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# Parents' recognition of dental trauma in their children

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Abstract - Objectives: The aim of the present study was to assess parents' recognition of dental trauma in their children. Methods: A cross-sectional study was conducted in Belo Horizonte, Brazil, with 519 randomly selected children between 1 and 3 years of age. The parents answered questions on the occurrence of previous dental trauma, caregiver's schooling and the impact of dental trauma on activities and quality of life of the children. The children were also clinically examined for presence of dental trauma. Descriptive analysis, the chi-squared test, Mann-Whitney test and Poisson regression analysis were performed. The calculation of effect size was used to test the clinical significance of the findings. *Results*: A total of 41.2%(n = 214) of the children had at least one tooth with dental trauma. Among the parents of the children with dental trauma, 42.5% (n = 91) had not recognized the trauma. Mean caregiver's schooling was  $8.9 \pm 3.3$  years of study. The schooling of caregivers who were unaware of the dental trauma was lower (mean:  $5.3 \pm 2.5$  years of study) than that of those who were aware of the trauma (10.4  $\pm$  2.1 years of study; P < 0.001). The recognition of dental trauma was more prevalent among parents of children over 24 months of age (PR: 3.5; 95% CI: 2.2-5.6), those whose children experienced an impact of oral health status on quality of life (PR: 1.2; 95% CI: 1.1–1.4) and those with a higher level of schooling (PR: 1.2; 95% CI: 1.1–1.2). Conclusion: A large portion of parents do not recognize the occurrence of dental trauma in their toddlers. The age of the child, impact of oral health status on quality of life and caregiver's schooling were directly associated with parents' recognition of dental trauma in children aged 12 to 36 months.

Parents are usually the primary decision makers regarding their children's health-related behavior and health care (1, 2). When parents decide to seek dental care, timeliness and appropriateness depend on the accuracy of their recognition of the child's oral health status (3).

Studies have demonstrated that dental trauma is frequent among toddlers, as motor skills are not yet well established in this period of life (4–7). Dental trauma can affect mineralized tissues (tooth and bone), damage pulp and periodontal tissues by causing their rupture, hyperemia or hemorrhage, obliterate the pulp cavity and cause tooth mobility, sensitivity to percussion, coronal discoloration, pulp necrosis, and pathological root resorption (8). Dental trauma and its effects can have physical, esthetic, and psychological impacts on children and their parents (9). Moreover, dental trauma may cause pain and affect the development of the permanent dentition (9, 10).

The recognition of dental trauma and knowledge regarding post-trauma sequelae leads parents to seek treatment, thereby allowing the prevention of possible complications in the primary teeth and permanent successors (8, 11). Thus, a parent's recognition regarding the identification of dental trauma is a critical factor. A favorable prognosis and greater chance of treatment success following dental trauma are directly related to the time elapsed between injury and dental care (4). A large number of studies have measured caregivers' recognition regarding the oral health status and treatment needs of adolescents (12, 13), schoolchildren (14), and preschoolers (15, 16). However, there is limited information on the association between clinical oral health status and parents' recognition of the oral health of toddlers. Socioeconomic differences may exert an important influence on parents' recognition regarding their child's oral health (2, 17).

The current literature has proposed that children's oral health may be related to the level of knowledge and understanding of health on the part of parents (18). Some studies have indicated that higher educational levels are associated with positive beliefs regarding oral health as well as the application of parents' knowledge in preventive care for children (18–21). Thus, caregiver's schooling was investigated in the present study to determine whether it may be a risk factor for the recognition of teeth affected by trauma in children. Moreover, no study has yet examined how caregivers recognize their child's dental trauma. Understanding factors that affect parents' recognition of their

child's oral health can bring dentistry closer to developing strategies to help overcome the barriers, parents encounter in assessing their child's oral health status. Such understanding may enable parents to become partners with healthcare providers in ensuring the wellbeing of their children (17). These considerations are especially important for toddlers due to their inability to verbalize their symptoms and their dependence on caregivers. Despite the importance of this issue, there is a lack of evidence on the recognition of parents regarding trauma to primary teeth in toddlers (22).

The aim of the present study was to assess parents' recognition regarding the occurrence of dental trauma in the primary dentition of children aged 1 to 3 years.

#### Methods

A cross-sectional study was conducted in the city of Belo Horizonte, which is the state capital of Minas Gerais, Brazil. Belo Horizonte has approximately two million inhabitants and is geographically divided into nine administrative districts.

Children aged 1 to 3 years were selected from all children attending a National Children's Vaccination Day. To ensure representation and randomization, each administrative district was used for the sampling of participants. The children participated in the study in order of arrival. All children had their eight incisors erupted. A term of informed consent was signed by the parents.

