

# Oral hygiene orientation and caries experience for cerebral palsy patients using oral medication

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## ABSTRACT

The presence of damage associated with cerebral palsy (CP) often requires the long-term continuous use of prescription drugs. Among the adverse side effects of these drugs are decreased salivary flow and increased risk for caries. **Objective:** To determine whether those responsible for CP patients received orientation regarding the necessity of oral hygiene after the administration of drugs of continuous oral use and the caries experience in patients with CP. **Method:** Participating in this study were 205 children with medical diagnosis of CP, of both genders, aged 0-12 years ( $6.6 \pm 2.9$ ) attending a preventive program in dentistry in a reference institution of rehabilitation in São Paulo-SP. The data regarding gender, movement disorder and clinical types of CP were collected from medical records. In an interview format, the caregivers reported whether there was use of any continuous medicine. They were asked what form it took, whether the caregivers had received prior guidance on the importance of oral hygiene after the use of medicines, who performed the oral child's hygiene, and how often it was done. Their caries experience was recorded based on whether a given tooth was decayed (D, d) missing (M, m) or filled (F, f) (DMFT). The sample was divided into two groups according to whether they used continuous drugs (group 1: G1) or did not (group 2: G2). The Chi-square test and *Student's t* test were used, with the level of significance set up at 5%. **Results:** G1 (n = 110) and G2 (n = 95) were similar in terms of gender ( $p = 0.343$ ) and age ( $p = 0.514$ ). However, they differed significantly in relation to the clinical pattern, with G1 presenting significantly higher percentages of patients with tetraparesis ( $p < 0.001$ ). Considering only the G1, it was observed that the subgroup that used medicine in oral solution form (solution, n = 65) differed significantly from that using tablets (tablets, n = 45) in relation to their previous orientation for hygiene oral ( $p = 0.013$ ), in that the solution subgroup had been better oriented. With regard to oral hygiene, the solution subgroup had significantly higher percentages ( $p = 0.044$ ) of children requiring supervision and completion of the oral hygiene when compared to the tablet group. The comparison of caries experience between G1 and G2 showed that the G1 had significantly higher values for their DMF index ( $p = 0.048$ ), and fewer caries-free patients ( $p = 0.016$ ) when compared to G2. **Conclusion:** Although those responsible for the patients receiving medication in the form of oral solution were better oriented, these patients presented higher values of caries experience.

**Keywords:** Cerebral Palsy, Oral Hygiene, Dental Caries, Administration, Oral

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Received on April 3, 2014.

Accepted on January 7, 2015.

DOI: 10.5935/0104-7795.20140033

## INTRODUCTION

Cerebral Palsy (CP) describes a group of permanent developmental disorders related to movement and posture that cause limitation in activities and that are attributed to non-progressive disorders that occur in the developing fetal or infant brain. Motor disorders in CP are frequently accompanied by disturbances in sensation, perception, cognition, communication, behavior, epilepsy, and secondary musculoskeletal problems.<sup>1</sup> This condition is the most common cause of physical disability in childhood.<sup>2</sup>

The type of abnormal muscle tone or involuntary movement disorder, observed or elicited, is generally related with the underlying physiopathology. Individuals with spastic CP present increased tone, pathological reflexes, and hyperreflexia or pyramidal signs, with patterns of clinical involvement including tetraparesis (motor involvement in the four limbs), diparesis (more evident in lower limbs), and hemiparesis (one side affected) Dyskinetic individuals have involuntary and uncontrolled movements that are recurrent and stereotyped and that can be totally disabling as well as severe.<sup>3</sup>

The presence of losses associated with CP<sup>1</sup> many times requires the continuous use<sup>4</sup> of medication for long periods of time.<sup>3</sup> The drugs used to treat these conditions cause adverse side effects that interfere with oral health, as well as reduce the salivary flow, thus increasing the risk of caries and the presence of gingival hyperplasia.<sup>4</sup>

Children with CP have difficulty taking care of their oral health due to motor and cognitive dysfunctions, which demands the support, participation, and involvement of their caregivers who must be motivated and oriented.<sup>5</sup>

A multidisciplinary approach in early childhood provides better health conditions. Generally, medical professionals have more frequent returns with these children and the visit to the dentist tends to be postponed.<sup>6</sup>

## OBJECTIVE

The objective of this study was to verify whether the persons responsible for the CP patients received orientation on how to perform their oral hygiene after the administration of continuous use medication taken orally and the experience of caries in patients with CP.

