GRADUATION PROJECT

Degree in Dentistry

EARLY INTRODUCTION OF FLUORIDE TOOTHBRUSHING HABITS AND ITS ROLE IN PREVENTING DENTAL CARIES IN CHILDREN. A PERSPECTIVE FROM DENTAL CARE PROFESSIONALS

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RESUMEN

Introducción: La introducción temprana del cepillado con pasta dental fluorada es una de las medidas preventivas más eficaces frente a la caries de la primera infancia, pero su aplicación en la práctica diaria depende en gran medida de las recomendaciones y de la comunicación de los profesionales de la salud bucodental. **Objetivos:** Este estudio tuvo como objetivo evaluar los conocimientos, las actitudes y las prácticas clínicas de los profesionales dentales con respecto a la introducción temprana de la pasta dental fluorada en niños, así como explorar las barreras y los facilitadores que influyen en la adherencia parental a estas recomendaciones. **Materiales y métodos:** Se realizó un estudio transversal descriptivo mediante una encuesta entre profesionales de la salud oral implicados en la atención pediátrica. Se utilizó un cuestionario en línea estructurado para recopilar datos sobre el perfil profesional, la edad aconsejada de introducción del flúor, la frecuencia recomendada del cepillado, los consejos dados a los padres, la discusión sobre la fluorosis, las barreras percibidas, la exposición a recomendaciones oficiales y las estrategias consideradas más eficaces para mejorar la adherencia. **Resultados:** Noventa y ocho profesionales completaron la encuesta. La mayoría recomendó pasta dental fluorada desde la erupción del primer diente y aconsejó cepillarse dos veces al día, utilizar cantidades adecuadas de pasta según la edad y supervisión parental. Sin embargo, una proporción considerable seguía retrasando la introducción del flúor hasta edades más tardías y rara vez hablaba de fluorosis con los padres. La principal barrera percibida para el uso temprano del flúor fue la falta de conocimiento parental, seguida del miedo al flúor y de las dudas sobre su eficacia. Las demostraciones prácticas y el seguimiento personalizado fueron identificados como las estrategias más eficaces para mejorar la adherencia parental. **Conclusiones:** Los profesionales dentales desempeñan un papel clave en la configuración de las prácticas de los padres relacionadas con el flúor. Aunque el conocimiento de las recomendaciones preventivas fue generalmente adecuado, persistieron diferencias en su aplicación práctica, lo que destaca la necesidad de una comunicación más clara, una mejor difusión de las guías y estrategias educativas más activas para las familias.

PALABRAS CLAVE :

Odontología, profesionales dentales, caries de la primera infancia, pasta dental fluorada, adherencia parental, prevención en salud oral.

ABSTRACT

Introduction: Early introduction of fluoride toothbrushing is one of the most effective preventive measures against early childhood caries, but its implementation in daily practice depends largely on the recommendations and communication of dental care professionals. **Objectives:** This study aimed to evaluate dental professionals' knowledge, attitudes, and clinical practices regarding the early introduction of fluoride toothpaste in children, and to explore the barriers and facilitators influencing parental adherence to these recommendations. **Material and methods:** A descriptive cross-sectional survey was conducted among oral health professionals involved in paediatric care. A structured online questionnaire was used to collect data on professional role, suggested age of fluoride introduction, brushing frequency recommendations, advice given to parents, discussion of fluorosis, perceived barriers, exposure to official recommendations, and strategies considered most effective to improve adherence. **Results:** Ninety-eight professionals completed the survey. Most respondents recommended fluoride toothpaste from the eruption of the first tooth and advised brushing twice a day, appropriate age-specific toothpaste quantities, and parental supervision. However, a substantial proportion still delayed fluoride introduction until later ages and rarely discussed fluorosis with parents. The main perceived barrier to early fluoride use was lack of parental knowledge, followed by fear of fluoride and doubts about its effectiveness. Practical demonstrations and personalized follow-up were identified as the most effective strategies to improve parental adherence. **Conclusions:** Dental professionals play a key role in shaping parents' fluoride-related practices. Although knowledge of preventive recommendations was generally adequate, differences remained in their practical application, highlighting the need for clearer communication, stronger guideline dissemination, and more active educational strategies for families.

KEYWORDS

Dentistry, dental professionals, early childhood caries, fluoride toothpaste, parental adherence, oral health prevention.

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1. INTRODUCTION

1.1. Early childhood caries and prevention

Dental caries is one of the most prevalent chronic diseases among children worldwide, with far-reaching effects on growth, development, and quality of life in young populations. Despite advances in paediatric dental care, caries remains highly prevalent, especially in low-income settings and populations with limited access to oral health education. Early prevention is essential, making the introduction of fluoride toothbrushing habits at a young age one of the most effective strategies in reducing caries incidence(1)(2)(3).

1.1.1. Definition of early fluoride toothbrushing

Early fluoride toothbrushing is defined as initiating regular (twice-daily) brushing with a fluoride-containing toothpaste when the first primary teeth erupt, using an age-appropriate amount (a smear or grain of rice under three years, pea-size beyond that), under parental supervision(2). This intervention targets the remineralization of enamel and inhibits the growth of cariogenic biofilm, reducing the risk of early childhood caries (4,5).

