ORIGINAL ARTICLE

Factors that can influence the gingival health of children with cerebral palsy

Fatores que podem influenciar na saúde gengival de crianças com paralisia cerebral

Taciana Mara Couto Silva[1], Caroline Pequeño de Paula[1], Dorothy de Souza Alves Moura Coelho[2], Letícia Cardoso Tapia[2], Rosangela Aparecida Pereira[2], Regina Celia Villa Costa[3], Giuliana Tessicini[4], Marcela de Oliveira Conde[4], Daniela Pimenta Bittar[5], Louise Jimenez[6], Therezinha Rosane Chamlian[7], Maria Teresa Botti Rodrigues Santos[8]

ABSTRACT

Studies have shown that the greater the severity of neurological damage in children with cerebral palsy (CP), the greater risk of oral disease. **Objective:** To evaluate the influence of some factors as intellectual disability, oral sensitivity, manual ability and clinical patterns of cerebral palsy (CP) onto gingival health of CP children. **Method:** One hundred and six children (10.7 ± 3.6) with CP participated of the study. Descriptive data and continuous use of drugs were collected from their medical records. Clinical assessments included the Simplified Oral Hygiene Index (SOHI), the Gingival Index (GI) and the biting reflex. Were also evaluate oral sensitivity, intellectual assessment by Raven test, and manual dexterity by Manual Ability Classification System Manual (MACS). It was used the chi-square, *t Student*, and logistic regression tests whit a significance level of 5%. **Results:** Group 1 (G1) consisted of 47 children without and group 2 (G2) by 59 children with gingivitis. Groups were similar regarding gender (p = 0566), but G2 were significantly older (p = 0.001), with quadriplegia (p = 0.016), who used drugs (p < 0.001) and biting reflex (p = 0.025). G2 children presented significantly higher values for SOHI (p < 0.001) and IG (p < 0.001). Significantly higher percentages of children in G2 presented percentiles below 10 (p = 0.036) for Raven test, with manual skill levels IV and V (p = 0.002) of MACS. The chance of a child present gingivitis grows 23.5% for each year of age, and up to 5 times for every 1 unit increase in SOHI. The use of medication increases the chance of children present gingivitis by about 4.5 times. **Conclusion:** Increasing age, accumulation of biofilm, and use of drugs increase the risk of gingivitis in children with CP.

Keywords: Disabled Children, Cerebral Palsy, Gingivitis

RESUMO

Estudos têm demonstrado que, quanto maior a severidade do dano neurológico em crianças com paralisia cerebral (PC), maior é o risco das doenças orais. **Objetivo:** Avaliar a influência dos fatores: *déficit* intelectual, sensibilidade oral, habilidade manual e padrões clínicos da PC sobre a saúde gengival de crianças com PC. **Método:** Participaram do estudo 106 crianças (10,7 ± 3,6) com PC, que frequentavam um programa de prevenção em Odontologia numa instituição de referência em reabilitação em São Paulo - SP. Os dados relativos ao sexo, desordem do movimento, tipo clínico da PC e uso contínuo de drogas foram coletados dos prontuários. As avaliações clínicas odontológicas incluíram o Índice de Higiene Oral Simplificado (OIHS), o Índice Gengival (IG) e presença do reflexo de mordida. Ainda foram realizadas as avaliações da sensibilidade oral, intelectual pelo Raven test e a habilidade manual pelo Sistema de Classificação da Habilidade Manual (MACS). Foram utilizados os testes *t-Student*, Qui-quadrado e regressão logística. Fixou-se nível de significância em 5%. **Resultados:** O grupo 1 (G1) era composto por 47 crianças sem gengivite e o grupo 2 (G2) por 59 crianças com gengivite. As crianças do G2 eram significantemente mais velhas (p = 0,001), com tetraparesia (p = 0,016), em uso de medicamentos (p < 0,001) e com reflexo de mordida (p = 0,025). As crianças do G2 apresentaram valores significantemente maiores para o IHOS (p < 0,001) e IG (p < 0,001); porcentagens significantemente maiores de crianças com percentis inferiores a 10 (p = 0,036) para o teste Raven e com habilidade manual níveis IV e V (p = 0,002) do MACS. A chance de uma criança apresentar gengivite cresce 23,5% para cada ano de idade, até 5 vezes para cada 1 unidade de aumento do IHOS e cerca de 4,5 vezes com utilização de medicamento. **Conclusão:** O aumento da idade, o acúmulo do biofilme e o uso de medicamentos aumentam o risco de gengivite em crianças com PC.

