

Original article

Evaluation of The Dental-Gingival Health in Children With Cerebral Palsy in Zonguldak

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ÖZET

Zonguldak'ta yaşayan serebral palsili çocukların diş ve dişeti sağlığının değerlendirilmesi

Amaç: Bu çalışmada serebral palsi tanısı almış Zonguldak'ta yaşayan çocukların diş ve dişeti sağlığı prospektif bir çalışmayla değerlendirilmiştir.

Materyal ve Metot: Araştırma amaçları doğrultusunda değişik yaş gruplarında serebral palsili 51 kız, 69 erkek toplam 120 çocuğun diş ve dişeti muayenesi yapılmıştır. Çürük, kayıp ve dolgu sayıları kaydedilmiş ve DMFT indeksleri hesaplanmıştır. Enamel defektleri, renkleri ve hipoplazi oranları araştırılmıştır. Diş etleri muayeneleri gingival indeks ile değerlendirilmiş ve ağız pH'ları incelenmiştir.

Bulgular: DMFT indeksleri kız çocuklar için $6,08 \pm 3,79$, erkek çocuklar için $6,22 \pm 3,43$ bulunmuştur. Değişik tiplerde enamel defektleri kızlarda %82,67, erkeklerde %86,87 olarak hesaplanmıştır. Akut dişeti enfeksiyonu kızlarda %31,91, erkeklerde %22,72 oranında bulunmuştur. Hipoplazi kızlarda %46,80, erkeklerde %37,87 oranındadır. Ağız pH'sı kızlarda $7,66 \pm 0,54$, erkeklerde $7,96 \pm 0,60$ olarak tespit edilmiştir.

Sonuç: Ailelerin serebral palsili çocuklarda diş sağlığına dikkat etmedikleri görülmüştür. Bu çocukların dişlerini fırçalamadaki yetersizlikleri göz önüne alınarak düzenli olarak diş hekimine götürülmeleri önerilmiştir.

Anahtar Kelimeler: Serebral palsi; diş; dişeti; klinik muayene

ABSTRACT

Objectives: In this study it was aimed to define tooth and gum health of children with cerebral palsy (CP) through a prospective study.

Material and Method: Tooth and gum examinations of 120 children of different age groups 51 females and 69 males with cerebral palsy. Numbers of Decays (D), Missings (M) and Fillings (F) were recorded and the DMFT index was evaluated. The enamel defect types were recorded, and also the enamel color defects and hypoplasia rates were investigated. The gums were evaluated via gingival index, and pHs of mouth were checked.

Results: The DMFT index was found to be 6.08 ± 3.79 for females and 6.22 ± 3.43 for males. Various types of enamel defect were encountered in 82.67% of females and 86.87% of males. Acute gingival inflammation was diagnosed in 31.91% of females and 22.72% of males. Hypoplasia was found in 46.80% of females and 37.87% of males. pHs of mouth were found as 7.66 ± 0.54 for females, and 7.96 ± 0.60 for males.

Conclusions: It was realized that families did not pay attention to tooth health of individuals with cerebral palsy. It was suggested that these individuals who are not capable of brushing their teeth should regularly be taken to dentist. These studies will allow to make more informed recommendations to patients with CP and their parents that will improve the oral hygiene and reduce the risk of future dental decay in these children.

Key Words: Cerebral palsy; teeth; gum; clinical examination

INTRODUCTION

During the development of teeth, some systemic ailments negatively affect teeth structure and make it difficult to fix them¹. Teeth defects are known to be common among children and adults with certain systemic neurological diseases; for instance, cerebral palsy (CP)¹⁻³.

Cerebral palsy is a common disorder characterized by motor and posture dysfunction occurring due to brain damage. There is no cure for cerebral palsy but it is non-progressive.

There is no single disorder; rather, the term encompasses a group of disorders. In addition to loss of balance, motor loss, and posture impairment, difficulties with eating and swallowing are recognized in the first year of life. Eating, drinking, swallowing, and talking disorders, as well as dribbling of saliva, occur due to mental retardation and orofacial dysfunction. Ninety percent of children with cerebral palsy have oral motor dysfunction and develop nutrition disorder.

Abnormal neuromuscular coordination in the tongue, lips, and cheeks lead to periodontal problems and irregularities in teeth arrangement. Furthermore, children with cerebral palsy frequently develop bruxism, which causes dental erosion and losses of tooth structure⁴.

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As a review of national and international research on oral and dental health among disabled children reveals, most studies showed that disabled children have impaired oral hygiene and when compared to healthy children. Also gum problems closely related to oral hygiene such as gingivitis and periodontitis are commonly reported in disabled children⁵⁻⁹. And as studies on the DMF values of disabled children show, most studies report that the prevalence of caries is higher among disabled children than healthy children, while some others report that there is no difference in terms of the prevalence of caries between disabled and healthy children⁹.

