Plaque, gingivitis, enamel defects and tooth wear among cerebral palsy children of Riyadh region

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Abstract: Objectives: To determine the gingivital health status, tooth wear and enamel hypoplasia in cerebral palsy children of Riyadh region.

Design: One hundred and four CP children were examined for dental plaque, gingivitis, tooth wear and dental enamel defects. The children were divided into two groups; the first group comprised of children with primary dentition only and the second group consisted of children with mixed dentition.

Setting: Rehabilitation Center for Disabled Children's Dental Clinic, Riyadh.

Results: Majority of the first group of children had moderate to mild plaque accumulation. In the second group, more than half of the children had heavy plaque accumulation. Almost half of the first group of children had only mild gingivitis and a slightly lower number had no gingivitis. The number of children with health gingiva in the second group was lower as compared with the first group of children. About one-third of the CP children in both the groups had tooth wear. Enamel hypoplasia was present in more than one third of the children in both groups.

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KEYWORDS:

Cerebral palsy (CP) is a broad term used to describe a group of disorders that affect the neuromuscular system. The condition usually originates in childhood and is characterized by paresis, lack of coordination, weakness, convulsions, vision and hearing defects, speech problems, psychological problems, and behavioral disorders of organic origin. Some oral and dental problems are more prevalent in CP children than in normal children. These problems include gingivitis, tooth wear and dental enamel defects.

Inability to control muscle function and muscle in-coordination makes oral hygiene maintenance a difficult task in these children. It results in formation of plaque, which subsequently may lead to gingivitis. Studies have reported higher plaque scores and gingivitis experience in CP children as compared to normal children.

A higher incidence of tooth wear has been reported in CP children as compared with normal children, which in turn has been attributed to higher incidence of bruxism in CP children. A higher incidence of enamel hypoplasia, especially in primary dentition has also been reported in CP children.

The purpose of the present study was to determine and describe the gingival health status, tooth wear and enamel hypoplasia in CP children of Riyadh area. The results also provide baseline data for future studies and assist in the dental management of these children.

Material and methods One hundred and four CP children, who are registered with the Rehabilitation Center for Disabled Children, Riyadh, were examined for plaque, gingivitis, tooth wear and enamel defects in the Center's Dental Clinic. Loe's Plaque Index was utilized to record the plaque deposition. Gingival health status was assessed using the Gingival Index described by Nanda. The tooth wear and enamel defects were recorded utilizing the Smith and
Knight Tooth Wear Index\textsuperscript{9} and FDI DDE Index\textsuperscript{10} respectively. The Smith and Knight Tooth Wear Index\textsuperscript{9} was simplified to examine the occlusal/incisal wear only. All the children were examined by the principal investigator (AHW). The intra-examiner reliability was 95\%, utilizing the percent-agreement method. The results of the examination were recorded on special forms. The Rehabilitation Center for Disabled Children, Riyadh provides educational, medical and dental health services to disabled children including CP children of Riyadh region. All the CP children registered with the center are regularly examined by a dental hygienist, who also carries out dental prophylaxis, topical fluoride application, and provides instructions on oral hygiene maintenance of CP children to parents/caretakers of CP children. The dental treatment is provided by the pediatric dentistry faculty and graduate students of King Saud University College of Dentistry.

The data was entered into the microcomputer using FOXPRO database software and then transferred to King Saud University mainframe computer (IBM 3083) for statistical computation. Statistical Analysis System (SAS) was utilized to generate frequency distribution tables.

**Results** One hundred and four CP children were examined, 60 were male and 44 were female with a mean age of 7.5 years. Out of the 104 children, 73 (70.2\%) children suffered from spasticity, 10 (9.6\%) with atethosis, 4 (3.8\%) with ataxia, 5 (4.8\%) with atonia, and 12 (11.5\%) with various combinations of these diagnoses. Eighteen (17.3\%) children had hemiplegia, 52 (50.0\%) had diplegia, 1 (0.9\%) had paraplegia and 7 (6.7\%) had quadriplegia. The children were not evenly divided by CP type and physical disability (as expected), which obstructed any categorized analysis by CP type and physical disability.

As the age range was very high (2-12 years), the children were divided into two groups for further analysis: the first group comprised of children with primary dentition only and the second group consisted of children with mixed dentition. There were 37 children in the first group, 15 males and 22 females, with a mean age of 3.8 (±1.2) years. The second group consisted of 67 children, 45 males and 22 females, with a mean age of 9.2 (±1.9) years.