## METHOD

The project for this study was registered and approved by the Plataforma Brasil under the numbers 32053 and 339.666. After being informed of the objective of the study, the parents and/or persons responsible for the children with CP signed a Free and Informed Consent Form.

Two hundred and fifty patients of both genders who were not institutionalized, who had received a medical diagnosis of CP, and were aged from 0 to 12 years were included consecutively in this study during the data collection. Children who were fed exclusively through gastrostomy were excluded.

This was a cross-sectional study, made with children who frequented a dental prevention program in a reference rehabilitation institution in the city of São Paulo, state of São Paulo at the time of the data collection.

Initially, the demographic data were collected from the patients' medical records and included age, gender, type of movement disorder (spastic, dystonic with choreoathetosis, or ataxic), and clinical pattern (tetraparesis, diparesis or hemiparesis).

The following information was then collected through interviews with parents and/or caregivers responsible for the children:

- I. Whether the child used any medication continuously and, if so, in which form they were given;
- II. Whether the caregivers believed the use of medication presented as solution or tablet could be damaging to the oral health of the children;
- III. Whether the caregivers received orientation on the need to provide oral hygiene after the use of such medications;
- IV. Who took care of the child's oral hygiene, and how frequently.

After that, all the patients were evaluated as to their caries experience. These exams were made at a dental office, using artificial light, compressed air to dry the teeth, dental mirror, and dental probe. The caries experience was registered in accordance with the criteria established by the World Health Organization<sup>7</sup> that classifies teeth as decayed (D, d), missing (M, m), or filled (F, f), by tooth (T, t), using DMFT and dmft for permanent and deciduous teeth, respectively. In children with mixed teeth, the DMFT and dmft were registered jointly. Only one trained and calibrated examiner (MTS) did the evaluation of caries experience (Kappa Coefficient 0.96).

Two groups were established according to the use of continuous medication (group 1: G1) or non-use (group 2: G2).

In order to evaluate the difference in proportions between the groups studied, the Chi-square test was used. The *Student t* test was used to verify the hypothesis of equality between the groups. The significance value was fixed at  $\alpha = 5\%$ .

## RESULTS

Of the 205 patients with CP, 113 (55.1%) were males and 92 (44.9%) were female. Of those, 110 (53.6%) used medication continuously (G1) and 95 (46.4%) did not (G2). The groups were homogeneous regarding gender ( $p = 0.343$ ) and age ( $p = 0.514$ ). However, groups G1 and G2 differed significantly in regards to clinical pattern, with G1 showing a significantly larger percentage of persons with tetraparesis ( $p < 0.001$ ) (Table 1).

The group G1 ( $n = 110$ ) was composed of 65 children who used medication in the form of an oral solution (solution group) and 45 who used medication in the form of a tablet (tablet group). The majority (60.9%) of the caregivers from both groups reported not knowing or not believing that there was a relationship between the use of continuous medication and oral health (Table 2).

The continuous use medications most used by the patients were anticonvulsants (phenobarbital, valproic acid, carbamazepine), muscle relaxants (baclofene), and anxiolytics (clonazepam).

The groups differed significantly in regards to previous orientation to the performance of oral hygiene ( $p = 0.013$ ), with the oral solution group showing a higher percentage of caregivers oriented and a significantly higher percentage ( $p = 0.044$ ) of children who required supervision and the performance of oral hygiene from their caregivers when compared to the tablet group (Table 2).

