

# PLAQUE AND GINGIVAL HEALTH STATUS AMONG CEREBRAL PALSIED CHILDREN OF RIYADH CITY

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## ABSTRACT

*The objective of this study was to evaluate and describe the plaque and gingival health status in cerebral palsy (CP) children of Riyadh city. One hundred and forty non-institutionalized CP children (82 males & 58 females) were examined in the dental clinic of the Disabled Children Association Center, Riyadh, for presence of plaque and gingival inflammation. Children were divided into three age groups; the first (3-6 years) consisted of 41 children, second (7-9 years) consisted of 52 children and third (10-12 years) had 47 children. The highest mean plaque index (PI) was recorded for the first group. There was no significant ( $p>0.05$ ) difference between the three groups examined. The highest mean gingival index (GI) was recorded for the third group which differed significantly from the first ( $p=0.000$ ) and second ( $p=0.001$ ) groups. GI scores were found to be related to the oral hygiene (OH) status of the CP children examined, as the children with poor OH got the highest mean GI followed by children with fair and good OH. Neither PI nor GI scores were affected by the gender of the examined CP children. The CP children examined in this study had mild to moderate plaque accumulation and the gingival inflammation increased as the age of the children increase. Gender had no significant effect on the PI or GI scores obtained, and the GI scores were found to be related to the OH status.*

**Key words:** Plaque, gingivitis, gingival index, plaque index, oral hygiene, cerebral palsy.

## INTRODUCTION

Cerebral palsy (CP) is a common neurologic condition that originates in early childhood but affects individuals throughout their life. This handicapping condition has specific motor skills problems, delay in developmental milestones as well as physical limitations that might include abnormal muscles tonus, reflexes and persistent infantile reflexes.<sup>1,2</sup> Disability is the functional limitation within the individual caused by physical, mental, or sensory impairment, and individuals with any kind of disability or illness usually have poor oral health in comparison with general population.<sup>3-6</sup>

The cause of gingivitis is complex and is considered to be based on a multitude of local and systemic factors. Poor oral hygiene (OH), dietary inadequacies, malocclusion, mouth breathing, carious lesions, as well as faulty restorations with overhanging margins, all favor the development of chronic gingivitis.<sup>7</sup> In disabled individuals the process of developing gingival / periodontal diseases does not differ from non-disabled individuals. The main factor related to gingival / peri-

odontal problems in disabled individuals is the inadequacy of the plaque removal from the teeth which is impaired by learning disabilities, motor in-coordination and muscular limitation (in neuromuscularly disabled individuals).<sup>8,9</sup> Periodontal treatment needs have been found to be highly correlated to OH of individuals with handicapping conditions.<sup>10</sup> Previous studies have stressed the importance of assisted brushing for the CP children and the need for either modified or electric tooth brushes,<sup>3,9,11-13</sup> while others encourage the use of chemical measures of plaque control as an effective method of reducing plaque accumulation and gingival inflammation.<sup>8</sup> Since CP is a major childhood disability, studies to assess the oral health status and dental treatment needs of CP children are required to plan properly for prevention and to keep the treatment burden to a minimum. In Saudi Arabia, no current data are available on periodontal health status of CP children; the only study available was carried out more than a decade ago by Wyne and coworkers in 1996.<sup>1</sup> The aim of this study was to evaluate and assess the plaque and gingival health status in CP Children of Riyadh city.

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## METHODOLOGY

The study population consisted of 140 non-institutionalized CP children (82 males and 58 females) attending a special school of Disabled Children Association Center in Riyadh (DCAC). The children's demographic and medical information were obtained from their records available in the DCAC. The children were examined by one pediatric dentist assisted by a dental hygienist, who regularly examines the children and carries out dental prophylaxis and topical fluoride application. They also educate the parents/caretakers of the CP children on the importance of OH for their children.

Approval of the study was obtained from the Research and Ethics Committee of King Saud University College of Dentistry Research Center.

