

Original Research Article

Study on prevalence of traumatic injuries in deciduous teeth of children aged from 6 to 60 months in the city of João Pessoa – Paraíba

Fernanda de Araújo Trigueiro Campos¹
Adriana Furtado de Macedo¹
Danilo Antonio Duarte¹

Corresponding author:

Adriana Furtado de Macedo
Universidade Cruzeiro do Sul – Departamento de Odontologia
Av. Dr. Ussiel Cirilo, 225
CEP 08060-070 – São Paulo – SP
E-mail: adriana.macedo@cruzeirosul.edu.br

¹ Cruzeiro do Sul University – São Paulo – SP – Brazil.

Received for publication: January 9, 2014. Accepted for publication: May 16, 2014.

Keywords: child clinics; epidemiology; dental trauma; public health.

Abstract

Introduction: Traumatic injuries in anterior teeth are common in children and can cause serious consequences in subsequent permanent teeth, requiring professional intervention to minimize complications. **Objective:** To evaluate the traumatic injuries in anterior deciduous teeth of children enrolled in kindergartens and schools at the city of João Pessoa, Paraíba. **Material and methods:** The sample comprised 46 children, both genders, aged from 6 to 60 months. Data collection was based on X-rays, intraoral clinical analysis and the application of questionnaire with open and structured questions to obtain information on previous injuries, obtained by a calibrated examiner. Data was subjected to descriptive statistics by calculating absolute and relative frequencies, and to inferential statistics by Chi-square test ($p < 0.05$). **Results:** The results showed that 71.73% of children affected were male, 60.9% aged from two to three years, 63% of injuries occurred at home, 56.5 % had enamel fractures and 53.3% had injuries in the maxillary right central incisor. **Conclusion:** Trauma in deciduous teeth is common, especially in young children. Thus, preventive and corrective measures should be taken, both at private and public dental care.

Introduction

Trauma at childhood is the result of impact whose force surpasses the resistance of bone, muscle and tooth tissues. Some factors have determined trauma severity degree and extension, such as: child's age; stage of deciduous tooth development; trauma intensity, type, impact duration, and site; and elapsed time.

Maxilla is the bone most affected by traumas and central and lateral incisors are the most affected teeth [11]. The most common injury types have been enamel/dentine fractures, followed by tooth avulsion [11, 12]. The fractures may cause loss of masticatory function, alterations in occlusion, tooth migration, damages to surrounding tissues, esthetics and speaking impairment. Moreover, traumas psychologically affect the child and may cause damages to permanent teeth, such as crown-root dilacerations, tooth discolorations due to enamel hypoplasias or hypocalcifications, among other disturbs that triggers other functional esthetic problems [11, 12].

Immediate treatment of tooth trauma requires deep technical-scientific knowledge; however, great variability of trauma type classifications and lack of treatment protocols of eventual sequelae lead to doubts on follow-up procedures of these cases [8]. Emergency dental treatment should include firstly the anamnesis to gather information on type, time and site of trauma aiming to find whether prescription of tetanus vaccine is necessary; next, the dentist should evaluate surrounding teeth and bone tissue through radiographic examination and soft tissue injuries to find the possible presence of foreign bodies [5].

Many educative measures directed to little-age children provide reduction in the amount of caries lesions in deciduous teeth. Notwithstanding, the effects of these measures do not reach the prevention of tooth lesions from traumas. The increase in the number of violence cases, car accidents, and high impact and contact sports activities contributes to raise tooth trauma as emerging public health problem [1].

Thus, the aim of this present study was to evaluate the type and site of trauma; patient's age, gender, and most affected deciduous teeth in children at complete deciduous dentition in the city of João Pessoa (PB/Brazil), to gather specific information on trauma at this geographic area and provide subsidies to help dentists treat dental trauma which has been reported to increase in the population of the aforementioned geographic area. The current stage of studies on dental trauma

shows advance in cellular and molecular biology field to repair hard tissues undergoing trauma, but little focus on preventive measures [14]. The epidemiological profile designing of trauma injuries in these children may help establishing preventive and educational measures which would decrease the severe repercussions of trauma lesions and provide relevant data to trauma treatment.

Material and methods

This observational, cross-sectional study with qualitative and quantitative data was submitted and approved by the Institutional Review Board and authorized by the Municipal Secretary of Education, according to the guidelines of the Resolution no. 196/96 of the Brazilian Council of Health, which states the guidelines of studies on human beings.

