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Impact of the COVID-19 pandemic on the gingival health of children and adolescents with cerebral palsy

Impacto da pandemia do COVID-19 na saúde gengival de crianças e adolescentes com paralisia cerebral

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ABSTRACT

Objective: to evaluate the impact of the COVID-19 pandemic on children and adolescents with cerebral palsy, comparing the gingival condition and the type of dental treatment before and after the interruption of dental care. **Material and Methods:** the retrospective longitudinal study consisted of 273 participants undergoing Dental Clinic of the AACD (Disabled Child Assistance Association), divided into three groups according to age: Group 1 (G1: 0 to 5 years and 11 months; n=137), Group 2 (G2: 6 to 11 years and 11 months; n=85) and Group 3 (G3: 12 to 17 years and 11 months; n=51). Sociodemographic, data, clinical pattern of cerebral palsy and use of medication were collected, evaluating the gingival condition by the gingival index and the type of dental treatment before the pandemic and during, nine months after the interruption of dental care. Chi-square, Fisher Exact and Kruskal-Wallis (α=5%) tests were used. **Results:** the groups were homogeneous in terms of sex (p=0.4581), race (p=0.1725), clinical pattern (p=0.3482) and use of antiepileptic drugs (p=0.3509). Regarding the gingival condition, in the period during the pandemic, there was a reduction in the number of participants with Gingival Index scores 0 and 1 and an increase in participants with scores 2 and 3 (p<0.05). As for the procedures performed, the three groups showed a reduction in preventive procedures (p<0.05) and an increase in surgical, periodontal and restorative procedures (p<0.05). **Conclusion**: it is concluded that the interruption of dental care for nine months during the COVID-19 pandemic in children and adolescents with cerebral palsy had a negative impact on oral health.

KEYWORDS

COVID-19; Caregivers; Gingivitis; Oral health; Cerebral palsy.

RESUMO

Objetivo: avaliar o impacto da pandemia da COVID-19 em crianças e adolescentes com Paralisia Cerebral, comparando a condição gengival e o tipo de tratamento odontológico antes e após a interrupção dos atendimentos odontológicos. **Material e Métodos:** o estudo longitudinal retrospectivo foi composto por 273 participantes atendidos na Clínica odontológica da AACD (Associação de Assistência à Criança Deficiente), reunidos em três grupos segundo a faixa etária: Grupo 1 (G1: 0 a 5 anos e 11 meses; n=137), Grupo 2 (G2: 6 a 11 anos e 11 meses; n=85) e Grupo 3 (G3: 12 a 17 anos e 11 meses; n=51). Foram coletados dados sociodemográficos, padrão clínico da Paralisia Cerebral e o uso de medicação, avaliando a condição gengival pelo índice gengival e o tipo de tratamento odontológico antes e durante a pandemia, nove meses após a interrupção dos atendimentos. Foram empregados os testes Qui-quadrado, Exato de Fisher e Kruskal-Wallis (α=5%). **Resultados:** os grupos eram homogêneos quanto ao sexo (p=0,4581), raça (p=0,1725), padrão clínico (p=0,3482) e uso de drogas antiepiléticas (p=0,3509). Com relação à condição gengival, no período Durante Pandemia, observou-se redução no número de participantes com escores Índice Gengival 0 e 1 e aumento de participantes com escores 2 e 3 (p<0,05). Quanto aos procedimentos realizados, os três grupos apresentaram redução de procedimentos preventivos (p<0,05) e aumento dos procedimentos cirúrgicos, periodontal e restaurador (p<0,05). **Conclusão:** conclui-se que a interrupção do acompanhamento odontológico por nove meses na pandemia da COVID-19 em crianças e adolescentes com PC acarretou impacto negativo na saúde bucal.

PALAVRAS-CHAVE

COVID-19; Cuidadores; Gengivite; Saúde bucal, Paralisia cerebral.

INTRODUCTION

COVID-19 was first detected in China in December 2019 and is characterized by a respiratory disease caused by the SARS-CoV-2 virus capable of causing mild to severe infections in humans. This virus spread to other countries, starting the most recent global epidemic [1]. The World Health Organization (WHO) declared it a public health emergency of international concern [2]. In July 2020, more than 14,765,256 confirmed cases were registered in only 24 hours, with a mortality rate of approximately 3.7% in more than 200 countries [3]. Restrictive measures imposed by states and municipalities in the face of the pandemic were recommended, guiding social distancing as a dissemination strategy to reduce cases and control of the disease [4], resulting in measures of temporary suspension of face-to-face preventive dental care [5], due to the high risk of transmission in a dental environment, by respiratory droplets in suspension or by the production of aerosols [6].