Palavras-chave: Crianças com Deficiência, Paralisia Cerebral, Gengivite

[1] Surgeon Dentist Degree Student, Odontology Department of the Association for the Assistance of Deficient Children (Setor de Odontologia da Associação de Assistência à Criança Deficiente - AACD).
[2] Psychologist Degree Student, Psychology Department of the Association for the Assistance of Deficient Children - AACD.
[3] Psychologist, Psychology Department of the Association for the Assistance of Deficient Children - AACD.
[4] Speech Therapist Degree Student, Speech Therapy Department of the Association for the Assistance of Deficient Children - AACD.
[5] Speech Therapist, Speech Therapy Department of the Association for the Assistance of Deficient Children - AACD.
[6] Occupational Therapist, Occupational Therapy Department of the Association for the Assistance of Deficient Children - AACD.
[7] Physiatrist, Association for the Assistance of Deficient Children - AACD.
[8] Supervising Surgeon Dentist, Odontology Department of the Association for the Assistance of Deficient Children - AACD.

Mailing address:
Maria Teresa Botti Rodrigues Santos
E-mail: mtsantos@aacd.org.br

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INTRODUCTION

Cerebral palsy (CP) describes a group of permanent developmental disorders related to movement and posture that causes limitations in activities, attributed to non-progressive disorders that occur in the brain of a fetus or of a child in development. Motor disorders in CP are frequently accompanied by sensory, perception, cognition, communication, and behavior disorders, in addition to epilepsy and secondary musculoskeletal problems.[1] This condition is the most common cause of physical disability in childhood.[2]

The type of abnormal muscle tone or involuntary movement disorder, observed or elicited, is generally related to the physiopathology subjacent to the condition. Individuals with spastic CP show increased muscle tone, pathological reflexes, and hyperreflexia or pyramidal signs, with clinical patterns of involvement that include quadriparesis (motor involvement in all four limbs), diparesis (more evident in the lower limbs), and hemiparesis (one hemibody affected). Dyskinetic individuals show involuntary, uncontrolled, recurrent, and stereotyped movements that may be totally disabling when severe.[3]

Periodontal disease is an oral health problem for individuals with CP,[4-7] probably resulting from their incapacity to reach and maintain satisfactory standards of oral hygiene. Nevertheless, other factors may also contribute to increase the occurrence of gingival problems in children with CP.[8-10]

Maintaining the oral health of people with CP requires hygiene practices that demand supervision and even that caregivers perform them. During development, the child needs family participation, involvement, and support that, when well structured, contributes to a better quality of life for the child. However, when individuals with CP are considered, the process of participation, involvement, and support is not restricted to the development period. The task of caring for a child with multiple disabilities at home can be difficult for the caregivers and, many times, this is reflected in the child's oral health.[10-11]

Factors related to the oral health of individuals with CP have been discussed in the literature,[4-11] however, very little is known of the effect the intellectual and manual dexterity deficits of these individuals have on their oral health. The question raised is whether the presence of gingivitis in individuals with CP would be associated either with the clinical status resulting from neurological damage, with the severity of the intellectual deficit, or with the functional upper limb disability of these individuals. The premise of this study is that these factors may be associated with the presence of gingivitis in individuals with CP; no studies on this subject were found in the literature.

OBJECTIVE

The objective of this study was to evaluate the influence of the following factors: intellectual deficit, oral sensitivity, manual dexterity, and clinical patterns of CP on the gingival health of children with CP.

METHOD

This clinical investigation was conducted in accordance with the principles of the Helsinki Declaration. This project was approved by the Committee on Ethics (Plataforma Brasil under protocol Nº 260.255). After being informed of the objective of this study, the parents and/or persons responsible for the children with CP signed the Free and Informed Consent Term.

Study Design

This was a cross-sectional study made with children who attended the Odontology Prevention Program at a reputable rehabilitation institution in the city of São Paulo, state of São Paulo, Brazil, at the time of the data collection.