Study sample firstly comprised 544 children aged from 6 to 60 months. Because of the presence of pathologies with different etiologies of tooth trauma, the final study sample was composed by 46 children, both genders, with tooth trauma cases confirmed.

Data was collected from February to June of 2011 through anamnesis directed to the children's parents/guardians, performed by a single examiner, specialized in Pediatric Dentistry, previously calibrated. Intra-examiner agreement was measured by Kappa test, at the beginning of the study in 10% of the sample, twice, at 10 day interval. Kappa coefficient was considered as excellent (Kappa = 1.0). The evaluation method applied for tooth trauma classification was based on the classification proposed by Andreasen and Andreasen [1], adopted by the World Health Organization (WHO) [15], the International Association Dental Traumatology (IADT) [10], and the American Association Pediatric Dentistry (AAPD) [9]. Traumas were classified as follows: lesions to tooth hard tissues, pulp and alveolar bone (incomplete enamel fracture, enamel dentine fracture, enamel dentine fracture with exposed pulp, crown-root fracture, root fracture, and alveolar fracture), lesions to periodontal tissues (concussion, subluxation, extrusion, lateral luxations, intrusion and avulsion). After the confirmation of tooth trauma history by parents/guardians, anamnesis and clinical examination, the children were referred to the Radiologic Clinic of the University Center of João Pessoa (UNIPE), to be submitted to radiographic examination. To obtain the radiographic image, modified intraoral occlusal technique was applied with size 2 type E

radiographic films (Kodak Company, Nova York, USA), with the aid of radiographic device (X-Timex 70X® Drs GNATUS) at 70kVp and 7mA. Exposure time was of 0.4 second, focal distance of 20 cm, following geometric standardized technic, in which the X-ray central beam focuses at vertical angle of 65 to 70° on the glabella in upper shots and -90° on oral floor in lower shots. Next, the films were processed by time/temperature method and the findings were registered by a radiologist.

Obtained data were submitted to descriptive and inferential statistics by Pearson's chi-square test and Fisher's exact test with level of significance of 5% ($p < 0.05$).

Results

Gender data of the children undergoing tooth trauma showed significant statistically differences ($p = 0.001$), according to Pearson's chi-square test.

Of 544 children, only 46 exhibited tooth traumas (11.9%). Of these latter, 33 (71.7%) were male while 13 (28.3%) were female. Concerning to trauma types on hard or soft tissues, this did not present association with gender ($p = 0.667$) (table I).

According to the results displayed in table II, regarding tooth trauma, enamel fracture was the most found (56.5%), followed by intrusive luxation (10.9%), lateral luxation (8.7%) and concussion (2.2%). Considering to age ranges, at 2 to 3 years (60.9%) there were an increasing of traumatic injuries, which reduces as age increasing (table III). With regard to teeth, right maxillary central incisor was the most affected (53.3%) followed by left maxillary central incisor (36.7%), as demonstrated in table IV.

Tooth trauma occurred mostly at the children's home (63%), followed by school (2.2%), and collision to other children at school and home outdoors (2.2%). In all sample analyzed, only 4.3% of the parents/guardians requested dental treatment.

Table I – Absolute and relative distribution regarding to gender and oral tissue affected by trauma

Gender	Trauma				Level of significance*
	Absence	Presence	Lesions on hard tissues	Lesions on periodontal tissues	
	n (%)	n (%)	n (%)	n (%)	
Male	230 (48%)	33 (71.7%) ¹	18 (39.1%) ²	15 (32.6%) ²	$p < 0.05^1$
Female	249 (52%)	13 (28.3%) ¹	8 (17.4%) ²	5 (10.6%) ²	$p = 0.667^2$
Total	479 (100%)	46 (100%)			

* Pearson's chi-square test

¹ Presence of trauma: male versus female ($p < 0.05$)

² Lesions on hard and periodontal tissues ($p = 0.667$)

Table II – Absolute and relative distribution of tooth trauma type prevalence

Tooth trauma	Prevalence (n)	Frequency (%)
Concussion	1	2.2
Enamel fracture	26	56.5
Intrusive luxation	5	10.9
Extrusive luxation	5	10.9
Lateral luxation	4	8.6
Avulsion	5	10.9
Total	46	100.00

Table III – Absolute and relative distribution of tooth trauma presence according to age range

Age range	Tooth trauma	
	n	%
0 to 12 months	3	6.5
13 to 24 months	10	21.7
25 to 36 months	28	60.9
37 to 48 months	5	10.9

Table IV – Absolute and relative distribution of tooth trauma prevalence according to deciduous teeth

Deciduous teeth	Prevalence (n)	Frequency (%)
51	32	53.3
52	0	0.0
53	0	0.0
61	22	36.7
62	1	1.7
71	0	0.0
72	0	0.0
73	0	0.0
81	0	0.0
82	0	0.0
83	0	0.0
No information	5	8.3
Total	60	100.00

Discussion

Tooth trauma injuries are part of daily practice due to many etiologic factors and have been considered as public health cases because of high incidence in children [5]. According to Rodriguez [17], approximately 30% of children have been exposed to tooth trauma.