As for oral hygiene, it could be observed that the groups differed significantly in relation to the frequency of oral hygiene ( $p = 0.009$ ), with the tablet group showing significantly higher percentages of children who brushed their teeth three times a day (Table 2).

The comparison of caries experience between the G1 and G2 groups showed that G1 had values much higher for the DMFT index value ( $p = 0.048$ ), and a lower number of patients free of caries ( $p = 0.016$ ) when

**Table 1.** Descriptive characteristics of patients with CP according to the use (G1) or non-use of (G2) medications

Variable	G1 n = 110	G2 n = 95	Total n = 205	Value of p
<b>Gender (n,%)</b>				
Female	46 (41.8)	46 (48.4)	92 (44.9)	0.343 <sup>a</sup>
Male	64 (58.2)	49 (51.6)	113 (55.1)	
Total	110 (54.0)	95 (46.0)	205 (100.0)	
Age (mean ± SD) years	6.7 ± 3.1	6.5 ± 2.8	6.6 ± 2.9	0.514 <sup>b</sup>
<b>Movement disorder</b>				
Spastic	91 (82.7)	79 (83.2)	170	0.718 <sup>a</sup>
Dyskinetic	9 (8.2)	10 (10.5)	19	
Ataxic	2 (1.8)	3 (3.1)	5	
Mixed	8 (7.3)	3 (3.1)	11	
<b>Clinical pattern</b>				
Tetraparesis	51 (46.4)	7 (7.3)	58	< 0.001 <sup>a</sup>
Diparesis	40 (36.4)	65 (68.4)	105	
Hemiparesis	10 (9.1)	10 (10.5)	20	
Double hemiparesis	2 (1.8)	0 (0.0)	2	
No record	7 (6.4)	13 (13.7)	20	

\*  $p < 0.05$ ; <sup>a</sup> Chi-square test; <sup>b</sup> Student t test

**Table 2.** Descriptive characteristics of the caregiver's perception, orientations received, and oral hygiene habits according to the presentation of medications from group G1

Variable	Solution (n = 65)	Tablet (n = 45)	Value of p
<b>Caregiver's Perception</b>			
Yes	29 (44.7)	14 (31.1)	0.281
No	19 (29.2)	19 (42.2)	
Don't know	17 (26.1)	12 (26.7)	
<b>Previous hygiene orientation</b>			
Yes	26 (40.0)	8 (17.8)	0.013*
No	39 (60.0)	37 (82.2)	
<b>Performing hygiene</b>			
Independent	3 (4.6)	5 (11.1)	0.044*
Independent supervised	9 (13.8)	13 (28.8)	
Supervised and performed	53 (81.6)	27 (60.1)	
<b>Hygiene frequency</b>			
Once daily	10 (15.3)	0 (00.0)	0.009*
Two times	28 (43.1)	17 (37.8)	
Three times	27 (41.6)	28 (62.2)	

\*  $p < 0.05$ ; Chi-square test

compared with G2. However, the groups did not differ when the DMFT  $\geq 1$  values were compared between the groups (Table 3).

## DISCUSSION

The rehabilitation process seeks to rescue the residual potential of individuals with CP. Multidisciplinary is fundamental for the success of this process, which is directly related

to the extent of the brain damage, represented not only by the alteration in tone and posture, but also by the associated losses.<sup>1</sup>

The characteristics of the population in this study are similar to those described in the literature, showing a great number of individuals with spastic type CP, followed by those with dyskinesia, and by rare cases of ataxia.<sup>8</sup> The developmental disorders that accompany CP are more common in males

than in females,<sup>9</sup> which was also observed in the present study.

