Influence of socioeconomic level and dentifrice brand on the oral hygiene habits and the fluoride dentifrice ingestion

Regina M. Puppin Rontani* / Ariana Belotto Correa Kassawara** / Celia Regina M. Delgado Rodrigues***

The aim of this study was to evaluate the influence of socioeconomic level and dentifrice brand on the brushing habits and the fluoride ingestion. The sample was composed of 124 Brazilian children aged 3-9 years, from different socioeconomic levels (SEL). It was used a crossover study with the children using two dentifrice brands: Tandy Uva/T (1,100 ppm NaF) and Super Branco/SB (1,500 ppm MFP). Each child brushed his/her teeth with both dentifrice brands with weekly intervals between the brushes. The oral hygiene habits considered in this study were the Dentifrice Amount Placed on toothbrush (ADP), Dentifrice Amount Ingested (ADI), Fluoride Amount Ingested (FAI) and Brushing Time (TB). The data obtained were submitted to ANOVA test. It was observed that there was influence of SEL on the ADP and TB. The high SEL children showed a higher ADP and TB. The dentifrice brand influenced significantly the ADP, ADI, AFI and TB; the dentifrice T showed a higher ADP, ADI, but a lower AFI and TB. The results showed a significant interaction between SEL and dentifrice brand as ADI, AFI and TB. Although the children ingested a higher amount of T dentifrice they ingested a higher amount of fluoride from the SB dentifrice.

J Clin Pediatr Dent 26(3): 319-326, 2002

INTRODUCTION

Several authors have related the brushing habits to the inadvertent ingestion of fluoride. Nevertheless, they have not reached consent on how it could influence the ingestion and what kind of preventive measures should be implemented to decrease the risk of dental fluorosis. The more influential factors that can contribute to increase the dental fluorosis levels are related to the amount of dentifrice used during the brushing[1-3] the type of dentifrice used[4,5] the number of rinses that are made after brushing[1,6,7] the age when introduced to brushing[8,9] and the manual dexterity.[1,4,10-17]

Several studies were made to identify the amount of fluoride ingested from the dentifrice during brushing. The researchers found controversial results attributed to the diversity of methodologies and differences of educational, cultural and social levels among the several countries.[1,10-12,18-20]

There is some concern about the reduction of the inadvertent ingestion of dentifrice, being recommended for children in the preschool age the use of 0.3 to 0.5g of dentifrice in each brushing, which is equal to the pea size. However, it has been observed that this recommendation is not assimilated by most of the patients.[1,21,22]

There are also reports, which consider the direct ingestion from the dentifrice tube, called intentional ingestion.[13,22,23] It demonstrates the clarifying needs for the population to be aware of the dentifrice use during the brushing[3,4,9,15,22-27] by children younger than 10 years old,[16] since, according to some authors high fluoride concentrations in the formulations are not necessarily associated with benefit increase on dental caries prevention.[7,27]

This research was accomplished with the objective to determine the influence of the socioeconomic level (SEL) and type of fluoride dentifrice on the habit of dental brushing, for children aged 3 to 9, in a town with fluoridated water supply (0.7 ppm F).

* Regina M. Puppin Rontani, DDS, MSc, PhD, Associate Professor in Pediatric Dentistry at Piracicaba Dental School – University of Campinas, Brazil.

** Ariana Belotto Correa Kassawara, DDS, MSc, Lecturer in Pediatric Dentistry at Piracicaba Dental School – University of Campinas, Brazil.

*** Celia Regina M. Delgado Rodrigues, DDS, MSc, PhD, Assistant Professor in Pediatric Dentistry at Sao Paulo Dental School – University of Sao Paulo, Brazil.