1.1.2. Rationale for early fluoride use

The theoretical underpinnings for early fluoride use derive from its well-documented ability to enhance enamel resistance to acid attacks and to interrupt the demineralization process through the formation of fluorapatite. Studies confirm that fluoride, administered either topically (toothpaste, varnish) or systemically (water, salt) has been pivotal in lowering caries rate across populations (3). Behaviourally, establishing toothbrushing as a daily routine from an early age increases adherence and sets the stage for lifelong oral health. Preventive frameworks also underscore the combined benefits of fluoride use, dietary modifications, parental involvement, and regular dental care for maximizing caries prevention.(6)

1.2. Evidence, benefits and safety considerations

Recent clinical trials and systematic reviews have demonstrated that early supervised brushing with fluoride toothpaste can greatly decrease the risk of caries and improve oral health outcomes, especially when paired with oral health education and targeted preventive measures like fluoride varnishes or sealants(3,4). For instance, a 24-month randomized controlled trial reported that oral health education and supervised fluoride toothbrushing were more effective

in reducing caries worsening than fluoride varnish alone, particularly in mixed dentition children. Systematic reviews further highlight that not only fluoride exposure but also the frequency and parental supervision of brushing are critical determinants of caries' risks (1). However, overexposure to fluoride at an early age may increase the risk of dental fluorosis, indicating a need for professionals to provide tailored guidance and monitor dosage, particularly for children under six years old(2).

1.3. Research question and objectives

Despite international recommendations supporting early toothbrushing with fluoride toothpaste to prevent early childhood caries, what are the barriers, perceptions, and practices among dental professionals that influence the actual implementation of these recommendations?

Although the preventive role of early fluoride toothbrushing is well established, real-world adoption of this practice remains inconsistent. Factors such as professional knowledge, attitudes, perceived risks, and communication challenges with parents may hinder effective implementation. This research aims to explore these dimensions to inform targeted strategies that enhance the uptake of early fluoride oral hygiene practices, thereby reducing the burden of early childhood caries(1,2,5).

2. OBJECTIVES

2.1. **General objective:**

To evaluate how dental care professionals perceive and implement the early introduction of fluoride toothbrushing in children for the prevention of dental caries.

2.2. Specific objectives

1- To measure the level of knowledge of dental professionals regarding the timing, dosage, and supervision recommendations for fluoride toothbrushing initiation in children aged 0 to 6 years.
2- To assess the attitudes of dental professionals toward the benefits and potential risks, including fluorosis, associated with early fluoride toothbrushing.
3- To identify the common practices and recommendations given by dental professionals to parents concerning fluoride toothpaste use for children under 6 years.
4- To analyse the barriers and facilitators experienced by dental professionals in promoting early fluoride toothbrushing.
5- To explore how dental professionals' perceptions and practices influence parental adherence to recommended fluoride toothbrushing habits for young children.

3. MATERIALS AND METHODS

3.1. Study design

This study has been conducted as an observational, descriptive, cross-sectional survey. The research aims to explore oral health professionals' knowledge, attitudes, and practices regarding the recommendation of early fluoride in children aged 0 to 6 years.

3.2. Sample size

The target population will consist of oral health professionals (dentists, dental hygienists, and dental assistants) currently involved in paediatric or family dental care. Dentists are oral health professionals who diagnose, prevent, and treat dental diseases and supervise overall treatment planning. Dental hygienists are licensed professionals mainly focused on preventive care, including scaling, prophylaxis, and oral hygiene instruction. Dental assistants support the clinical work of dentists by preparing materials, assisting during procedures, and helping with patient management. It should be noted that the availability and scope of practice of dental hygienists and dental assistants vary significantly between countries: for example, dental assistants do not exist in Spain, while dental hygienists are not recognized in France.

The minimum sample size has been estimated using an online simple size calculator for survey research, assuming a 95% confidence level and a 5% margin of error for a finite population of oral health professionals. This estimation was obtained with two online calculators named "Survey Monkey" and "Question Pro". Based on these parameters, a minimum of approximately 300 participants will be required to obtain statistically reliable estimates. To account for possible non-response or incomplete questionnaires, the survey will be distributed to a larger number of professionals than the minimum calculated.

3.3. Inclusion and exclusion criteria

Inclusion criteria will be:

-Licensed oral health professionals (dentists, dental hygienists, dental assistants).

-Currently practicing in a clinical setting where children are seen for dental care.

-Able to understand and complete an online questionnaire in English.

-Acknowledgement of having read and accepted the inform consent question at the beginning of the questionnaire (answering "Yes").

-Exclusion criteria will be:

-Professionals who do not provide any clinical care to children.

-Health professionals who are not related to oral health.

-Students without independent clinical responsibility.

-Incomplete questionnaires (more than a predefined proportion of missing answers).

-Participants who do not acknowledge having read and accepted the informed consent question at the beginning of the questionnaire (answering "No").

3.4. Intervention

No clinical intervention will be carried out in this study. The only intervention consists of the administration of an online questionnaire. Participants will be invited to complete a structured survey composed of 11 closed-ended questions exploring:

-Their role and experience in paediatric oral health.

-Their recommendations regarding the age of introduction and frequency of fluoride toothbrushing.

-Their perceptions of parental barriers and facilitators related to early fluoride use.

-Their exposure to official guidelines and their views on strategies to improve prevention.

3.5. Data collection method

Data will be collected using a self-administered online questionnaire created with Microsoft Forms. A link to the survey will be shared via e-mail, professional's networks, and/or institutional mailing lists targeting oral health professionals. Participation will be voluntary, and no financial incentive will be offered. Respondents will be able to submit the questionnaire only once. Data from Microsoft Forms will be exported into an Excel sheet for cleaning and analysing. Descriptive statistics (frequencies and percentages) will be used to summarize answers, and subgroup analyses may be according to professional role or years of experience, if the sample size permits.