Case History

One hundred and six (106) non-institutionalized children and adolescents (47 females and 59 males), diagnosed with CP, aged from 5 to 16 years (average: 10.7 ± 3.6), were The study was conducted from April to July 2013.

Information on age, gender, type of movement disorder (spastic or dystonic with choreoathetosis), clinical pattern (quadriparesis, diparesis or hemiparesis), and medication used continuously were obtained from the patient's medical records. Information on socioeconomic conditions, consistency of the diet, and characteristics of oral hygiene practices of all the participants was collected by interviewing the parents and/or persons responsible for those children.

Odontological Evaluation

All the evaluations were made by two calibrated examiners (kappa = 0.89) in a dental office, in a dentist's chair lit by reflectors. Six teeth (four posterior and two anterior) were evaluated and scored for each child in accordance with the Simplified Oral Hygiene Index (OHI-S).[12] For the posterior teeth, the first tooth fully erupted, distal to the second pre-molar or deciduous second molar was examined in each quadrant. For the upper molar, the vestibular surfaces were scored and for the lower molars, the lingual surfaces. For the anterior teeth, the vestibular surfaces of the upper and lower central incisors were scored. The OHI-S is a combination of the visible plaque/biofilm and of the calculus.

During the exam, the amount of biofilm observed on the teeth was recorded by a scale with four levels:

0 absence of biofilm or of detectable extrinsic stains;
1 biofilm covering not more than 1/3 of the tooth cervix or extrinsic stains;
2 biofilm covering more than 1/3 and less than 2/3 of the dental surface evaluated;
3 biofilm covering more than 2/3 of the dental surface evaluated.

Another scale with four levels was used for the calculation:

0 absence of calculus;
1 supragingival calculus covering not more than 1/3 of the dental surface exposed;
2 supragingival calculus covering more than 1/3 and less than 2/3 of the exposed dental surface or the presence of subgingival calculus around the tooth cervix; and
3 presence of supragingival calculus covering more than 2/3 of the surface exposed or the presence of subgingival calculus covering the cervical area of the tooth.

Pathological bite reflex

The evaluation of the presence or absence of the bite reflex was made by observing the reaction of the participants after the application of digital stimulus to the vestibular gingiva in the lower molar region. When the mandible reacted with an instantaneous closing movement, making it difficult to open the mouth, the bite reflex was considered as present.[13]

Periodontal evaluation

After examination with a periodontal probe,[15] the gingival condition of the participants was evaluated in accordance with the Gingival Index (GI),[14] through a four-level scale:

0 absence of inflammation;
1 light inflammation with color and texture alterations;
2 moderate inflammation with redness, edema, and the presence of bleeding during examination; and
3 severe inflammation, intense redness, edema, and ulcerated tissue with tendency to bleed spontaneously).

All the four dental surfaces (vestibular, mesial, lingual/palatine, and distal) of each tooth index received a score from 0 to 3, resulting in the GI of the area. The scores of the four areas of the index teeth were added and the total divided by four to determine the GI of the tooth. The individual scores of the index teeth (the same evaluated by the OHI-S) were added and divided by six, resulting in the GI of each participant.

Oral sensitivity

The sensory profile measures the responses in relation to the sensory experiences that happen in a familiar environment. Its items were developed according to processing tests and sensory stories found in the literature.[16] In this study, the sensory processing category of the sensory profile test was used.[17] The test has 12 questions, each with five alternatives, related to daily feeding situations and to sensory reactions to smells, flavors, and textures. Some questions were modified by three speech therapists to better suit the population studied. The items "Limited to certain textures/temperatures of food" and "Looks for certain flavors or smells" were excluded and replaced by "Resists brushing the teeth" and "Has difficulty noticing when there is still liquid or food on their lips," which are present in the test version used in Portugal.

The caregiver answered the questions measuring the frequency of the proposed situations, classifying them into: always, frequently, occasionally, rarely, or never, as the test proposes. The answers could be: "always" when the situation occurred every time; "frequently" when the situation occurred more than three times a week; "occasionally" when it occurred once every 15 days; "rarely" when it occurred once a month; and "never" when it did not occur at al.