Send all correspondence to Dr Regina M. Puppin Rontani, Departamento de Odontologia Infantil, FOP – UNICAMP, AV Limeira 901 13414-018 – Piracicaba – SP, Brazil

Telephone: 55 19 430 5286
Fax: 55 19 430 5218
E-mail: rmpuppin@fop.unicamp.br

MATERIALS AND METHODS

One hundred twenty four children were selected, among 500 participant children of a previous study on habits of dentifrice use,[22] whose responsible persons had authorized their children's participation in the study, after signing a consent term, free and illustrious, according to norms of the Ethical Committee in Human Research of FOP/UNICAMP and Ministry of the Health 1996. One hundred twenty four selected children were distributed equally between a public (School 1/ low SEL) and a private school (School 2/ high SEL). The procedure of methodology was applied to 140 children, but 16 of them did not reach the entire procedure and they were eliminated from the sample.

In this study it was considered as oral hygiene habits the amount of dentifrice placed on the dental brush (ADP); amount of dentifrice ingested (AIT); amount of fluoride ingested (AFI) and time of brushing (TB).

For the development of this research a crossover study was done. All children of the sample used the two dentifrice brands. The dentifrice brands were selected based on a previous study.[22] The first one was Kolynos Super White (SB) - (Kolynos of Brazil Ltd, São Paulo, SP, Brazil), containing 1,500 ppm F/MFP, mentioned by the parents as of routine use for the children, and Tandy (T) - (Kolynos of Brazil Ltd, São Paulo, SP, Brazil) containing 1,100 ppm F/NaF, preferred by them.[22] The children received an extra soft children's toothbrush, Kolynos Doctor (Kolynos of Brazil Ltd, São Paulo, SP, Brazil), at the time of the brushing, which had been weighed initially.

Each child received an original packing of T or SB dentifrice, randomly determined by the operator. Then, he/she executed the placement of the dentifrice on the brush as he/she accomplished at home, with no information on placement technique or amount of dentifrice supplied previously. Then, the brush plus dentifrice was weighed.

The amount of dentifrice placed (ADP) on the dental brush was determined by the difference between the initial weight of the brush and the final weight of the brush plus dentifrice. Next, the child proceeded the brushing with no previous orientation on the technique or time of brushing. It was requested by the operator that they executed the procedure as they used to do at home, and the time spent in the procedure was monitored through a chronometer.

No interference was done by the operator on the post-brushing procedures, except the initial recommendation that the child expectorated as he/she usually did at home, but in a funnel inserted in a plastic flask. The funnel was rinsed with deionized water and the product of the rinsing was included in a plastic flask with the dental brush. The products of the expectoration of the oral residues from brushing were picked up using a wood spatula, also inserted in the flask.

The oral rinsing was accomplished with deionized water using plastic washing bottles, which was sprinkled as the child requested. After the end of the collection, the flask was closed with the cover cap and sealed with a ribbon adhesive. After one week this procedure was repeated with the other dentifrice.

Determination of the content of total fluoride in the samples

The analysis of the content of total fluoride was made using the brushes and the spatulas that were washed inside a beaker with deionized water and the volume was completed up to 50mL, following a methodology similar to Simard *et al*.[1]

The residues analysis of the group T dentifrice was made by the direct reading through fluoride specific electrode (Orion 9609) coupled to a pH meter (Procyon SA 720), and 1ml of TISAB III was added to the 10ml of the sample. For analysis of SB dentifrice the methodology was based on Heidbüchel[33] and Villena.[21] For a volume of 2.5ml of the sample, 2.5ml of 2M HCl was added after 1 hour in Water Bath (FANEM) at 45° C. Then, 5.0 ml of NaOH 1.0 M and 1.0 ml of TISAB III were added. Next, the solution was read at a Fluoride specific electrode (Orion 9609) coupled to a pH meter and the 0.25, 0.5, 1.0, 5.0 and 10 ppm solution patterns were used in the calibration curve.

Calculation methods of the studied parameters

The amount of dentifrice placed (ADP) on the brush was calculated by the difference between the final weight of the brush plus the dentifrice and the initial weight of the brush alone. The amount of ingested fluoride (AFI) was deduced starting from the reading of the fluoride specific electrode combined to the pH meter that determined the reading in mV. The data were transformed in ppm and the result was multiplied by 0.05L, being calculated, therefore, the amount of expectorated fluoride. The amount of ingested fluoride was obtained through the difference between the amount of fluoride placed and the amount of fluoride expectorated. The amount of ingested dentifrice (AIT) was determined proportionally in relation to the amount of ingested fluoride (AFI), multiplied by the concentration of fluoride from the used dentifrice that was determined previously. The time of brushing (TB) was determined through digital chronometer, in seconds, and it was considered as the time elapsed in each brushing.

