ajuste para sexo, idade, cárie dentária e maloclusão.

Conclusão
A prevalência de traumatismo dentário encontrado entre esta população era baixa, mas significativamente associada à qualidade relacionada à saúde bucal de vida.

Termos de indexação: Saúde da criança. Avaliação em saúde. Qualidade de vida. Inquéritos e questionários. Traumatismos dentários.

[1] Universidade do Sul de Santa Catarina, Programa de Pós-graduação em Ciências da Saúde. Av. Pedra Branca, 25, Cidade Universitária, Pedra Branca, 88137-272, Palhoça, SC, Brasil. Correspondência para / Correspondence to: AN LUNARDELLI. E-mail: <abelardo.coe@terrra.com.br>.
[2] Universidade do Sul de Santa Catarina, Faculdade de Odontologia. Palhoça, SC, Brasil.

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INTRODUCTION

Dental trauma, an oral health condition has aroused interest in the scientific community for different reasons. Together with dental caries, malocclusion and oral cancer, dental trauma has been regarded as a public health problem [1]. It has been observed that dental caries morbitiy indicators [2] decreased as well as recreational equipment and sports activities access increased. Potential fall risks and traumas, combined with the almost non-existing habit of wearing safety devices by children and adolescents [3], has highlighted the importance and interesnt in dental trauma studies. Nonetheless, the number of population-based epidemiological studies is still relatively small for Brazil, a country with continental and multicultural aspects. A study published in 2012 [4] pointed out that scientific studies involving Brazilian populations was restricted to 39 studies, of which 29 were population-based, followed by only two studies [5,6], after this period.

Considering that dental trauma occurs most commonly in the anterior dental arch sextants, the negative impact on the children's life quality and their families may be high. The traumatic event itself which caused the dental trauma or the aesthetics compromised by a fractured or darkened tooth [4], together with the increased dental sensitivity, once the dentin has been exposed by the fissure [7] or another function commitment [4] may be responsible for these occurrences. Locker [8] has stated that oral condition can have both a positive as well a negative impact on people's living conditions.

A study carried out in England has highlighted the high cost of restorative dental trauma treatments, as well as school absenteeism, from post traumatic conditions [9]. In another research, an association between the occurrence of dental caries and untreated malocclusions along with children's unhappiness has been described. However, such association has not observed with the occurrence of dental trauma [10].

The dental trauma prevalence rates indicated by the studies have greatly varied [10-12]. Reports of negative impact associated with dental trauma, even in a small number, presented variations [4,13,14]. Few studies have analyzed the relationship between the prevalence magnitude and the impact generated, at the population level. Traebert et al. [4] have demonstrated a 79% higher prevalence of impact reports associated with the occurrence of dental trauma in a population where the prevalence rate was 16.6%.

Thus, this study is justified by the need for further studies on dental trauma impact on the quality of life routine of the affected children, even when the prevalence rate is low.

The aim of this study was to observe the possible association between the prevalence of dental trauma and the impact on daily performance in a population of schoolchildren in a city in southern Brazil.

METHODS

Study design

A cross-sectional study was carried out with schoolchildren enrolled in elementary public schools in the municipality of Tubarão, Santa Catarina state, Brazil, in 2012.

Sampling

The following parameters were used to calculate the sample size: a total of 6,554 students enrolled in the schools in the year the research was performed; confidence level of 95%, relative error of 5%. As the prevalence of impact of daily performance on the study population was unknown, 50% was used, which generates the largest sample size. In order to compensate for any losses, to the calculated number of 363 students were added 20%. Therefore, the minimum sample size was defined as 435 students, randomly selected, keeping the proportionality of students enrolled in small, medium-sized and large schools. The size of the schools was determined by the tertiary distribution in relation to the number of students enrolled. First, the schools were grouped according to size and then randomly assigned to those who would participate in the survey. After that, the selection of the students was randomly carried out, through a list provided by the each school secretary.