Dental treatments for disabled children are difficult to be implemented due to cooperation problems in these children. Since patient compliance is one of the most important problems that affect success in dental treatment for children, non-compliant children should be treated under deep sedation or general anesthesia¹⁰. Therefore, related researches report higher rates of untreated caries among disabled children when compared with healthy children¹¹. Different caries prevalence between disabled and healthy children could be attributed to a number of factors including differences in carbohydrate intake frequency and saliva flow rate, impaired cooperation, lack of hygiene due to muscle and articulation problems, and chewing difficulties¹².

Caries prevalence among disabled children varies according to the type of disability. Many studies, particularly those on children with Down syndrome and cerebral palsy, report higher caries prevalence^{11,12}. Inability of children with cerebral palsy to brush their teeth properly leads to dental and gum problems, which are observed at a higher rate in our country due to parental indifference. Our study was designed to determine among the children with cerebral palsy in our region dental caries, tooth loss rates, enamel defects, gingival disorders, and oral pH.

MATERIAL and METHOD

In our study, a total of 120 children with cerebral palsy (51 females and 69 males) with ages ranging between 8 and 18 who receive education at Special Education Center in Kozlu, Zonguldak, were examined. The necessary approvals have been obtained from parents and school.

Examinations were performed by a single dentist. The dental examination was done in standard condition, in natural light. Children’s permanent teeth were examined using a dental mirror as they sat on a chair in a school room under daylight. Prior to examinations, patients’ teeth were not

brushed or not subjected to any professional cleaning procedure.

The number of caries (D), tooth losses (M), and fillings (F) were determined using the DMFT index¹³. To determine the health status of children’s teeth, DMFT indices were used which include the following criteria: caries (D), missing due to caries (M) and filled due to caries (F), and (T), which is obtained by dividing the number of teeth by the number of examined individuals¹³.

For the DMFT value, ≥ 1 was taken to indicate poor and < 1 good health status^{7,13}. This study has included the examination of permanent teeth. In 8-18 years of age group, first molar and central incisor teeth was erupted all children. Enamel defects were determined using the DDE index¹³. For enamel defects, left mandibular first molars were examined^{7,14}. For hypoplastic defects, maxillary central incisors were examined^{13,15}. Buccal, occlusal, lingual surfaces and color changes were evaluated¹⁶.

Oral surface pH was assessed using pH indicator paper (Whatman International, sensitivity of 0.5 pH in the 4.5-10.0 range) and measurements were performed in buccal mucosa¹⁷⁻¹⁹.

Oral surface pH was compared between children with cerebral palsy (51 females and 69 males) and normal (47 females, 40 males).

Gingival index was used for gingival examination¹². Calculation of gingival index and interpretation are shown in Table 1 and 2.

Table 1. Gingival index

Appearance	Bleeding	Inflammation	Points
Normal	no bleeding	none	0
Slight change in color and mild edema with slight change in texture	no bleeding	mild	1
Redness, hypertrophy, edema and glazing	bleeding on probing/pressure	moderate	2
Marked redness, hypertrophy, edema, ulceration	spontaneous bleeding	severe	3

Table 2. Gingival Index Interpretation

Average Gingival Index	Interpretation
2.1-3.0	severe inflammation
1.1-2.0	moderate inflammation
0.1-1.0	mild inflammation
<0.1	no inflammation

The data were recorded and evaluated by SPSS 11.0 statistical program. Student’s t-test was used for mean value, standard deviation, and female-male comparison. For age comparisons, the Mann-Whitney U and frequency distribution for descriptive statistics were used. Chi-square statistic

was used to investigate whether distributions of categorical variables differ from one to another.

RESULTS

The mean age and age distribution of children with CP participating in the study are shown in Table 3 and 4.

Table 3. Age Means and Standard Deviations of Children with CP

Gender	n	Minimum	Maximum	Age means
Female	51	8	17	11.72±2.66
Male	69	8	18	12.04±2.54
Total	120	8	18	11.90±2.58

Table 4. Age Distrubition of Children with CP

Age years	Female	Male
≤12	33	44
>12	18	25
Total	51	69

Number of decayed teeth (D), missing teeth (M), and the filled teeth (F) and DMFT index of children with CP participating in the study are shown in Table 5.