It is known that children with cerebral palsy (CP) are at greater risk for COVID-19 due to biological and medical factors [7]. CP encompasses a group of developmental disorders related to movement and posture that cause limitations in the execution of daily life tasks. In addition to disturbances in motor function, the most common comorbidities are cognitive and behavioral changes, epilepsy, changes in oral motor functions and speech [8]. It is considered the most common cause of physical disability in childhood [9], with a prevalence of 1.77 in developed countries. per thousand live births [10] and in developing countries of 7 per thousand [11], with greater expression among white male children [12,13]. The spastic movement disorder is the most common (increased muscle tone), and is present in 80% of the cases. Clinical types include quadriplegia (involvement of all four limbs, swallowing difficulties and epilepsy), diplegia (greater involvement in the lower limbs and epilepsy) and hemiplegia (complete involvement of one side of the body, and epilepsy [14]. Movement disorder dyskinetic corresponds to about 10% of cases, characterized by the presence of involuntary movement, causing great difficulty in performing automatic movements and maintaining posture [15].

Among the factors that interfere with oral hygiene, the presence of primitive oral reflexes such as biting and vomiting [16], the continuous use of antiepileptic medications that lead to a reduction in salivary flow [17], in the buffering capacity and higher values of salivary osmolarity, favoring the accumulation of pathogenic microorganisms and gingival inflammation, leading to the development of caries and periodontal diseases. Thus, these individuals are considered vulnerable to these diseases [18,19].

As children and adolescents with CP have difficulties in performing oral hygiene and have suboptimal hygiene habits, this group is considered at risk for oral diseases, requiring the participation of the caregiver as an active member for the maintenance of oral health. However, either due to the lack of understanding/cooperation of the caregiver, or the overload of the rehabilitation program, oral diseases are often observed in these individuals [20]. The knowledge acquired and the guidance received at the institution of reference in rehabilitation related to oral health are fundamental for adaptation, overcoming and coping with difficulties [21].

Since maintaining oral health requires periodic preventive visits for children and adolescents with CP and the oral literature is scarce regarding the oral health of the individuals during the pandemic. The Study hypothesis is that the interruption of dental care during the COVID-19 pandemic has a negative impact on the oral health of participants, Thus the objective of this study was to evaluate the impact of the COVID-19 pandemic on children and adolescents with CP, comparing the gingival condition and the type of dental treatment before and after the interruption of dental care for nine months.

MATERIAL AND METHODS

Ethics statement

According to the resolution 466/2012 of Ministry of Health. Written informed consent form was obtained from the guardian of each participant after they were informed about the study objectives. The Research Ethics in Committee of AACD (Disabled Child Assistance Association) approved this study at #4.944.343, São Paulo, Brazil.

Study design

A retrospective longitudinal study was carried out, with a convenience sample, consisting of children and adolescents diagnosed with CP, undergoing physical rehabilitation and dental treatment at the at the Dental Clinic of the AACD

(Disabled Child Assistance Association), São Paulo, Brazil at the time of data collection.

Participants

A total of 273 children and adolescents with a medical diagnosis of spastic or dyskinetic CP, of both gender and aged between 0 and 17 years and 11 months, undergoing rehabilitation treatment, were invited to participate in this study. Children and adolescents with progressive or neurodegenerative lesions, who had used antibiotics in the last month, non-collaborative behavior, or whose guardians refused to sign the Free and Informed Consent Term were excluded from the research. Before applying the exclusion, criteria there were 543 participants.

Data collection

Demographic and clinical data related to gender, age, race (white, black and others), medical diagnosis of CP according to the type of movement disorder (spastic and dyskinetic), clinical pattern (tetraparesis, diparesis and hemiparesis) and use of antiepileptic medication. The criterion for distributing participants in the three age groups was carried out according to the presence of deciduous dentition (0 to 5 years and 11 months), mixed (6 to 11 years and 11 months) and permanent (12 to 17 years and 11 months) [22].

In order to assess the impact of the COVID-19 pandemic on the oral health of children and adolescents with CP, records of the gingival condition were collected by the gingival index (GI) and the type of dental treatment (preventive, restorative, periodontal and surgical) in two different periods: (BP) before the pandemic (the last dental appointment between June 2019 and February 2020) and (DP) during the pandemic (first appointment nine months after the interruption of dental treatment between the September 2020 to May 2021).