The obtained data were submitted to the variance analysis (ANOVA). It was adopted the 5% significance level of alpha (α) as critical limit for rejection of the nullity hypothesis.

RESULTS

The tooth brushing habits were related at the amount of placed dentifrice, ingested dentifrice and time of

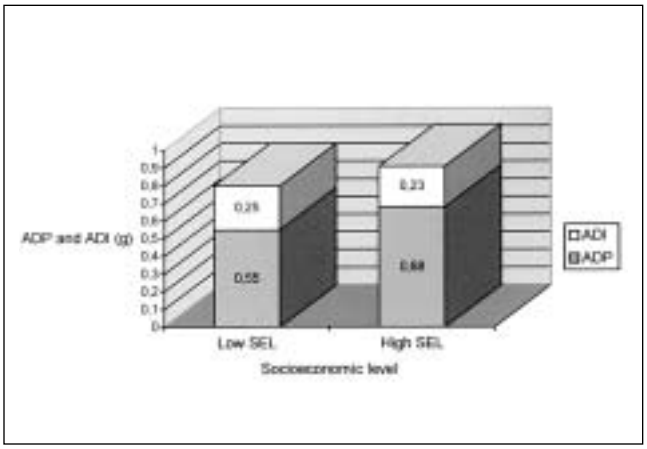

Figure 1. Amount of dentifrice placed on toothbrush and ingested by children from the sample.

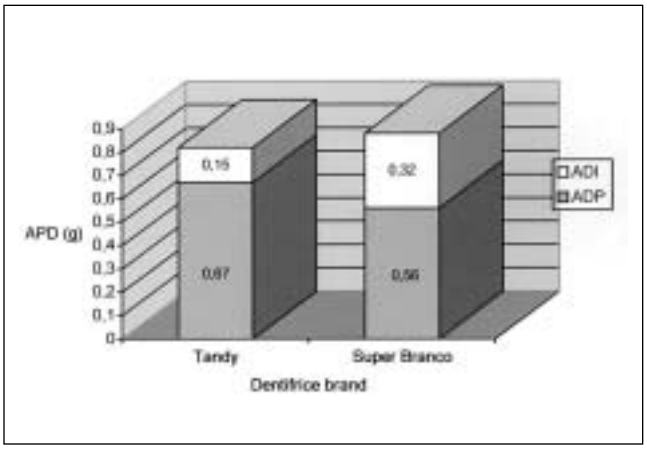

Figure 2. Amount of dentifrice placed on toothbrush and ingested by children from the sample.

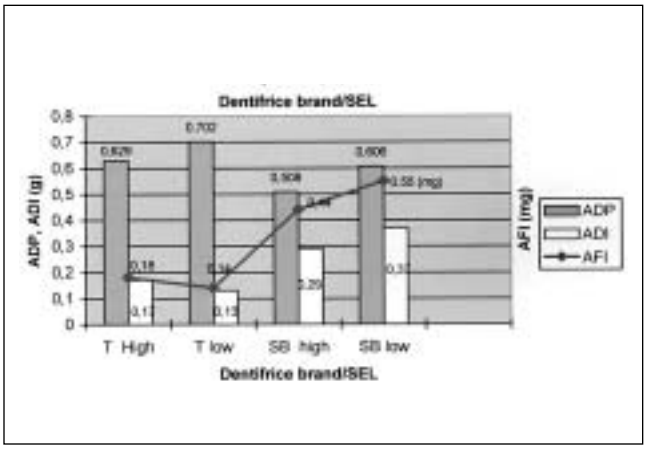

Figure 3. Amount of dentifrice on brush and ingested and amount of fluoride ingested by children from the sample.

