

REVIEW ARTICLE

Use of Fluoridated Tooth Paste Under Age 6: How Much Safe?

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ABSTRACT

Now –a- days Fluoridated toothpastes are mostly used as preventive interventions in dentistry because the appropriate use of fluoridated toothpaste reduces the risk of incidence of caries and it makes balance between the risk of fluorosis and anticaries effect. Therefore the amount of toothpaste in child must be in consideration of the risk and efficacy.

Keywords: Toothpaste, Fluoride, Preschool children, fluorosis, caries

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INTRODUCTION

Mouth and dentition plays a major role in the life of the child and it expresses happiness and sadness and allowing vocal communication.¹ So for good health; healthy mouth should be the goal for all children. Effective brushing helps in removing dental plaque. Now –a - day's many tooth brushes and pastes are available in market, which especially designed for children.(Fig 1)²

In 2003 Marinho et.al reviewed on fluoridated toothpaste for children in association with “The Cochrane Collaboration” and concluded that fluoridated toothpaste are helpful in preventing caries.³ Taken together, the trials are of relatively high quality, and provide clear evidence that F-toothpastes

are efficacious in preventing caries,^{3,3} (Fig 2).

Usually the type, frequency and quantity of any toothpaste used by children depend upon parental preference.⁴ Low but excessive fluoride ingestion by the children during tooth formation causes dental fluorosis which is seen in both the fluoridated and non-fluoridated areas.⁵ The main purpose of this review is to assess the parental attitude and their pattern of toothpaste usage among children below six years of age because at this age Fluorosis usually affects, developing un-erupted and erupted permanent teeth in children.⁶

DISCUSSION

Parents are the main source who can motivate the children towards the good oral health with the help of their knowledge regarding oral health and implementation of preventive attitudes.⁷

Small children's plaque can be removed by either washcloth or soft, small headed toothbrush in combination with smear layer of non-fluoridated toothpaste as the child's first tooth erupts in oral cavity.⁸

In infants gum pads have to be cleaned or massaged gently by using wet cloth or gauze or cotton. Oral hygiene care must be started as soon as possible prior to the eruption of first tooth erupts in oral cavity.⁹

Tooth brushing activity should be started as soon as the first tooth starts to erupt in oral cavity (Tay and Jaafar¹⁰ and Nagarajan et al.),⁷ by using fingertip tooth brushing (fig 3) aid



Figure-1: Different types of tooth brushes for children



Figure-2: Different type of fluoridated toothpastes for kids

or smear layer of fluoridated children's tooth paste.

According to the recommendations of European Academy of Paediatric Dentistry (EAPD)⁸ and American Academy of Pediatric Dentistry (AAPD)¹¹, children who are below the age of six should use toothpastes with low fluoride concentrations (less than 500 ppm). There are two different views regarding on this issue; one states that children below the age of two years are at higher risk for enamel fluorosis than who begin to use fluoridated toothpaste later/not use them at all.^{12,13} so the use of gauze and water or non-fluoridated toothpaste for cleaning of infant's teeth are recommended. On another view only use of smear layer may be beneficial in preventing caries.(fig 4) Clinically it is proven that the role fluoride is beneficial in caries prevention.¹⁴

There is good evidence that F exerts its main effect in the maturation phase of tooth development [Andersen et al., 1986; Richards et al., 1986].¹⁵ However, although the main effect is thought to be on enamel maturation there is also evidence to suggest that continuous intake of F during and after the secretory phase may also increase fluorosis risk [Aoba and Fejerskov, 2002].¹⁶ It should be appreciated that initially, even when the crown is fully formed, the mineral density is low (30%) [Robinson et al., 1996].¹⁷ Maturation of the enamel occurs up to the time of eruption, with a phase of heavy mineralization of the surface enamel occurring just prior to eruption, the so-called pre-eruptive maturation phase. This results in a final mineral density for enamel of about 96%. It is believed that F present in the extra cellular matrix of the developing enamel inhibits the breakdown of enamel proteins required for full mineralization, resulting in porous enamel. This effect is not at the cellular level but depends on the tissue F concentration [Aoba and Fejerskov, 2002].¹⁶ At higher doses than those normally seen in the majority of the population there is a possibility that F may exert a more pronounced effect at earlier stages of tooth development via a cellular effect that would not be specific to ameloblasts.