The evaluation of the Gingival Index (GI) [23] was performed by a single trained and calibrated examiner, specialist in Special care with six years of experience, kappa 0,97, using a millimeter plastic periodontal probe (HuFriedy's Colorvue PerioScreen Kit probe, Chicago, USA), which smoothly covered the gingival margin of all teeth. Measurements were made at six sites per tooth (mésio-, mid-, and disto-buccal; mésio-, mid-, and disto-lingual) for all teeth. Partially erupted teeth and residual roots were excluded without replacement.

The GI was calculated by the percentage of the sum of the individual values of each tooth, divided by the number of faces examined, and categorized according to the scores: score 0 = normal gingiva, no bleeding on probing; score 1 = mild inflammation - slight change in color, slight edema but no bleeding on probing;Categorized 0-1 (Good); score 2 = moderate inflammation - redness, edema and glazing, bleeding on probing;Categorized (Regular); score 3 = severe inflammation - marked redness and edema, ulceration with tendency to spontaneous bleeding:Categorized (Poor). The Gingival Index was employed, since this indicator has been used by our research group [24].

Statistical analysis

Descriptive statistical analysis was performed to characterize the sample, followed by the application of non-parametric tests, since the data did not present normal distribution. Chi-square and Fisher's Exact tests were used to compare categorical and Kruskal-Wallis variables, with a significance level set at 5% ($p<0.05$) using the statistical software IBM SPSS Statistics (SPSS for Windows, Version 20.0, Armonk, USA).

RESULTS

Data were collected from 273 children and adolescents with CP, divided into three groups according to age: Group 1 (G1: 0 to 5 years and 11 months; n=137), Group 2 (G2: 6 to 11 years and 11 months; n=85) and Group 3 (G3: 12 to 17 years and 11 months; n=51).

The groups were homogeneous in terms of gender ($p=0.4581$), race ($p=0.1725$), clinical pattern of CP ($p=0.3482$) and use of antiepileptic medication ($p=0.3509$) (Table I).

The comparison of the results of the cross tabulation related to the gingival health of children and adolescents with CP in the two moments BP (June 2019 to February 2020) and DP (September 2020 to May 2021) showed that the three groups differed significantly, with reduction in the number of participants with IG scores 0 to 1 (good) ($p<0.0001$) and an increase in participants with IG scores 2 (regular) ($p=0.0016$) and 3 (poor) ($p=0.0002$) (Table II).

The comparison of the results of the cross-tabulation related to the type of dental treatment performed in children and adolescents with CP in the two moments BP (June 2019 to February 2020) and DP (September 2020 to May 2021) showed that the three groups differed significantly, with a reduction in preventive

Table I - Sociodemographic and clinical characteristics of children and adolescents with CP according to the age groups

Sociodemographic and clinical characteristics	Group 1 (n=137)	Group 2 (n=85)	Group 3 (n=51)	p-value
Gender	**(n, %)**	**(n, %)**	**(n, %)**	
Female	65 (47.4)	38 (44.7)	19 (37.3)	
Male	72 (52.6)	47 (55.3)	32 (62.7)	p=0.4581[‡]
p-value	p=0.6082[‡]	p=0.3855[‡]	p=0.0929[‡]	
Race	**(n, %)**	**(n, %)**	**(n, %)**	
White	100 (73.0)	60 (70.6)	45 (88.2)	
Black	3 (2.2)	3 (3.5)	1 (2.0)	p=0.1725[‡‡]
Others	34 (24.8)	22 (25.9)	5 (9.8)	
p-value	p<0.0001[‡‡]	p<0.0001[‡‡]	p<0.0001[‡‡]	
Clinical Pattern	**(n, %)**	**(n, %)**	**(n, %)**	
Tetraplegia	36 (26.3)	24 (28.2)	17 (33.3)	
Diplegica	64 (46.7)	43 (50.6)	17 (33.3)	
Hemiplegia	26 (19.0)	16 (18.8)	13 (25.5)	p=0.3482[‡‡]
Disknetcs	11 (8.0)	2 (2.4)	4 (7.8)	
p-value	p<0.0001[‡]	p<0.0001[‡‡]	p=0.0315[‡‡]	
Antiepileptic drugs	**(n, %)**	**(n, %)**	**(n, %)**	
No use	94 (68.6)	57 (68.7)	34 (68.0)	
Calcium channel blocker	11 (8.0)	5 (6.0)	1 (2.0)	
Sodium channel blocker	12 (8.8)	8 (9.6)	7 (14.0)	p=0.3509[‡‡]
GABA inhibition	11 (8.0)	10 (12.0)	2 (4.0)	
GABA inhibition AEDs	9 (6.6)	3 (3.6)	6 (12.0)	
p-value	p<0.0001[‡]	p<0.0001[‡‡]	p<0.0001[‡‡]	

[‡]Chi-square test. [‡‡]Fisher's exact test.