The score obeyed the original test criteria, where the higher the score, the better the performance of the patient. The test proposes that the performance of the patients with scores from 12 to 39 be considered as "Clear Difference," from 40 to 45 as "Probable Difference," and from 45 to 60 as "Typical Performance." The patients who showed clear and probable differences were included in the group called "atypical," and those who had a typical performance formed the group called "typical." Based on the performance obtained in the test result, the children with CP were divided into two subgroups: typical (typical performance) and atypical (combining the clear difference and the probable difference groups).

Raven Test

The intellectual evaluation of the participants was made by three trained psychologists through the Raven Progressive Matrices Test.[18]

For participants aged between 4 years and 9 months to 11 years, the Colored Progressive Matrices made of three series were used (A, Ab, and B), with 12 items each, in which the examinee should choose one of the alternatives. For those aged between 11 and 18 years, the Standard or General Scale was applied as it is known in Brazil. This scale is divided into five series of 12 items, progressively more difficult, in which the participant would choose one of the six alternatives that completed the missing part of the matrix of each one of the 12 items. Both scales result in a percentile (referring to the frequency percentage of a similar score occurring between people of the same age[18]) varying with the performance of the person evaluated. Based on the performance obtained in the test result, the children with CP were divided into 2 subgroups: with intellectual deficiency (percentile equal to or less than 10) and without intellectual deficiency (percentile higher than 10). The participants evaluated who could not have their tests corrected for lack of standardization in the answers were classified as "not applicable."

Manual Ability Classification System (MACS)

The direct application of the MACS was made by only one occupational therapist, through questions related to the functional performance of the child in the oral hygiene tasks. The Manual Ability Classification System (MACS)[19] describes how children diagnosed with CP, between 4 and 18 years old, use their hands to manipulate objects in their daily lives, classifying the ability in five levels. The levels as follows are based on the capacity of the children to initiate and to handle objects and their need for support or adaptations in order to perform manual activities daily.

MACS I: Handles objects with ease and successfully (loses little in speed and precision);
MACS II: Handles most objects, but the quality and/or speed of the task is a bit reduced;
MACS III: Handles objects with difficulty; needs help to prepare and/or modify the activities;
MACS IV: Handles a limited variety of easy-to-handle objects in adapted situations;
MACS V: Does not handle objects and has severely limited ability to perform even the simplest tasks.

Based on their performance in the MACS, the participants were divided into 2 subgroups: those who presented levels I, II, and III and those who presented levels IV and V.

The evaluations were made in sequence all in one day. The initial evaluation was at the Odontology clinic, followed by the intellectual evaluation in the Psychology department, and the manual ability test in the Occupational Therapy department.

Statistical Method

The primary endpoint of the study was the presence of gingivitis, based on the GI value (continuous variable). The absence of gingivitis was defined as GI having values between 0 and 1 (group 1 = G1), while GI values greater than 1 (group 2 = G2) led to a dichotomous evaluation between the absence/presence of gingivitis. The goal was to evaluate the associations between the independent variables and gingivitis. The independent variables were: gender (male or female), age (continuous variable in years), clinical patterns of cerebral palsy (quadriparesis, diparesis, or hemiparesis), bite reflex, consistency of the diet, medication used continuously, oral sensitivity, the Raven test, and the MACS. For periodontal conditions, the parameters evaluated were: visible plaque (scores of 0-3), presence of calculus (scoring 0-3), OHI-S (scores 0-3), and gingival index (scoring 0-3), computed as continuous variables.

The Chi-Squared test was made to evaluate the association of the presence of gingivitis with qualitative variables, and for the quantitative variables, the *Student-t* test was made.

A logistic regression analysis was used to estimate the behavior of the independent variables associated with the endpoint. The model employed was the stepwise method, using the Akaike criterion (AIC). Adjustment

measurements such as R^2 and area under the ROC curve (statistic C) were presented for the final models.

The calculation of the power of this sample was made based on the descriptive statistics of average and standard deviation of the OHI-S and the GI, using the confidence interval of 95%. For the analyses, a level of significance of 5% was used and the results were obtained with the help of the statistical software R2.15.3(R Core Team, 2013).

RESULTS

The power of the sample composed of 106 children participating in this study came to 0.837. The group G1 was composed of 47 children without gingivitis and the group G2, of 59 children with gingivitis. The groups were homogeneous for gender (p = 0.566), however they differed significantly in relation to age, with the children of G2 showing greater ages (p = 0.001). They also differed in relation to the clinical pattern, use of medication, and the presence of a bite reflex, with the G2 showing greater percentage of children with quadriparesis (p = 0.016), who used medication continuously (p < 0.001), and had a bite reflex (p = 0.025) (Table 1).