**First Group:** Among the 37 children of this group 8 (21.6\%) children had a plaque score (PS) of three (heavy plaque accumulation), 16 (43.3\%) had a PS of two (moderate plaque accumulation), 11 (29.7\%) had a PS of one (mild plaque accumulation) and, 2 (5.4\%) children had a PS of zero (no plaque accumulation).

Only 1 (2.7\%) child had severe gingivitis, 2 (5.4\%) children had medium gingivitis, 18 (48.7\%) had mild gingivitis and 16 (43.2\%) children had no gingivitis.

Tooth wear was present in 10 (27.0\%) children (Table 1), of which 4 (10.8\%) children had generalized tooth wear and 6 (16.2\%) had localized tooth wear. In these 10 children with tooth wear, 5 (13.5\%) children had loss of enamel only and the remaining 5 (13.5\%) had loss of enamel which was enough to expose dentine.

Enamel hypoplasia was present in 16 (43.2\%) children (Table 2), of which 8 (21.6\%) children had enamel hypoplasia in their anterior teeth only, 1 (2.7\%) child had it in the posterior teeth only and 7 (18.9\%) children had it in both the anterior and posterior teeth.

**Table 1:** Tooth wear in CP children.

<table>
<thead>
<tr>
<th>Tooth Wear</th>
<th>1st Group (%)</th>
<th>2nd Group (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>10 (27.0)</td>
<td>21 (31.3)</td>
<td>31 (29.8)</td>
</tr>
<tr>
<td>Absent</td>
<td>27 (73.0)</td>
<td>46 (68.7)</td>
<td>73 (70.2)</td>
</tr>
<tr>
<td>Total</td>
<td>37 (100)</td>
<td>67 (100)</td>
<td>104 (100)</td>
</tr>
</tbody>
</table>

**Table 2:** Enamel hypoplasia in CP children.

<table>
<thead>
<tr>
<th>Enamel Hypoplasia</th>
<th>1st Group (%)</th>
<th>2nd Group (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>16 (43.2)</td>
<td>26 (38.8)</td>
<td>42 (40.4)</td>
</tr>
<tr>
<td>Absent</td>
<td>21 (56.8)</td>
<td>41 (61.2)</td>
<td>62 (59.6)</td>
</tr>
<tr>
<td>Total</td>
<td>37 (100)</td>
<td>67 (100)</td>
<td>104 (100)</td>
</tr>
</tbody>
</table>

**Second Group:** Among the 67 children of this group, 40 (59.7\%) children had a PS of three (heavy plaque accumulation), 13 (19.4\%) had a PS of two (moderate plaque accumulation), and 14 (20.9\%) children had PS of one (mild plaque accumulation).

Three (4.5\%) children in this group had severe gingivitis, 29 (43.3\%) children had medium gingivitis, 24 (35.8\%) had mild gingivitis and 11 (16.4\%) children had no signs of gingivitis.

Tooth wear was present in 21 (31.3\%) children (Table 1), of which 9 (13.4\%) children had generalized tooth wear and 12 (17.9\%) had localized tooth wear. In these 21 children with tooth wear, 15 (22.4\%) children had loss of...
enamel only and the remaining 6 (8.9%) had loss of enamel which was enough to expose dentine.

Enamel hypoplasia as present in twenty-six (38.8%) children (Table 2), of which 8 (11.9%) children had enamel hypoplasia in anterior teeth only, 3 (4.5%) children had it in the posterior teeth only and 15 (22.4%) children had it in both the anterior and posterior teeth.

**Discussion** Majority of the first group of children had moderate to mild plaque accumulation and some children were plaque free. In the second group, more than half the children had heavy plaque accumulation. This could be the result of a combination of factors such as physical defects impeding toothbrushing, lack of expectation on part of the family and inadequate personal care due to poor self image. These finding were in agreement with previous reports on plaque scores in CP children.5,12

A higher gingivitis incidence in CP children may result from inadequate oral hygiene and increased plaque formation.3,13 Cerebral palsy patients who take phenytoin to control seizure activity also tend to have a degree of gingival hyperplasia.14,15 Gingival inflammation can be prevented by adequate and frequent removal of plaque.2 The most frequent and efficient way of removing plaque is toothbrushing,16 a difficult task to carry out in CP children. It is necessary therefore, to advise parents and care takers of CP children that assistance should be provided to these children in maintenance of oral hygiene. A considerable number of first group children had only mild gingivitis and a large number had no gingivitis. The gingival health status of the first group children was similar to that reported for normal children of the same age group.17,18 The incidence of gingivitis in the second group children was 83.6%. There are controversial reports regarding the incidence of gingivitis in normal children of similar age groups. While Carter and Wells19 found an incidence of 57% in normal 10-year-old children, Moore20 found an incidence of 93% in 7-13 year-old children. Nevertheless, the number of children with healthy gingiva in the second group was lower as compared with the first group children. This indicates continuous and increased vigilance to gingival health as the CP children grow. Although many studies have reported a higher gingivitis incidence in CP children2,6,21 the overall gingival health situation in the present sample was encouraging.