Table II - Cross tabulation of the gingival condition of children and adolescents with CP before and after the return of dental care during the COVID-19 pandemic according to the age groups

Group 1		Before			Total (n, %)
		Poor	Regular	Good	
After	**Poor**	13	7	9	29 (21.2)
	Regular	7	24	19	50 (36.5)
	Good	2	6	50	58 (42.3)
	Total (n, %)	22 (16.1)	37 (27.0)	78 (56.9)	137 (100.0)
Fisher's exact test P<0.0001					
Group 2		**Before**			**Total (n, %)**
		Poor	**Regular**	**Good**	
After	**Poor**	5	4	2	11 (12.9)
	Regular	6	15	24	45 (52.9)
	Good	1	5	23	29 (34.1)
	Total (n, %)	12 (14.1)	24 (28.2)	49 (57.6)	85 (100.0)
Fisher's exact test P=0.0016					
Group 3		**Before**			**Total (n, %)**
		Poor	**Regular**	**Good**	
After	**Poor**	5	5	2	12 (23.5)
	Regular	2	11	7	20 (39.2)
	Good	0	3	16	19 (37.3)
	Total (n, %)	7 (13.7)	19 (37.3)	25 (49.0)	51 (100.0)

Fisher's exact test P=0.0002.

Table III - Cross tabulation of the type of dental treatment of children and adolescents with CP before and after the return of dental care during the COVID-19 pandemic according to the age groups

Group 1		Before				Total (n, %)
		Preventive	Restorative	Periodontal	Surgery	
After	Preventive	81	5	2	1	89 (65.0)
	Restorative	17	9	1	2	29 (21.2)
	Periodontal	5	0	3	2	10 (7.3)
	Surgery	6	1	0	2	9 (6.6)
	Total (n, %)	109 (79.6)	15 (10.9)	6 (4.4)	7 (5.1)	137 (100.0)
Fisher's exact test p<0.0001						
Group 2		Before				Total (n, %)
		Preventive	Restorative	Periodontal	Surgery	
After	Preventive	29	2	2	3	36 (42.4)
	Restorative	9	5	0	1	15 (17.6)
	Periodontal	7	0	3	2	12 (14.1)
	Surgery	16	0	2	4	22 (25.9)
	Total (n, %)	61 (71.8)	7 (8.2)	7 (8.2)	10 (11.8)	85 (100.0)
Fisher's exact test p=0.0063						
Group 3		Before				Total (n, %)
		Preventive	Restorative	Periodontal	Surgery	
After	Preventive	16	0	1	3	20 (39.2)
	Restorative	2	4	0	0	6 (11.8)
	Periodontal	9	1	10	1	21 (41.2)
	Surgery	3	0	0	1	4 (7.8)
	Total (n, %)	30 (58.8)	5 (9.8)	11 (21.6)	5 (9.8)	51 (100.0)

Fisher's exact test p<0.0001.

procedures and an increase in surgical, periodontal and restorative procedures [(G1: p<0.0001; G2: p<0.0063; G3: p<0.0001)] (Table III).

DISCUSSION

This study confirmed the hypothesis that the interruption of dental care during the COVID-19 pandemic had a negative impact on the gingival health of children and adolescents with CP. Thus, it was observed that children and adolescents with CP evaluated in this research who were undergoing physical rehabilitation and dental treatment at a Reference Center need systematic preventive visits.

The mean age was 7.1 years old. It is known that the sooner rehabilitation therapies are started, the greater the motor progress will be. Early intervention is guided by the critical moment of development for the moldability of developing systems [25], which justifies the action of the institutional program.

The interruption of dental care during the COVID-19 pandemic showed a worsening of the gingival health of the participants in this study, corroborating the observed results where children with Cerebral Palsy have an increased risk of dental caries and a lower gingival status [26].

The presence of primitive oral pathological reflexes makes individuals with CP more susceptible to poor oral hygiene. The accumulation of biofilm is the main risk factor for the development of oral diseases, such as dental caries and periodontal diseases [18,27]. These results corroborate the need for periodic and systematic follow-up visits for this population.