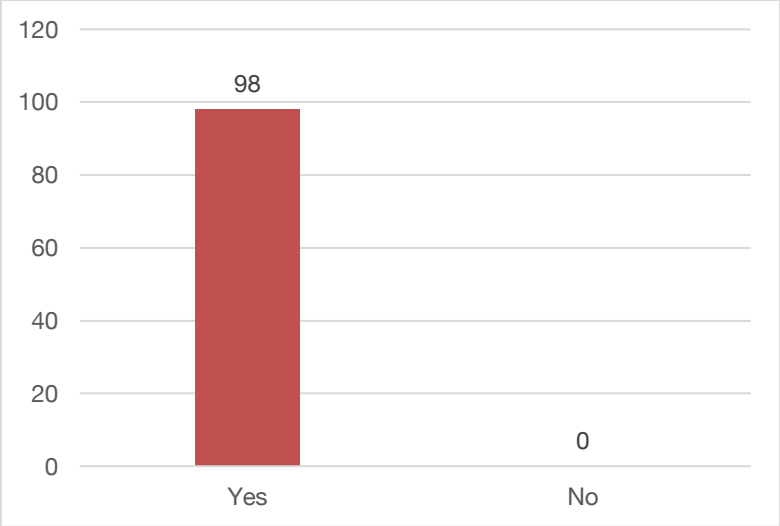
3.6. Ethical aspects

Participation in this study will be entirely voluntary and based on informed consent. An introductory page at the beginning of the questionnaire will explain the objectives of the study, the approximate time required to complete the survey, and the anonymous and confidential nature of data handling. By proceeding to answer the questionnaire, participants will provide their implied consent. No personally identifiable information (such as name, phone number, or clinic address) will be collected. All data will be stored securely and used exclusively for research purposes. The study protocol will be submitted to the appropriate institutional ethics committee

for review and approval before data collection begins, in accordance with applicable ethical and legal regulations. After that, the questionnaire will be approved by the committee, and this following code has been given - OD.037/2526.

4. RESULTS

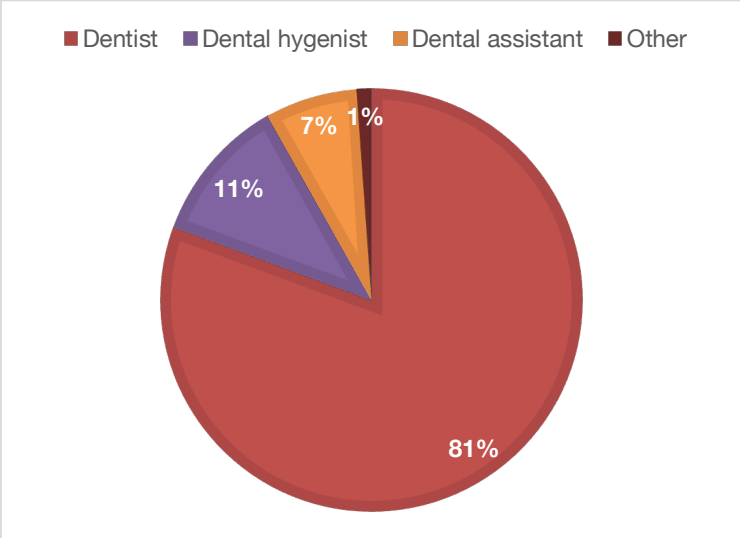
4.1. Sample characteristics



Title 1: Number of informed consent approval

A total of 98 oral health professionals consented to participate in the survey and completed the questionnaire. All responses met the inclusion criteria and were retained for analysis. No responses were excluded due to missing data or failure to provide informed consent.

4.2. Participants profile

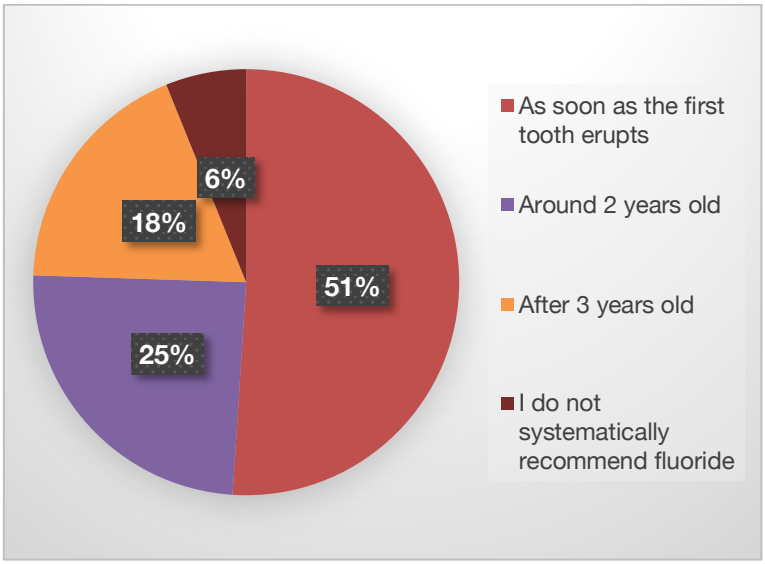


Title 2: Professional activity of participants

Most of the respondents were dentists (n=79, 80,6%), followed by dental hygienists (n=11, 11.2%) and dental assistants (n=7, 7,1%). Only one participant (1,0%) identified as “Other”.

