Sweetened medicines and hospitalization: caries risk factors in children with and without special needs

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**ABSTRACT**. Aim This was to evaluate caries risk factors: medicine consumption level, oral hygiene frequency and oral hygiene habits during hospitalization of children with and without special needs. Methods A cross-sectional study was carried out using a pre-tested form, interviews were conducted with guardians of children with (G1-116) and without special needs (G2-86), from a public day nursery in Rio de Janeiro (Brazil). Results Average use of medicines was at 21.8 months for G1- 24.5 and G2- 7.2 (Mann-Whitney: p-value = 0.0009). In the total sample, medicines were taken usually at night; 8.4% of parents sweetened them before ingestion and the majority of children did not brush their teeth after taking medicines. More than half (61.9%) had been hospitalized with an average duration of 21.8 days; 83 (66.4%) had had few hospitalizations; G1- 62.8% and G2 -77.4%. Some 81.6% of the sample reported no tooth brushing while in hospital. Statistics The data were entered in the EPI INFO 6.04d program, and the tests used were Fisher Exact, Mann-Whitney, Kruskal-Wallis and Chi-square with a 5% significance level. Conclusions Poor oral hygiene habits when taking medicines and during hospitalizations were observed, mainly among children with special needs.

**KEYWORDS**: Oral health, Oral hygiene, Children, Disabled, Dental health education, Medicines, Sugars.

**Introduction**

Children with special needs are those “who necessitate special care for an indefinite length of time or for part of their lives, and their dental treatment depends on eliminating or skirting the difficulties inherent to their condition, be their limitation in the emotional, intellectual or social area” [Lannes and Vilhena-Moraes, 1995]. Dental caries, gingivitis and lesions in the oral mucosa, although present in individuals without systemic involvement, are more frequent in patients with some systemic disease [Donatsky et al., 1980; Dens et al., 1995; Hede, 1995; Franco et al., 1996; Souza et al., 1996]. At present, dentistry focuses on prevention and education in oral hygiene. To that end, bacterial plaque control programs should be introduced to maintain a satisfactory level of oral hygiene [Weddell et al., 2001], as plaque accumulation is the principal cause of caries and gingivitis, particularly in patients with systemic involvement. Very often, due to anxiety over their general condition, the parents or guardians end up neglecting other health facets of the disabled child [Roberts and Roberts, 1979].

The greatest oral health threat of these patients may be related to risk factors, such as inadequate oral health in children hospitalized for a long time [Willershausen et al., 1998], or to medicines they take during prolonged periods [Maguire et al., 1996] which contain sucrose, owing either to addition by parents [Marques et al., 2000] or to the composition of the medicament [Kenny and Somaya, 1989]. Furthermore, additional factors may be related to the aetiology of dental caries, such as a hypercaloric diet [Howell and Houpt, 1991], salivary alterations [Madigan et al., 1996] and lessening of salivary A immunoglobulins in patients infected with AIDS [Castro et al., 2004]. Such children may be considered a risk group for oral diseases. Therefore, the aim of this study was to evaluate medicine consumption level, oral hygiene frequency and habits during hospitalization of children with and without special needs.

**Materials and methods**

**Subjects.** The cross-sectional study consisted of a survey of the attitudes towards oral health adopted by
obtained was complemented by indirect documentation of the child's personal identification. The information to tooth brushing habits during hospitalization and each of medicine consumption, addition of any kind of selected. The questions aimed at determining the level of systemic condition. Alterations pertained to information about the child's modify 2 questions, eliminate 3 and add 2 others. All wrong answers. After pre-testing, it was necessary to text of the informed consent that there were no right or knowledge and educational level, it was stated in the answer the proposed questions according to their purpose of putting the participants more at ease to the study.

Questionnaire. This was pre-tested by guardians of 10 children with special needs, patients at the Special Patient Pediatric Clinic, and contained 63 questions (37 open and 26 closed). A single examiner interviewed 202 parents/guardians, consisting of 116 from G1 and 86 from G2. The guardians were chosen to participate in the study by a convenience criterion. Those selected attended day nursery and Stimulation Center on the weekdays when the examiner herself was present at the institution, over a period of six months, and who voluntarily accepted to participate in the study. All participants signed an informed consent. With the purpose of putting the participants more at ease to answer the proposed questions according to their knowledge and educational level, it was stated in the text of the informed consent that there were no right or wrong answers. After pre-testing, it was necessary to modify 2 questions, eliminate 3 and add 2 others. All alterations pertained to information about the child's systemic condition.

