Retrospective study on the occurrence of primary incisor trauma in preschool children of a low-income area in Brazil

ABSTRACT
The objective of this study was to investigate the occurrence of trauma in primary incisors in a sample of preschool Brazilian children living in a low-income area of Rio de Janeiro, Brazil.

Methods For the study 527 dental records of a Municipal Children’s Hospital were evaluated, and the following related factors were recorded: gender, age, tooth affected, type and cause of trauma. Data were tabulated and subjected to statistical analysis (chi-square test).

Results There were no significant differences in the prevalence of injuries among boys and girls. Children 10 to 24 months-old were the most affected (p <0.05). The maxillary central incisor was the most affected tooth (p <0.05), with predominance of lateral luxation and concussions (p > 0.05). The most common cause of trauma was associated with child’s own-height fall (p <0.05).

Conclusion Based on the results, it was concluded that the high incidence of incisor trauma in deciduous teeth should be viewed with concern, requiring the implementation of health policies aimed primarily at the prevention of such accidents.

Keywords Prevalence; Primary teeth; Tooth injuries.

Introduction
Traumatic injuries of the primary dentition are a serious public health problem among children. Trauma in primary teeth can result in pain and affect the development of the permanent dentition. The occurrence of dental trauma in children and adolescents has been the subject of several epidemiological studies published in recent years [Granville-Garcia, 2006; Oliveira et al., 2007; Avsar and Topaloglu, 2009; Jorge et al., 2009; Hasan et al., 2010; Jesus et al., 2010; Viegas et al., 2010; Wendt et al., 2010]. These studies are characterised by their diversity, having been carried out in different institutions (hospitals, colleges, and schools) or at home and having used different instruments for data collection, such as questionnaires and interviews, as well as clinical and radiographic examinations. Therefore, comparisons between these studies are very difficult. However, in general they showed that the prevalence of dental trauma in Brazilian children is high, reaching values of up to 40% [Cunha et al., 2001; Kramer et al., 2003; Grimm et al., 2004; Jorge et al., 2009; Wendt et al., 2010], making it an important public health problem in the country [Oliveira et al., 2007].

In most cases, the age groups investigated are schoolchildren and adolescents, with, comparatively, few studies of preschool children. However, although it may share some characteristics with the trauma in permanent dentition, the trauma in the primary dentition has its own peculiarities. For example, contrary to what is observed in patients 7 to 10 years of age, where boys are more affected than girls, in preschool children are usually not observed gender differences [Mestrinho et al., 1998; Cunha et al., 2001; Kramer et al., 2003; Skaare and Jacobsen, 2005; Oliveira et al., 2007; Avsar and Topaloglu., 2009; Jorge et al., 2009; Wendt et al., 2010]. Similarly, the greater flexibility of the alveolar bone in this age group increases the predisposition of displacement type of trauma, such as dislocations and avulsions [Cardoso and de Carvalho Rocha, 2002]. However, like the permanent dentition, the anterior teeth are the most frequently affected, causing functional and aesthetic problems and possible periapical sequelae which can adversely affect the development of the permanent teeth and the developing occlusion [Kramer et al., 2003; Sennehenn-Kirchner and Jacobs, 2006].

Therefore, the purpose of the present investigation was to assess the prevalence of dental trauma and related factors (gender, age, tooth affected, type and cause of injury) in Brazilian preschool children attending a dental emergency service in a Municipal Children’s Hospital located in a low-income area of Rio de Janeiro city, Brazil.

Methods
The study was a retrospective analysis of 527 clinical records from a dental emergency service of a Municipal Children’s Hospital located in a low-income area of Rio de Janeiro city (Brazil) specifically for cases of dental trauma of anterior deciduous teeth occurred in children of preschool age (6 to 48 months). The traumatic injuries were classified as follows [Andreasen and Andreasen, 1994].

Fractures
• Fracture of the crown: enamel only, enamel and dentin with or without pulp exposure.
• Fracture of the crown with pulp exposure: enamel and...
of trauma among patients at 36 (27%) and 48 months (13.70%) of age were observed (Fig. 2). Regarding the type of tooth, the maxillary central incisors were affected in 89.50% of cases, while the lateral incisors were affected in only 10.50% (Fig. 3). The difference in the occurrence of trauma between the two types of teeth was considered significant ($\chi^2 = 2.1, p < 0.05$).