4.3. Knowledge and recommendations about fluoride toothbrushing

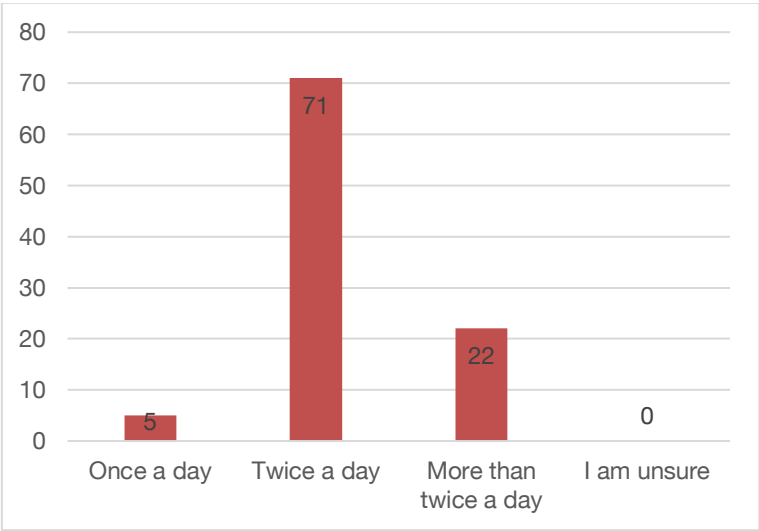
4.3.1. Age of fluoride introduction



Title 3: Fluoride use recommendation

Half of the participants (n=50, 51,0%) recommended introducing fluoride toothpaste as soon as the first tooth erupts. Nearly a quarter (n=24, 24,5%) recommended starting around 2 years old, while 18,4% (n=18) recommended waiting after 3 years old. Six participants (6,1%) stated they do not systematically recommend fluoride.

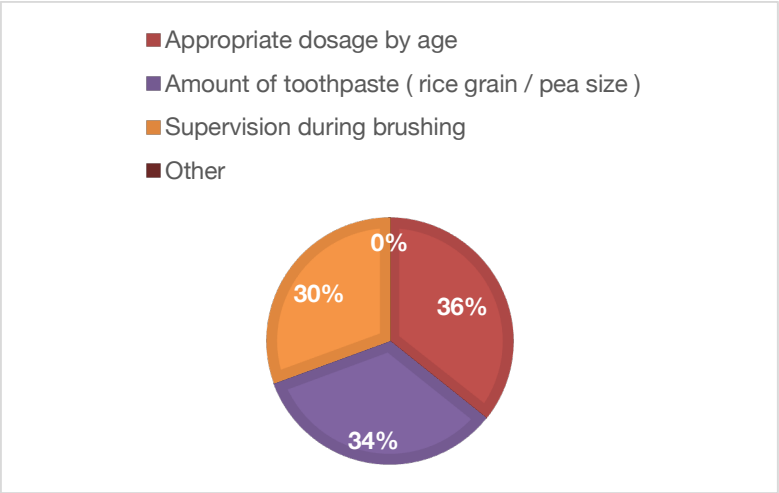
4.3.2. Frequency of toothbrushing



Title 4: Frequency of toothbrushing's opinion among participants

Many professionals (n=71, 72,4%) recommended brushing twice a day for children aged 0 to 6 years. A smaller proportion (n=22, 22,4%) recommended more than twice a day, and five participants (5,1%) recommended once a day. No participant selected "I am unsure".

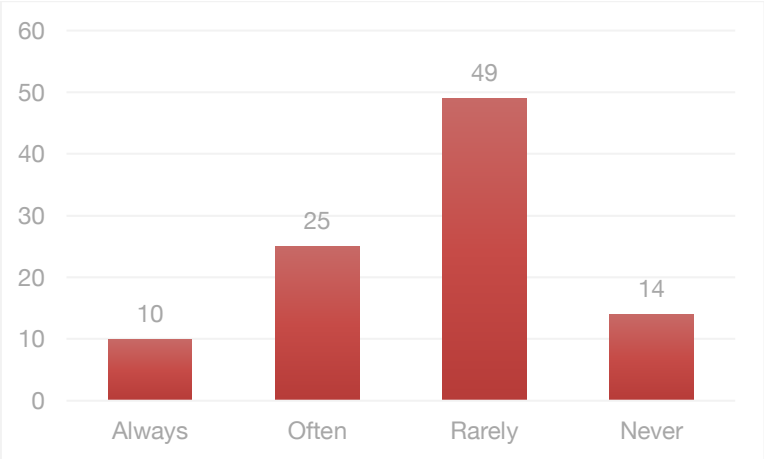
4.3.3. Advice given to patients



Title 5: Advice among fluoride use

The most common advice provided to parents was appropriate fluoride dosage by age (n=35, 35,7%), followed closely by guidance on the amount of toothpaste to use, such as a rice grain or pea-sized amount (n=33, 33,7%). Supervision during brushing was mentioned by 30 participants (30,6%). No participants selected "Other"

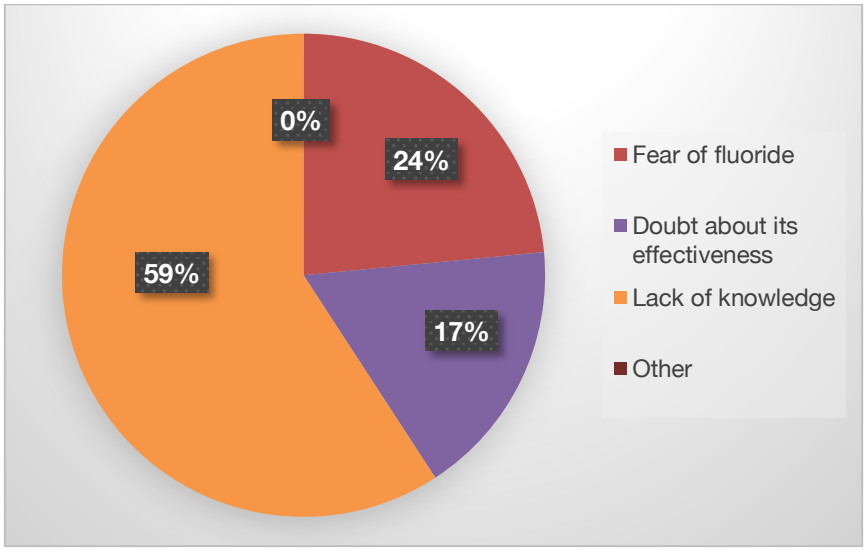
4.3.4. Clinical practice regarding fluoride risk



Title 6: Fluoride risk discussion with parents

Half of the participants (n=49, 50%) reported that they rarely discuss the risk of dental fluorosis with parents during consultations. A quarter (n=25, 25,5%) reported discussing it often, while 10,2% (n=10) always discuss it, and 14,3% (n=14) never do.