In 1995 Evans and Darvell¹⁸ investigated the conc. of fluoride in drinking water of HongKong from 1.0 ppm to 0.7 ppm. Along with a number of studies have considered for the timing of F ingestion and the risk of fluorosis and they concluded that maxillary permanent central incisor appears most at risk to fluorosis from dietary fluoride between age 15 and 24 months for male and between 21 to 30 months for females. So it is said that fluoride ingestion is restricted for children under the age of 30 months. In case of other aesthetically important teeth the age range will need to be extended.

A pea sized amount of fluoride dentrifice(fig 5) has been more consistently recommended for preschoolers.¹⁹ The findings showed that mothers lacked knowledge regarding quantity of toothpaste that could be used or they may have been influenced by seeing the advertisements on toothpastes.⁸ It is prudent to suggest that children who are between six months to two years of age should use small smears of low fluoride toothpastes for cleaning their teeth.⁹ Children who are be-



Figure-3: Soft fingertip tooth brush



fig 1: Under 2, Smear



fig 2: 2 years and older, Pea-Sized

Figure-4: Smear layer children's fluoride toothpastes

Correct Amount of Toothpaste for Children

It is common for children to use more toothpaste on the toothbrush than what is needed or what is in the child's best interests. Too much toothpaste increases the chances of your child consuming too much fluoride.

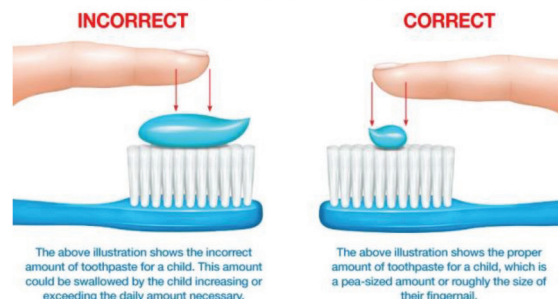


Figure-5: Correct amount of toothpaste for children

tween two and six years of age should use pea sized quantities of less than 500 ppm of fluoride containing toothpastes, unless it is recommended otherwise by their dentists.²⁰ Ellwood et al., 2008 (Table 1) states that the doses of fluoride delivered into the mouth for a "thin smear", "small pea", "half head" and "full head" of a child-sized toothbrush are estimated for the three most commonly available F concentrations in toothpaste. Clearly toothbrush head sizes vary between different brands and the interpretation of a smear and pea sized amount is somewhat variable and these values should only be taken as a guide. It can be seen that a "thin smear" might deliver approximately 0.06 mg of fluoride for a 500 ppm F (w/w, mg F/kg) toothpaste formulation and a small pea sized amount of a 1,000 ppm F toothpaste delivers approximately 0.25 mg the same as approximately a half head of 500 ppm F paste.²¹

Multiple tooth brushing every day can result in ingestion of excessive amount of fluoride, in children²² So tooth brushing should be twice daily, at least to maintain good oral health. It is fact that effectiveness of brushing is more important than frequency of tooth brushing.²² There is also strong evidence for improved efficacy of twice daily brushing compared with once daily [Ellwood et al., 2008]. Therefore, it is sensible that for this young age group any calculations of potential F intake from toothpaste should be based on twice a day brushing and the assumption that all the F applied is ingested.²¹

Swallowing reflex is not completely developed in young children²³ and 26 to 65% dentifrices may be ingested by the children having age of 6 years²⁴ Parents should be educated regarding the toxic effect of excessive fluoride ingestion by the children²⁵

In one study Cochrane et al., 2004 the percentage of toothpaste swallowed of that used in seven cities was compared for 1.5 to 2.5 year olds. The mean percentage ingested ranged from 64 to 84 % with between 36 and 70% of children swallowing 80-100% of the toothpaste applied.