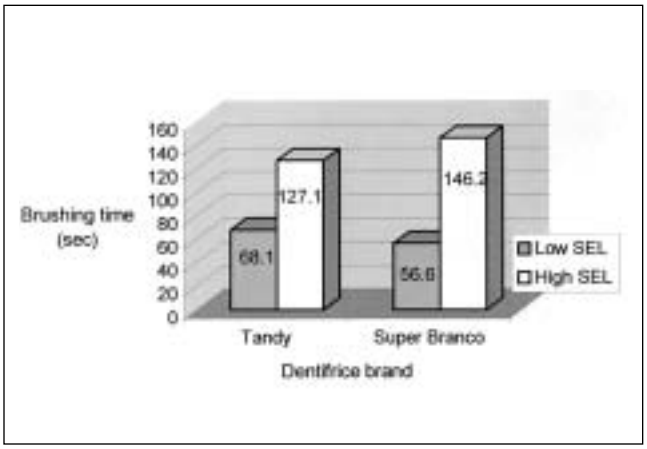

Figure 4. Brushing time according to SEL and dentifrice brand.

brushing. A statistically significant influence of the socioeconomic level was observed on ADP on the dental brush (P=0.0251), which can be seen at Figure 1. It can be observed that ADP on the dental brush by children from high SEL was significantly larger (Figure 1). In Brazil, the children of high economic level attend private schools, unlike the ones of low socioeconomic level, who attend public schools. The amount of T dentifrice placed on the brush by two-studied SEL children was significantly larger than the SB one (P=0.0005) and it can be seen at Figure 2. In Figure 3, a comparison of the patterns of T and SB dentifrice placement and ingestion are demonstrated, according to the children SEL. The results showed that there was no statistically significant difference on the ADI regarding to SEL (P=0.8475). However, regarding the dentifrice brand, the results showed that independent of SEL the children exhibited statistically significant larger ingestion of SB dentifrice (P=0.0001), which is demonstrated on Figure 4. Concerning the dentifrice brand and SEL interaction, it can be observed that the low SEL children ingested a larger amount of SB dentifrice (P=0.0001), and for the ones with high SEL the difference was smaller, evidencing the existence of a potentiation of low SEL on the dentifrice brand considering the amount of dentifrice ingested (Figure 5).

The high SEL children ingested a significantly larger amount of T dentifrice than those of the low SEL (P=0.0016), while the children of the low SEL exhibited a larger ingestion of SB dentifrice in relation to the ones of high SEL (Figure 5), however, those differences cannot be considered statistically significant.

Regarding the SEL and dentifrice brand influence on the fluoride ingestion it can be noticed that the SEL did not significantly influence the AFI (P=0.4160), but the dentifrice brand influenced the AFI (P=0.0001). The results showed that although the influence of SEL is not statistically significant, T dentifrice caused a larger fluoride ingestion for high SEL children (P=0.0001), while SB dentifrice caused a larger fluoride ingestion to low SEL children (P=0.0001) as it is demonstrated on the Figure 5. We can also observe the potentiation of the fluoride ingestion provoked by the combination of SB dentifrice with both high and low

SEL. The difference to low SEL children is much more evident than that observed at high SEL ones (Figure 5). Besides, although the children placed a higher amount of T dentifrice on brush, they ingested a higher amount of dentifrice and fluoride from SB dentifrice (Figure 5).

The results showed that there was a statistically significant influence of SEL on the TB (P=0.0001), but there was no statistically significant influence of dentifrice brand on the TB (P=0.3689). The children from high SEL exhibited significant higher TB (P=0.0001). However, there was no statistically significant influence of dentifrice brand on TB, there was significant influence of the dentifrice brand within the low SEL children (P=0.01). The low SEL children showed a significant higher TB using T than SB dentifrice brands (fig 6).

DISCUSSION

Studies concerning dentifrice ingestion have presented contradictory results, concerning the amount of ingested dentifrice. It is attributed to the diversity of methodologies and differences of educational, cultural and social levels among the several countries in which those researches were accomplished.[1,10-12,18-20] It is also observed a great variety of results within the same sample, individually, according to the considered age grouP.[3,34] In this research it was observed that there was a significant influence of the social economic level (school type) and the dentifrice brand on ADP (P <0,05). High SEL children placed, on the average, 24% more dentifrice on the dental brush than the low SEL ones; in a first evaluation it can be attributed to the largest availability and access to the dentifrice brands (Figure 1).