Examiners' calibration and data collection

Data collection included an interview with the students, followed by oral clinical examination in order to identify the dental trauma. The interviews were individually conducted with each student, at the school where he or she attended. The interview script covered questions about age and sex. To obtain data on the impact of oral health conditions on quality of life, the OIDP (Oral Impact on Daily Performance) indicator [13] validated in Brazil [14], was used. The indicator based on four questions related to eight daily activities as follows: eating, speaking, cleaning teeth, sleeping, maintaining emotional well-being, smiling,

performing daily activities and maintaining social well-being. The oral examination was performed in classrooms by a team of four dentists and four notetakers who were wearing protective vests. Periodontal mirrors and periodontal probes were sterilized according to biosafety standards. In order to determine the presence of dental trauma, the examination included the eight anterior teeth, central and lateral incisors of both archs. In order to observe dental trauma O'Brien criteria [15] was used. Dental caries as well as its sequelae were observed in all teeth according to World Health Organization (WHO) criteria [16]. The occlusal condition was diagnosed based on the WHO criteria [16] for measuring the Dental Aesthetics Index (DAI). Both aimed to find out possible confounders. Prior to data collection, the team was calibrated by means of theoretical studies on the criteria, followed by the examinations of a sample of the schoolchildren regarding dental caries, malocclusion and dental trauma. Kappa values greater than 0.7 were obtained in inter and intra-examiner measurements.

A pilot study was conducted with 10% of the total sample, involving students who were not participating in the main study. The methodology showed to be adequate, with no need for adjustments. The data collected were inserted into a spreadsheet specially designed for this study where they were analyzed using SPSS 18.0 software. Bivariate and multivariate analyzes were performed using Poisson log-linear regression with robust estimator in order to determine the association between the dependent variable (OIDP> 0) and the independent variables (dental trauma, age, sex, dental caries and malocclusion) with a significance level of $p < 0.05$. Raw and adjusted prevalence ratios (PR) and their respective confidence intervals (95%) were also estimated.

This research project was submitted to and approved by the Research Ethics Committee of University of Southern Santa Catarina under number 11.142.4.02.III.

RESULTS

A total of 389 students were examined, generating a response rate of 89.4%. Children aged 10 to 12 years old accounted for 67.4% of the sample, and female, 59.6% of the total. The prevalence rate of dental trauma was 7.2% (95% CI 4.7 to 9.7). The prevalence of dental caries was 55.5% (95% CI 50.6 - 60.4) and the mean DMFT was 0.99 (SD = 1.51). The prevalence of definite, severe or very severe malocclusion was 57.3% (95% CI 52.3 - 62.1) (Tables 1 and 2).

Table 1. Distribution of students according to sex, age, dental trauma, caries and malocclusion. Tubarão (SC), 2012.

Variables	n	%
Sex		
Female	232	59.6
Male	157	40.4
Age (years)		
From 10 to 12	262	67.4
From 13 to 15	127	32.6
Dental trauma		
Yes	28	7.2
No	361	92.8
Caries		
Yes	216	55.5
No	173	44.5
Malocclusion		
Yes	223	57.2
No	166	42.8

Table 2. Description of the studied clinical conditions. Tubarão (SC), 2012.

Dental trauma	n	%
Upper right central incisor	12	3.1
Upper left central incisor	13	3.3
Upper right lateral incisor	4	1.0
Upper left lateral incisor	2	0.5
Lower right central incisor	4	1.0
Lower left central incisor	3	0.8
Lower right lateral incisor	1	0.3
Lower left lateral incisor	1	0.3
Dental aesthetic index	**n**	**%**
Loss of incisors, canines or premolars	10	2.6
Incisal crowding	170	43.7
Incisal spacing	87	22.4
Anterior maxillary misalignment	111	28.7
Anterior mandibular misalignment	148	38.1
Diastema	55	14.1
Overjet >3 mm	120	30.9
Anterior crossbite	3	0.8
Open bite	10	2.6
Altered anteroposterior molar relationship	129	33.2
Dental caries	**Mean (SD)***	**%**
DMFT	0.99 (1.51)	100.0
D (Decayed)	0.55 (1.19)	55.6
M (Missed due to caries)	0.02 (0.12)	2.0
F (Filled)	0.42 (0.91)	42.4

Note: *SD = standard deviation.

