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Original Article

Oral Health Status among Girls with Developmental Disabilities: A Cluster Analysis

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Abstract

Objective: To investigate the factors that influence oral health of girls, with developmental disabilities, attended by a dental service. **Material and Methods:** A Cross-sectional epidemiological study was carried out using information collected from 171 dental charts of children aged one to 13 years, with developmental disabilities who were treated between 1998 and 2013. Studied variables were: dental caries, gingivitis, bruxism, xerostomia, ingestion of cariogenic food and oral hygiene. Statistical analysis was performed using proportion calculations of each variable and by cluster analysis. **Results:** Three types of clusters were formed from girls based on three variables (presence of dental caries, gingivitis and bruxism). The choice of two clusters was due to a better understanding of the phenomenon (oral conditions). There was an average of 0.77 of deciduous and 0.21 permanent decayed teeth. Cluster 1 is composed of younger children with lower caries and gingivitis experiences; lower proportion of xerostomia and ingestion of cariogenic food, higher proportion of good oral hygiene and more bruxism experience. **Conclusions:** Dental caries and gingivitis among girls with developmental disabilities are influenced by factors whose relation of cause and effect has been discussed in the literature. Bruxism is a protective factor against these diseases. Results reinforce the need for early preventive interventions in this population.

Keywords: Dental Care for Disabled; Cerebral Palsy; Cluster analysis.

Introduction

Among the group of developmental disabilities, a frequent alteration is the cerebral palsy that is a group of postural disorders and movements that occurs during the formation of the fetal brain or due to complications in the partum and postpartum problems. It is a conjunct of motor dysfunctions that frequently involve alterations in sensation, cognition, communication, behavior and epilepsy [1]. Therefore, in many cases, these patients are dependent on caregivers to perform their activities of daily living, including feeding and performing oral hygiene [2].

Individuals with cerebral palsy present higher prevalence of dental caries and periodontal alterations than the general population [1]. In addition, the drugs used in the treatment of epilepsy and seizures may have a negative impact in the oral health [3]. These negative results are not common to all groups of patients with cerebral palsy and vary according to the region and the country in which the individual lives [1,4].

Among the patients in the extension project "Dental Care for Patients with Special Needs", boys are more likely to breathe through the mouth [5], present bruxism [6] and present dental caries when they use fluoride-free dentifrice [7].

The aim of this study was to investigate factors that influence the oral health of female children, with developmental disabilities, attended by a dental service of Universidade Federal de Minas Gerais, Brazil.

Material and Methods

Study Design

A Cross-sectional epidemiological study was carried out using information collected from dental charts obtained from a reference center for the rehabilitation of children with neuromotor disabilities, Associação Mineira de Reabilitação (AMR), a philanthropic institution in Minas Gerais state, which has a partnership with the aforementioned university.

Participants

A total of 171 charts of female children, with developmental disabilities, aged one to 13 years, who were treated between January 1998 and December 2013, were examined. We evaluated the caries lesions in primary and permanent teeth (decayed and filled teeth), gingivitis and bruxism in relation to cariogenic diet, oral hygiene, xerostomia and age.

The variables were measured on the first day of dental treatment, and since 1998, a clinical chart was created to aid in developing the dental treatment proposed for each patient.

This study employed a consecutive sample. The completion of the medical records was conducted by students under the strict supervision of the same teacher/researcher from the UFMG Dental School throughout the whole study period.

Measures

Dental caries experience was measured by annotation cavitated lesions in dentine in the records made when the patient first joined the program. The dental caries indexes were the DMFT (decayed, filled and missing permanent teeth) and decayed and filled deciduous teeth, according to the criteria of the WHO [8]. The Missing component included only permanent teeth because for the primary teeth it was not possible to predicted, at the first visit, if the loss was due to tooth decay or normal exfoliation. Then, the patients were classified as patients with or without dental caries. Gingival status was determined using the Modified Gingival Index (MGI), and the contour and gingival colour were considered normal (0) or with mild to severe inflammation (1) [9]. Xerostomia was also recorded as “present” or “absent”. Cariogenic food ingestion was calculated through the “Sucrose Intake Index” [10]. Oral hygiene was classified as “good”, “regular” or “poor” [11]. For analysis purposes, the individuals were categorized with or without bruxism experience based on reports by parents/caregivers (“Does your child have audible teeth grinding?”). Sleep bruxism was not differentiated from awake bruxism [6].

