

Quantity of Fluoridated Toothpaste Children Use for Daily Brushing

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Abstract

Aim: The aim was to evaluate the quantity of fluoridated toothpaste placed on toothbrushes by children or their parents/caregivers, at the time of daily tooth brushing, and to analyze whether this quantity is within the standards recommended by national and international institutions on this question.

Methods: In total 50 children in the age-range from 3 to 12 years were analyzed. These children and their parents/caregivers/ were asked to bring the toothbrushes and toothpastes they used daily (when they came for the dental consultation). Firstly, we measured the mass of the patient's toothbrush, without toothpaste. The next measurement was made, based on who performed the daily brushing (children/parents/caregivers), and this individual was asked to put the amount of toothpaste habitually used on the brush, during the daily brushing performed at home. Lastly, the amount of fluoridated toothpaste dispensed was measured, according to the values recommended by national and international agencies, in relation to the child's age ("a grain of raw rice", "the size of a pea", horizontal scrub technique). The values obtained at all the stages were recorded and were compared by the T test ($\alpha = 5\%$).

Results: The quantity of toothpaste put on the brush by the child or parent/caregiver ranged from 0.1g to 1.45 g, with the mean value being 0.55g (s.d 0.33). The persons responsible for the children used significantly smaller quantities when compared with the children ($p < 0.05$).

Conclusions: Children, irrespective of age, tended to put more toothpaste on toothbrushes, when compared with the parents/caregivers.

Key words: Daily tooth brushing, Children, Fluoridated toothpaste.

Introduction

Over the last few decades, there has been a considerable decline in dental caries disease, due to various factors, including fluoridation of public water supplies and the more extensive use of fluoridated toothpastes¹. According to Lima and Cury² (2001), in Brazil, the consumption of

fluoridated toothpaste has increased, with the total daily amount per inhabitant being considered high.

One of the main reasons for the increase in prevalence of dental fluorosis is the combination of these two factors, daily consumption of fluoridated water and tooth brushing with fluoridated toothpaste³. For

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developing countries, whose policy against caries disease is based on the abundant use of fluoride in both water supplies and daily tooth brushing, this information is a warning.

According to Cury⁴ (1998), all the toothpastes sold in Brazil since 1990, have contained fluoride in their composition. It is known that of the total daily amount of fluoride ingested by children up to the age of 3 years, 55% occurred during toothbrushing². The ideal dose of fluoride ingested per day is 0.05 mg per kilogram⁵. Therefore, excessive fluoride ingestion by children in early childhood may lead to the development of dental fluorosis, a developmental disturbance observed in permanent teeth, in which opacity or whitened lines in tooth enamel are generally observed⁶.

Seeing that the majority of parents do not put the correct quantity of toothpaste on their children's toothbrushes, so that children always tend to have a larger amount than those recommended⁷; they drink fluoridated water and brush their teeth with fluoridated toothpaste daily it is the most effective method to reduce the prevalence of caries in children. Therefore, we must indicate fluoridated toothpastes; however the quantity must be dosed at the time of toothbrushing⁸.

According to national and international institutions⁸⁻¹⁰, the recommendation is to use a "spot" of fluoridated toothpaste (1.000 ppm of fluoride) or a quantity like a "grain of raw rice" from the time the first tooth erupts up to 3 years of age. Whereas a quantity equivalent to the size of a pea is recommended for children between the ages of 3 and 6 years. In these age-ranges, the parents are responsible for supervising their children's tooth brushing sessions, to guarantee the minimal ingestion of fluoridated toothpaste. For children over the age of 6 years the routine use of the horizontal scrub tooth brushing technique is recommended⁹.

Dentists are responsible for providing children's parents and/or caregivers with information by means of verbal communication, visual resources and demonstration itself, to help guaranteeing

that the appropriate quantity of toothpaste will be used⁹.

Then, the aim of the present study was to evaluate the quantity of fluoridated toothpaste usually placed on toothbrushes by children or their parents/caregivers, and to analyze whether this quantity is or is not in accordance with the amount recommended by national and international institutions on this question.

Materials and Methods

In total 50 children, from 3 to 12 years of age participated in this study. They were selected from among the patients at the Undergraduate Clinic of Pediatric Dentistry of the Dental School of Ribeirão Preto, USP, SP, Brazil. Initially, each patient was approached and asked about the possibility of participating in the research. In case of a positive response, the patients/parents or caregivers who brought them were requested to bring the toothbrush and toothpaste the child used daily with them, when they came for the next session. In the following session, before the dental treatment, the child/ parent or caregiver were asked to show the toothbrush and toothpaste they brought. In cases in which patients forgot, or did not comply with this request, depending on the child's age, we provided a toothbrush and toothpaste.