Prior to data collection, a written consent was obtained from the parents of all the children. Examination was conducted in the dental clinic of DCAC, for plaque deposition and gingivitis. Plaque deposition was recorded using Loe's Plaque Index (PI)<sup>14</sup> where four categories were recorded for plaque deposition as follows:

- 0 = The gingival area of the tooth surface is literally free of plaque. The surface is tested by running a pointed probe across the tooth surface at the entrance of the gingival crevice after the tooth has been properly dried. If no soft matter adheres to the point of the probe, the area is considered clean.
- 1 = No plaque can be observed in situ by the unaided eye, but the plaque is made visible on the point of the probe after it has been moved across the tooth surface at the entrance of the gingival crevice .
- 2 = The gingival area is covered with a thin to moderately thick layer of plaque. The deposit is visible to the naked eye.
- 3 = Heavy accumulation of soft matter, the thickness of which fills out the niche produced by the gingival margin and the tooth surface. The interdental area is stuffed with soft debris.

The gingival health status was assessed using the Gingival Index (GI) described by Nanda,<sup>15</sup> where the severity of inflammation was graded numerically from 0 to 4, in successive degree according to increasing intensity and extent:

- 0 = No gingivitis with the following characteristics:  
Color: pale pink  
Texture: firm, no bleeding on firm digital pressure  
Contour: pointed to slightly rounded

Tonus: close adherence of the free gingiva to the alveolar bone. When two adjacent teeth have their interproximal surfaces in direct apposition, the gingiva should completely fill the interdental space: the dental margin of the gingiva should taper off to the enamel.

- 1 = Mild inflammation, with slight change in color and little loss of contour.
- 2 = Moderate inflammation, with swelling, glazing and redness. Tendency to bleed on slight pressure. Papillae or margins become blunted or rounded in contrast to the normal tissue. Slight extension of the inflammation to the adjacent tissue.
- 3 = Severe inflammation with more swelling and redness, spontaneous bleeding. Involvement of the adjacent definite. Slight degeneration.
- 4 = Very severe, any degree more severe than above, including ulceration and sloughing.

Gingival Index (GI) score for each child was calculated as total degree of severity for anterior teeth divided by total number of anterior teeth affected.

Statistical package for social science (SPSS- version 15) was utilized for statistical computation; p value of  $\leq 0.05$  was considered to be significant. The difference in mean scores were analyzed using ANOVA; a follow up Tukey's Post-Hoc significance test was used to determine which groups were significantly different in case of more than two groups. Pearson's test was used to determine the correlation between plaque deposition and gingival condition.

## RESULTS

The age of the CP children ranged between three and 12 years. For the purpose of analysis, the children were divided into three age groups, first group (3-6-years), second group (7-9-years) and the third group (10-12-years). Out of the 140 CP children, 102 (72.9%) were spastic, 4 (2.8%) had athetosis, 5 (3.6%) rigidity, 4 (2.8%) ataxia and 25 (17.9%) had mixed CP. As for the physical disability; 2 (1.4 %) were hemiplagic, 65 (46.4%) had deplagia, 6 (4.3%) paraplagia, 48 (34.3%) quadreplagia and 19 (13.6 %) had non-specific physical disabilities.

Analysis of plaque score and gingival scores by CP type and physical disability were not done as the children were not evenly distributed by CP type or physical disability.

**Plaque:** A majority (67.9%) of children had moderate plaque accumulation followed by heavy plaque accumulation (22.1%) and mild plaque accumulation (10.0%); none of the children was plaque-free. The mean plaque score of the sample was  $1.79 \pm 0.99$  (Table 1). The

highest mean PI score ( $2.07 \pm 1.26$ ) was recorded for the first age group. However, no statistically significant ( $p > 0.05$ ) difference was found between the three age groups (Table 1). The mean PI score for males and females was ( $1.81 \pm 1.19$ ) and ( $1.77 \pm 0.82$ ) respectively with no statistically significant ( $p > 0.05$ ) difference between them.

**Gingivitis:** Nine (6.4%) children had good gingival health, while all others (93.6%) had mild gingivitis. The mean gingivitis score was  $0.83 \pm 0.39$  (Table 2). The highest mean GI ( $1.04 \pm 0.28$ ) score was recorded for the third age group in comparison with the mean GI of the first and second groups, who had similar mean GI scores of  $0.66 \pm 0.46$  and  $0.77 \pm 0.34$  respectively (Table 2). A significant difference was found between the GI scores of the three age groups; multiple comparison Post-Hoc test showed that the third age group differed significantly from the first age group ( $p > 0.05$ ) and second age group ( $p > 0.05$ ) with no difference between the first and second age groups ( $p > 0.05$ ).

Gender had no effect on the GI scores recorded as the difference between males and females mean GI scores was not statistically significant ( $p > 0.05$ ).

