



10.5281/
zenodo.10028633

Evaluation of the awareness of dental students in Turkey regarding the use of fluoride during preclinical education

Ezgi Eroglu Cakmakoglu¹ - Ayse Gunay² - Sema Celenk²

Correspondence

Ezgi Eroglu Cakmakoglu, Bingöl University Faculty of Dentistry Department of Pediatric Dentistry, Bingöl, Turkey.

e-mail

derogluvezgi@gmail.com

Received: 15 May 2023

Revised: 28 May 2023

Accepted: 1 September 2023

Published: 15 October 2023

Keywords

- ⇒ Awareness
- ⇒ Dental students
- ⇒ Fluoride

ORCID ID of the author(s):

EEC: 0000-0002-5014-3099

AG: 0000-0002-0918-7962

SC: 0000-0001-8981-6281

1. Bingöl University Faculty of Dentistry Department of Pediatric Dentistry, Bingöl, Turkey.
2. Dicle University Faculty of Dentistry Department of Pediatric Dentistry, Diyarbakır, Turkey.

Abstract

Objective: Recently, silver diamine fluoride (SDF) containing silver and fluoride ions has been applied topically. However, it has been observed that negative articles in the local press, especially suggesting that fluoride applications cause toxic effects in children and even lead to cognitive delays, have influenced individuals' perspectives and preferences regarding fluoride-containing products. This study aims to assess the knowledge and perspectives of dental students who are just beginning their dental education and have not yet had any clinical experience on the topic of fluoride.

Materials and Methods: A 15-question survey was prepared, inspired by previous publications. It was distributed to 1st and 2nd-year dental students via online platforms, and participation was based on voluntariness.

Results: Of the students who participated in the survey, 55.6% were female, and 53.1% were in their second year. There was a statistically significant difference in the distribution of answers to questions such as what do you know about fluoride depending on which year the students are in, have you ever heard of brushing teeth with fluoride toothpaste (at least 1000 ppm) twice a day for children using an age-appropriate amount of paste, and do you think you have adequate knowledge about fluorosis ($p < 0.001$).

Conclusions: There is a need for more information on this subject. Another reason for this is believed to be the fact that pediatric dentistry courses start only after the second year.

Cite as: Eroglu Cakmakoglu E, Gunay A, Celenk S. Evaluation of the awareness of dental students in Turkey regarding the use of fluoride during preclinical education. *J Clin Trials Exp Investig.* 2023;2(4):239-245.

Introduction

Tooth decay is considered one of the most significant infectious diseases affecting oral and dental health. With the increased accessibility of dental services, the use of fluoride toothpaste, socioeconomic changes, and reduced sugar consumption, tooth decay has decreased. However, early childhood caries can lead to psychosocial, socioeconomic, and physical problems in developing countries like ours, where preventive dentistry practices have not yet become widespread (1).

Fluoride is used in various ratios and forms to prevent and/or halt tooth decay. Today, the most common recommendation is to use fluoride-containing toothpaste twice a day. It's also suggested that individual/professional topical fluoride applications be made according to age groups and risk groups (2,3). In professional applications, fluoride gels, fluoride solutions, and fluoride varnishes containing fluoride between 5000 and 19,000 ppm are preferred (4). The American Academy of Pediatric Dentistry (AAPD) has determined, based on evidence-based studies, that fluoride is a safe and effective agent (5).

Recently, silver diamine fluoride (SDF), which contains silver and fluoride ions, has been applied topically (6). However, negative articles in the local press, especially those suggesting that fluoride applications in children cause toxic effects and even lead to cognitive delays, have influenced individuals' perspectives and preferences regarding fluoride-containing products.

This study aims to assess the knowledge and perspectives of dental students, who are at the very beginning of their dental education and have not yet gained clinical experience, on the subject of fluoride.

Materials and methods

The ethics committee approval for the study was obtained from the Dicle University Non-Interventional Clinical Research Ethics Committee (Decision Date: 27.05.2020; Protocol No: 2020-14).

In our study, a 15-question survey form was prepared inspired by previously published studies (1,7). It was distributed to first and second-year dentistry students via online platforms, and participation was based on voluntariness. After the survey, the participants who agreed to participate in the study were sent informational emails to address any gaps in their understanding of the topic.

Statistical analysis

When comparing the answers given to questions 4, 10, and 12 according to the students' class status, Pearson's chi-square test was used and multiple comparisons of the ratios were examined with the Bonferroni-corrected Z-test. Analysis results were presented as frequency (percentage). Data analyses were performed using SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA). The significance level was set at $p < 0.05$.