For this study, a part of the original questionnaire was selected. The questions aimed at determining the level of medicine consumption, addition of any kind of sucrose to the medicines, frequency of hospitalization, tooth brushing habits during hospitalization and each child's personal identification. The information obtained was complemented by indirect documentation from the children's clinical files at the institution.

Statistical analysis. Comparisons between groups were made with the total sample, including the five and six-year-old children who attended the day nursery and the Stimulation Center. For other analyses, the groups were matched by age and the comparisons made with up to four-year-old children, which constituted a sample with 169 individuals, 83 in G1 and 86 in G2. The answers were inserted into the EPI INFO 6.04d program, and for the statistical analyses the tests used were Exact Fisher, Mann-Whitney, Kruskal-Wallis and Chi-square, with a significance level of 5%.

Results

Subjects. The children’s ages varied from 7 to 83 months (mean 37.3 months); mean ages by group were G1 45.8 months and G2 26.0 months (Mann-Whitney: p-value < 0.0001). Analyzing G1 only with children of up to 4 years of age, the average age was 36.9 months, also presenting statistical difference in relation to G2 (Kruskal-Wallis: p-value < 0.0001). Regarding gender, 55.4% were male and this percentage per group was 56.9% (G1) and 53.5% (G2).

Medicines. Of the children who were on medication (n=83), the average time during which they took medicines (syrup form only) was 21.8 months and in groups G1 and G2 it was 24.5 and 7.2 months respectively (Mann-Whitney: p-value = 0.0009). Comparing the matched groups (n= 57) the average period of medication use was 18.5 months, and 21.9 months was the value for G1 (Kruskal-Wallis: p-value = 0.0023).

The principal medicines used by the children were vitamins, anticonvulsants, antihistamines, anxiolytics, antibiotics, anti-depressives, anti-thyroids, antiviral, antihypertensive, cardiological and homeopathic medicines. However, group G2 reported taking only the first three and only one child took anticonvulsants and another antihistamines. Figure 1 shows the ingestion times of these medicines, predominantly at night (after supper and before sleeping). When the guardians of the children were asked whether they usually sweetened medicines for Figure 1 shows the answers according to groups. The substances most used to sweeten them were water with sugar, milk, condensed milk, juice and honey.

Hospitalization. Of the sample, more than half (61.9%; n = 125) had already been in hospital and the figures per groups were G1 81.0% (n = 94) and G2 36.0% (n = 31), $\chi^2$: p-value < 0.0001).
Hospitalization frequency was that 83 (66.4%) had had few hospitalizations (up to 2), 32 (25.6%) from 3 to 5 episodes and 10 (8.0%) from 6 to 15. By group the results were G1 and G2: 62.8%, 26.6% and 10.6%; 77.4%, 22.6% and 0.0%, respectively.

Considering only the children aged up to 4 years, the hospitalization frequency was also statistically significant ($\chi^2$: p-value = 0.0014). Of those children who had been hospitalized, most (84.8%) were accompanied by their mother, followed by the mother and another person, such as the father, aunt and grandmother and a smaller percentage stayed alone.

The average duration of the hospitalization was 21.8 days and the distribution per group was 39.1 (G1) and 16.9 (G2). This difference was statistically significant (Mann-Whitney: p-value = 0.0042). For the group of children up to 4 years of age, this result was also statistically significant, with the average duration of 43.2 months for G1 (Mann-Whitney: p-value = 0.0018).

**Tooth brushing.** During hospitalization, 81.6% reported they did not brush, with similar values in the two groups, although there was a higher percentage in group G2 (Table 2). As for tooth brushing after taking medicines, the majority (81.9%) answered no. There was a higher percentage (84.3%) among disabled children (Table 3).
Discussion