Studies which were conducted by Steven M Levy et al.¹⁹ showed that parental assistance in brushing was associated with the duration of brushing. The fact that children who received parental assistance during brushing, ingested more fluoride than children who brushed by themselves, may have been seen, due to longer brushing done with help of parents, as parents desired to achieve excellent oral hygiene and caries prevention for their children, coupled with their lack of knowledge regarding fluorosis and fluoride ingestion.⁹

Young children have lack of manual dexterity for carrying out brushing effectively as well as inability in expectorating property. So parents must be supervise their children's tooth brushing habits and if required brush their toddler's teeth especially by standing or kneeling behind children in front of the mirror. Over ingestion and effective cleaning of tooth is important.⁷

Mostly it is seen that children rinses their mouths with plenty of water after brushing, while some swallowed tooth pastes while brushing.²⁶ This may not be a good practice, as it tends to wash away the fluoride which is needed for caries prevention activity.²⁷ According to studies for seeing beneficial effect of fluoride in caries prevention, one has to ensure a continued presence of fluoride orally for a considerable period, for it to assert its effect on the teeth.²⁸ Therefore, children who are below the age of six years should be encouraged to either rinse briefly with a small amount of water or to spit out the oral contents without rinsing, in order to retain more fluoride in the mouth.⁷

Clinical recommendations

The EAPD recommendations for the use of fluoride toothpaste in children are summarized in Table 2. The daily use of fluoride toothpaste, in combination with oral hygiene instructions, is recommended as the basic part of a caries-pre-

	Fluoride concentration of paste in ppm F		
	500 ppm F 0.5 mg F/g	1000 ppm F 1 mg F/g	1500 ppm F 1.5 mg F/g
"Thin smear" 0.125g	0.06 mg	0.13 mg	0.19 mg
"Small Pea" 0.25g	0.13 mg	0.25 mg	0.375 mg
"Half head" 0.5 g	0.25 mg	0.5 mg	0.75 mg
"Full head" 1.0 g	0.5 mg	1.0 mg	1.5 mg

Table-1: Dose of fluoride (mg F) contained in different amount of toothpastes for three commonly used fluoride toothpaste.

Age group	Fluoride concentration	Amount to be used Daily use
6 months-<2 years	500 ppm	twice pea-size
2-<6 years	1000 (+) ppm	twice pea-size
6 years and over	1450 ppm	twice 1-2 cm

Table-2: Recommended use of fluoride toothpaste in children.

ventive program in addition to other caries-preventive methods, such as diet counseling, topical use of fluorides and fissure sealants, which are also important.

So fluoridatedtoothpaste must be used as guidelines which was reconed by EAPD⁸ and AAPD¹¹

CONCLUSIONS

This review suggests that the regular use of fluoride toothpaste is associated with a clear reduction in caries increment. It appears that there is still much lack of awareness on proper guidelines for the selection and usage of toothpastes in children It is clear that the risk of fluorosis is dependent on the dose ingested. Professionals should use this knowledge to help and motivate parents to properly supervise and assist their children's brushing, with the goal of reducing the potential risk of fluorosis. Parents should be provided sufficient knowledge on using small amounts of dentifrice and trying to avoid their children from ingesting dentifrice.

REFERENCES

1. Erickson R.T., Thomas HF. A survey of the American Academy of Pediatric dentistry membership infant oral health care. *Pediatr Dent.* 1997; 19: 17-21.
2. Lynch RJM, Navada R, Walia R. Low-levels of fluoride in plaque and saliva and their effect on the demineralisation and remineralisation of enamel; role of fluoride toothpastes. *Int Dent J.* 2004; 54: 304-09.
3. Marinho VC, Higgins JP, Sheiham A, Logan S. Fluoride toothpaste for preventing dental caries in children and adolescents. *Cochrane Database syst Rev.* 2003;(1)
4. Featherstone JDB, Prevention and reversal of dental caries; Role of low level fluoride, *Community Dent Oral Epidemiol.* 1999; 27: 31-40.
5. Corey H. Basch, Rodney Hammond, Alexis Guinta,