**Plaque and Gingivitis:** GI scores were found to be correlated to PI scores; as children with High GI had the highest mean PI scores and those with lowest GI scores had the lowest PI scores.

TABLE 1: MEAN AND SD OF PLAQUE SCORES BY AGE

Age Group (Years)	N	Mean Plaque Score*	SD
3 – 6	41	2.07	1.26
7 – 9	52	1.69	0.88
10 - 12	47	1.66	0.78
Total	140	1.79	0.99

\* No significant difference ( $P > 0.05$ )

TABLE 2: MEAN AND SD OF GINGIVAL SCORES BY AGE

Age Group (Years)	N	Mean Gingival Score*	SD
3 – 6	41	0.66 <sup>a</sup>	0.46
7 – 9	52	0.77 <sup>a</sup>	0.34
10 - 12	47	1.04 <sup>a</sup>	0.28
Total	140	0.83	0.39

\*  $P < 0.05$  (Different alphabetical letters indicate a significant difference)

## DISCUSSION

Information on plaque accumulation and gingival status is scarce in CP children. Accessing this special group of children has always been challenging. Dental

examination of these children poses an additional challenge due to neuromuscular in-coordination. The present study gathered information on the plaque deposition and gingival status of CP children in Riyadh. It is expected that the results of the study will help in better planning the preventive and curative needs of these children.

The majority of CP children examined in this study had mild to moderate plaque accumulation; the mean PI decreased through age with no significant difference between various groups examined. These findings are comparable with other studies on PI of CP children.<sup>3,6,9,13</sup> The mean PI values obtained for the present study population were higher than those obtained for normal children in several previous studies.<sup>3,6,16</sup>

Motor and mental alterations as well as dyskinetic movements, the presence of aberrant oral reflexes such as biting and vomiting, and alterations in intra oral sensitivity are all important detrimental factors for mechanical removal of plaque in CP children.<sup>17,18</sup> There was no gender difference in relation to mean PI in the present study which coincides with the results obtained by Santos et al<sup>17</sup> who found no statistically significant difference in PI of CP males and females in mixed dentition. A higher incidence of gingivitis in CP children as compared with normal children has been reported by several investigators.<sup>3,6,19</sup> In the present study the youngest CP children had less gingivitis than CP children of comparable age reported in two previous studies.<sup>3,6</sup> de Oliveira & Ciampioni<sup>6</sup> reported higher values of GI scores for CP children with primary dentition in comparison to normal children. The two older age groups had minimal clinical inflammation according to Loe and Silness Index<sup>20</sup> as their GI score values were less than 1.1. The GI scores of the second and third groups in the present study were comparable to those reported by other investigators<sup>3,13</sup> in similar-age CP children, while the scores were less than that of 6-13-year-old normal children reported by Nanda.<sup>15</sup>

In the present study and several other studies in CP children,<sup>3,13,21</sup> GI scores increase as the age of the children advances. The same observation was reported also by Nanda<sup>5</sup> in normal children. However, Anagnou-Vareltzides et al<sup>16</sup> found no relation between age and GI scores in normal children.

The higher GI recorded for the older age group (10-12 years) in this study could also be attributed to the



gingival inflammation observed usually at this age, commonly referred to as puberty gingivitis. Although a higher GI score was recorded in females compared to males, gender had no significant effect on the GI in the present study. This is in agreement with the results reported by Nanda<sup>15</sup> in normal children.

The degree of oral cleanliness and the health of the gingival tissue in children are definitely related, and the importance of a good standard of oral cleanliness in reducing gingivitis and preventing the progression of the disease in later life is a well known fact.<sup>7</sup> The GI values in this study were also found to be related to the plaque status of the CP children with the highest mean GI scores recorded for children with highest PI scores. Mann et al<sup>10</sup> reported a significant correlation between the periodontal health status and OH level in individuals with handicapping conditions;

they also advocated that new cleansing aids and antibacterial agents should be further investigated to simplify plaque removal in such populations.

The overall gingival health status in the present study population was encouraging as the majority (80.7 %) of the examined children had a mean GI score equals to or less than one. Similar results were shown by Wyne et al<sup>13</sup> in 1996, who reported an encouraging gingival health situation in CP children of similar age in Riyadh region

## CONCLUSIONS

The majority of CP children examined in this study had mild to moderate plaque accumulation with an encouraging gingival health status.

- Gender does not appear to be related to the PI or GI scores.
- The GI scores were found to be related to the PI score.

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