In the present study, approximately one-third of the children in both groups had tooth wear (Table 1). Johansson et al21 reported on the severity of occlusal tooth wear in Saudi young adults and attributed the Saudi experience of high tooth wear to high soft drink consumption and harsh environmental/climatic conditions. Higher incidence of occlusal tooth wear in CP children probably results from unusual masticatory patterns and higher incidence of bruxism (related to the overall neurologic problem) in these children.11 The severity of tooth wear was greater in the first group than the second group. This may be attributed to the lower mineral contents and less general hardness of the enamel in primary teeth, and lower exposure period to unusual masticatory patterns and bruxism.

Amelogenesis is a very sensitive process and any disturbance during the process of enamel formation results in enamel defects. Al-Shammary et al22 reported a hypoplasia prevalence of only 0.4% in 13-14 year old children of Riyadh. Enamel hypoplasia was present in more than one-third of children in both groups (Table 2). The increased frequency of enamel hypoplasia in CP children as compared to overall population has been reported previously.23,24 The prevalence of enamel hypoplasia in the present study was about the same as reported by Herman and McDonald in 2-10 year old CP children, and was higher than that reported in normal children of developed countries.23

**Conclusion** Majority of children in primary dentition had mild to moderate plaque accumulation. In the mixed dentition children, more than half had heavy plaque accumulation. Almost half of the primary dentition children had only mild gingivitis. The number of children with healthy gingiva in the mixed dentition children was lower as compared with the primary dentition children. Approximately one-third of the children in both groups had tooth wear. Enamel hypoplasia was present in more than one-third of children in both groups. The results of this study indicate that early dental prevention and treatment should be a part of the overall care of CP children. CP children represent a heterogenous group and therefore need individualized prevention strategies.

In view of a high incidence of enamel hypoplasia and tooth wear stainless steel crown restorations should be preferred over conventional restorations for more durable results.

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This study was registered with the Research Center, King Saud University College of Dentistry, Riyadh, Saudi Arabia.

References

7. Loe H. The gingival index, the plaque index and retention index systems. J Periodontol 1967; 38; 610-616.
ملخص

الهدف: معرفة حالة اللثة الصحية، تأكل الأسنان، والقصور في تكون طبقة المينا في الأطفال المصابين بالبشرة الدماغية.

التصميم: تكمن عينات البحث من 104 من الأطفال المصابين بالشرة الدماغية، وتم فحصهم لتقييم مستوى تراكم الطبقة الجرثومية (الزلاج) والتهاب اللثة البسيط، وتأكل الأسنان والتشوهات الخلقية بطلاقة مينا السن. تقسم العينة على مجموعتين:

1- المجموعة الأولى: وتشمل الأطفال في مرحلة وجود الأسنان الأولية (اللبية) فقط.
2- المجموعة الثانية: وتشمل الأطفال في مرحلة وجود الأسنان المختلطة (أي الأسنان الأولية مع الأسنان الدائمة).

المكان: عيادة الأسنان مركز التأهيل للأطفال المعاقين بالرياض.

النتائج: عانى غالبية الأطفال في المجموعة الأولى من تراكم الطبقة الجرثومية (البلاك) بدرجة بسيطة إلى متوسطة، بينما عانى أكثر من نصف الأطفال المجموعة الثانية من تراكم شديد (كثيف) للطبقة الجرثومية على أسنانهم. كما عانى ما يقرب من نصف المجموعة الأولى من التهاب اللثة البسيط، ولعبت نسبة الأطفال غير المصابين بالتهاب اللثة. أما في المجموعة الثانية فقدان عدد الأطفال الذين لم يصابوا بالتهاب اللثة أقل كثيرًا من المجموعة الأولى، كما كان حوالي ثلث الأطفال المصابون بالبشرة الدماغية في كلتا المجموعتين يعانون من تأكل الأسطح الماضحة لأسنانهم. أما عن التشوهات الخلقية (القصور) في تكون طبقة مينا السن، فكانت موجودة في أكثر من ثلث الأطفال في كلتا المجموعتين.