- SonaliRajan, Charles E. Basch. Advertising of Toothpaste in Parenting Magazines. *J Community Health*. 2013;38:911–14.
6. Erdal S., Buchanan S. A quantitative look at fluorosis, fluoride exposure, and intake in children using a health risk assessment approach. *Environmental Health Perspectives*. 2005;113: 111–17.
 7. S Nagarajan MP Sockalingam, SuhairahJani, NoridawatiMohd Nor. Pattern of Toothpaste Usage in Children Under Six Years Old. *Malaysian Dental Journal*. 2010; 31: 14-19.
 8. Oulis CJ, et al. Guidelines on the use of fluoride in children; a EAPD policy document; *European Journal of Paediatric Dentistry*. 2000;1: 7-12.
 9. New Zealand Guidelines Group. Guidelines for the use of fluorides. Wellington: New Zealand Ministry of Health; 2009.
 10. Tay HL, Jaafar N. Mothers' Knowledge of Fluoride Toothpaste Usage By Their Preschool – Children. *Malaysian Dental Journal*. 2008; 29: 140-5.
 11. American Academy of Pediatric Dentistry. Policy on early childhood caries (ECC): Classifications, consequences, and preventive strategies. *Pediatr Dent*. 2008;30(suppl): 40-42
 12. Lalumandier JA, Rozier RG. The prevalence and risk factors of fluorosis among patients in paediatric dental practice. *Pediatr Dent*. 1995;17:19-25.
 13. Mascarenhas AK, Burt BA. Fluorosis risk from early exposure to fluoride toothpaste. *Community Dent Oral Epidemiol*.1998; 26: 241-48.
 14. Clarkson JE, Ellwood RP, Chandler RE. A comprehensive summary of fluoride dentifrice caries clinical trials. *Am J Dent*. 6 (special issue):59-106.
 15. Andersen L, Richards A, Care AD, et al. Parathyroid glands, calcium, and vitamin D in experimental fluorosis in pigs. *Calcif Tissue Int* 1986; 38:222-6.
 16. Aoba T, Fejerskov O. Dental fluorosis: chemistry and biology. *Crit Rev Oral Biol Med*. 2002;13:155-70.
 17. Robinson C. Kirham J. Weatherell JA Fluoride in Teeth and Bone. In: *Fluoride in Dentistry*. Copenhagen: Munksgaard, 1996: 69-87.
 18. Evans RW, Darvell BW. Refining the estimate of the critical period for susceptibility to enamel fluorosis in human maxillary central incisors. *J Public Health Dent*. 1995 Fall;55:238-49
 19. Steven M Levy, Jodi A McGrady, PatitaBhuridej, John J Warren, Judy R Heilman, James S Wefel. Factors affecting dentifrice use and ingestion among a sample of U.S. preschoolers. *Pediatr Dent*. 2000; 22: 389-94.
 20. Lussi A., Hellwig E., Klimek J. Fluorides: Mode of action and recommendations for use. *SchweizerMonatsschrift fur Zahnmedizin*. 2012;122: 1030–36.
 21. Ellwood, R., Fejerskov, O, Cury JA, Clarkson B. 2008, *Clinical use of Fluoride*, in Fejerskov, O., Kidd, E.A.M. (eds), *Dental Caries: The disease and its clinical management*, Blackwell Munksgaard, Oxford, pp. 287-327
 22. Levy SM. Review of fluoride intake from fluoride dentifrice. *J Dent Child*. 1993; 61: 115-24.
 23. Adair SM, Piscitelli WP, McKnight-Hanes C. Comparison of the use of a child and an adult dentifrice by a sample of preschool children. *Ped Dent*. 1997;19: 99-103.
 24. Ripa LW. A critique of topical fluoride methods (dentifrices, mouthrinses, operator-, and self-applied gels) in an era of decreased caries and increased fluorosis prevalence. *J Public Health Dent*. 1991; 51: 23-41.
 25. Naccache H, Simard PL, Trahan L, Brodeur J, Demers M, Lachapelle D, et al. Factors affecting the ingestion of fluoride dentifrice by children. *J Public Health Dent*. 1992;52: 222-26.
 26. Duckworth RM, Knoop DTM, Stephen KW. Effect of mouthrinsing after toothbrushing with a fluoride dentifrice on human salivary fluoride levels. *Caries Res*. 1991; 25: 337-42.
 27. Chesnutt IG, Schafer F, Jacobson APM, Stephen KW. The influence of toothbrushing frequency and post-brushing rinsing on caries experience in a caries clinical trial. *Community Dent Oral Epidemiol*. 1998; 26: 406-11.
 28. Duckworth RM, Morgan SN. Oral fluoride retention after use of fluoride dentifrices. *Caries Res*. 1991; 25: 123-29.