The Epidemiologic Survey of Traumatic Deciduous Teeth in Taiwan

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Abstract: The purpose of this study was to focus on the survey of the prevalence rate of dental trauma for Taiwanese children aged below six years. A total sample of 4,620 children was collected by stratified cluster sample design, and Probability Proportion to Size. The sample examined was 4,037 children and the completion rate was 87.38%. Training for the oral examination was provided to improve the coordination and reliability of the examiners to enhance consistency. A database was designed by Microsoft Access and data analyzed by statistics software SAS and JMP after data entry. Comparison between categorical variables was performed by using Pearson’s chi-square test and between numerical variables by using t-test analysis. The prevalence rate of dental trauma to deciduous teeth for the 0-6 year-old children was 0.94%, boys had 1.12% and girls 0.68% prevalence rate of dental trauma. There was no significant difference between boys and girls in dental trauma prevalence. The prevalence rate of dental trauma by age showed that the highest peak occurred at 3 years old (1.19%), followed by 4 (0.95%) and then 5 year-old (0.92%) children. In our study, upper central incisors occupied 0.99% prevalence of dental trauma among primary dentition. Upper lateral incisors and lower central incisors only occupied a very small prevalence rate, less than 0.05%. A low prevalence rate of dental trauma occurred to the children aged below 6 years in Taiwan, which may be caused by different study and sampling method, different definition of dental trauma, and different care attitude of parents to children. Considering the high frequency of dental trauma in the 3-5 year-old children, the safety of kindergartens and the prevention of dental trauma to deciduous teeth should be considered.

Keywords: dental trauma, epidemiology, deciduous teeth

Introduction
Prevalence of dental trauma is the rate of dental trauma defined as the number of events and children who have experienced dental trauma, in a limited population during a limited period. The prevalence of dental trauma has been reported to have a wide variation in different epidemiological studies. This variation may be caused by several different factors such as data collection methods, sample selection and the place where the study was conducted.

The prevalence rate of dental trauma has been reported by authors from several countries. Andreasen reported 30% for the prevalence rate of dental trauma for 3-7 year-old children in Denmark. Zadik reported 11.1% in Israel for five year old children. Sanchez reported 16.6% for 3-6 year-old children in the Dominican Republic. Foreberg reported 12% for 1-6 year-old children in Sweden. Otuyemi reported 30.8% for 1-5 year-old children in Nigeria. Hargreaves reported 15 % for 1-5 year-old children in South Africa. Cunha reported 16.3% for 0-3 year-old children in Brazil. So the prevalence rate of dental trauma for deciduous teeth ranged from 10-30%. These figures were influenced by the country, location, of course, and also varied according to the type of survey method used and definition of dental trauma, trauma classification, the dentition studied, geographical and behavioral differences between study locations and countries. Even socio-economic status, the culture and education status, and the attitude of parents to their children will affect the prevalence rate of dental trauma remarkably.

The above data were interesting to us for surveying the real status of dental trauma to deciduous teeth in Taiwan. There is insufficient data on the of prevalence rate reported in Taiwan nationwide, so the purpose of this study was to focus on the survey of the prevalence rate of dental trauma for Taiwanese children aged below six years, and which age group has the highest prevalence rate, the gender variation, which teeth are involved and how many teeth will be affected.

Materials and Methods
The sample was extracted from a survey of oral health status for children aged 0-6 years old appointed by the National Bureau of Health Promotion from June, 2004 to May, 2005 in Taiwan. A total sample of 4,620 children was collected by stratified cluster sample design, and Probability Proportion to Size (PPS). The sample examined was 4,037 children, the completion rate was 87.38%.

There were ten items for the oral health status examination such as craniofacial assessment, TMJ function, tooth morphology assessment, dentition status and treatment need, plaque index, gingival status, oral habit(s), occlusal status, orthodontic status and treatment needs. Dental trauma was included in the 4th item, dentition status. Dental trauma was recorded according to the definition of this examination record, only fracture of the enamel, dentin and crown root, discoloration of teeth, infra-occlusal incisors, and unusual rotation of central and lateral incisors which could be diagnosed, were recorded in this study. Concussion, dislocation, root fracture,
The prevalence rate of dental trauma by age showed that the highest peak happened at 3 years old (1.19%). Followed by 4 (0.95%) and then 5 year-old (0.92%) children (Table 3).

There was only 0.74% of the deciduous teeth which had one tooth traumatized, 0.17% had two teeth traumatized (Table 4). In our study, there were only seven children, 3 boys and 4 girls, who had two traumatized teeth, their traumatized teeth were maxillary right and left central incisors, 3 children in the 4-year-old group and 2 children in the 5 year-old group and 2 children were in the 3 and 6 year-old group. The most severe dental trauma seems to happen in 4 and 5 year-old children.

In our study, upper central incisors occupied 0.99% prevalence of dental trauma among primary dentition. Upper lateral incisors and lower central incisors only occupied a very small prevalence rate, less than 0.05% (Table 5).

