

# Preferences in the Prescription and Dosage of Children's Toothpaste Among General Dentists in Ecuador

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#### Abstract

Preventing carious lesions in infants is achieved through educating parents responsible for their children's oral hygiene in their early years, employing strategies such as proper brushing techniques and the use of suitable toothpaste. Objective: To determine the preference in the prescription and dosage of children's toothpaste among general dentists in Ecuador in 2021. Methodology: 388 dentists participated in a survey where they expressed their preferences regarding fluoridated children's toothpaste. The collected data were tabulated and analyzed using frequency tables and chi-square tests. Results: 39.43% of dentists use a fluoride concentration of 0.11%, and 35.05% are aware of dosing based on age. Conclusion: General dentists in Ecuador demonstrate moderate knowledge regarding the prescription of fluoridated toothpaste in children.

Keywords: Toothpaste; Prescription; Dentists; Fluoride concentration

# Introduction

Dental caries is one of the most prevalent diseases globally, affecting both children and adults, impacting not only patients' aesthetics but also their quality of life and that of their surroundings. This condition primarily results from a diet high in sugar coupled with poor oral hygiene. In children, the incidence of dental caries exceeds 50% of the population, irrespective of gender or social class, and regardless of socioeconomic strata [1].

Oral hygiene measures are crucial for preventing dental caries, this includes mechanical measures such as proper brush and floss use, and chemical measures like the appropriate use of toothpaste. The correct combination of these tools enables effective control of dental biofilm, the primary cause of enamel demineralization [2].

While proper brushing techniques have a beneficial effect on caries control, this effect is limited without appropriate toothpaste. Various toothpaste formulations are available in the market, with varying fluoride concentrations. Scientific literature suggests that the ideal concentration for anticaries protection and avoiding dental fluorosis risks is 0.11% of fluoride [3].

It is essential to determine the proper dosage of toothpaste and emphasize their correct usage. Worldwide entities, such as the American Academy of Pediatric Dentistry, have established parameters for fluoride use. The recommended dose varies based on factors such as the patient's risk level and age. For children under three years, a smear equivalent to a rice grain is recommended, while from age 3 onwards, an amount equivalent to a pea is advised [4]. The guidelines set by the Latin American Association of Pediatric Dentistry, an organization made up of 21 Latin American societies and who's primary objective is to bring optimal oral health to Latin American children, coincides with the International Association of Pediatric Dentistry's (IAPD) recommendations. Since the IAPD is the global reference for standard oral health care in pediatric patients, this emphasizes that brushing should start with the eruption of the first tooth, using a soft-bristled brush. Dispensing toothpaste on the brush head should be done by a responsible adult [5].

Ensuring an adequate dosage of toothpaste is used, is crucial in preventing side effects that can result from chronic exposure to excess fluoride. This includes dental fluorosis, which often presents mildly and is influenced by other factors such as consuming water with a high fluoride concentration [6]. Therefore, prescribing suitable toothpaste, considering an accurate anamnesis, the patient's cariogenic risk, diet, and residential area, becomes imperative.

In Ecuador, there has been no comprehensive information surveying professionals on this topic, prompting the need for this study to determine the preference in the prescription and dosage of children's toothpaste among general dentists in Ecuador in 2021.

# **Materials and Methods**

This research is an observational, descriptive, cross-sectional study. After obtaining approval from the bioethics committee of the Universidad San Francisco de Quito, contact was made with a representative of the Federación Odontológica Ecuatoriana. The study's purpose was explained, and a request was made for a database containing information on professionals nationwide meeting the study's inclusion criteria. An initial survey, modified from Wang's 2019, *Awareness of the benefits and risks related to using fluoridated toothpaste among doctors: A population-based study* [7], was created and validated by national experts to ensure clarity for participants.

Invitations were extended via email to general dentists listed by the Federación Odontológica Ecuatoriana, explaining the study's purpose and providing informed consent. Participants were informed of the information scope and were free to withdraw from the survey at any time. Those who voluntarily agreed to participate accessed the online survey through a provided link.