In this present study, statistically significant differences were seen in the presence of tooth trauma in males (71.7%) in comparison with females (28.3%), corroborating other studies [2, 5, 17] that reported trauma prevalence in 56.7% of males and 43.3% of females [4]. Such fact suggests the influence of boys' behavioral at this age range, coming from bruising physical activities leading to tooth trauma. Girls are generally more protected by the parents reducing trauma chances.

Concerning to age range, 2-3 years of age was the most affected (60.9%) similar to the finding of other study indicating that 86.7% of injuries affected children at 25-36 month age range [4]. At this phase, the child commonly begins to walk and explore the environment, which increase trauma incidences. According to Duarte *et al.* [6] and Kramer and Feldens [12], the age range most

prone to trauma occurrence is 1 to 3 years, because at these ages the child does not have enough improved motor coordination to avoid possible falls together with the involuntary acts of the age itself. Notwithstanding, some authors indicated higher ages, around 4 years-old, as the most susceptible to trauma because potentially high energy behavior [11]. Kramer *et al.* [11] believes that the higher age reported by some studies occur because of exploratory researches citing trauma cases with visible sequelae after the event.

The environment where most of the traumas took place was the children's home (63.0%), followed by the children's school (2.2%) and collision to other children (2.2%), data similar to those of other study reporting the child's home as the site of most occurrences (64.9%) [2]. Trauma injuries on deciduous dentition occur at familial environment because children stay mostly at home [3]. Notwithstanding, sites close to houses and school are greater sources of trauma affecting permanent dentition [3]. Trauma site of occurrence is important for treatment planning so that the possible contamination level of the injury could be evaluated. However, to better assess and follow-up the injury, dental referral is necessary. According to

this present study, only 4.3% of this study sample searched for dental treatment after trauma. This probably occurred because of lack of knowledge and information of parents/guardians on the necessity of immediate trauma care, lack of symptoms after trauma, and difficult to treatment access.

The most prevalent tooth trauma type was enamel fracture (56.5%), followed by avulsion, intrusive luxation, extrusive luxation (10.9%), lateral luxation (8.7%) and only one concussion case (2.2%). Such result was similar to that of other authors [4, 13, 16], such as Beltrão *et al.* [4], who described that 83.3% of traumas were enamel fracture and 2.8% extrusive luxation and avulsions. According to Kawabata *et al.* [13], 69.8% of injuries cause enamel fractures. Cabral *et al.* [5] affirmed that the high prevalence of luxations in deciduous teeth occur because of the small alveolar bone resilience and loosen bone trabeculae, which does not prevented the impact mechanical force and leads to tooth luxation.

By evaluating the affected deciduous tooth, maxillary central incisors were the most affected, with little predominance of the right (53.3%) over the left central incisor (36.7%), corroborating other studies [4, 5, 11]. Kawabata *et al.* [13] found that left maxillary central incisors were the most affect deciduous teeth (44.3%) followed by the right maxillary central (41.4%). According to Beltrão *et al.* [4], maxillary central incisors are 94.4% more affected by traumas. Anterior teeth are the most affected by traumas and fractures, because physiologically maxillary teeth are in front of mandibular teeth and become more susceptible to injury. Likely, according to Cabral *et al.* [5], factors as the maxillary skeletal fixations, loosen and thin bone trabeculae, presence of thumb sucking habit, and oral breathing raises put maxillary anterior teeth at greater risk of trauma.

Deciduous tooth traumas are frequently, mainly affecting boys at little age and maxillary central incisors. Final diagnosis, treatment planning and prognosis depending on many factors, such as the stage of permanent bud development, patient's age, trauma site and lesion nature. Therefore, the result of this present study showed the epidemiological profile of tooth trauma in this population, undoubtedly demonstrating the need of implementing educative and preventive measures aiming to decrease the damages to the stomatognathic system of children and psychobiosocial impairment. Educative actions towards tooth trauma prevention can decrease behavioral alterations and physical disturbs due to tooth trauma in little age children. Moreover, tooth

trauma prevention would avoid longer follow-up periods, interventions in oral cavity, and possible sequelae to permanent teeth.