Table 5. Number and Percentage of Children with Caries, Mean DMFT Index and Standard Deviations

Gender	DMFT	DT	MT	FT
Female (n=51)	6.08± 3.79	4.70± 2.12	1.36± 1.76	0.02± 0.01
Male (n=69)	6.22± 3.43	4.56± 2.33	1.66± 1.84	0
Total	6.16± 3.80	4.61± 2.80	1.53± 1.98	0.00± 0.94

No significant differences were found between females and males under and over 12 years in terms of the DMFT index. No significant differences were found between females and males. The DMFT value was determined in both females and males as >1, which indicates poor health status. The distribution of the enamel defects of children with CP participating in the study by examining the left mandibular first molar tooth are shown at the Table 6. Various types of enamel defect were encountered in 82.67% of females and 86.87% of males. It was observed that the rate of more than two defects was significantly higher among females (p=0.048), the rate of localized defects was significantly higher among males (p=0.01), the rate of diffuse defects was significantly higher among females (p=0.043), and the rate of teeth without defects was not significantly different for males and females (p>0.05). Distribution graphic of the enamel defect of children with CP participating in the study are shown in the Figure 1.

The distribution of the defects according to the tooth surface are shown in the Table 7. Occlusal defects were found to be more common in both

sexes and were significantly higher in number among males.

Table 6. Number and Percentage of Children According to Developmental Defects of Enamel Left Mandibular 1. Molar Teeth

DDE	Female (n=51) (%)	Male (n=69) (%)
With defects	40 *	35.35
Demarcated defects	10.66	28.28 *
Diffuse defects	33.33 *	23.23
With no defects	17.33	13.13

*: p<0.05

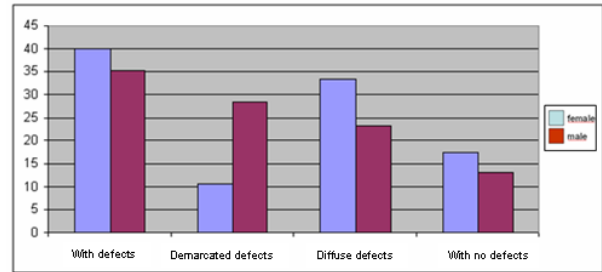


Figure 1. Percentage of enamel defects

Table 7. Location of Defects on Various Tooth Surfaces

Gender	Buccal surface %	Lingual surface %	Occlusal surface %
Female (n=51)	36.5	17.46	46.03*
Male (n=69)	34.15	10.97	54.87*

* p<0.05

Enamel defect types and distribution of the children with CP participating in the study are shown in the Table 8. Females displayed higher hypoplasia rates (p=0.048), while the rate of yellow/brown opacities was significantly higher among males (p=0.043). Gingival index of the children with CP participating in the study are shown in the Table 9. A higher rate of severe inflammation was observed among females, while males had a higher rate of medium-level inflammations. Distribution graphic of the gingival index of children with CP participating in the study are shown in the Figure 2. Mean pH values were determined to be 7±1 among females and 7.5±1 among males children with cerebral palsy. The difference was found to be significant (p=0.049).

The oral surface pH of males was more basic when compared to females. Mean pH values were determined to be 6.5±1 among females and 7±1 among males in normal children. The oral surface pH of males was more basic when compared between normal females and males (p=0.049). The oral surface pH didn't differ significantly between male with cerebral palsy and normal males (p>0.05). The oral surface pH detected significantly basic in females with cerebral palsy than normal females (Table 10).

Table 8. Number and Percentage of Teeth with Different Types of Enamel Defects and Hypoplasia

Gender	OpacityA	OpacityB	DE	Other	HP
Female	78.72	14.84	2.12	2.12	46.80*
Male	66.66	28.78*	-	4.5	37.87

Opacity A: white/cream, OpacityB: yellow/Brown, DE: Discoloured enamel, HP: Hypoplasia, *: p<0.05

Table 9. Percentage of Gingival Index

Gender	Mild	Moderate	Severe	None
Female	2.12	14.89	31.91*	51.06
Male	1.5	27.27 *	22.72	48.48

*: p<0.05

Table 10. Mouth pH Means

Groups	pH	
CP	Female (n=51)	7±1
	Male (n=69)	7.5±1
N	Female (n=47)	6.5±1
	Male (n=40)	7±1

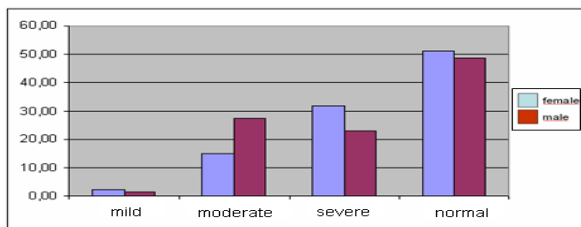


Figure 2. Percentage of gingival inflammations

DISCUSSION

Although children with cerebral palsy experience the same dental and oral problems as healthy children do, the prevalence of these problems is higher among those with cerebral palsy. Their inability to brush their teeth properly and to use dental floss effectively leads to lack of oral hygiene, which, in turn, causes early tooth losses and periodontal diseases^{1,20,21}.