The average OIDP was 24.16 (SD = 2.71), with the median 25. The minimum and maximum OIDP values were 10 and 30, respectively. The distribution of schoolchildren who presentes an impact according to OIDP can be observed in Table 3. Proportionally, the activities that had the greatest impact on the sample studied were "eating" (28%), "smiling" (26.5%), "cleaning teeth" and "maintaining emotional-well being" (both with 19.5%).

Table 3. Distribution and impact of dental trauma on daily performance according to *Oral* Impacts on Daily Performances (OIDP) domains. Tubarão (SC), 2012.

Domain	Impact on daily perfomance			
	n	%	PR (CI 95%)	p
Eating	109	28.0	1.25 (0.62-2.55)	0.533
Speaking	23	5.9	3.67 (1.24-10.86)	0.019
Cleaning teeth	76	19.5	1.31 (0.55-3.14)	0.542
Sleeping	34	8.7	2.41 (0.95-6.13)	0.065
Maintaining emotional well-being	76	19.5	1.16 (0.49-2.75)	0.739
Smiling	103	26.5	1.36 (0.66-2.77)	0.402
Performing daily activities	21	5.4	3.52 (1.06-11.75)	0.040
Maintaining social well-being	76	19.5	0.56 (0.07-4.29)	0.576

Note: PR = Prevalence ratio. CI 95% = 95% Confidence interval. Reference group: children without dental trauma present. Adjusted for sex, age, dental caries and malocclusion.

The activities associated with dental trauma "speaking" (p = 0.019) and "performing daily activities" (p = 0.040). Table 4 presents the raw and adjusted models of the two features associated with the prevalence of dental trauma. Schoolchildren presenting dental trauma showed a 3.67-fold higher prevalence of impact on "speaking" compared to those without dental trauma [PR = 3.67 (95% CI 1.24-10.86)]. Regarding "performing daily activities" the magnitude of the prevalence ratio was 3.52 (95% CI 1.06-11.75). In both case, regardless of sex, age and presence of dental caries and malocclusion (Table 4).

Table 4. Crude and adjusted models for two OIDP domains associated to dental trauma. Tubarão (SC), 2012.

Variables	Speaking				Performing daily activities			
	PR_c (IC 95%)	p	PR_a (IC 95%)	p	PR_c (IC 95%)	p	PR_a (IC 95%)	p
Sex		0.901		0.793		0.023		0.018
Male	1.00		1.00		1.00		1.00	
Female	1.05 (0.47; 2.37)		1.11 (0.50; 2.45)		4.06 (1.21; 13.55)		4.29 (1.28;14.39)	
Age (years)		0.048		0.055		0.889		0.934
From 10 to 12	1.00		1.00		1.00		1.00	
From 13 to 15	3.09 (1.01; 9.45)		2.34 (0.98; 5.60)		1.06 (0.44; 2.57)		1.04 (0.42; 2.55)	
Dental caries		0.046		0.101		0.043		0.051
No	1.00		1.00		1.00		1.00	
Yes	2.34 (1.02; 5.39)		2.08 (0.87; 4.98)		2.50 (1.03; 6.05)		2.38 (0.99; 5.69)	
Malocclusion		0.229		0.779		0.664		0.789
No	1.00		1.00		1.00		1.00	
Yes	1.70 (0.72; 4.04)		1.16 (0.41; 3.27)		1.21 (0.51; 2.85)		1.14 (0.43; 3.00)	
Dental trauma		0.006		0.019		0.033		0.040
No	1.00		1.00		1.00		1.00	
Yes	3.58 (1.48; 8.92)		3.67 (1.37; 9.82)		3.03 (1.09; 8.40)		3.18 (1.18; 8,58)	

Note: PR_c = Crude prevalence ratio. RP_a = Adjusted prevalence ratio. CI 95% = 95% Confidence interval.

DISCUSSION

The good response rate obtained and the successful calibration process of the examiners have suggested excelente internal study validity. Some schoolchildren have not agreed to the oral exam, even with the free and informed consent signed by their parents, which has caused a less than 100% response rate. Positive indication for a good external validity was achiis related to the use of world and nationwide recommended criteria for the diagnosis of the studied clinical conditions. The found prevalence of dental trauma in the studied population may be considered low when compared to other studies conducted in Brazil [4,10,13] and in other countries [5,19,20]. Such discrepancies could be partially attributed to possible differences in population age and the methodology used, particularly the studies conducted in both public or private schools, vaccination campaign populations and others, in addition to different diagnosis methodology.