Since the data from this study were collected in a reference rehabilitation center, it is easy to understand a prevalence of 79.5% of the participants having a clinical CP pattern of tetraparesis and diparesis. In this way, the involvement of caregivers in the performance of oral hygiene is fundamental, for these children require their support and participation for periods beyond the child development stage.<sup>10</sup>

The multifactor etiology of dental caries is well established and results from the interaction of biological, economic, cultural, environmental, and social factors.<sup>11</sup> Performing effective oral hygiene is the main method for preventing this disease via the disorganization of the dental biofilm, which when colonized by cariogenic bacteria, acidify the environment through the decomposition of the substrate, causing the demineralization of the enamel and consequent progression of the process to the dentin and pulp.<sup>12</sup>

Some factors are described in the literature as responsible for unsatisfactory oral hygiene in patients with CP. Highlighted among them are the level of motor skill necessary to perform oral hygiene effectively;<sup>13</sup> the degree of intellectual/cognitive<sup>13</sup> commitment; the difficulty/inability of these patients to follow instructions to perform oral hygiene or to understand its importance;<sup>14</sup> the presence of spasticity, involuntary movements, tonic bite reflex, and possetting;<sup>15</sup> as well as the difficulty that the caregivers of these patients report in maintaining their satisfactory oral hygiene.<sup>16</sup> These factors contribute negatively to the performance of oral hygiene.

Thus, it is necessary that parents or caregivers become aware, participate, and be involved regarding the importance of performing oral hygiene (technique, frequency of oral hygiene, and use of dental floss),<sup>5</sup> with individualized orientations, and with the dentist verifying what the difficulties are, proposing solutions, and stimulating the performance of it, either by the patient himself or with supervision or performance by a caregiver, as a preventive measure efficient in the prevention of oral diseases.<sup>13,14</sup>

Due to the presence of impairments associated with the CP neurological condition,<sup>1</sup> continuous use medications are indicated for this population,<sup>3,4</sup> and it was observed that 53.6% of this study's sample used those medications. The recommendation of a pharmaceutical solution or a tablet for

**Table 3.** Caries experience of CP patients' groups, according to the use (G1) or not (G2) of medications

	G1 (n = 110)	G2 (n = 95)	Value of p
Caries experience (mean ± SD)	2.7 ± 3.3	1.9 ± 2.9	0.048*
Free of caries (lesions) (DMFT = 0; n, %)	43 (39.1)	53 (57.8)	
Sequelae from caries (lesions) (DMFT ≥ 1; n,%)	67 (60.9)	42 (42.2)	0.016*
DMFT ≥ 1 (mean ± SD)	4.3 ± 3.3	4.2 ± 2.9	0.482

\* p &lt; 0.05; Chi-square test; † p &lt; 0.05 Student t test

continuous use is related to the patient's ability to swallow,<sup>17</sup> which, in its turn, is related to oral motricity.<sup>18</sup>

Children with greater oral and motor impairment present greater problems of deglutition, use a liquid diet,<sup>19</sup> and may more often use medications in the form of a solution, which predisposes them to a greater risk of oral diseases, thereby requiring more attention from their dentists and caregivers.

Oral medications in the form of a solution generally contain sugar, valproic acid, and additives (Glycerine, methylparaben, propylparaben, sugar, sorbitol, vanillin, red food dye, artificial cherry flavor, deionized water). Generally, these medications are administered in daily fractioned doses, with the last dose given at night. The sugar in the formulation of the medication causes a decrease in salivary pH and reaches values of neutrality only one hour after the administration of the medication. In this way, children with CP are exposed to greater risk of oral diseases, since the saliva's buffering capacity in these individuals is diminished.<sup>4,20</sup>

With the results of this study, it is clear that all the patients with CP should be monitored periodically by a dental professional, preferably even before their dental eruption, in prevention programs, with periodic pre-established returns, so that their caregivers may remain oriented on the importance of removing dental biofilm, especially for those who use medications in the form of a solution.

## CONCLUSION

Patients with CP who use medications continuously in the form of an oral solution present a greater caries experience, although their caregivers receive orientation on the performance of oral hygiene after the administration of medication.

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