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Traumatic dental injuries and impact on quality of life of 12-year-olds in Brazil

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Authors' contribution
JKNA, JMS managed the literature searches
PAPO designed the study and performed the statistical analysis.
SHGC e GGA managed the literature searches and wrote the protocol of the manuscript.
SAM wrote the first draft of the manuscript and managed the analyses of the study. All authors read and approved the final manuscript.

Abstract
Aims: The aim of the present study was to analyze the association between traumatic dental injuries and impact on quality of life among 12-year-olds in Brazil. **Sample**: 7328 12-years-old were evaluated. **Study design:** An analytical cross-sectional study was carried out. **Place and Duration of Study**: The study used secondary data from the 2010 Brazilian National Oral Health Survey. **Methodology:** Oral health-related impact on daily activities was assessed using the Oral Impacts on Daily Performances (OIDP) inventory. The chi-square test was used for the bivariate analysis. **Results:** A high prevalence rate of traumatic dental injuries was found in the male gender as well as among residents in the mid-west, north and northeast regions of the country. The OIDP score was equal to or greater than 1 in the majority of children with traumatic dental injuries, with consequent irritability or upset feelings and greater trouble brushing the teeth. These individuals also exhibited trouble practicing sports and recreational activities, felt embarrassment upon smiling and had greater difficulty regarding school activities. All these associations were statistically significant. **Conclusion:** Traumatic dental injuries affect the daily performances of 12-year-olds. Aesthetic concerns were greater than functional concerns in the sample study, as no statistically significant association was detected between traumatic dental injury and trouble eating.

Keywords: Traumatic Dental Injuries. Oral Health. Quality of Life. Health Surveys.

1. Introduction

Defects in the oral-maxillofacial region have important functional, sensory and psychosocial implications and traumatic dental injuries are significantly associated with impacts of a physical, psychological, social and economic nature[1,2]. Anomalies in one's aesthetic appearance and the function oro-facial structures can exert a negative impact on self-image and self-acceptance, with altered psychosocial behaviour and a significant effect on quality of life[1,3,4].

Facial trauma often leads to fractures of the anterior teeth, which are generally related to the practice of sports, recreational activities and falls. The upper central incisors are the most affected by trauma[5,6,7,8]. The 2010 Brazilian National Oral Health Survey demonstrated a high prevalence rate of traumatic dental injuries among 12-year-old males[9].

Quality of life is a multidimensional concept that includes subjectively perceived physical, psychological and social function as well as a sense of subjective wellbeing[10]. Oral health-related quality of life assessment tools have been developed to measure subjective oral impacts on daily performances and quality of life[11]. Among such assessment tools, the Oral Impact on Daily Performance (OIDP) inventory is one of the most widely used and consists of eight questions related to daily physical, psychological and social activities over the previous six months[4,11,12].

The aim of the present study was to assess the impact of traumatic dental injuries on the quality of life of 12-year-old Brazilians using the OIDP inventory.

2. Material and methods

2.1 Study design: A documental, quantitative, descriptive, analytical, cross-sectional study was carried out.

2.2 Sample: Secondary data were used from the database of 2010 Brazilian National Oral Health Survey carried out in all states of Brazil, during which 7328 12-year-olds were examined[9].

2.3 Inclusion criteria: The survey addressed the following signs on only the permanent upper and lower incisors: enamel fracture; enamel and dentine fracture; fracture with pulp involvement and missing tooth due to trauma.

2.4 Socio-demographic variables: Gender, schooling, income and geographic region were considered.

2.5 OIDP (Oral Impacts on Daily Performances): The Brazilian oral health survey used the OIDP to measure the impact of oral health on daily activities, which has been validated for use on the Brazilian population[12]. This assessment tool consists of eight questions addressing daily physical, psychological and social activities in the previous six months, such as eating and enjoying food, speaking and enunciating clearly, cleaning the teeth, sleeping and relaxing, smiling without embarrassment, maintaining emotional status, enjoying contact with other people and carrying out school-related tasks. The response options were yes and no.

2.6 Statistical analysis: The Statistical Package for Social Sciences 18.0 (SPSS) was used for the data analysis. The chi-square for independent samples was employed in the bivariate analysis for the determination of associations among the variables, with the level of significance set to 5% ($P < .05$).

2.7 Ethical considerations: The Brazilian oral health survey received approval from the National Ethics Committee of the Brazilian Ministry of Health in January 2010 under process number 15.498[9].

3. Results

The 2010 Brazilian National Oral Health Survey revealed a high prevalence rate of traumatic dental injuries among 12-year-olds, with the highest rate found for enamel fracture, followed by enamel and dentine fracture (Table 1).