Besides, although the high SEL children have access to the dental private practice, and consequently to the information about preventive methods to dental caries, it seems that there is no concern on the part of the professionals in informing the patient on the risk/benefit of the fluoride dentifrice use, as pointed out by Ripa[7], who verified that, in comparison to parents and patients, orthodontists demonstrated smaller concern with the presence of dental fluorosis.

A larger access to the product seems to propitiate a larger amount of dentifrice placed on toothbrush, and that, associated to the lack of information on the safe dentifrice use, can expose a larger risk of dental fluorosis in the studied population.

In relation to the dentifrice brand, on the average, the sampled children placed a significantly larger amount of T dentifrice on the toothbrush, indicating the children's preference, faintly related to the socioeconomic level, for the dentifrice with scent and flavor adapted to the children's taste (Figure 2). Those results corroborate the ones of Villena *et al.*[35] and Puppin-Rontani *et al.*[22], that analyzed questionnaires on the dentifrice preference, and showed the children's preference for the children's dentifrice, corroborating the results found by Puppin-Rontani *et al.*[22] that demonstrated a higher preference for children's dentifrice, but at the same time, they found a larger frequency of use of conventional dentifrice instead of the children's one.

According to Miasato *et al.*[36], another fact that can contribute to the amount of dentifrice released from toothpaste tube is the hole size of the dentifrice tube, which can influence the amount of dentifrice released on the brush. The results obtained in this study corroborate those findings where a larger release of T dentifrice on the brush was observed, in comparison to SB dentifrice, whose tube hole diameters were respectively 8.8 and 7.6mm. It should be pointed out that in this study, information about the brushing method, amount of used dentifrice, as well as numbers of post brushing rinsing were not provided to the children, so that they showed during the experiment their daily routine habits of oral hygiene.

The obtained results showed that a larger amount of fluoride was placed on the toothbrush from the dentifrice SB compared to the T one, although a larger average amount of T dentifrice have been used, in relation to the amount of SB one. The difference in fluoride amount placed on brushing varied according to the amount of fluoride contained in the dentifrice. SB and T dentifrice brands present 1,500ppm and 1,100ppm F, respectively. Then, the use of SB dentifrice provided a larger amount of available fluoride.

Although the children had placed larger amounts of T dentifrice, they ingested a significantly larger amount of SB. The difference between the ingestion of SB and T dentifrice brands by low SEL children was larger than that presented by those of the high SEL (Figure 3). Therefore, it can be observed that regardless of the socioeconomic level, the children ingested a larger amount of SB in relation to T.

One of the factors that contribute to ADI can be related to the amount of detergent presented in its composition. According to the manufactures' information (Kolynos of Brasil Ltd.), the children's dentifrice brand, in the gel form (T) presents smaller amount of Sodium Lauril Sulfate, in comparison to SB dentifrice. This occurrence provides decreasing of the amount of foam formed during the brushing, and it offers smaller risk for ingestion, as demonstrated in this study, where a larger amount of SB was ingested in relation to T, although a larger amount of T had been placed on the dental brush.

The results showed that high SEL children, compared to the low SEL ones, ingested T dentifrice in larger amounts. Concerning SB dentifrice, the low SEL children ingested a larger amount of SB in comparison to the high SEL ones (Fig 3); even so, the differences were not statistically significant.

The ingestion of fluoride originated from the two studied dentifrice, T and SB, revealed that proportion-

Table 1. Oral hygiene habits regarding children aged 3-6 concerning ADP, ADI, AFI and TB according to SEL and Dentifrice type.

	Tandy Uva		Super Branco	
	Low SEL	High SEL	Low SEL	High SEL
ADP (g)	0.448	0.738	0.449	0.596
ADI (g)	0.104	0.231	0.342	0.299
AFI (mg)	0.114	0.255	0.513	0.448
TB (sec)	71	125	56	142

ally, the dentifrice T produced a larger fluoride ingestion in the high SEL children compared to the Low ones, in opposition to SB. In relation to the amount of fluoride originating from dentifrice SB it was observed that the amount of ingested fluoride was larger for the low SEL children (Figure 3).