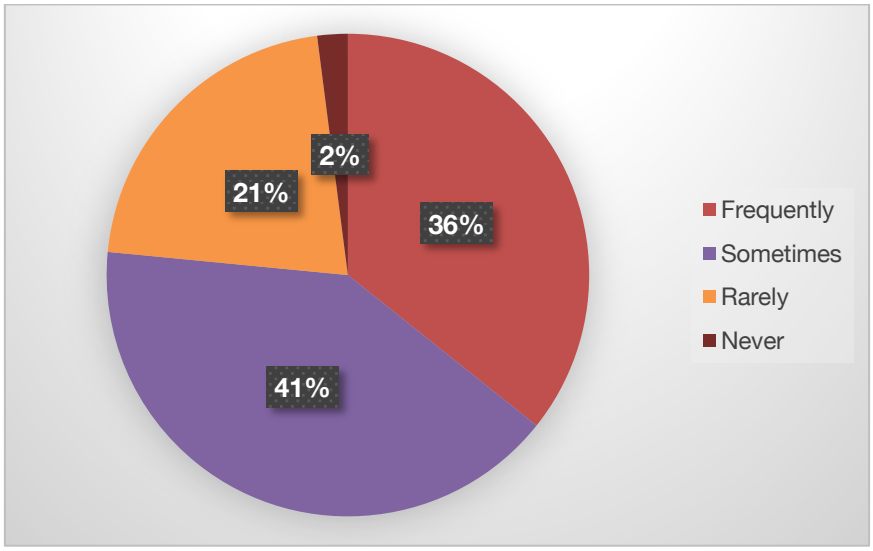
4.3.5. Barriers to early fluoride introduction



Title 7: Barriers to fluoride introduction

The most frequently observed barrier among families was lack of knowledge (n=58, 59,2%), followed by fear of fluoride (n=23, 23,5%) and doubts about its effectiveness (n=17, 17,3%). No participant selected "Other".

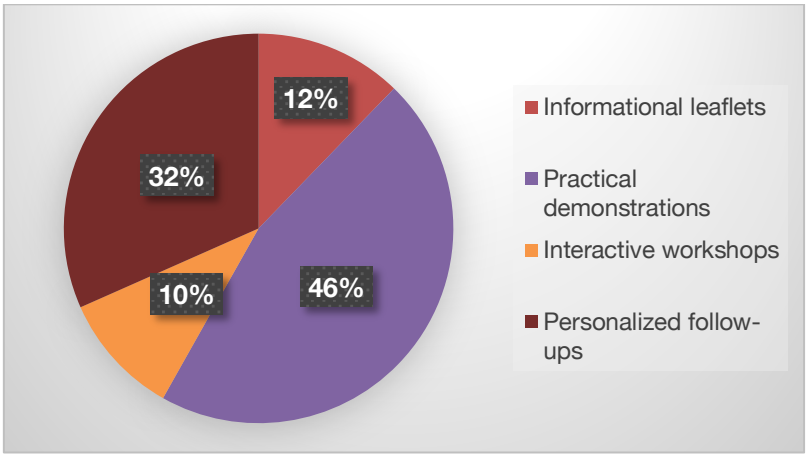
4.3.6. Exposure to official recommendations



Title 8: Frequency of official recommendations for caries prevention

Participants reported varying levels of exposure to official caries prevention guidelines. The most common response was "Sometimes" (n=40, 40,8%), followed by "Frequently" (n+35, 35,7%) and rarely (n=21, 21,4%). Only two participants (2,0%) reported never being informed.

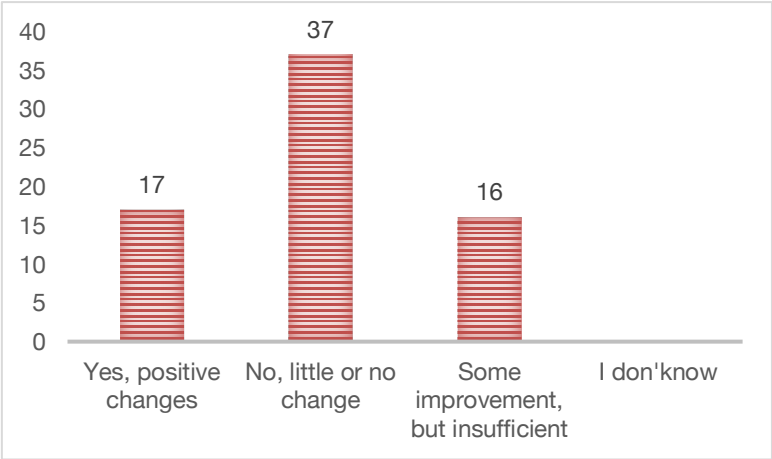
4.3.7. Strategies to improve parental adherences



Title 9: Different way to improve parental adherence

Practical demonstrations were identified as the most effective strategy to improve parental adherence to fluoride toothbrushing recommendations (n=45,45,9%). Personalized follow-ups were the second most popular choice (n=31, 31;6%), followed by informational leaflets (n=12, 12,22%) and interactive workshops (n=10, 10,2%).