The present study was carried out in two phases. In the first phase, the sample size was calculated to give a standard error of 4.0% or less. A 95% confidence interval (CI) and 30.2% prevalence of primary tooth injuries [based on Bijella et al. (4)] were used. The minimal sample size for satisfying the requirements was estimated at 506 children. The sample was increased by 10% to compensate for possible losses during the survey. Thus, a total of 557 children were selected. In the second phase, all caregivers of children with dental trauma were investigated.

A pilot study involving 10 children and their parents had previously been carried out at a daycare center in the city of Belo Horizonte, which determined that no changes to the proposed methodology were needed.

One pair of dentists acted in each of the nine public health districts (total of 18 dentists). One dentist carried out the interviews with the children's parents/ guardians and the other performed the clinical examinations. The forms filled out by the dentists included items addressing caregiver's schooling (years of study), history of dental injuries (yes/no), sucking habits (yes/ no), and dental care following trauma as well as the results of the examination of hard and soft tissues. Dental injuries were classified based on Andreasen's classification system/criteria (23). Tooth discoloration was included among the criteria.

All dentists previously participated in a training and calibration exercise. The examiners received illustrations of the classifications and examples of how to correctly fill out the forms. Training was performed with criteria used to identify primary tooth fractures and differentiate this type of injury from bruxism or physiological wear. For such, color slides of each type of injury to the primary dentition were used, including two pictures of each injury. Intra-examiner and interexaminer agreement was determined through a duplicate examination of 10% of the children in the sample. The results of the examinations were compared with the judgment of an experienced dentist in traumatology. Intra-examiner and inter-examiner agreement were almost perfect (24; Kappa = 0.90 and 0.85).

The dental examinations were carried out in a kneeto-knee position and a Petzl zoom headlamp provided the standardized light. All primary incisors were dried with gauze before examination to enhance the accuracy of the diagnosis. Teeth with extensive carious lesions and that raised doubts regarding the precise diagnosis of dental trauma were excluded from the analysis.

Education level was derived from the caregivers' responses to a survey on the years of schooling beginning with elementary school.

Three items from the Early Childhood Oral Health Impact Scale (ECOHIS), which has been validated for use in Brazil (25), were used for assessing the impact of oral health on quality of life. The items were selected based on a survey of the impacts most frequently reported by mothers of children seeking treatment for dental trauma at the pediatric dental clinic of the Universidade Federal de Minas Gerais: Item 3-How often has your child had difficulty eating some foods because of dental problems or dental treatments?; Item 6—How often has your child had trouble sleeping because of dental problems or dental treatments?; and Item 9-How often has your child avoided talking and playing with other children because of dental problems or dental treatments? Response categories for the ECOHIS were coded: 0 = never; 1 = hardlyever; 2 =occasionally; 3 =often; 4 =very often; and 5 = do not know. Toddlers whose caregivers gave responses of 'occasionally', 'often', or 'very often' on at least one of these three items were considered to have experienced oral health-related impact on quality of life.

#### Statistical analysis

The results were organized and entered into a databank using the Statistical Package for Social Sciences (spss, version 17.0; SPSS Inc., Chicago, IL, USA). Absolute and relative frequencies of the variables studied were first determined. Only those children with dental trauma determined by the dentist during the clinical exam were considered for further analysis (n = 214). Either the chi-squared test or Fisher's exact test and the Mann-Whitney test were used to determine associations between the outcome variable (parent's recognition of dental trauma) and the independent variables child's age (12 to 23/24 to 36 months), number of teeth with trauma (one/two to six), lip seal (adequate/inadequate), accentuated overjet (no/yes), non-nutritive sucking habits (no/yes), impact on daily activities-eating, playing and sleeping-(no/yes), and caregiver's schooling (quantitative

variable). The level of significance was set to 5%. The calculation of effect size proposed by Cohen (26) was used to test the clinical significance of the findings. According to Cohen's criteria, effect size statistics of <0.2 indicate a small, clinically meaningful magnitude of difference, effect size statistics of 0.2 to 0.7 indicate moderate difference and effect size statistics of >0.7 indicate a large difference. For the analysis of factors associated with parents' recognition of dental trauma, Poisson regression with robust variance was performed, with the presence of dental trauma used as the reference category. The magnitude of the association of each factor with the recognition of trauma was assessed by crude and adjusted prevalence ratios (PR), respective 95% confidence intervals (CI) and P-values (Wald test). Variables with P-value < 0.20 in the bivariate analysis were selected for inclusion in the multiple regression analysis and those with *P*-value  $\leq 0.05$  remained in the final model.

#### Ethical considerations

The protocol for the present study received approval from the Human Research Ethics Committee of the *Universidade Federal de Minas Gerais* (Brazil). Children with any type of dental injury were directed to the dental trauma clinic of the same university.