The DMFT index is the most important indicator of lifelong dental care²². The DMFT index is around 5.51 in normal children¹⁰. The DMFT index of children with cerebral palsy has been reported to be significantly higher than that of normal children¹¹. In our study, The DMFT index was found to be 6.08 for females and 6.22 for males. No significant difference was found between females and in terms of the DMFT index.

A study on the deciduous teeth of children with cerebral palsy reported a high prevalence of hypomineralization defects²³. In the deciduous teeth of children with cerebral palsy, developmental enamel defects were found to be two times the normal rate¹. Another study conducted to determine the prevalence of enamel defects in

children with congenital cerebral palsy²⁴. Varying rates of dentofacial anomalies among these children were reported²⁰. In our study, the rate of defects are shown in Table 6. The rate of hypoplasia was 46.80% for females and 37.87% for males, a result which was significantly higher for females. Occlusal defects were found to be more common in both females and males. This finding is compatible with the literature^{1,25}.

As patients with cerebral palsy can not maintain oral hygiene, inflammation occurs, which finally results in tooth loss. In evaluating gingival index, the rate of medium-level inflammations was high among males, while females had a higher rate of severe inflammation. A study demonstrated that children with cerebral palsy did not have hypersalivation and were not different from healthy children in this respect; however, it did not examine oral Ph^{26,27}. The worst scoring in terms of oral hygiene among disabled patients was observed among children with cerebral palsy²⁸. Oral surface pH was found to be more basic in male children with cerebral palsy than females. Oral surface pH of males was more basic when compared between normal females and males. The oral surface pH didn't differ significantly between male with cerebral palsy and normal males. The oral surface pH detected significantly basic in females with cerebral palsy than normal females. In a study conducted in our country on the oral-dental health of disabled children, the percentage of good oral-dental health status was found to be 11.8, medium-level oral-dental health was 50.5, while the percentage of poor oral health was reported as 37.7⁷. In our study, good oral health in terms of gingival index was 51.06 percent for females and 48.48 percent for males. Another study reported the prevalence of periodontal diseases among disabled children as 61%¹². Similarly, many international studies on the oral-dental health of disabled children report that oral hygiene of disabled children is insufficient when compared to healthy children. It is known that disabled children can not maintain good oral hygiene both as a result of their mental and motor incompetence¹². Numerous studies report higher caries prevalence particularly among children with cerebral palsy when compared to normal children^{7,13}.

In our study, we determined caries prevalence as 14.49% among females and 14.34% among males; the rate of tooth loss as 4.25% for females and 5.16% for males; and the rate of fillings as 0.06% for females and 0% for males. There was no significant difference between males and females in these rates.

A total evaluation of all patients revealed that of 113 patients with cerebral palsy, only 9.73% did not have any caries and 47.78% did not have any tooth loss. It has been reported that 42% of the disabled patients did not have any caries²⁷. An examination of the studies investigating caries prevalence among disabled children reveals that the researchers arrived at different results. It has been reported that²⁷ caries prevalence among 43 mentally disabled children as 63%, while Akyüz report the rate as 85%⁹. As a result of an examination of Turkish literature, it was observed that the researchers usually select mentally disabled groups from among disabled children^{9,28}.

CONCLUSIONS

Our study only examines patients diagnosed with cerebral palsy. Only one patient had a filled tooth. The DMFT value indicated poor health status in females and males. Localized defects was significantly higher among males, the rate of diffuse defects was significantly higher among females. Occlusal defects were found to be more common in both sexes and were significantly higher in number among males. Females displayed higher hypoplasia rates, while the rate of yellow/brown opacities was significantly higher among males. A higher rate of severe inflammation was observed among females, while males had a higher rate of medium-level inflammations. The oral surface pH of males was more basic when compared to

females. The oral surface pH didn't differ significantly between male with cerebral palsy and normal males. The oral surface pH detected significantly basic in females with cerebral palsy than normal females. It was detected that families did not visit dentists and were unwilling to face any troubles during treatment. The families were informed about the importance of oral health and were guided to a dentist. They were told that progress could be in oral health with active cooperation of families and patients. The level of informedness of families on nutrition and diet is crucial in determining eating habits and hygiene. Advising and informing patients and their families will help to reduce potential problems. Educators were informed that parents should control their children's diet; however, their information levels should first be adequate in this respect. We believe that attempts should be focused on preventive treatments among children with cerebral palsy and parents and educators should be trained about oral-dental health habits.

Poor oral hygiene increases the risk of gum disease which can lead to a build-up of harmful bacteria leading to bad breath. A build-up of bacteria may also affect general health. These studies will hopefully allow us to make more informed recommendations to patients with CP and their parents that will improve the oral hygiene and reduce the risk of future dental decay in these children.

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