To complete the characterization of the sample, the medical diagnosis was raised from the International Classification of Diseases.

Statistical Analysis

Descriptive statistical analysis was performed using proportion calculations of each variable; confidence intervals were not calculated because this was a census study. Clustering was based on three variables that evaluated the presence of dental caries, gingivitis and bruxism. Three types of clusters were formed from the 171 girls. The choice of two clusters was due to a better understanding of the phenomenon (oral conditions). The multivariate agglomerative hierarchy technique based on the furthest neighbor was used for the cluster analysis. This exploratory data analysis tool involved the organization of the observed data (in our case, girls with developmental disabilities) into groups (clusters) based on combinations of independent variables (in our case, oral conditions) and for maximizing the similarity of cases within each cluster while maximizing the dissimilarity between groups.

This multivariate analysis creates new groupings without any preconceived notion of what clusters may arise, and this data reduction makes it easier to manage subgroups. Then, we compared the proportions of the two clusters to xerostomia, cariogenic food, oral hygiene and age. All analyses were performed using the Statistical Package for Social Sciences (SPSS) version 19.0 (SPSS Inc., Chicago, USA).

Ethical Aspects

This study received approval from the Human Research Ethics Committee of Universidade Federal de Minas Gerais (ETIC 219/03).

Results

The age ranged from 1 to 13 years, mean of 3.81 (± 2.86) and a median of 3 years. There was an average of 0.77 (± 1.73) decayed deciduous teeth and 0.21 (± 0.74) permanent decayed teeth. The median of primary and permanent teeth with caries were equal to zero. There was an average of 0.23 (± 1.4) primary teeth and 0.14 (± 0.42) restored permanent teeth. The median of primary and permanent restored teeth were zero. There were neither, deciduous or permanent teeth with indicated extraction or extracted permanent teeth.

The frequency of the clinical characteristics of the studied group is shown on Table 1. Table 2 shows that the cluster 1 is composed of children and adolescents with lower caries experience and lower gingivitis index, but with more bruxism experience when compared to girls who made up the cluster 2.

Table 1. Descriptive characteristics of the sample, Belo Horizonte, Minas Gerais, Brazil, 1998-2013.

Variables*	%
CID G80	59.6
Dental caries	30.4
Gingivitis	12.9
Bruxism	26.9
Age up to 3 years-old	57.3
Xerostomia	14.0
Cariogenic food	43.3
Good oral hygiene	71.3

*Data for some variables are missing.

Table 2. Oral conditions in the two clusters of girls with cerebral palsy in Belo Horizonte, Minas Gerais, Brazil, 1998-2013.

Oral condition*	Cluster1 (n= 133) (Yes) %	Cluster2 (n = 16) (Yes) %
Dental caries	28.6	43.8
Gingivitis	2.3	100
Bruxism	30.8	18.8

*Data for some variables are missing.

Table 3 shows that in the components of the cluster 1, it was identified lower proportion of xerostomia and ingestion of cariogenic food. In the same cluster, there was also a higher proportion of good oral hygiene and subjects are younger.

Table 3. Proportion of the two clusters girls with developmentql disabilities according to some explanatory variables in 1998-2013, Belo Horizonte, Minas Gerais, Brazil.

Variables*	Cluster 1 (n = 133) %	Cluster 2 (n = 16) %
Age up to 3 years-old	59.4	43.8
Xerostomia	12.0	25.0
Cariogenic food	35.6	62.5
Good oral hygiene	79.7	56.3

*Data for some variables are missing.