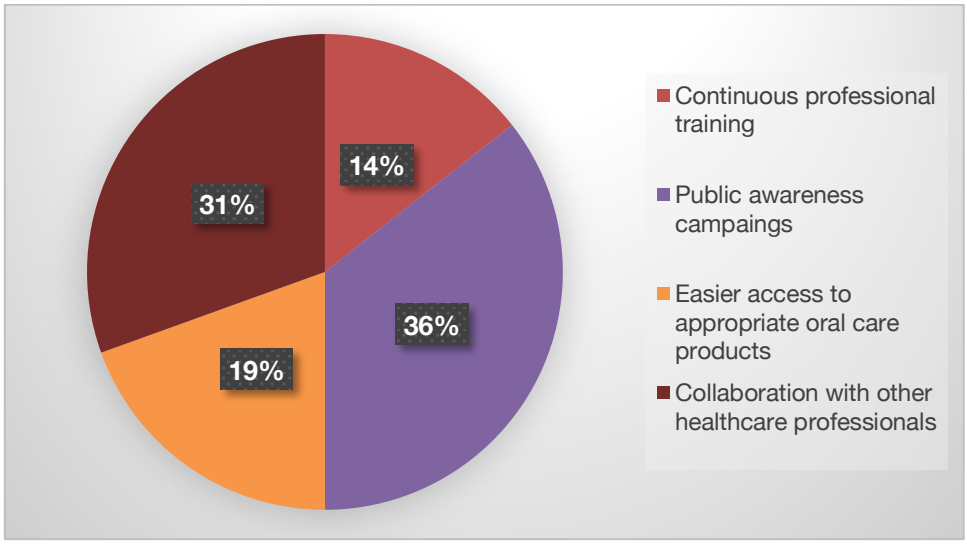
4.3.8. Perceived changes in parental practices



Title 10: Changes in parental practices

When asked whether they had noticed changes in parental practices around fluoride toothbrushing over recent years, 37,8% (n=37) responded "Some improvement, but insufficient", 28,6% (n=28) reported "Yes, positive changes", 17,3% (n=17) observed "No, little or no changes", and 16,3% (n=16) answered "I don't know".

4.3.9. Societal levers for early childhood caries prevention



Title 11: Strategy for strengthening early childhood caries prevention

When asked about the main levers for strengthening early childhood caries prevention at the social level, most respondents selected public awareness campaigns (n=42, 42,9%). Easier access to appropriate oral care products was chosen by 23 participants (23,5%), while 17 respondents (17,3%) identified continuous professional training as the main lever. Collaboration with other healthcare professionals was selected by 16 participants (16,3%).

5. DISCUSSION

5.1. Discussion

The main objective of this study was to explore oral health professionals' knowledge, attitudes, and clinical practices regarding the early introduction of fluoride toothbrushing in children, and to compare these findings with current evidence and recommendations on caries prevention in early childhood.

A first key finding is that just over half of respondents recommended introducing fluoride toothpaste as soon as the first tooth erupts, while a substantial proportion reported starting around 2 years or later. This pattern only partially aligns with current guidelines that support the use of fluoride toothpaste from tooth eruption, provided that age-appropriate amounts are used to balance caries prevention and fluorosis risk(7). The updated EAPD (European Academy of Paediatric Dentistry) policy document explicitly recommends twice-daily brushing with fluoridated toothpaste from the eruption of the first tooth, with a smear or rice-sized amount under three years and a pea size amount thereafter, as a central measure for caries prevention in children(7). Similar positions are reported in preventive frameworks that emphasize topical fluoride as a first-line strategy for individualized caries prevention in paediatric patients(2,8) . Evidence from systematic reviews and narrative overviews confirms that early and regular exposure to topical fluoride significantly reduces caries incidence in young children, especially in high-risk groups(1,2,9). The fact that nearly half of professionals in this survey delay introduction suggests that recommendations are not yet fully harmonized in daily practices(2,5).

Regarding brushing frequency, most of participants recommended twice daily toothbrushing for children aged 0 to 6 years, which is consistent with most international guidelines and with the preventive strategies highlighted in paediatric oral health reviews(2,7). This result indicates a good level of consensus on basic hygiene frequency among respondents and is in line with evidence showing that twice-daily brushing with fluoride toothpaste is associated with lower caries prevalence in children(7,9). The relatively small proportion recommending brushing more than twice a day may reflect awareness of the limited additional benefit beyond two brushings and concerns about practicality for families(1,4,5,9).

The survey also showed that professionals most frequently advise patients on appropriate fluoride dosage by age, the correct quantity of toothpaste (rice grain or pea-sized), and the need

for parental supervision during brushing. These messages are coherent with recommendations that emphasize controlling the amount of fluoride ingested while maintaining its topical effect, particularly in children under 6 years, who are at higher risk of swallowing toothpaste(4,7,9). Studies on topical fluoride and fluorosis underline the importance of dosage and supervision to minimize fluorosis risk without compromising caries prevention. Similar counselling priorities are reported in clinical and policy documents that stress parental supervision, appropriate toothpaste strength, and correct brushing technique as key elements of early childhood caries prevention. The absence of alternative advice options in the responses suggests that clinical counselling in this sample is focused on these core aspects rather than on less established or more controversial practices(1,2,5,7).

In contrast, communication about the risk of dental fluorosis appears limited: half of respondents reported rarely discussing fluorosis with parents, and an additional proportion never raise the topic. This is noteworthy given that the balance between caries prevention and fluorosis risk is central in the literature on topical fluoride use in young children. Systematic reviews indicate that the risk of fluorosis is mainly associated with excessive ingestion of fluoride during the early years, and that risk can be greatly reduced by controlling technique, toothpaste amount and ensuring supervision(4,6,9). When parents are not properly counselled, fears about toxicity may be amplified by media or non-scientific sources, which has been reported as a reason for avoiding fluoride toothpaste in several parental surveys. The low frequency of fluorosis counselling observed in this survey may therefore contribute to persistent parental uncertainty and could partially explain some of the barriers identified(2,5,7,10).