Initially, the precision balance was calibrated to measure the masses. Afterwards, the child's toothbrush (without toothpaste) was placed on the balance and the weight was measured and noted on a specific chart. In the next step, the patient/parent or caregiver (depending on who put the toothpaste on the brush at home) was asked to put the amount of toothpaste usually used for brushing at home, on the brush. The weight was again measured on the precision balance, and noted on the chart. In the third step, a professional who had previously been calibrated to put the correct quantity of toothpaste on the brushes, as stipulated by the Brazilian Association of Pediatric Dentistry (2016) and the American Dental Association (ADA) (2015/2016)^{9,10}, put the quantity of toothpaste, recommended by the above-mentioned associations, on the patient's toothbrush. For children from 0 to 3 years, a quantity no larger than "a rain of

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raw rice”; that is, approximately 0.1g of toothpaste was placed. For children from 3 to 6 years the quantity placed was similar to the “size of a pea”; that is, approximately 0.3 g of toothpaste; and for children over the age of 6 years, the quantity placed on the toothbrush was based on the horizontal scrub technique. At this time, the last mass measurement was made and recorded. On conclusion, the brush was returned to the patient/caregiver, and they were informed about the ideal quantity of toothpaste to be used by the patient, according to the child’s age. At the end of each of the stages, a photograph of the toothbrush/toothpaste was taken to record the value obtained by the precision balance, and to analyze the brush, quantity and type of tooth paste used. The chart used for recording the data contained additional information such as:

The patient’s name, age, sex, weight values obtained by the balance at each stage, and the person who put the

toothpaste on the brush at the time of daily brushing (patient or caregiver).

The age groups were classified in accordance with the Center for Disease Control and Prevention (CDC): children aged 3 to 5 years were classified as pre-school and children aged between 6 and 12 years, as school-age children¹¹.

The data were analyzed using the software Program EPI Info 7.0. The T Test was used for analyzing the comparisons between the groups. The level of significance was 5%.

Results

Due to extreme data, 4 children were excluded from the calculations, totaling 46 children.

The children’s ages ranged from 4 to 12 years. Twenty-eight (60.9 %) were boys and 18 (39.1%), girls. The characteristics of the studied population are shown in Table 1.

Table1. Characteristics of the studied population

Age Group	n (%)
Pre-school children	19 (41.3%)
Schoolchildren	27 (58.7%)
Who brushed the Child's teeth	
Children	32 (69.6%)
Parent/caregiver:	14 (30.4%)

Quantity of toothpaste put on the brush by the child or person responsible range from 0.1g to 1.45 g, with the mean value being 0.55g (s. d 0.33).

Table 2 demonstrates the comparison between the quantity of toothpaste according to the person who

performed the daily brushing (children/parents/caregivers). The data indicated that there was statistically significant difference (p=0.003). The children’s parents/caregivers used significantly smaller quantities when compared with the children.

Table2. Comparison between the quantity of toothpaste dispensed by children and by parents/ caregivers

Previously calibrated professional	N	Mean	SD	p-value
Child	32	0.64	0.12	0.003*
Parent/caregiver	14	0.34	0.04	

Note: SD , Standard Deviation * Statistically significant difference

Of the children who brushed their teeth by themselves, 8 (25%) were pre-school and 24 (75%) were school-age children. Comparison between the

quantities of toothpaste placed on the toothbrush according to child’s age group did not differ statistically (p=0.794) (Table 3).

Table3. Comparison of quantity of toothpaste between different age groups

Previously calibrated professional	N	Mean	SD	p-value
Pre-school children	8	0.62	0.36	0.794
Schoolchildren	24	0.65	0.35	

Note: SD , Standard Deviation

Discussion

The daily consumption of fluoridated water and tooth brushing with fluoridated toothpaste are known to be some of the main causes of the increase in dental fluorosis³. This is why it is most important for parents to supervise their children's times of daily toothbrushing⁹.

Due to the lack of studies in the literature and scarcity of the use of this methodology, in this study, 0.3 g of fluoridated toothpaste was used, as proposed by Chedid et al.¹² (2013). This quantity corresponds to approximately the size of "one pea"; that is, as recommended by different dental academies⁸⁻¹⁰.

The present study demonstrated that there was significant difference when the fluoridated toothpaste was put on the toothbrush by the child, in comparison with the parent/caregiver; there always tended to be a larger quantity of toothpaste when the children themselves put it on their brushes. This finding was in agreement with that described by the American Dental Association Council on Scientific Affairs (2014)⁹.

In the present study, when the parents/ caregivers were asked to put the fluoridated toothpaste on the tooth brush as they usually did, the mean was 0.34 g; that is, very close to the recommended amount. This result differed from the results of Creeth et al.¹³ (2013), in which German mothers placed a mean amount of 1.18 g of toothpaste when they are asked to put the quantity they routinely used, and a mean of 0.60g when they were asked to place a quantity equivalent to the size of "one pea"; that is, a mean quantity higher than the recommended value.

According to the American Academy of Pediatric Dentistry, American Dental Association and Brazilian Association of Pediatric Dentistry⁸⁻¹⁰, as from years of age children could brush their teeth by themselves, however, in the present study, it was possible to observe that even children older than six years of age put excessive quantities of fluoridated toothpaste on their toothbrushes. Therefore, we believe that it would be appropriate for the parents/caregivers to

help them put the ideal quantity of toothpaste on the toothbrush, irrespective of the child's age.

Since the 1980s, fluoride has been incorporated into toothpastes and public water supplies². Therefore, the fluoridated toothpastes were not the only source of fluoride for this population. Knowing about this fact, care must be taken with putting fluoridated toothpaste on the toothbrush when children brush their own teeth, since both acute and chronic fluoride ingestion could generate negative effects^{14,15}, so that supervision by a parent or caregiver is of fundamental importance.

Conclusion

The present study demonstrated that children, irrespective of age, tended to put more toothpaste on their toothbrushes when compared with quantities placed by parents/caregivers. Then, children must be supervised by a parent or caregiver at the time of tooth brushing to make sure that excessive quantities of toothpaste are not put on their toothbrushes, and consequently, reduce the risk for dental fluorosis in children at the stage of permanent tooth formation.

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