Those data demonstrate that the amount of fluoride ingested during the brushing is dependent on the composition of the dentifrice. In that way, mainly in the smaller age groups, the use of a children's dentifrice brand should be indicated and an adult must supervise the brushing to avoid the inadvertent dentifrice ingestion.

The potentiation of the fluoride ingestion in this research was produced by the combination of SB dentifrice in the Schools 1 and 2 (low and high SEL, respectively). The difference of AFI by low SEL children (School 1) is so much more evident than observed by high SEL children (School 2), because the amount of SB dentifrice ingested by children from School 1 was larger than that ingested by children from School 2. It is important to remind that SB presents in its composition a larger fluoride concentration than T dentifrice, although it should be considered that in that one the fluoride is not totally bio-available.

In this study was observed that the low and high SEL children ingested 0.114mg and 0.255mg of fluoride, respectively, from T dentifrice, and the low and high SEL children, respectively, ingested 0.513mg F and 0.448mg F from SB dentifrice, (Table 1) regarding 3-6-year-old children.

If we consider those AFI values per brushing and so that children brushed their teeth 2 or 3 times/day[1,22] only by the brushing procedure, for children aged 3 to 6-year-old, the children are ingesting a fluoride overdose, beyond that recommended as a safe dose to prevent the chronic intoxication by fluoride, and they can be considered as being a high dental fluorosis risk sample, due to they become to an area with fluoridated water.

Even considering that there was overestimate fluoride ingestion from the high brushing frequency told by the mothers, more researches should be accomplished to evaluate the amounts and fluoride sources that the children of that age group are submitted to settling down safe protocols for the fluoride administration.

It was observed that there was statistically significant difference to TB in the two schools, being considered the two-studied dentifrice. The high SEL children spent larger TB, emphasizing that socioeconomic and cultural factors should have influence on the habits of oral hygiene. However, being considered the dentifrice brand, there was no statistically significant difference related to the TB when children used adult's (99 seconds) and children's dentifrice (92 seconds). Adair *et al*.[5], reported that for children aged 31 to 60 months the spent time in the brushing procedure with the adult dentifrice was of 83.56 seconds and 57.48 seconds for the children's one.

Being considered the dentifrice individually, related at the average time of brushing, it was observed that low SEL children exhibited a larger TB using dentifrice T than SB, pointing out that the low SEL children seems to have little access to the children's dentifrice brand, determining the use for a larger period of time of the infantile dentifrice, adapted to the child taste.

The children of the high SEL presented a larger ADP on the brush and they spent a larger TB. After observing the tooth brushing habits presented by the children of the sample, in relation to AFI, ADP, ADI and TB, recommendations should be made by the professionals with the aim of preventing the unnecessary exhibition of the dental fluorosis risk.

The prevalence and severity of the dental fluorosis depend on the concentration of the ingested fluoride during the dental development, on the individual susceptibility and on environmental variations.[20] Therefore, it should be analyzed the several fluoride sources that the child, mainly in the age of 0 to 6 years, is submitted, to due to the condition of faulty aesthetics and irreversibility that the fluorosis can provide.

In Brazil, there are reports of prevalence of dental fluorosis around 11.7% for the city of Piracicaba (0.7 ppmF in the water of provisioning) and 0.7% for the city of Iracemápolis (0.2 ppm F).[38] In that way the several fluoride sources should be used in a cautious way so that the benefits provided by its employment is potentialized and the inappropriate use it is reduced. [7,8,29,32,40-42]

Many authors recommend, in order to diminish the risk of ingestion of fluoride dentifrice, the necessity of the parents' supervision in the placement of

the dentifrice and during the brushing period, mainly for the young children that do not possess motive control in the swallowing reflex and for they possess not enough dexterity to accomplish an efficient brushing.[15,19,25,43]

In developing countries, as Brazil, there is a need of professional orientations and warning in the packing of the fluoride dentifrice with relation to their use for children in the susceptibility window to the dental fluorosis.[22,44-46]