Table 1 – Distribution of traumatic dental injuries in 12-year-olds; 2010 Brazilian National Oral Health Survey.

Variable	n	%
Trauma		
Present	1578	21.50
Absent	5630	76.80
Missing data	120	1.60
Type of trauma		
None	5630	76.80
Enamel fracture	1282	17.50
Enamel/dentine fracture	262	3.60
Fracture with pulp exposure	21	0.30
Missing tooth due to trauma	13	0.20
Missing data	120	1.60
Total	**7328**	**100**

Regarding socio-demographic variables, the bivariate analysis revealed a statistically significant association between trauma and geographic region, with a greater prevalence rate of traumatic dental injury in the male gender and 12-year-olds residing in the mid-west, north and northeast regions of Brazil (Table 2).

Table 2 – Association between traumatic dental injuries and socio-demographic variables; 2010 Brazilian National Oral Health Survey.

Variables	With Trauma		Without Trauma		Total	p-value	Missing data
	n	%	n	%	n		
Gender						<0.001	120
Male	845	23.60	2735	76.40	3580		
Female	733	20.20	2895	79.80	3628		
Schooling						0.365	141
Up to 5 years	560	22.50	1928	77.50	2488		
6 or more years	1014	21.60	3685	78.40	4699		
Monthly income						0.451	509
Up to R$250	69	22.30	240	77.70	309		
R$251 to 500	219	20.60	845	79.40	1064		
R$501 to1500	821	22.60	2816	77.40	3637		
More than R$ 1500	383	21.20	1426	78.80	1809		
Region						<0.001	120
North	400	23.60	1295	76.40	1695		
Northeast	425	21.10	1589	78.90	2014		
Southeast	254	19.10	1077	80.90	1331		
South	180	18.00	818	82.00	998		
Mid-west	319	27.30	851	72.70	1170		
						Total	**7328**

The OIDP score was equal to or greater than 1 in the majority of 12-year-olds with traumatic dental injury (P ≤ .05). These individuals had greater trouble eating, discomfort when brushing the teeth, experienced irritability or upset feelings, had trouble relaxing, practicing recreational activities, practicing sports and speaking, were embarrassed to smile, had greater difficulty with school activities and had trouble sleeping due to their teeth (Table 3).

Table 3 – Association between traumatic dental injuries and OIDP; 2010 Brazilian National Oral Health Survey.

Variables	With Trauma		Without Trauma		Total	p-value	Missing data
	n	%	n	%	n		
OIDP						**<0.001**	120
OIDP = 0	956	20.50	3716	79.50	4672		
OIDP ≥ 1	622	24.50	1914	75.50	2536		
Trouble eating						0.238	154
No	1290	21.60	4679	78.40	5969		
Yes	279	23.20	926	76.80	1205		
Discomfort when brushing						**<0.001**	151
No	1333	21.20	4950	78.80	6283		
Yes	239	26.70	655	73.30	894		
Upset with teeth						**<0.001**	161
No	1366	21.30	5045	78.70	6411		
Yes	206	27.20	550	72.80	756		
Trouble relaxing						**<0.001**	148
No	1448	21.40	5303	78.60	6751		
Yes	124	28.90	305	71.10	429		
Trouble practicing sports						**<0.001**	146
No	1478	21.50	5404	78.50	6882		
Yes	95	31.70	205	68.30	300		
Trouble speaking						0.053	150
No	1487	21.70	5371	78.30	6858		
Yes	84	26.30	236	73.80	320		
Embarrassed to smile						**<0.001**	153
No	1289	20.80	4917	79.20	6209		
Yes	281	29.00	688	71.00	969		
Negative effect on school activities						**0.002**	147
No	1468	21.50	5345	78.50	6813		
Yes	104	28.30	264	71.70	368		
Trouble sleeping						0.061	151
No	1412	21.60	5136	78.40	6548		
Yes	156	24.80	473	75.20	629		
						Total	**7328**

4. Discussion

Information from national surveys on the prevalence and severity of dental trauma in specific age groups of a population helps guide public oral healthcare strategies[7]. The Oral Health Brazil project is a key part of the Brazilian national oral health policy and its findings serve for the assessment of the impact of the problem as well as the establishment of prevention and care measures, especially those related to the implementation of the Family Health Strategy in basic health care[9].

Socio-dental indicators, such as the OIDP, are able to measure the extent to which oral health conditions influence normal, desirable function in affected individuals, including functional, psychological and social aspects. Such indicators are based on self-perceptions and dental impacts and offer important advantages regarding the planning of dental services, with a change from the emphasis on purely biological aspects to the inclusion of psychological and social aspects[13].