Indeed, the most perceived barrier to early fluoride introduction among families was lack of knowledge, followed by fear of fluoride and doubts about its effectiveness. These perceptions are consistent with studies showing that parents and caregivers often have limited understanding of early childhood caries, fluoride benefits, and proper toothbrushing practices. Research in different settings has highlighted that parental uncertainty, conflicting messages from professionals, and misconceptions about safety frequently lead either to inadequate fluoride exposure or to complete avoidance of fluoridated products. For example, surveys in Trinidad and other populations have reported gaps in parental knowledge, underestimation of caries risk, and inconsistent use of fluoridated toothpaste in preschool children(6,11). The predominance of “lack of knowledge” in this survey reinforces the idea that education and clear communication from oral health professionals remain essential components of caries prevention strategies (2,8,10,12,13).

Considering these findings, the present study provides insight into how dental professionals' own perceptions and routines can shape parents' adherences to recommended fluoride toothbrushing habits in early childhood as outlined by the EAPD guidelines, which strongly endorse daily supervised brushing with fluoride toothpaste (⩾1000 ppm F) from tooth eruption(7). A large majority of respondents reported that they systemically advise parents on the appropriate age to introduce fluoridated toothpaste, age-specific doses, and the need for close supervision until at least 7 years, yet only about half recommend introduction of fluoride from tooth eruption and discussion of fluorosis remains infrequent. This partial alignment with evidence-based EAPD guidelines means that parents may receive messages that are cautions or delayed regarding fluoride use, which can reinforce existing uncertainties documented in parental surveys from different settings(5,14). At the same time, professionals clearly identified lack of parental knowledge followed by fear of fluoride and doubts about its effectiveness as the main barriers to early adoption. They also reported that practical demonstrations and personalized follow-up were the most effective strategies to overcome these obstacles and support parents in adopting recommended fluoride toothbrushing habits. This is in line with interventional studies showing that interactive, chairside education improves toothbrushing routines and caries outcomes. Together, these results suggest that when dental professionals combine clear, guideline consent recommendations with hands-on educational approaches, they are well placed to influence parents' daily practices and to support adherence to early fluoride toothbrushing for young children(2,3,5).

Another relevant finding concerns professionals' exposure to official guidelines: most respondents reported being informed "Frequently" or "Sometimes", while a smaller proportion indicated "Rarely" or "Never". This distribution suggests that, although many professionals are at least partially updated, there is still room to strengthen the dissemination and uptake of evidence-based recommendations. Narrative and systematic reviews on paediatric dentists' knowledge and practice regarding fluorinated toothpaste have similar reported variability and occasional inconsistencies with existing recommendations, even among specialists(5). Such finding mirrors the heterogeneity observed in the present survey and support the need for more structured continuing education and clearer decision tools(3,4,9,14).

Regarding strategies to improve parental adherence, practical demonstrations and personalized follow-up were clearly preferred over informational leaflets or workshops. This preference is in line with literature suggesting that interactive and individualized interventions, such as chairside

demonstrations, motivational interviewing, and tailored counselling, are more effective at changing oral health behaviours than passive written information alone(1,5,11). Interventions combining parental training, motivational components, and regular professional support have been associated with improved fluoride toothbrushing routines and reduced caries risk in young children, as shown in preventive trials and community-based programs(3). The high importance attributed to these strategies by respondents indicates that many professionals recognize the need for active engagement of families to promote early and consistent fluoride toothbrushing habits(4,7,8,14).

Finally, responses about changes in parental practices over recent years showed that most professionals perceived some improvement, although often considered insufficient, while a smaller group observed clear positive changes or little/no change. These perceptions resonate with epidemiological trends where, despite progress in preventive dentistry, early childhood caries remains prevalent in many populations, particularly in disadvantaged groups(1,2,12). The feeling of "partial but insufficient" improvement suggests that current preventive efforts, including fluoride toothbrushing promotion, have had some impact but still fall short of achieving optimal caries control in young children.

Several limitations must be considered when interpreting these findings. The study relied on a convenience sample of oral health professionals, which may not be fully representative of all practitioners in the region or country. Participation was voluntary, introducing the possibility of selection bias, as professionals more interested in prevention and fluoride may have been more likely to respond. The use of a self-administered online questionnaire also means that results are based on self-reported practices rather than direct observation, and social desirability bias cannot be excluded(10). In addition, the cross-sectional design does not allow assessment of causal relationship or changes over time.

Despite these limitations, the results have several practical implications. They highlight the need to further harmonize recommendations on the age of fluoride introduction and to reinforce communication about fluorosis risks in a balances and evidence-based manner(4,7). They also underline the importance of improving access to updated guidelines and continuing education on early childhood caries prevention for oral health professionals, with particular attention to translating policy documents into simple, usable messages for daily practice(2,7,8,13). The variability in professional recommendations observed in this study suggests a need not only for better dissemination of guidelines, but also for their adaptation into clear, practical decision

tools that support individualized caries prevention based on each child's risk profile, dietary habits, and socio-behavioural context(1,2,8).

Finally, the prominence of parental lack of knowledge and the value attributed to practical demonstrations and personalized follow-up suggest that interventions should focus on empowering families with clear, consistent, and actionable information on fluoride toothbrushing from the earliest years of life(2,10,12,14).