The injuries that occurred most frequently were lateral luxations and concussions, both occurring in 25.40% of cases. Other types of trauma that were observed in the sample were: intrusive luxations (18.80%), avulsions (17%), extrusive luxations (9%) and crown fractures (4.40%) (Fig. 4). Although there was difference in the frequency of different types of trauma, it was not statistically significant ($\chi^2 = 5.44, p > 0.05$). Among the causes of trauma, there was a marked predominance of child’s own-height fall (86%), which was statistically superior to all others ($\chi^2 = 9.71, p < 0.05$) (Fig. 5).

**Discussion**

There are several studies in the literature that evaluate the prevalence of dental traumatism in the primary and permanent dentitions [Cunha et al., 2001; Kramer et al., 2002].

**Luxations**
- Concussion: the tooth is tender to touch without increased mobility or sulcular bleeding.
- Subluxation: increased dental mobility without displacement, taking into account the mobility of the affected tooth as compared to the physiological mobility of the homologous tooth.
- Lateral luxation: tooth displacement in a nonaxial direction.
- Intrusive luxation: tooth displacement into the alveolus.
- Extrusive luxation: tooth displacement out of the alveolus.
- Avulsion: tooth prematurely lost if compared with the homologous tooth.

The following information pertaining to the child and trauma were collected: gender, age, tooth affected, type and cause of trauma. Data were tabulated on a spreadsheet specifically developed for the study and subjected to statistical analysis through chi-square test ($\chi^2$) performed by using a statistical program (version 11.0, SPSS Inc., Chicago, IL, USA) and adopted a significance level of 5% (p < 0.05).

**Results**

Prevalence of primary incisor trauma in male children was 11.7%, while in the female children was 12.6%, with no statistically significant differences between genders (p > 0.05) as shown in Figure 1. Patients from 10 to 24 months-old were the most affected in this study, representing 59.30% of cases ($\chi^2 = 5.36, p < 0.05$). Furthermore, no significant differences in the occurrence of trauma among patients at 36 (27%) and 48 months (13.70%) of age were observed (Fig. 2). Regarding the type of tooth, the maxillary central incisors were affected in 89.50% of cases, while the lateral incisors were affected in only 10.50% (Fig. 3). The difference in the occurrence of trauma between the two types of teeth was considered significant ($\chi^2 = 2.1, p < 0.05$).

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2003; Grimm et al., 2004; Skaare and Jacobsen, 2005; Granville-Garcia, 2006; Oliveira et al., 2007; Avsar and Topaloglu, 2009; Jorge et al., 2009; Hasan et al., 2010; Jesus et al., 2010; Wendt et al., 2010), although just a few of them present the prevalence of traumatic injuries in younger children aged 10-48 months as the present investigation, which draws more attention since most researches shows that the prevalence of this condition among children between 1 and 3 years of age is high, characterizing it as a public health problem [Oliveira et al., 2007]. In addition, the assessment of traumas in such early age is very relevant not only because of the presence of sequelae in the present dentition, but also because it allows the identification of possible development alterations in the permanent dentition. Moreover, available studies do not follow a standardised methodology, which limits the comparison of results and establishment of epidemiological features of dental trauma in this age group.

As demonstrated in this study, no differences were observed in the occurrence of injuries among male and female children, which is in agreement with previous publications [Mestrinho et al., 1998; Cunha et al., 2001; Kramer et al., 2003; Skaare and Jacobsen, 2005; Oliveira et al., 2007; Avsar and Topaloglu, 2009; Jorge et al., 2009; Wendt et al., 2010]. However, the occurrence of dental trauma in male children tends to increase with age, when the practice of sports or physical contact seems to make them more susceptible to the occurrence of accidents [Grimm et al., 2004; Skaare and Jacobsen, 2005].