#### Results

After losses, 519 children (52% male) between 1 and 3 years of age were examined [mean: (SD) = 24.1(6.8) months]. Among the caregivers, 89% (n = 462) were mothers, 8% (n = 41) were fathers, and 3%(16) were others (nannies, grandparents). Children with dental trauma had a mean age of 25.7 months (SD: 6.3 months) and those without dental trauma had a mean age of 22.9 months (SD: 6.9 months); this difference was statistically significant (P < 0.001). The prevalence of dental trauma to primary teeth was 41.2% (n = 214), with one incisor involved in 25.1%, two incisors involved in 11.2%, and three to six incisors involved in 4.8% of the overall sample. Among the 519 children, 193 (37.2%) had enamel fractures, 30 (5.7%) had enamel-dentin fractures, and three (0.6%) had enamel-dentin fractures with pulp involvement. Soft tissue injuries were observed in 12 children (2.3%), and crown discoloration was detected in eight children (1.5%). Some children (n = 32) had more than one dental injury. The upper incisors were the most affected teeth. Among the caregivers of children diagnosed with dental trauma, 42.5% (*n* = 91) were unaware of the existence of the trauma.

Considering only those children with dental trauma based on the diagnosis of the examiner (n = 214), the schooling of caregivers who were unaware of the dental trauma was lower (mean:  $5.3 \pm 2.5$  years of study) than that of those who had recognized the trauma ( $10.4 \pm 2.1$  years of study; P < 0.001; high effect size; d = 2.23). Statistically significant associa-

tions were found between caregiver's knowledge regarding the presence of dental trauma and the following factors: child's age (P < 0.001; high effect size; d = 0.74), difficulty eating (P = 0.001; moderate effect size; d = 0.27), and impact of oral health status on quality of life (P < 0.001; moderate effect size; d = 0.29; Table 1).

In the final adjusted model (Table 2), age over 24 months (PR: 3.5; 95% CI: 2.2-5.6), the report of impact of oral health status on quality of life (PR: 1.2; 95% CI: 1.1-1.4) and a higher level of caregiver's schooling (PR: 1.2; 95% CI: 1.1-1.2) remained associated with a higher prevalence of parent's recognition of trauma dental.

#### Discussion

The results of the present study demonstrate that a significant portion of parents did not recognize the occurrence of dental trauma in their toddlers. Moreover, the recognition of dental trauma was more prevalent among parents with a higher degree of schooling, those whose children were between 24 and 36 months of age and those whose children experienced an impact of oral health status on quality of life.

The lack of knowledge of dental trauma by 42.5% of the parents may be explained by the age group investigated. A total of 85.6% of parents with toddlers between 12 and 23 months of age did not recognize that the child had suffered dental trauma. The lack of recognition dental trauma was much lower (11.3%) among parents of children over 24 months of age. Caregivers recognize oral alterations in children when pain is manifested (27). However, toddlers with a dental condition do not manifest pain or discomfort, in part because they do not grasp the full concept of toothache. They do, however, exhibit the behavioral effects of pain through changes in their eating and sleeping habits. Very young children greatly depend on behavioral cues in their communication (28). It is more difficult for parents to recognize dental trauma in toddlers. Moreover, trauma itself does not always lead to discomfort (29), especially in cases of enamel fracture, which was the most common type of dental trauma in the present study. There is also evidence that Brazilian parents may not feel dental trauma is as worrisome as untreated caries or anterior open bite (30). Limited knowledge regarding trauma to the primary dentition and its consequences may hamper the recognition of the negative impact on oral health and the need to seek treatment.

Parents with a higher degree of schooling recognized the occurrence of dental trauma in their toddlers more frequently. Previous studies report that individuals with poor schooling often display poorer health knowledge and health status, unhealthy behavior, less use of preventive services, higher rates of hospitalization and chronic disease, increased healthcare costs and poorer health outcomes than those with higher levels of schooling (18, 31–33). As children depend on their parents for access to health

Table 1	. Distribution	of parents	' recognition	of dental	trauma	according t	o age	of ch	hild, i	number	of	affected	teeth,	lip	seal,
overjet,	sucking habits	s, impact of	oral health of	1 perform	nance of	daily activiti	es, and	1 careg	giver'	s school	ing	(n = 214)	)		