The study targeted general dentists practicing in Ecuador. The total population size was based on the number of dentists registered in the Agencia de Aseguramiento de la Calidad de Servicios de Salud y Medicina Prepagada (Acess), the regulatory body for health professionals in Ecuador. The search yielded 18,995 registered dentists as of April 2021, considered the approximate number of practicing dentists in Ecuador and used as the total population size.

Sample size calculation employed a statistical formula based on the total population size (18,995). A margin of error of 5% is expected, an interval representing the parameter estimate within the true population. Moreover, a heterogeneity percentage of 50% is desired, referring specifically to individuals within the population or sample size who showed interest. Lastly, we are looking for a confidence level of 95%, implying that if the study were to be repeated multiple times then 95% of the confidence intervals would remain true values. The minimum number of participants required for the digital survey, constituting the sample, was 378 professionals±3.

A probabilistic-simple random sampling method was employed. Each participant in the dentists' population who voluntarily responded to the survey received a unique number for equal participation opportunity.

# Selection Criteria Inclusion Criteria

- Dentists registered with Acess.
- Dentists voluntarily accepting informed consent and survey participation.
- Dentists currently practicing the profession.

#### **Exclusion Criteria**

- Health personnel other than dentists.
- Dentists not voluntarily accepting informed consent.
- Dentists not currently practicing the profession.

Following email invitations, participants voluntarily accessed the digital survey on Google Forms. This manner of surveing was chosen due to its simplicity, regarding ease of use and quick accessibility. For instance, participants answered 15 questions, without a time limit, and were given the option to skip any question they did not want to answer.

The survey comprised three blocks of closed-ended questions with multiple-choice responses, covering knowledge of anticaries effectiveness and the use of fluoridated toothpaste, considerations regarding the use and dosage of fluoridated toothpaste in children of different ages, and alternatives to fluoridated toothpaste in children.

Response options were numbered from 0 to 5 or 0 to 3, depending on the question. The estimated time for each participant to answer all questions was between 5 and 8 minutes, based on expert feedback during survey validation.

Survey responses were analyzed by grouping participants' chosen answers into an Excel file, subsequently subjected to statistical tests (Frequency). To find the correlation between knowledge variables and years of professional experience and university attended, the chi-square test was conducted using the SPSS statistical program.

### Results

Descriptive statistics, frequency distribution, and inferential statistical analysis were employed. Of the participants, 66% were female, and 34% were male (N= 388) (Fig. 1). Participants' universities were classified into two groups: those from public universities (268 or 69%) and those from private universities (120 or 31%) (Fig. 2).



Regarding dental practitioner fluoride concerns and the use of fluoridated toothpaste, the primary concern among respondents was the potential ingestion of toothpaste by patients (45%, N= 175), followed by the risk of dental fluorosis (43%, N= 167) (Fig. 3).

Prescribed fluoride concentrations varied: 39.43% of dentists (N= 153) prescribed children's toothpaste with 0.01 to 0.11 % of fluoride, 33.51% (N=130) prescribed 0.05 % of fluoride, 5.93% (N= 23) prescribed 0.09 % of fluoride, and 21.13% (N = 82) did not prescribe fluoride-containing toothpaste (Fig. 4).



Figure 2: Distribution of public and private schooling of participants. Source: Author's own research.



Dentists were asked if they considered the patient's age when prescribing fluoridated toothpaste. 71.13% (N= 198) considered the patient's age, 36.08% (N= 140) began prescribing from the eruption of the first tooth, 40.72% (N= 158) prescribed from age 3, and 21.65% (N= 74) either did not prescribe fluoridated toothpaste or lacked knowledge (Fig. 5).

An example of toothpaste dosage for 3-year-olds was suggested, with only 35.05% (N= 136) of respondents stating that the ideal dose for that age is equivalent to the amount of a pea (Fig. 6). This age group was chosen according to the standard provided by the American Dental Association (ADA) and World Health Organization (WHO). The ideal fluoride dosage in children of 3 years of age is critical. It guarantees proper protective benefits of fluoride without the risk of developing enamel abnormalities such as dental fluorosis.