Nonetheless, the low prevalence rate was associated with daily performance impact, at least in two diferent domais. The association of dental trauma with other variables has been the subject of research for more than two decades. Its relation to the impact on quality of life is more recent. However, a comparative analysis between the prevalence of dental trauma and the impact's magnitude needs further research. The non-association between dental trauma and dimensions related to aesthetics was unexpected and led to further investigation.

The sample showed the highest percentage of impacts reported by schoolchildren for "eating" (28%), "smiling" (26.5%) and "maintaining emotional well-being" (19.5%) corroborated other studies [5,21-23]. Activities such as "smiling" and "social well-being", which are closely related to aesthetic standards, showed no statistical association with trauma, unlike previous results [14,24,25].

"Speaking" and "performing daily activities" have shown remarkable high magnitudes and statistically significant association with dental trauma, even with a low prevalence in the studied population. Thus, the lowest percentages of impact activities with the lowest reported were those which presented statistical association. "Speaking" has a functional characteristic which can be pain-related present in fractures with pulp or dentine exposure [26] or with the dental anatomy after fracture, which may cause injuries in intraoral tissues.

As for the activities "eating", "speaking", "cleaning teeth", "smiling", "social well-being" and "maintaining emotional well-being" associations have not proved to be statistically significant with dental trauma. Probably, aesthetic and socialization activities were not of concern, in the sample studied, unlike the findings of Bendo et al. [19], where social interaction was the main concern in adolescents of the same age group. "Eating" and "cleaning teeth" were probably more related to posterior teeth which is less susceptible to dental trauma.

The use of an impact assessment indicator not specially designed for children which could in theory, underestimate the impact, was among the main limitations of this study. It is known that children have different perceptions on what can generate impact in their life. Activities such as "studying" and "relaxing" are not part of the index used in this study, impairing comparisons with more specific indices for youngsters. According to Barbosa [26][26], children and adolescentes do not have the autonomy of an adult and their peculiar affection relationship with family and friends provide them with special quality of life perception.

Trauma and non-trauma dichotomization may also underestimate the impact on the quality of life of children and adolescents [25]. Severe trauma is usually less prevalent, however more distressing when analyzed separately.

Moreover, the cross-sectional design used in the present study is not adequate concerning whether dental trauma could be the cause of such impacts. Comparative longitudinal assessments of quality of life have been cited as important parameters for program development in the planning of public health policies [22,24] suggesting that longitudinal study designs may be more adequate.

Additionally, sex, age, dental caries and malocclusion adjustments may disregard other confounding variables, therefore the results must be carefully interpretated. Moreover socioeconomic variable adjustment of schoolchildren and their families were not considered, even though they were from public schools. Some studies have related the low socioeconomic status, as well as low parents' schooling as predictors of dental trauma [2,27]. In contrast, access to sporting goods, homes with stairs and swimming pools, for example, may be related to a higher prevalence of dental trauma.

This study was carried out in a medium sized city in a southern Brazilian state involving a sample of children from elementary public schools. Therefore, the results

could be applied for similar populations.

It has been concluded that the oral health-related quality of life associated with the occurrence of dental trauma may not be related to the magnitude of the prevalence rate. Even with low prevalence rate, there was found statistical association with children's and adolescents' quality of life negative impact, mainly related to functional activities, as observed in this study.

Collaborators

AN LUNARDELLI, analysis and interpretation of the data; writing the manuscript; final approval of the version to be published. SE LUNARDELLI, manuscript revision including important intellectual criticism of its content; final approval of the version to be published. KCR PEREIRA, study design; data collection; manuscript revision including important intellectual criticism of its content; final approval of the version to be published. SC XAVIER, study design; data collection; manuscript revision including important intellectual criticism of its content; final approval of the version to be published. LGT MARTINS, manuscript revision including important intellectual criticism of its content; final approval of the version to be published. EA TRAEBERT - manuscript revision including important intellectual criticism of its content; final approval of the version to be published. J TRAEBERT, analysis and interpretation of the data; writing the manuscript; final approval of the version to be published.

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