	Parents' recognition	n of dental trauma		
	No <i>n</i> (%)	Yes n (%)	<i>P</i> -value	Cohen's d*
Age				
12–23 months	77 (85.6)	13 (14.4)	<0.001 <sup>1</sup>	0.74
24–36 months	14 (11.3)	110 (88.7)		
Number of teeth with fracture				
One	55 (42.0)	76 (58.0)	0.841 <sup>1</sup>	0.01
Two to six	36 (43.4)	47 (56.6)		
Lip seal				
Adequate	61 (44.2)	77 (55.8)	0.503 <sup>1</sup>	0.05
Inadequate	30 (39.5)	46 (60.5)		
Accentuated overjet				
No	57 (46.0)	67 (54.0)	0.232 <sup>1</sup>	0.08
Yes	34 (37.8)	56 (62.2)		
Sucking habits	<b>、</b>	· · ·		
No	38 (42.2)	52 (57.8)	0.939 <sup>1</sup>	0.00
Yes	53 (42.7)	71 (57.3)		
Trouble eating				
No	91 (46.7)	104 (53.3)	< 0.001 <sup>1</sup>	0.27
Yes	0 (0.0)	19 (100.0)		
Trouble sleeping				
No	87 (42.2)	119 (57.8)	0.725 <sup>2</sup>	0.03
Yes	4 (50.0)	4 (50.0)		
Trouble playing	<b>、</b>	· · ·		
No	91 (43.1)	120 (56.9)	0.263 <sup>2</sup>	0.10
Yes	0 (0.0)	3 (100.0)		
Impact of oral health status on quality	of life	ζ, γ		
Absent	91 (47.4)	101 (52.6)	< 0.001 <sup>1</sup>	0.29
Present	0 (0.0)	22 (100.0)		
Caregiver's schooling (years) Mean (SD)	5.29 (2.5)	10.44 (2.1)	<0.001 <sup>3</sup>	2.23

<sup>1</sup>Chi-squared test.

<sup>2</sup>Fisher's exact test.

<sup>3</sup>Mann–Whitney test.

\*Effect size statistics of <0.2 indicate a small, clinically meaningful magnitude of difference; effect size statistics of 0.2-0.7 indicate moderate difference; and effect size statistics of >0.7 indicate a large difference.

Table 2.	Prevalence	ratios	and	confidence	intervals	for	parents'	recognition	of	dental	trauma	and	associated	variables	among
children	diagnosed v	with der	ntal t	rauma (n =	214)										

	Unadjuste	d prevalence ratio		Adjusted prevalence ratio					
	PR	(95%CI)	Р	PR	(95%CI)	Р			
Age									
12–23 months	1.0			1.0					
24–36 months	6.0	(3.6–10.0)	< 0.001	3.5	(2.2–5.6)	< 0.001			
Trouble eating									
No	1.0								
Yes	1.9	(1.7–2.2)	< 0.001	-					
Impact of oral health status on quality	of life								
No	1.0			1.0					
Yes	1.9	(1.7–2.2)	< 0.001	1.2	(1.1–1.4)	0.041			
Caregiver's schooling (scale)	1.2	(1.2–1.3)	<0.001	1.2	(1.1–1.2)	<0.001			

care (34), a low degree of adult schooling has potential detrimental implications for the pediatric population (17).

The results of the present study suggest that the manifestation of difficulties during eating on the part

of the children may lead caregivers to investigate the possible cause of this impact and hence recognize dental trauma. It has been demonstrated that parents are better able to assess aspects related to function and physical symptoms than those related to emotional and social functions (12). Thus, it is possible that caregivers of toddlers with chewing difficulties seek to discover the reason for this difficulty and consequently recognize an oral health problem. This finding indicates that caregivers may have limited skills in detecting dental conditions such as trauma in their children, especially in the stage at which the condition is not causing pain or discomfort.

A limitation of the present study is the cross-sectional nature of the design. The results demonstrate associations rather than causality and should be interpreted with caution. Longitudinal studies should be carried out to gain a better understanding of factors that influence caregivers' recognition regarding dental trauma in children. Moreover, the assessment of impact on quality of life was performed with only three items on the ECOHIS. This measure was modified to reduce the number of questions to be answered due to the fact that the investigation was an epidemiological study. However, some impacts may not have been detected.

Dental trauma in toddlers can compromise the eruption of the permanent teeth or lead to the malformation of these teeth (23, 35). Thus, health promotion strategies should be adopted to assist parents in recognizing oral health alterations in their children.

This is the first study to investigate the recognition of parents regarding the occurrence of dental trauma in toddlers between 12 and 36 months of age. The relationship between a caregiver's recognition of his or her child's dental trauma may have implications with regard to visits to the dentist for early intervention rather than surgical care. Therefore, it is necessary for parents to be aware of the possible consequences of dental trauma and the need to seek treatment.

#### Conclusion

The present study reveals that a large portion of parents do not recognize the occurrence of dental trauma in their toddlers. The age of the child, parents' impression of the impact of oral health status on quality of life and caregiver's schooling were directly associated with parents' recognition of dental trauma in children aged 12 to 36 months.

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