### Discussion

Compared to the reported prevalence rate of dental trauma which occurred to children aged below 6 years\(^1\)(6), our study showed a low value, it may be caused by the different study and sampling method, different definition of dental trauma and the different care attitude of parents to children, because parents in Taiwan have a tendency to overprotect their children from sport, games, or outdoor activity during childhood.

Cunha RF\(^2\) reported the prevalence of dental trauma was 62.6% in boys and 37.4% in girls for children aged 0-3 years old. Boys had a higher prevalence rate than girls. In the Llarena’s study\(^12\) of Mexico City children, the prevalence rate of dental trauma followed by 4-5 and 6-7 year-old children. Kramer\(^10\) reported the largest prevalence rate of dental trauma was 62.6% (38.2%). Andreasen(1994)\(^2\) reported the same tendency showing more boys (61.84%) presented traumatic injuries than girls (38.2%). Andreasen(1994)\(^2\) reported the same tendency showing the prevalence rate of dental trauma of boys was higher than girls. In our study, the prevalence rate of dental trauma was 64.86% in boys and 35.13% in girls. All of these surveys have shown the same tendency.

In a study by Llarena del Rosario\(^12\) of Mexico City children, 2-3 year-old children presented the highest prevalence rate of dental trauma followed by 4-5 and 6-7 year-old children. Kramer\(^10\) reported the largest prevalence rate of dental trauma was demonstrated by 3-4 year-old children, followed by 4-5 year-old children, 5-6 year-old and 2-3 year-old children occupied the third
It is obvious that gender, age and history of trauma are important factors in dental trauma. In most studies, the second most frequently injured teeth were the maxillary central incisors. Bastone reported that the prevalence of dental trauma in the upper arch (89.4%) was greater than in the lower arch (10.6%). Therefore, more attention should be paid to protecting 1-2 year-old children from dental trauma.

Bastone (2000) reported that the number of traumatized deciduous teeth per patient has varied from between 1.1 and 2.0, but this variation could be influenced by the actual trauma being recorded, the classification used and the study location. The studies by Liew, Daly and Martin et al., conducted for all age groups from after hours dental clinics, reported more severe trauma occurred to older patients and involved more teeth per patient than had been found in private practice.

The number of traumatized teeth per patient also varied by country and site of the studies. The type of study also affected the frequency of multiple trauma per person. Only one tooth trauma occurred in most studies conducted at school dental services and general clinics. Those studies conducted in hospital departments and after hours clinics observed one or two traumatic teeth in equal proportions, or two teeth or more, frequently combined with more severe dental trauma in after hours clinics and it may also indicate that people attend hospitals rather than dental clinics for protecting 1-2 year-old children from dental trauma. Kramer (2003) reported that single tooth trauma was predominant in all age groups.

In our study, dental trauma occurred mostly in the upper arch, 95.46%, than to the lower arch, 4.54%. In primary dentition, Bastone reported that the prevalence of dental trauma in the upper arch (89.4%) was greater than in the lower arch (10.6%). Maxillary central incisors were the most frequently involved in both dentitions. In Kramer’s study, the prevalence of dental trauma occurring in the upper jaw was 95.50%, the lower jaw was 4.50%. That was very similar to our report.

By calculating the percentage of traumatized tooth type in 12 anterior teeth, the upper central incisor, the most occupied definitely, 90.90%, compared to 4.60% in the upper lateral incisor. Lower anterior teeth only occupied a very small amount, 4.50%, in dental trauma. In Kramer’s study, the same tendency was observed (Figure 1). Bastone (2000) also reported that the maxillary central incisors were the most frequently injured teeth in all studies for both the primary and secondary dentition. In most studies, the second most frequently injured teeth were maxillary lateral incisors.

It is obvious that gender, age and history of trauma are important predisposing factors to dental trauma. Large maxillary overjet and incomplete lip closure also tend to sustain dental trauma. Galea observed that the severity of injuries appeared to increase when there was an associated injury to the lower lip, while one third of the trauma occurred in subjects with some form of malocclusion. Female subjects with prominent maxillary incisors and incompetent lip closure often had trauma to the supporting structures of the teeth.

Burden observed that subjects with an overjet greater than the normal range (0-3.5mm) were significantly more likely to have received trauma to the maxillary incisors. It also appeared that the prevalence of dental trauma in females increased as the overjet increased. Dearing and Hunter et al. also observed a significant difference in the frequency of fractured incisors between patients with an increased overjet.

Hamilton et al. observed that significantly more children in the lower socio-economic groups have more dental trauma compared with the higher socio-economic groups, while Onetto and colleagues observed that a high percentage of patients with dental trauma complain about previous dental trauma.

**Conclusions**

In summary, although our study, compared to other studies, showed a low prevalence rate of dental trauma to children aged below 6 years in Taiwan, it may be caused by different study and sampling method, different definition of dental trauma, and different care attitude of parents to children. The gender variation, age distribution, jaw and tooth type difference have shown a close similarity to other reports. Considering the high frequency of dental trauma which occurs in 3-5 year-old children, an age when children attend kindergarten, the safety of the kindergartens and the prevention of dental trauma to deciduous teeth should be considered. The cause of dental trauma, the place where the dental trauma occurs to the children and other factors which we did not cover in this study should be surveyed in the near future.

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