It was observed that the groups did not differ in relation to the caregiver's schooling (p = 0.086), nor in relation to the family income (p = 0.402) (Table 2).

As for the oral hygiene of the children evaluated, it was observed that the groups did not differ in the frequency of brushing teeth (0.253), nor in the use of dental floss (p = 0.621). However, the group G2 showed significantly greater percentages of children that required supervision to perform their oral hygiene (p = 0.001) and values significantly greater for the OHI-S (p < 0.001) and GI (p < 0.001), when compared to G1 (Table 3).

As for the oral sensitivity variable, the groups showed similar behavior (p = 0.383). However, they differed significantly in the intellectual evaluation and in the MACS, with the G2 showing significantly greater percentage of children with percentile values lower than 10 (p = 0.036) for the Raven test and with manual ability levels IV and V (p = 0.002) in the MACS (Table 4).

To build the final model for the logistic regression, initially the variables with p value up to 10% were considered. The initial model was estimated as shown in Table 5. Only the variables: age, use of medication, and OHI-S were considered significant to the stipulated level of significance.

From this model, the smallest number of variables responsible for explaining the phenomenon through the Akaike criterion was selected and the final model was estimated as shown in Table 6. Only the significant coefficients in the initial model remained in the analysis.

The models showed excellent adjustment measurements. The initial model had a C statistics (area under the ROC curve) of 85.5%

Table 1. Descriptive characteristics of children with cerebral palsy, according to the absence (G1) or presence (G2) of gingivitis

Variables	G1 (n = 47)	G2 (n = 59)	Total (n = 106)	*p* value
Gender (n, %)				
Female	19 (40.4)	28 (47.4)	47 (44.3)	0.566[a]
Male	28 (59.6)	31 (52.6)	59 (55.7)	
Age (average ± SD) years	8.9 ± 3.3	11.2 ± 3.6	10.7 ± 3.6	0.001*[b]
Movement disorders				
Spastic	40 (85.1)	52 (88.1)	92 (86.8)	0.647[a]
Dyskinetic	7 (14.9)	7 (11.9)	14 (13.2)	
Clinical pattern (n= 92)				
Quadriparesis	12 (30.0)	31 (59.7)	43 (46.7)	0.016*[a]
Diparesis	23 (57.5)	16 (30.7)	39 (42.4)	
Hemiparesis	5 (12.5)	5 (9.6)	10 (10.9)	
Medication				
None	27 (57.4)	15 (25.5)	42 (39.7)	< 0.001*[a]
Anxiolytic	3 (6.4)	5 (8.4)	8 (7.6)	
Antiepileptic	7 (14.9)	15 (25.5)	22 (20.7)	
Muscle Relaxant	3 (6.4)	3 (5.0)	6 (5.6)	
Others	7 (14.9)	21 (35.6)	28 (26.4)	
Consistency of diet				
Solid	41 (87.2)	42 (71.1)	83 (78.3)	0.054[a]
Pasty	6 (12.8)	17 (28.9)	23 (21.7)	
Bite reflex				
Yes	19 (40.4)	38 (64.4)	57 (53.8)	0.025*[a]
No	28 (59.6)	21 (35.6)	49 (46.2)	

The data was compared by [a] Chi-squared test, [b] *Student-t* test, * p < 0.05.

Table 2. Descriptive characteristics relating to the caregiver' schooling and family income of children with cerebral palsy, according to the absence (G1) or presence (G2) of gingivitis

Variables	G1 (n = 47)	G2 (n = 59)	Total (n = 106)	*p* value
Caregiver's Schooling				
Illiterate	1 (2.2)	1 (1.7)	2 (1.9)	0.086[a]
Junior High	19 (40.4)	34 (57.6)	53 (50.0)	
High School	20 (42.5)	23 (39.0)	43 (40.6)	
College	7 (14.9)	1 (1.7)	8 (7.5)	
Monthly Family Income (R$)				
3.051.00	1 (2.2)	0 (00.0)	1 (0.9)	0.402[a]
2.373.00	6 (12.6)	5 (8.4)	11 (10.3)	
1.017.00	39 (83.0)	50 (84.8)	89 (84.0)	
500.00	1 (2.2)	4 (6.8)	5 (4.8)	

The data was compared by [a] Chi-squared test.

