ORIGINAL RESEARCH

THE EFFECT OF TRAUMATIC DENTAL INJURIES ON THE DROOLING OF SALIVA IN CHILDREN WITH CEREBRAL PALSY

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ABSTRACT

Background: Drooling of saliva is a manifestation of abnormal function seen in many forms of Cerebral Palsy. Aims and Objectives: To study the prevalence and severity of drooling of saliva and its relationship to traumatic dental injuries in children with cerebral palsy. Materials and Method: The sample consisted of 298 children with a mean age 9.6 ± 2.8 yrs. Results: It was found that children who had traumatic dental injuries had a greater severity of drooling. Treating the traumatic dental injuries showed a reduced severity of drooling in children having mixed and permanent dentition but not in the primary dentition. Conclusion: The study results concludes that traumatic dental injuries may be either a consequence or an accompanying condition to the drooling of saliva in individuals with cerebral palsy.

Key Words: Traumatic Dental Injury; Drooling of Saliva; Cerebral Palsy; Dental Trauma

Introduction

Drooling of saliva is a manifestation of abnormal function seen in many forms of Cerebral Palsy (CP) with head and neck involvement. It is seen commonly in normal infants and usually subsides by 15-18 months of age as a consequence of physiologic maturity of oro-facial motor function. Although drooling may, in some rare cases, persist in a normal child, its presence beyond the age of 4 years must be considered abnormal. The prevalence of drooling has been reported to vary between 12 to 58% depending upon the index used to measure drooling. However recent studies using a single standardized scale have shown that the prevalence of drooling in individuals with cerebral palsy ranges between 48.7% to 58%. While some early researchers thought drooling to be linked with the salivary flow rate, it is now accepted that the cause of drooling is a defect in muscular coordination. Individuals with CP have been shown to be prone to traumatic injuries because of their poor motor coordination. Studies have shown a varied prevalence of traumatic dental injuries in children with CP ranging from 10 to 50%. Many studies have focused on the oral health of children with CP and few have measured the effect of drooling on their oral health. However, the possibility that oral health, especially traumatic dental injury or oral habits, could influence the severity of drooling; is one that has not been previously studied. The aim of this study was to study the prevalence and severity of drooling of saliva and its relationship to traumatic dental injuries in children with cerebral palsy.

Materials and Methods

A total of 298 children with a mean age 9.6 ± 2.8yrs reporting to 3 different centers in India, i.e., Chennai (N=113), Darbhanga (N= 76) and Dhahran Nepal(N= 109) were randomly selected after obtaining parental consent. Ethical clearance for the study was obtained from the ethical committees of the B.P. Koirala Institute of Health Sciences, Dhahran, Nepal and the Darbhanga Medical College, India. Medical histories and demographic data were obtained from the records maintained by the centers. In order to rule out misdiagnoses, only records that had been verified by the in-house in Dhahran or consulting neurologist in Chennai and Darbhanga were included in the study. The incidence and severity of drooling was assessed by observing the children over a 5 minute period using the index proposed by Blasco et al. In order to rule out inter-examiner variability in drooling scores a part of the sample (N 35) were evaluated by both examiners and the collected data was subject to the Guttmann analysis to determine reliability.

Traumatic injuries were assessed by recording the number of affected teeth. Both tooth number and the type of dentition (primary, mixed or permanent) were recorded. The severity of the injuries was recorded using a modified WHO classification. Teeth were scored based on the loss of tooth structure; teeth without trauma were scored as 0. If more than one tooth was affected the score of the tooth with more severe injury was recorded. All data were then subjected to the ANOVA and Chi square analyses using the SPSS ver.17 data analysis software.

Results

The sample consisted of 144 males (48.3%) and 154 (51.7%) females. Spastic quadriplegia was the most common form of cerebral palsy while athetosis and mixed cerebral palsy were the least common forms (Graph 1). The sample consisted of 34 individuals with primary dentition, 200 individuals with mixed dentition and 64 individuals with permanent dentition. Drooling of saliva was present in 159 individuals (54.4 %). It was most severe in children with spastic quadriplegia (Graph 2) however the differences in drooling severity between groups was not statistically significant (ANOVA F = .488, P = 0.745). A highly significant negative correlation was found between drooling score and age (Spearman's rho -.162 , p 0.005).Inter examiner variability in the recording of drooling of saliva measured in a select group (N 35) showed that any difference between examiners in recording drooling scores was statistically insignificant as shown by the Guttmann analysis (Error variance 0.028, reliability of scale .988).
The effect of traumatic dental injuries on the drooling of saliva in children with cerebral palsy

Traumatic dental injury was present in 119 individuals (39.9%) of whom only 31 individuals had been treated for their injuries. Enamel dentin fracture (N = 51) was the most common form of injury followed by enamel fracture (N = 43). Together they accounted for 78.3% of all traumatic dental injury. Maxillary central incisors were the most commonly affected teeth in primary (N = 7), mixed (N = 73) and permanent (N = 25) dentitions. When the drooling score was compared between traumatic injuries of different severity it was found that children who had enamel dentin fracture (drooling score = 1.41), fracture involving the enamel dentin and pulp (drooling score = 1.83) en masse crown fracture (drooling score = 1.6) and avulsion (drooling score = 1.25) had a significantly higher severity of drooling than children with other forms of trauma or children without trauma (ANOVA F = 6.591, p < 0.001) (Graph 3).