The patients had different kind of diagnoses such as G80: G800 (spastic quadriplegic cerebral palsy), G801 (spastic diplegic cerebral palsy), G802 (spastic hemiplegic cerebral palsy) and others

diagnoses: G811 (spastic hemiplegia), G824 (spastic tetraplegia), F82 (specific developmental disorder of motor function), G540 (brachial plexus disorders), G71 (primary disorders of muscles), M401 (other secondary kyphosis), P271 (bronchopulmonary dysplasia), P143 (other brachial plexus injuries), Q052 (lumbar spina bifida with hydrocephalus), Q053 (sacral spina bifida with hydrocephalus), Q057 (lumbar spina bifida without hydrocephalus), Q059 (spina bifida unspecified), Q90 (Down syndrome), R628 (other lack of expected normal physiological development) and R629 (lack of expected normal physiological development unspecified).

Discussion

This study identified two clusters with different prevalence of oral diseases and behaviors. For one group there were a fewer risk factors for caries and gingivitis and, interestingly, the incidence of bruxism was higher. In the cluster 2, the incidence of dental caries and gingivitis was greater. The risk factors for these two oral diseases were: girls with older age, with high intake of sugar, with poor oral hygiene and low incidence of bruxism.

Actually, the relationship between caries and gingivitis was demonstrated in this study, fact that had already been shown in the literature [1,12]. It has been extensively demonstrated in the literature that these two factors are strongly related to poor oral hygiene and intake of sucrose [4,13,14].

In this study, dental caries and gingivitis were also related to xerostomia. The oral xerostomia can compromise the ability to perform self-cleaning of the oral cavity and can contribute to the establishment of gingivitis and periodontal disease [15]. An important observation of this study is the low incidence of xerostomia in this population, contrary to previous study [16]. As these data were collected from parents' reports, it may have introduced bias. However, we suppose it is the better way to have this information based on their knowledge on how often their children drink water or urine during the day.

We also observed that the highest incidence of bruxism is inversely associated with the incidence of dental caries unlike previous study [17]. We believe that dental attrition would lead to a disruption of dental plaque on the occlusal surface of molars and premolars, which would result in a lower incidence of dental caries. The dental attrition could also affect the anatomy pits and fissures causing a flatter occlusal surface and, consequently, with less possibility of retaining the biofilm. In our study, it may be observed that bruxism has its incidence decreased with advancing of age in girls. It is in accordance to the results of other studies described in the literature [18]. Clinically, this finding is important because it emphasizes the need for bruxism monitoring without implying other complex treatments [19,20].

In this study, the average of primary and permanent teeth decayed and filled are lower than the averages found by previous studies [1,2] and similar to a study conducted California, United States of America [3].

An intriguing observation in this study was the low incidence of gingivitis in this population. Our result is similar to that found by a previous study [21] in Belo Horizonte. Our result may be due to the percentage of individuals with earlier age (23.40% with 1 year and 20.5 % with 2 years). The eruption of primary teeth in these individuals has not been completed yet. Consequently, the probability of finding infected sites is reduced. Another explanation for this finding is that these data were collected from a dental care program, where the main objective is not to conduct researches, but the development of dental treatment plans and promoting oral health, so researcher's calibration was not a concern. This is a limitation of this study. The data were collected by several examiners over the 17 years of this program existence. Examiners are students of a Dentistry School, and the used method to evaluate the gum was visual, writing down their impression in the clinical record.

Conclusion

The results of this study showed that dental caries and gingivitis among females patients with developmental disabilities are influenced by factors whose relation of cause and effect has been widely discussed in the literature. In addition, caries and gingivitis behave as a set of changes that do not coexist with bruxism. The results reinforce the need for early preventive interventions in this population to guide parents and caregivers about delivering healthier eating habits and satisfactory dental plaque control, and also emphasize the need for bruxism monitoring in this population, without implying other complex treatments.

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