With regard to dental treatments, the three groups showed an increase in the need for restorative, periodontal and surgical treatment, with a consequent decrease in preventive consultations. This fact can possibly be explained by the increase in stress and anxiety levels in response to the COVID-19 pandemic, impacting on health behaviors, including changing eating habits (with frequent intake of cariogenic foods)

and poor oral hygiene with reduced access to dental services [28]. It should be noted that children and adolescents with CP need help with their daily oral hygiene, which may explain the results found in the present study during the pandemic, since some caregivers may have been hesitant to help them for fear of infection, causing further deterioration of oral health [29].

Among the most prevalent diseases worldwide are oral diseases. They bring a lot of expense to public coffers. The results of this study, coming from an association can be extended to the public or private service. These three groups probably stopped returning with preventive procedures, for more invasive procedures, generating more costs for the institution, since, as in the public service, prevention and health is much cheaper than treating a disease [30].

In addition, the fear of parents, guardians and caregivers in seeking dental care for their children, as shown by recent studies [31]. The success of the treatment depends on the adherence and interaction of the family, the patient and the professionals [32]. It is essential to start consultations early check-ups periodically, according to the risk of the disease. These measures facilitate the care of patients with special needs who will be familiar with the environment, with the professional and with the treatment itself [33].

The inclusion model is guided by equity, in order to allow access, opportunities, experiences and rights to all children and adolescents [34], meeting the guidelines of a reference institution in São Paulo, Brazil that provides dental care for children and adolescents with CP.

As for the movement disorder, the spastic type was the most prevalent and had the highest number of participants (n=64), with a clinical pattern of diparesis. The interpretation of these results suggests that a greater number of children and adolescents with CP have been evolving satisfactorily in the rehabilitation process, compared to previous data from our research group, which indicated the quadriplegic clinical picture as the most common one [17].

With regard to gender, we once again found a higher prevalence of males, in line with previous findings [17]. Possible explanations for this sexual dimorphism would be due to greater cortical folding in females [35].

As for race, the participants in this study declared themselves to belong to the white (75.1%), black (2.6%) and other (22.3%) groups. In the last Census carried out in Brazil, dated in 2010, the State System of Data Analysis Foundation [36] has records that 63.9% of the inhabitants of São Paulo declared themselves white, 29.1% brown, 5.5% black, 1 .4% yellow and 0.1% indigenous. Only 5.1% of the Brazilian indigenous population lives in São Paulo. Comparison of data from the white group in our study resulted in an 11.2% increase compared to SEADE data, as it is a recent data collection [36].

Regarding the use of antiepileptic medication, it was observed that 68.8% of the participants did not use drugs and 15.1% used the inhibitory neurotransmitter gamma-aminobutyric acid (GABA) and in associations (GABA and antiepileptic drugs). The possible explanation for the high number of participants not using antiepileptic medication may be related to the diparetic clinical pattern (48.4%) in contrast to another study in which the largest number of CP was composed of tetraparetic patients [17].

The study has some limitations that should be pointed out. As these are children and adolescents with CP, with associated comorbidities in most cases, many of these did not return to dental care after the resumption of consultations during the COVID-19 pandemic, for fear of exposure and contamination by the virus. In this sense, the use of teledentistry could favor the monitoring of these patients' oral health. Another limitation involves the non-collection of data regarding eating habits and oral hygiene during the period of social isolation [37].

We suggest further studies in children and adolescents with CP and also with other physical disabilities such as myelomeningocele, osteogenesis imperfecta and congenital malformation as a way to evaluate and promote oral health in these populations, allowing a better understanding of the factors that impacted oral health in the pandemic of COVID-19.

This study demonstrates the important role of dentists this population, as there was a decrease in the number of individuals in the three groups with no gingival inflammation after a break in dental care. Consultations train skills and motivate both caregivers and patients to perform proper oral hygiene with the aim of promoting, preventing and maintaining oral health.

CONCLUSION

It is concluded that the interruption of dental follow-up for nine months during the COVID-19 pandemic in children and adolescents with CP had a negative impact on gingival health. It was observed in the three study groups, in the three levels of gingival index, a reduction in preventive procedures and an increase in surgical, periodontal and restorative procedures, when compared before and after the interruption of dental care, thus, periodic and systematic dental visits are necessary for children and adolescents with CP, aiming at prevention and health education activities, reducing the need for invasive treatments.

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Author's Contributions

VLS, MBD, MTBRS: conceptualization, data curation and writing - original draft preparation GMG: methodology and formal analysis.

Conflict of Interest

The authors have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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Regulatory Statement

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