Children with systemic involvement often take sweetened medicines for a long time. Taken at night they can be an aggravating condition, because during this period salivary flow rate is reduced and the time of elimination from the oral cavity rises [Fraiz, 1997]. An analysis of the most frequent times when children took medicines showed night time, with a higher percentage in G1. If ingestion after supper is added to ingestion before sleeping, there was a frequency of 80.0% in G1 and 46.2% in G2 (Figure 1). This fact is more worrying if we consider that the average duration of the G1 children’s use of such medicines was 53.5% of their lifetime at the time of the survey, while in G2 this percentage was 27.7%. Fraiz [1997] wrote that the use of home remedies or honey or sugar syrups should be discouraged, particularly at night. Furthermore, this author also considers that children who take medications for long periods have been identified as a caries risk group and therefore should receive special dental care. This is corroborated by Maguire et al. [1996] who found more caries in the primary dentition of children who took liquid medicines for a prolonged time when compared with their healthy siblings. However, Littleton and White [1964] found a lower rate of caries and gingivitis among children taking medicines when compared with the group that did not, relating this factor to better oral hygiene standards. Our findings agree with those of Karjalainen et al. [1992] and Santos-Pinto et al. [2001], who suggest that preventive dental measures must be implemented for children who take potentially cariogenic medicines.

With regard to addition of sucrose to medicines by guardians, there was a low prevalence in our sample (8.4%) (Table 1), and the substances used most were water with sugar, milk, condensed milk, juice and honey. Worse results were reported by Marques et al. [2000], when they found that 65.5% of hospitalized children took medication with sugar. However, Castro et al. [2002] found that 100% of the doctors of an AIDS clinic recommended taking medicines associated with sweetened liquids and only 25% recommended oral hygiene after taking the medicine. This can be related to the low frequency of brushing, after taking medicine, found in this study. All the above shows the seriousness of the situation, particularly among disabled children, who face many other health problems.

However, Martens et al. [2000] found that children with special needs, who did not take medicines, had significantly less help for brushing, which resulted in more risk to gingival health. In spite of the low frequency of sucrose addition to medicines, another factor to be considered is the composition of the medicines that already contain sucrose, as noted by Lima et al. [2000], who recorded that 58.3% of the medicines studied contained this sweetening agent. Kenny and Somaya [1989] and Santos-Pinto et al. [2001] also found substantial quantities of sucrose in liquid medicines taken by chronically sick children. Silva and Guimarães [2001] found that the majority of the medicines most commonly sold in the city of Maceió (Brazil) had a potential to reduce the salivary flow. Sucrose is the sweetener generally added to the medication formulas because it is a low-cost, easily processed substance [Bigeard, 2000], and has the characteristic of improving the taste of the medicaments [Kenny and Somaya, 1989]. It would be better to use sugar substitutes, such as sorbitol.

Another aspect analyzed referred to the long periods of the children’s hospitalization, during which oral hygiene is often relegated to second place. This was found in the present study, in which the occurrence, duration and frequency of hospitalizations happened in a higher percentage in group G1, when the mother was the child’s principal companion. Willershausen et al. [1998] confirmed this situation when they reported a much lower level of oral health among children hospitalized for prolonged periods, compared with those who had not been hospitalized. Hede [1995] found similar results in an adult population. A lack of tooth brushing during hospitalization was found in the

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**Table 3 - Reported tooth brushing after taking medicines according to guardians of groups of children with (G1) and without (G2) special needs living in Rio de Janeiro (Brazil).**

<table>
<thead>
<tr>
<th>Tooth Brushing</th>
<th>G1</th>
<th>G2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>11</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>%</td>
<td>15.7</td>
<td>30.8</td>
<td>18.1</td>
</tr>
<tr>
<td>No</td>
<td>59</td>
<td>9</td>
<td>68</td>
</tr>
<tr>
<td>%</td>
<td>84.3</td>
<td>69.2</td>
<td>81.9</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>13</td>
<td>83</td>
</tr>
<tr>
<td>%</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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</tbody>
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present study. In research by Costa et al. [2000], with health professionals that treated hospitalized children, however, 56.9% said that the children brushed their teeth daily, mostly in the morning. Other authors have suggested the adoption of oral health programs for hospitalized patients [Hede, 1995; Marques et al., 2000; Pajari et al., 1995].

Conclusion
It is suggested that the labelling of medicines should mention their cariogenic potential and recommend oral hygiene after taking the medicine. Furthermore, oral hygiene routines should be introduced in hospitals, particularly at night. Children with special needs took medicines for longer periods and more frequently at night than children without special needs. Poor oral hygiene habits when taking these medicines and during hospitalizations were observed, mainly among these children with special needs.

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