Conclusion

Trauma injuries in children frequently affect oral cavity leading to damages to stomatognathic system. Considering the population of João Pessoa (PB/Brazil), the most affected children were male, at 2 to 3 years-old, suffering mostly enamel fracture mainly involving the right maxillary central incisor, at home, with lack of referral to the dentist. Thus, the results of this present study demonstrated the need of preventive measures focusing on tooth trauma together with the instructions to parents/guardians on the relevance of the dentist's role in tooth trauma treatment.

References

1. Andreasen JO, Andreasen FM. Texto e atlas colorido de traumatismo dental. 3. ed. Porto Alegre: Artmed; 2001. p. 778.
2. Assunção LRS, Cunha RF, Ferelle A. Análise dos traumatismos e suas sequelas na dentição decídua: uma revisão da literatura. *Pesq Bras Odontoped Clin Integr.* 2007;7(2):173-9.
3. Bastone EB, Freer TJ, McNamara JR. Epidemiology of dental trauma: a review of the literature. *Australian Dental Journal.* 2000; 45(1):2-9.
4. Beltrão EM, Cavalcanti AL, Albuquerque SSL, Duarte RC. Prevalence of dental trauma in children aged 1-3 years in João Pessoa (Brazil). *Eur Arch Paediatr Dent.* 2007;8(3):141-3.
5. Cabral ACR, Duarte DA, Valentim C. Prevalência das injúrias traumáticas na dentição decídua. *Revista de Odontologia da Universidade Cidade de São Paulo.* 2009;21(2):137-43.
6. Duarte DA, Bonecker MS, Rodrigues GS, Suga SS. Caderno de odontopediatria - lesões traumáticas em dentes decíduos: tratamento e controle. 1. ed. São Paulo: Santos; 2001. p. 45
7. Flores MT. Traumatic injuries in the primary dentition. *Dent Traumatol.* 2002;18(6):287-98.
8. Flores MT, Malmgren B, Andersson L, Andreasen JO, Bakland LK, Barnett F et al. Guidelines for the management of traumatic dental injuries: III. Primary teeth. *Dent.* 2007;23(4):196-202.

9. Guidelines for the Management of Traumatic Dental Injuries: 3. Injuries in the Primary Dentition. American Association Pediatric Dentistry (AAPD), 2007. Disponível em: http://www.aapd.org/media/Policies_Guidelines/E_Injuries.pdf.
10. Guidelines for the Dental Trauma. International Association of Dental Traumatology (IADT), 2007. Disponível em: <http://www.iadt-dentaltrauma.org/1-9%20IADT%20GUIDELINES%20Combined%20-%20LR%20-%2011-5-2013.pdf>.
11. Kramer PF, Zembruski C, Ferreira SH, Feldens CA. Traumatic dental injuries in Brazilian Preschool children. *Dent Traumatol.* 2003;19(6):299-303.
12. Kramer PF, Feldens CA. Traumatismos na dentição decídua. São Paulo: Santos; 2005.
13. Kawabata CM, Sant'Anna GR, Duarte DA, Mathias MF. Estudo de injúrias traumáticas em crianças na faixa etária de 1 a 3 anos no município de Barueri, São Paulo, Brasil. *Pesqui Bras Odontopediatria Clin Integr.* 2007;7(3):229-33.
14. Lourenço-Neto N, Fernandes AP, Marques NCT, Sakai VT, Moretti ABS, Machado MAAM et al. Terapia pulpar em dentes decíduos: possibilidades terapêuticas baseadas em evidências. *Rev Odontol Unesp.* 2013;42(2):130-7.
15. Organização Mundial da Saúde. Levantamentos básicos em saúde bucal. 4. ed. São Paulo: Santos; 1999. 66 p.
16. Ortiz SCE, Possobon RF, Moraes ABA. Ocorrência de traumatismo em dentes decíduos de crianças atendidas no Cepae-FOP-UNICAMP. *Rev Ibero-Am Odontopediatr Odontol Bebê.* 2004;7(35):33-40.
17. Rodríguez JG. Traumatic anterior dental injuries in Cuba preschool children. *Dent Traumatol.* 2007;23(4):241-2.