When the number of traumatic teeth in the children was compared with the severity of their drooling problem it was found that children with severe drooling had a significantly higher number of traumatic teeth than other children. (ANOVA F = 27.43, p < 0.001). Post Hoc Tukey’s analysis for inter group variation showed that while this difference was also true of children with moderate drooling there was no significant difference in the number of traumatic teeth between children without drooling and children with mild drooling (Graph 4).

When drooling scores of children without trauma were compared with the drooling scores of children with untreated dental trauma and those with treated dental trauma it was found that those with treated dental trauma had significantly lower drooling scores than those whose dental trauma was untreated. However both groups had significantly higher drooling scores than children without dental trauma. (ANOVA F = 39.97, p < 0.001) When the children were classified according
to the type of dentition it was found that the difference was highly significant in children with mixed dentition (chi square = 74.69, p < 0.001), significant in the permanent dentition (chi square = 23.48, p<0.01) but not significant in the primary dentition (chi square = 5.49, p .603) (Graph 5).

Discussion

Drooling of saliva is a serious problem in children with cerebral palsy. It not only causes physical disturbances such as such as irritation or maceration of the skin, increased perioral infection, a foul smelling odor and dehydration due to fluid and(electrolyte) nutrient loss; but also emotional disturbances. One of the biggest challenges in studying cerebral palsy lies in the diagnoses of the condition. It is for this reason that we limited our study to centers that had experienced neurologists and well maintained accurate medical records. The prevalence of drooling was 54.4% which was in between the 48.7% and 58% found in previous studies using the same methods showing that the Blasco index can overcome the large variations (12% to 37%) in prevalence of drooling found in previous studies. Furthermore the calibration of examiners and the low margin of error meant that the investigators could independently collect the data, thus increasing the size of the population studied.

The prevalence of traumatic injuries in our population was 39.9% and this is higher than the 10.6% reported by Costa et al. It is closer to the studies of dos Santos and Souza (32%) and of Holan et al. While there is evidence in literature that states that the prevalence of traumatic dental injuries in individuals with CP is similar to the general population most investigators agree that they tend to have a higher incidence of traumatic dental injuries than the general population. This increased incidence is often attributed to poor muscular co-ordination that predisposes individuals with CP to trauma. Drooling of saliva is generally accepted as a defect of poor motor coordination that results in a swallowing defect. We found a significant relationship between the severity of drooling and the number of traumatic teeth suggestive of a relationship between these two manifestations of defective motor coordination. The data comparing the severity of drooling to the severity of dental trauma showed that the severity of drooling was significantly greater in patients with enamel-dentin fractures, fractures involving the pulp, crown fracture en-masse and avulsion with no significant difference between these groups. All these forms of dental trauma have the effect of preventing an oral seal which is known to prevent effective swallowing.

The relationship between defective swallowing patterns and lack of mouth closure and drooling of saliva is well documented in literature. Franklin et al in a study on the orthodontic features of children with CP have also pointed to a less effective eating and swallowing pattern in children who have class II div1 malocclision, a group that is prone to traumatic dental injury. While these studies explain our finding of greater traumatic injuries in children with drooling it is hard to state definitively whether the drooling is a result of trauma, or whether drooling and traumatic injuries are unrelated manifestations of motor in coordination. Our data also showed that individuals who had been treated for traumatic injuries showed a milder form of drooling than those who had untreated traumatic injuries. This finding was significant in the mixed and permanent dentition but insignificant in the primary dentition.

Drooling of saliva usually decreases with age, becoming less severe as the orofacial musculature and sensation develops. This is evident by the negative correlation between drooling severity and age found in our study. This could also explain why treatment of dental trauma had an effect on the severity of drooling in the permanent and mixed dentition but not on the primary dentition. However given that only 31 individuals had received treatment for traumatic dental injuries it would be premature to assume that treatment of traumatic dental injuries could reduce the severity of drooling, though the idea merits future (multicentric randomized control ) study.

Individuals with cerebral palsy have been shown to be less likely to receive treatment for their traumatic dental injuries. The small number of individuals receiving treatment for their traumatic dental injuries would seem to be in keeping with that trend. However the fact that the study was conducted in India and Nepal shows that the percentage of individuals with CP who had received treatment for traumatic dental injuries was roughly at the same level as data gathered from the general population of the region. Treating CP patients at outpatient clinic level is always challenging. Dental practitioners who lack experience in rehabilitation may feel insecure when delivering dental care to severely impaired individuals at an outpatient clinic level. The number of studies in this specific topic is very limited due to limited knowledge of dentist caregivers.

Conclusions

In conclusion children with dental trauma tend to have a greater incidence of drooling when compared to children without traumatic dental injuries. Treatment of the traumatic dental in-
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References

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References


Conflict of Interest: None Declared