In the present study, the prevalence of traumatic dental injury among 12-year-olds was 21.5%, which is higher than the rates reported for India by Dua and Sharma (2012)[6], who found a prevalence rate of 14.5% and Patel and Sujan (2012)[14], who found a rate of 8.8%. Traumatic dental injuries directly affect facial aesthetics, as such trauma generally occurs in the anterior teeth. In the present study, the impact caused by dental trauma was statistically significant, despite the fact that the most prevalent consequence of trauma was enamel fracture, which has a low degree of aesthetic impact. According to Bendo et al. (2010)[5], health and quality of life experienced by an individual are not determined only by the nature or severity of the alteration. The social environment, relationships and belonging to a social group are very important factors in early adolescence, a phase in which any alteration in dental aspects can have a negative impact on quality of life. Cortes et al. (2002)[4] found that children with fractured teeth were more concerned with aesthetics than function and the consequences of traumatic dental injuries included feeling embarrassed to smile, laugh and show one's teeth, difficulty in social relationships and irritability, some of which were confirmed in the present study. Studying 805 11-and-12-year-old Peruvian children with malocclusion, Bernabé et al. (2007)[15] also found that the performances affected were mainly related to smiling, laughing and showing one's teeth without embarrassment. Bendo et al. (2010)[5] reported that the main concerns of preadolescents are related to the perception of others regarding their dental appearance. In early adolescence, relationships between peers are important components of an individual's perceptions regarding health and quality of life and teenagers are mostly concerned about what other people may think or say about them. Paula et al. (2012)[16] also observed a strong influence of aesthetic aspects on the quality of life of adolescents and report that malocclusion remained an important oral health characteristic with a negative impact on quality of life.

In the present investigation, traumatic dental injuries were more prevalent among boys than girls, which is in agreement with findings reported in previous studies[6,7,14,17,18,19]. Dua and Sharma (2012)[6] found that boys were twofold more likely to have dental injuries than girls. This may be attributed to behavioural factors, as boys tend to be more energetic and inclined toward vigorous outdoor activities in comparison to girls[6,7,14]. Since the reigning social framework and cultural reservations discourage the involvement of girls in vigorous outdoor activities, the female gender is less prone to traumatic dental injuries[6]. However, physical injury affects the self-esteem of girls much more than boys. For adolescent girls, dental appearance is the most important characteristic of their self-esteem[20]. Patussi et al. (2006)[18] and Patel and Sujan (2012)[14] found that traumatic dental injuries among boys occurred more often on public streets, whereas injuries among girls occurred mostly at home. Dua and Sharma (2012)[6] reported that 52% of children fractured their teeth near their homes and 41% fractured their teeth at school. The main causes of such injuries are falls and collisions[6,7,14,19].

In the present study, no statistically significant association was found between traumatic dental injuries and trouble eating, speaking or sleeping. This may be explained by the location of the tooth fractures in the anterior region of the oral cavity as well as the fact that most injuries were superficial fractures affecting the enamel alone, with a small portion of cases involving the dentine. Bernabé et al. (2007)[15] found that children with perceived malocclusion were more concerned with dental aesthetics than function and this impact primarily affected the psychological and social components of oral health. The present results are in agreement with these findings, as statistically significant associations were found regarding the impact of trauma on "trouble relaxing" and "feeling embarrassed to smile".

Twelve-year-old residing in the mid-west, north and northeast regions of Brazil were more affected by traumatic dental injuries. These findings may be related to poor school infrastructure in these less developed regions or even the warmer drier climate. Such a climate allows the practice of physical activities in outdoor environments more, including group sports among the male gender, thereby increasing the occurrence of accidents. In contrast, the prevalence of traumatic dental injuries was lower in the south and southeast regions of the country, which have cooler climates, are more developed and the population has a higher socioeconomic status. However, no significant association was found between income and the occurrence of traumatic dental injuries. It is possible that greater access to orthodontic appliances in more developed regions had minimized the occurrence of overjet, which is one of the major predisposing factors to dental trauma. Children with incisal overjet greater than 3.0 mm are 5.4 times more likely to exhibit dental injury than children with overjet equal to or less than 3.0 mm[7].

5. Conclusion

In conclusion, traumatic dental injuries have a negative impact on self-esteem and daily performances among Brazilian 12-year-olds. The identification of the etiological factors of this type of occurrence allows the establishment of preventive measures aimed at avoiding future dental injuries. Health policies should promote the creation of appropriate, safe environments for children and adolescents as well as increase awareness regarding such hazards[6]. Such strategies should involve subjective, social and environmental aspects in the planning, implementation and evaluation of oral health promotion interventions[16]. The initiative of the Brazilian government with the Oral Health Brazil project is a huge step in the right direction. However, this program should include strategies aimed at the prevention of traumatic dental injuries.

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