5.2. Limitations

Although the target sample size was 300 answers, calculated with an online tool (95% confidence interval and 5% margin of error), only 98 persons finally completed the survey, which correspond to a respond rate of 32,7%. This type of rate is quite common in online studies involving busy dental professionals, who are often limited by lack of time, repeated requests to participate in surveys, absence of incentives, or practical difficulties in accessing the questionnaire. In our case, the figure of 300 responses should therefore be understood as an orientated estimate of an "ideal" sample size rather than a strict requirement, and the 98 completed questionnaires are sufficient to explore the main trends in the data, while acknowledging that the results cannot be automatically generalized to all dentists.

Several other limitations should also be mentioned. First, the data are self-reported, which may lead some participants to present their practice in a more favourable way, even if the questionnaire was anonymous. Second, the cross-sectional design only provides a snapshot at a given time and does not allow us to establish causal relationships between dentists' practices and parents' behaviours. In addition, the sample comes from a limited number of clinics and hospitals, which may over-represent urban or academically affiliated practitioners. The exclusive use of an online questionnaire may also have discouraged some older professionals or those less comfortable with digital tools. For future studies, it would be useful to combine several recruitment strategies (reminders, small incentives such as continuing education credits, paper and online formats) and to plan from the outset how to manage non-response, to reach a more diverse and representative sample.

6. CONCLUSIONS

This study provides a clearer picture of how oral health professionals approach the early introduction of fluoride toothbrushing in children. Overall, the results suggest that respondents are aware of the importance of fluoride toothpaste in the prevention of early childhood caries and that most of them recommend its use, together with age-appropriate doses and parental supervision. Nevertheless, their practices do not always fully reflect current evident-based recommendations, since a substantial proportion of professionals still advise introducing fluoride later than the eruption of the first tooth. This indicates that, although the general direction of professional advice is appropriate, there is still some variability in how guidelines are applied in daily practice.

The study also highlights the role of professionals' perceptions in shaping parental adherence to fluoride toothbrushing habits. According to the respondents, the main barriers to early fluoride use among families are a lack of knowledge, fear of fluoride, and doubts about its effectiveness. In this context, professionals considered practical demonstrations and personalised follow-up to be the most effective ways of supporting parents. This suggests that providing information alone may not be enough, and that direct, hands-on educational approaches may be more useful in helping families adopt and maintain recommended brushing habits.

Finally, these findings underline the importance of improving communication between dental professionals and parents, as well as ensuring that official recommendations are more consistently disseminated and implemented in practice. Strengthening continuing education for professionals and promoting clearer, more consistent messages about fluoride use could help reduce uncertainty among parents and support earlier adoption of fluoride toothbrushing. In this way, dental professionals may play a key role in improving preventive behaviours and contributing to the reduction of early childhood caries.

7. SUSTAINABILITY

This study's findings on the early introduction of fluoride toothbrushing habits in children have considerable implications for sustainability in economic, social, and environmental domains. By increasing public awareness and promoting preventive oral health behaviours within communities, the project aims to encourage broader adoption of early fluoride use and improve parental adherence. This, in turn, may result in a significant reduction in dental caries incidence among children, which is one of the most common and costly chronic diseases globally.

Economically, preventing caries through early fluoride toothbrushing can substantially decrease long-term healthcare expenditures related to restorative treatments, emergency dental care, and associated systemic health complications. Socially, it can enhance children's oral health, quality of life, and school attendance, while reducing health inequalities by targeting education and prevent ion efforts to underserved populations. Environmentally, promoting preventive oral hygiene reduces reliance on resource-intensive dental interventions and decreases the use of dental materials and pharmaceuticals, which have ecological footprints from production to disposal.

Overall, this research supports sustainable health promotion by fostering responsible fluoride use, empowering dental professionals, and encouraging community-wide preventive behaviours that contribute to healthier futures and reduces the burden in healthcare systems and the environment.

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9. ANNEXES

9.1. Survey

1.Do you consent to participate voluntarily in the survey and allow the results to be sued in the Final Degree Projects entitled "Early introduction of fluoride toothbrushing habits and its role in preventing dental caries in children. A perspective from dental care professionals?"

°Yes
°No

2.What is your primary role in managing children's oral health?

°Dentist
°Dental hygienist
°Dental assistant
°Other

3.At what age do you typically recommend the use of fluoride toothpaste for children?

°As soon as the first tooth erupts
°Around 2 years old
°After 3 years old
°I do not systematically recommend fluoride

4.What is the ideal frequency to tooth brushing for children aged 0 to 6 years, in your opinion?

°Once a day
°Twice a day
°More than twice a day
°I am unsure

5.What advice do you usually give to parents about fluoride use?

°Appropriate dosage by age

°Amont of toothpaste (rice grain / pea size)

°Supervision during brushing

°Other

6.How often do you discuss the risk of dental fluorosis with parents during consultations?

°Always

°Often

°Rarely

°Never

7.What barriers do you most commonly observe among families regarding early fluoride toothpaste introduction?

°Fear of fluoride

°Doubt about its effectiveness

°Lack of knowledge

°Other

8.How regularly are you informed of official recommendations for caries prevention in young children?

°Frequently

°Sometimes

°Rarely

°Never

9.What do you believe are the most effective ways to improve parental adherence to fluoride toothbrushing recommendations?

°Informational leaflets

°Practical demonstrations

°Interactive workshops

°Personal follow-up

10.Have you notice changes in parental practices around fluoride toothbrushing over recent years?

°Yes, positive changes
°No, little or no changes
°Some improvement, but insufficient
°I don't know

11.What do you consider the main levers for strengthening early childhood prevention at the societal level?

°Continuous professional training
°Public awareness campaigns
°Easier access to appropriate oral care products
°Collaboration with other healthcare professionals