Limited amounts of dentifrice, whose formulation should not surpass 1,000 to 1,100 ppm, (Pang and Vann Jr[9]) should be released on the brush that preferentially should have small and round bristles and head and the amount of dentifrice should be limited to the size of a pea or placed by the traverse technique of dentifrice placement.[3,14,24,44,47,48] There are authors who point out those recommendations, and suggest that there is a decrease in the fluoride concentration in dentifrices targeting the infantile public[24,48] and also that the children should not be stimulated to play or to eat dentifrice.[14]

CONCLUSION

Based on the results obtained in this study, it can be concluded that:

1. The socioeconomic level (public school – School 1, low SEL; private school - School 2, high SEL) influenced ADP, and TB significantly, with the children of higher level exhibiting larger ADP and TB values.
2. The dentifrice brand (SB or T) influenced significantly the ADP, ADI, and TB.

REFERENCES

1. Simard PL, et al. The ingestion of fluoride dentifrice by young children. J Dent Child 56: 177-81, 1989.
2. Naccache H, et al. Factors affecting the Ingestion of fluoride dentifrice by children. J Public Health Dent 52: 222-26, 1992.
3. Heilman JR, et al. Estimated ingestion of fluoride dentifrice by preschool children. J Dent Res 78: 170, 1999.
4. Levy SM, Maurice TJ, Jakobsen, JR. A pilot study of preschoolers use of regular – flavored dentifrices and those flavored for children. Pediatr Dent 14: 388-91, 1992.
5. Adir SM, Piscitelli WP, Mcknight-Hanes C. Comparison of the use of a child and adult dentifrice by a sample of preschool children. Pediatr Dent 19: 99-103, 1997.
6. Duckworth RM, Knoop DTM, Stephen KW. Effect of mouthrinsing after toothbrushing with a fluoride dentrifice on human salivary fluoride levels. Caries Res 25: 287-91, 1991.
7. Ripa LW. Symposium on appropriate uses of fluoride in the 1990. A critique of topical fluoride methods (dentifrices, mouthrinses, operator, anal, self – applied (gels) in a era of decrease caries and increased (fluorosis prevalence). J Public Health Dent 51: 23-41, 1991.
8. Levy SM, Zarei ZM. Evolution of fluoride exposures in children. J Dent Child 58: 467-73, 1991.
9. Pang DTY, Vann Jr, WF. The use of fluoride containing tooth pastes in young children: the scientific evidence for recommending a small quantity. Pediatr Dent 14: 384-7, 1992.
10. Ericsson Y, Forsman B. Fluoride retained from mouth rinses and dentifrices in preschool children. Caries Res 3: 290-9, 1969.
11. Barnhart WE, Hiller LK, Leonard, GJ. Dentifrice usage and ingestion among four age groups. J Dent Res 53: 1317-22, 1973.
12. Baxter, PM. Dentifrice ingestion during toothbrushing by school children. Br Dent J 148: 125-8, 1980.
13. Dowell TB. The use of dentifrice in infancy. Br Dent J 150: 247-9, 1981.
14. Feigal RJ. Recent modifications in the use of fluorides for children. Northwest Dent 62: 19-21, 1983.
15. Skotowski MC. Risk factors for dental fluorosis in pediatric dental patients. J Public Health Dent 55: 154-9, 1995.
16. Unkel JH, et al. Toothbrushing ability is related to age in children. J Dent Child 62: 346-8, 1995.
17. Den Besten P, Ko HS. Fluoride levels in whole saliva of preschool children after brushing with 0.25 g (pea-sized) as compared to 1.0 g (full-brush) of a fluoride dentifrice. Pediatr Dent, 18:277-80, 1996.
18. Hargreaves JÁ, Ingram GS, Wagg BJ. Excretion studies on the ingestion of monofluorophosphte dentifrice by children. Caries Res 4: 256-68, 1970.