The most affected children were within the age range of 10-24 months, a fact also observed in previous studies [Mestrinho et al., 1998; Kramer et al., 2003; Avsar and Topaloglu, 2009; Jesus et al., 2010]. According to the literature, the highest occurrence of injuries in this age group is related to the fact that the child is learning to walk, run and jump without full coordination: this psychomotor underdevelopment and poor motor skill, do not allow the child to perform precise and safe movements and predisposes to the occurrence of falls and, thus, injuries to the face and oral structures [Mestrinho et al., 1998; Kramer et al., 2003].

The maxillary central incisors, as demonstrated in this and in most studies, in the deciduous dentition [Bastone et al., 2000; Sennehenn-Kirchner and Jacobs, 2006; Oliveira et al., 2007; Jorge et al., 2009; Hasan et al., 2010; Jesus et al., 2010; Wendt et al., 2010], are the most affected teeth by dental trauma, which seems to be related mainly to the vulnerable position of these teeth in the arches and can be even worse in the presence of some malocclusion [Skaare and Jacobsen, 2005; Viegas et al., 2010].

Among the injuries evaluated, lateral luxations and concussions comprised 50.80% of cases, the two most common types of injuries observed in the sample. These results are in disagreement with the majority of researches in the literature that show the tooth fractures as the type of dental trauma more common in preschool children [Bastone et al., 2000; Cunha et al., 2001; Kramer et al., 2003; Oliveira et al., 2007; Jorge et al., 2009; Hasan et al., 2010; Viegas et al., 2010; Wendt et al., 2010]. However, the results of this study agree with those found by other authors [Cardoso and de Carvalho Rocha, 2002; Avsar and Topaloglu 2009; Jesus et al., 2010], where the dislocations were 5.8 times more frequent than fractures in primary teeth and concussions/subluxations and lateral luxations were more frequent than tooth fractures in the primary dentition [Rasmusson and Koch, 2010]. Researchers relate greater predisposition to the occurrence of injury in the periodontal tissues to a number of morphological factors associated with that age group, especially the association of greater elasticity of the alveolar bone in development with roots of the primary teeth relatively shorter and in gradual process of absorption [Wilson, 1995; Skaare and Jacobsen, 2005].

Child’s own-height fall was the main cause of trauma in deciduous teeth, which is in agreement with previously published studies [Sae-Lim et al., 1995; Cunha et al., 2001; Cardoso and de Carvalho Rocha, 2002; Skaare and Jacobsen, 2005; Jorge et al., 2009; Feldens et al., 2010; Hasan et al., 2010; Rasmusson and Koch, 2010; Wendt et al., 2010]. This fact could be explained by the psychological phase of the child at this time, as he/she begins to be aware of the environment around him/her, becoming active and independent, engaging in more intense physical activities (i.e. running and jumping) without developing an accurate motor coordination,
which makes the child more susceptible to accidents. The child’s home is the location in which dental injuries occur with the greatest frequency, and this stresses the importance of making parents/guardians aware of measures that can prevent accidents, explaining that greater attention should be paid with regard to the children’s physical environment [Jorge et al., 2009].

The high occurrence of dental trauma in this age group, as shown by this epidemiological study indicates the need for implementation of health policies with preventive strategies, through education of parents and guardians, to encourage them to seek dental treatment immediately after traumatic injury [Kramer et al., 2003]. Thus, more epidemiological studies are required, in order to understand the complexities of dental trauma epidemiology since this guides the selection of effective treatments and the direction of public resources to reduce the increasing frequency of dental injuries in preschool children due to their impact on the children’s quality of life, and to the high costs associated with their treatment [Feldens et al., 2010].

Conclusion

This study revealed that traumatisms in primary teeth were more prevalent in the 10-24 months age group with no statistically significant difference between genders. Lateral luxation and concussion were the most frequent traumatic lesions, affecting mainly the maxillary central incisor. The most common cause of trauma was associated with child’s own-height fall.

Deeper knowledge and understanding of traumatic dental injuries in the primary dentition will help dentists to select effective treatments to this age group according to their individual needs and thereby act for the prevention of these traumatisms at an earlier age which will minimize the consequences in the permanent dentition.

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