Table 3. Descriptive characteristics of the oral hygiene of children with cerebral palsy, according to the absence (G1) or presence (G2) of gingivitis

Variables	G1 (n = 47)	G2 (n = 59)	Total (n = 106)	*p* value
Oral Hygiene				
Independent	7 (14.8)	1 (1.7)	8 (7.5)	
Independent/supervised	14 (29.7)	8 (13.5)	22 (20.7)	0.001*[a]
Supervised/done	26 (55.5)	50 (84.8)	76 (71.8)	
Frequency of brushing teeth				
1 time	1 (2.1)	0 (0.0)	1 (0.9)	
2 times	16 (34.0)	24 (40.7)	40 (37.8)	0.253[a]
3 times	28 (59.7)	35 (59.3)	63 (59.4)	
4 times	2 (4.2)	0 (0.0)	2 (1.9)	
Use of Dental Floss				
Yes	8 (17.0)	8 (13.6)	16 (15.0)	0.621[a]
No	39 (83.0)	51 (86.4)	90 (85.0)	
OHI-S (average ± SD)	2.14 ± 0.62	2.67 ± 0.66	2.43 ± 0.69	< 0.001*[b]
GI (average ± SD)	0.29 ± 0.32	2.67 ± 0.66	1.16 ± 0.76	< 0.001*[b]

OHI-S: Simplified oral hygiene index; GI: Gingival Index. The data was compared by [a] Chi-square test, [b] *Student t*-test, * $p < 0.05$

Table 4. Descriptive characteristics of the Raven test, oral sensitivity and MACS of children with cerebral palsy, according to the absence (G1) or presence (G2) of gingivitis

Variables	G1	G2	*p* value
Oral sensitivity (n = 66)			
Typical	18 (48.6)	11 (37.9)	0.383[a]
Atypical	19 (51.4)	18 (62.1)	
Raven test percentile (n = 77)			
≤ 10	15 (42.8)	28 (66.7)	0.036*[a]
> 10	20 (57.2)	14 (33.3)	
MACS (n = 94)			
I, II, III	21 (52.5)	12 (22.2)	0.002*[a]
IV, V	19 (47.5)	42 (77.7)	

The data was compared by [a] Chi-square test, * $p < 0.05$

Table 5. Estimated coefficients for the initial model

Coefficient	Estimated	Standard Error	Wald Z	*p* value
Interceptor	-7.261	2.183	-3.330	0.001
Age	0.190	0.087	2.190	0.029
Caregiver's schooling 2 = High School	-0.539	0.549	-0.980	0.326
Caregiver's schooling 2 = College	-1.336	0.976	-1.370	0.171
Uses any medication = Yes	1.439	0.571	2.520	0.012
Food consistency = Semi-solid	5.564	20.545	0.270	0.787
Food consistency = Solid	0.141	0.767	0.180	0.855
Oral hygiene = Independent and supervised	1.058	1.217	0.870	0.385
Oral hygiene = Independent and done	1.581	1.124	1.410	0.160
Bite reflex = Yes	-0.383	0.713	-0.540	0.592
OHI-S	1.532	0.500	3.060	0.002
MACS IV or V	0.393	0.720	0.550	0.586
RAVEN > 10	0.183	0.689	0.27	0.789

and R^2 46.4%. The final model showed a C statistics of 84.1% and R^2 40.9%. The estimates of adjusted chance reasons, calculated by the final model for the continuous variables, are interpreted as the increase of chance to the increment of 1 unit. It is estimated that the chance of a child having gingivitis grows 23.5% for each year of life and up to 5 times for each 1 unit of OHI-S increase. The use of some medication also increases the chance of children having gingivitis approximately 4.5 times.

DISCUSSION

The present study showed that older children with CP who use medication and show an accumulation of biofilm and calculus are at greater risk of developing gingivitis. However, this was the first study to show that the severity of the neurological damage expressed by the quadriparetic clinical pattern, the presence of the bite reflex, the intellectual deficit, and the manual dexterity of these children are not determining factors for the presence of gingivitis.