The most commonly suggested alternative to fluoridated toothpaste was xylitol (37.63%), followed by organic/home-made toothpaste (10.31%), and toothpaste containing hydroxyapatite (8.76%) (Fig. 7).

To establish a correlation between respondents' universities and their knowledge levels, an equal number of responses were considered from both public and private universities (120 participants each). The analysis revealed that 64.17% (N= 77) of respondents from public universities did not recommend using toothpaste from the eruption of the first tooth, while 58.33% (N= 69) of respondents from private universities also did not recommend it. The resulting p-value was 0.042, indicating a significant correlation between dentists' knowledge and their alma maters.





# Discussion

This study aimed to determine the preference in the prescription and dosage of children's toothpaste among general dentists in Ecuador in 2021. The results indicate that the participating general dentists have limited knowledge regarding the prescription of children's toothpaste, which consequently can result in an increased risk of dental caries, dental fluorosis, poor oral care habits, and a lack of knowledge towards potentially harmful ingredients- ultimately straying from dental care. This also aligns with Fux-Noy's 2020 research, which also relied on surveys among dental professionals, concluding that professionals lacked knowledge about the appropriate fluoride quantity according to patients' age and needed more education on the topic [8].

Similarly, Wang's 2020 study [7] sought to determine the knowledge of dentists and physicians regarding the benefits and risks of fluoridated toothpaste. Despite dentists having a greater awareness of the anticaries efficacy of fluoridated toothpaste compared to

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physicians, few knew the actual benefits and risks of its use, leading to the conclusion that greater education is needed in the profession regarding toothpaste prescription.

Fluoridated toothpaste has proven to be a valuable tool for preventing dental caries in the population, serving as the primary non-professional tool for controlling this condition.

However, this research demonstrated that the majority of surveyed dentists do not prescribe toothpaste with a minimum of 0.1 % fluoride from the eruption of the first tooth, contrary to Walsh et al.'s findings. Their study, based on a literature review of 96 studies, aimed to determine and compare the anticaries effects of fluoridated toothpaste. It concluded that toothpaste with 0.15 % fluoride could reduce caries increase compared to non-fluoridated toothpaste for primary dentition [9]. In comparison, Walsh considers a higher concentracion of fluoride in regards to a base-line for attaining a protective effect, wheras our concentration levels are 0.05% less.

Another result of this research is that xylitol is the first alternative to fluoridated toothpaste prescribed. Despite attempts to substitute fluoride in anticaries treatments with components like xylitol, it has been demonstrated to have a less inhibitory effect on cariogenic bacteria like Streptococcus mutans and Lactobacillus acidophilus than fluoride at a concentration of 0.1% of fluoride [10].

Dental fluorosis has always been a major concern for dentists when using fluoride as part of pediatric patients' oral hygiene routines, as evidenced by the current results. However, evidence has shown that by dosing toothpaste according to the patient's age and needs, the risk of dental fluorosis decreases significantly, as affirmed by AAPD, 2021 [11] and Wong, 2019 [12].

To ensure effective and safe fluoride use in pediatric patients, it is crucial to educate parents, achieving proper dosage and disseminating clear and accurate information. Another result of this study showed that a high percentage of respondents did not dose toothpaste correctly based on patients' age, leading to potential misdosage by parents, consistent with Chedid's 2020 study [13], proposing an accessory for accurate toothpaste dosing according to the patient's age.

# **Conflicts of Interest and Funding**

There is no conflict of interest in conducting this study.

# Conclusions

Based on survey results, it was concluded that general dentists in Ecuador have moderate knowledge regarding the prescription of fluoridated toothpaste in children. Moving forward, accessible training programs should be made about prescribing toothpaste to children adequately for dentists. Additionally, it is essential to recognize that a viable alternative to fluoridated toothpaste that can be offered by healthcare professionals is one containing remineralizing minerals like hydroxyapatite, rather than homemade/organic toothpaste with potentially abrasive ingredients for dental enamel. For future research, surveys should be conducted using a larger sample size so as to obtain more valid and precise results. It would also prove beneficial for future research to compare dental practitioners knowledge and fluoride prescription according to age or year of graduation; perhaps including recent graduates.

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