19. Hargreaves JÁ, Ingram GS, Wagg BJ. A gravimetric study of the ingestion of dentifrice by children. Caries Res 6: 237-43, 1972.
20. Ekstrand, J. Toxidade de flúor – fluorose dental. J Aboprev, São Paulo, 9: 1, 1999.
21. Villena RS. Análise da disponibilidade de flúor de dentifrícios de procedência peruana e da sua estabilidade após 12 meses de armazenamento. 90p. Dissertação (Mestrado) – Faculdade de Odontologia, Universidade de São Paulo, 1993.
22. Puppin-Rontani, RM et al. Fluoride dentifrice use by Brazilian schoolchildren from a fluoridated town. J Dent Res 76: 90, # 616, 1997.
23. Beltrán ED, Szpunar SM. Fluoride dentifrices for children: suggestion for change. Pediatr Dent 10: 185-8, 1988.
24. Horowitz, H S. The need for dentifrices with lower than conventional fluoride concentrations for preschool-aged children. J Public Health Dent 52: 216-21, 1992.
25. Levy SM. A review of fluoride intake from fluoride dentifrice. J Dent Child 60: 115-24, 1993.
26. Villena RS, et al. Estudo comparativo sobre o uso de dentifrícios fluoretados em crianças. In: Reunião da Sociedade Brasileira de Pesquisa Odontológica (SBPqO). 12: 86, 101, 1996.
27. Peres PEC, et al. In situ evaluation of a dentifrice formulation with low fluoride concentration. J Dent Res 78: 171, #526, 1999.
28. Heidbüchel PN. Fluoride determination in dentifrice- extracts with fluoride sectrade based on kinetics of hydrolysis of sodium-monofluorophsphate. Pharm Acta Helv 66: 290-7, 1991.
29. Miasato JM et al. Modified dispensing device and orientation; effects on quantity of dentifrice. J Dent Res 78: 497, # 3134, 1999.
30. Paiva SM, Cury JA. Contribution of diet and fluoridated dentifrice to the risk of dental fluorosis. J Dent Res 78: 367, #2089, 1999.
31. Gaspar, MR et al. Opacidades de origem não- fluorótica e fluorose dentária em áreas com baixo (0,2 ppmF) e ótima (0,7ppmF) concentrações de flúor na água de abastecimento. Rev Bras Odont 52: 13-8, 1995.
32. Schrotenböer GH. Fluoride benefits- after 3 years. J Am Dent Assoc 102: 473-4, 1981.
33. Larsen MJ, et al. Enamel fluoride, dental fluorosis and dental caries among immigrants to and permanent residents of five Danish fluoride areas. Caries Res 20: 349-55, 1986.
34. Lalumadier JA, Rozier RG. The prevalence and risk factors of fluorosis among patients in a pediatric dental practice. Pediatr Dent 17: 19-25, 1995.
35. Malatt ME, Smith CE. Acute fluoride ingestion: Recognition and Management. IDA J, 23-8, 1996.
36. Lewis, DW, Limeback, H. Comparison of recommended and actual mean Intakes of fluoride by Canadians. J Can Dent Assoc 62: 708-15, 1996.
37. Rock WP, Sobieha AM. The relationship between reported dentifrice usage incisors. Br Dent J 183: 165-70, 1997.

38. Barbosa, TRCL, Chelotti, A. Avaliação do conhecimento de aspectos da prevenção e educação em odontologia, dentição decídua e oclusão em gestantes e mães até 6 anos pós- parto, como fator importante na manutenção da saúde bucal da criança. Rev Instit Ciênc Saúde, 13-7, 1997.
39. Kroon J. Calculating the risk for dental fluorosis: Is this feasible? J Dent Res, Washington, 78: 433, Mar. 1999. [Abstract 2615].
40. Villena RS. Transversal technique as an alternative to placing fluoride dentifrice: an evaluation in South America. J Dent Res 78: 169, #508, 1999.
41. Osuji OO et al. Risk factors for dental fluorosis in a fluoridated community. J Dent Res 67: 1488-92, 1988.
42. Villena,RS , Cury, JA. Flúor – aplicações sistêmicas. In Odontopediatria na primeira infância, 1rst Ed. MSNP, Corrêa, MSNP. São Paulo: Santos, pp 291-314, 1998.