Biofilm is recognized as the etiological factor for gingivitis[20] and the greater the accumulation, translated by greater values in the OHI-S, the greater is the gingival inflammatory process,[6,18-20] as much in normoreactive individuals as in individuals with CP.[21] The results of this study corroborate this affirmation, since the G2 showed greater OHI-S values. Reduced self-cleaning, the presence of inappropriate movements of the chewing and deglutition[6] muscles, and the consumption of a pasty diet, as observed in children with gingivitis in this study, may facilitate this accumulation.

The presence of damages associated with CP[1] frequently requires the continuous use of medication[22] for long periods of time.[3] The drugs used in the treatment of these conditions carry adverse collateral effects that interfere in one's oral health, such as gingival hyperplasia and the diminution of salivary flow.[22] In this study, the children who used medication for the treatment of comorbidities showed more chance of having gingivitis. Since the use of medication is indispensable, it is necessary to take preventive actions, whether with periodic returns at shorter intervals or with controlling the efficiency of the oral hygiene, in order to intercept the gingival inflammatory process early and preserve the oral health of these patients.[23]

Table 6. Coefficients estimated for the final model

Coefficient	Estimated	Standard Error	Wald Z	*p* value
Interceptor	-6.585	1.594	-4.130	< 0.001
Age	0.211	0.074	2.850	0.004
Uses any medication = Yes	1.496	0.491	3.050	0.002
OHI-S	1.647	0.480	3.430	0.001

Almost 72% of the children in this study need their caregivers to perform their oral hygiene and the caregivers of the G1 and G2 groups showed similar schooling and family income. Based on this, it can be inferred that the difficulty in performing oral hygiene increases as the children grow older, demanding the support, participation, and involvement of their caregivers for periods beyond the childhood development, creating an overload and negative impact on the caregivers' health.[10-11] This is also a condition that escapes the domain of Odontology professionals. Training programs for caregivers on how to perform oral hygiene, and on why and how to use dental floss (85% of the children in this study do not use it) and on how to remove biofilm correctly are of great value,[10] since, when these children age, they would have these habits incorporated, facilitating oral hygiene, and sparing their caregivers the daily and repetitive struggle.

The instrument used to evaluate the oral sensitivity of the children with CP in this study was an adaptation of the global sensory processing,[17] for there is no instrument for this purpose in the literature. The category of oral sensory processing did not prove to be sensitive to distinguish the G1 and G2 groups, differing from the result observed in the literature,[24] when the authors evaluated children with and without behavior changes. In this study it was observed, for example, that some children have better performance in oral sensory questions related to texture and a deficient performance in questions referring to tastes or smells. Thus, it is possible that one variable interferes with another, masking the deficient performance. We attribute the great variability of sensory stimuli involved in feeding to the small percentage difference between the groups.

As for the analysis of intellectual performance, the individuals were classified with percentile below or equal to 10 and with percentile above 10, adopting the same division found in the literature.[25] From the psychological point of view, the influence of the parents on their children can be raised as a hypothesis for the result found. As seen in the literature,[26] the adoption of coherent behavioral habits in childhood starts at home with the parents, especially with the mother, who has an important role in the life style related to the oral health of her children. People with disability show a wide range of impairments, from light difficulties to intense conditions where dependence is total.[27] Therefore, it is noteworthy that in the case of children with greater physical and/or intellectual impairments this influence stands out, since it is normal that the self-care of these children is performed by their caregivers, especially the mothers. Our results agree with what has been developed in the literature,[28] which shows a high performance in self-care due to the constant encouragement of caregivers and professionals. The statistical results suggest that this influence may be decisive for smaller children, also because they lack the resources to do this.

There are many studies reporting that the greater the severity of the neurological damage of an individual, the less autonomy and independence he or she will have, reflecting on the social context.[29] In the literature, a gap is observed regarding manual dexterity, autonomy, and oral hygiene tasks. However, in clinical practice, it is observed that training and continuous guidance are essential to caregivers.

For all these aspects, this is the first study to show that individuals with CP are subjected to the same gingivitis risks as normoreactive individuals, thus highlighting the importance of biofilm control, and of the training and motivation of caregivers in providing efficient oral hygiene to those they care for.

CONCLUSION

Increasing age, the accumulation of biofilm, and the use of medication increase the risk of gingivitis in children with CP.

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