Results

Of the students who participated in the survey, 55.6% were female and 53.1% were in the second grade of Dentistry school. It was found that students obtain information about fluoride mostly (63.8%) from the internet, and least (20%) from books. 72.9% of the students preferred toothpaste containing fluoride when choosing one, and 76.3% would recommend fluoride toothpaste to their patients. When asked about foods rich in fluoride, the majority, 56.9%, said fish, while the least, 7.1%, said cocoa. 15.8% of the students were found to have heard about the use of silver diamine fluoride (SDF) in dentistry. Of those students who had heard of the use of SDF in dentistry, 56% mostly learned from the internet, and the least, 17.9%, from conferences (**Table 1**).

There is a statistically significant difference in the distribution of answers to the question 'What do you know about fluoride?' based on which class the students are in ($p < 0.001$). This difference stems from the answers 'it prevents cavity formation' and 'I have no knowledge about it.' Among first-year students, 72.3% said it prevents cavity formation, whereas 94% of second-year students gave the same answer. 13.6% of the first-year students said they have no knowledge about it, while only 1.3% of second-year students gave that response (**Table 2**).

Based on the students' year of study, there is a statistically significant difference in the distribution of responses to the question, 'Do you believe you have adequate knowledge about fluorosis?' ($p < 0.001$). This difference arises from the responses 'definitely insufficient', 'partially adequate', 'adequate', and 'absolutely adequate'. Among first-year students, 50.5% felt their knowledge was 'definitely insufficient', while this proportion was 26.7% for second-year students. 21.6% of first-year students felt their knowledge was 'partially adequate', compared to 36.2% of second-year students. Only 2% of first-year students believed their knowledge was 'adequate',

whereas 7.3% of second-year students felt the same. As for feeling 'absolutely adequate', 3.9% of first-year students expressed this level of confidence, in contrast to just 0.4% of second-year students (**Table 2**).

Based on the students' year of study, there is a statistically significant difference in the distribution of responses to the question, 'Have you previously heard

the recommendation that children should brush their teeth twice daily with fluoride toothpaste (at least 1000 ppm) using an age-appropriate amount of toothpaste?' ($p < 0.001$). Among the first-year students, 52.9% had heard of this recommendation before, compared to 69.8% of second-year students who were familiar with it (**Table 2**).

Table 1: Descriptive statistics

	n	%
Gender		
Female	244	55.6
Male	195	44.4
What grade are you?		
First	206	46.9
Second	233	53.1
What do you know about fluoride?		
Prevents caries formation	368	83.8
Causes mental and developmental delays	99	22.6
Harmful	88	20
It is a toxic substance	80	18.2
I have no idea	31	7.1
Where do you get information about fluoride?		
Experts / From your professors	274	62.4
Internet	280	63.8
Books	88	20
When choosing toothpaste, do you prefer it to contain fluoride?		
Yes	320	72.9
No	119	27.1
Do you recommend fluoride toothpaste to your patients?		
Yes	335	76.3
No	104	23.7
Is there enough fluoride in the daily diet for dental health?		
Yes	219	50.2
No	217	49.8

Which foods are rich in fluoride?

Milk	198	45.4
This	117	26.8
Tea	91	20.9
Fish	248	56.9
Cocoa	31	7.1

Do you think you have enough information about fluorosis?

Absolutely Insufficient	165	37.8
Partly Insufficient	113	25.9
Partially Sufficient	128	29.4
Sufficient	21	4.8
Absolutely Enough	9	2.1

Is fluoride poisoning life threatening?

Yes	326	74.8
No	110	25.2

Have you ever heard the saying that all children should brush their teeth twice a day with fluoride toothpaste (at least 1000 ppm), using the age-appropriate amount of toothpaste?

Yes	270	61.9
No	166	38.1

Do you have information about the use of fluoride in dentistry by combining it with other elements for a synergistic effect?

Yes	133	30.5
No	303	69.5

Have you heard of the use of the Silver Diamine Fluoride (GDF) compound in dentistry?

Yes	69	15.8
No	367	84.2

If your answer to question 14 is yes, where from?

Congresses	15	17.9
My teachers	40	47.6
Internet	47	56
Books	17	20.2

Table 2: Comparison of Question 4, Question 10 and Question 12 according to the question "What class are you in?"

	What grade are you?			Statistic	p-value
	1	2	Total		
What do you know about fluoride?					
Prevents caries formation	149 (72.3)a	219 (94)b	368 (83.8)		
Causes mental and developmental delays	45 (21.8)a	54 (23.2)a	99 (22.6)		
Harmful	45 (21.8)a	43 (18.5)a	88 (20)	65.223	<0.001
It is a toxic substance	33 (16)a	47 (20.2)a	80 (18.2)		
I have no idea	28 (13.6)a	3(1.3)b	31 (7.1)		
Do you think you have enough information about fluorosis?					
Absolutely Insufficient	103 (50.5)a	62 (26.7)b	165 (37.8)		
Partly Insufficient	45 (22.1)a	68 (29.3)a	113 (25.9)		
Partially Sufficient	44 (21.6)a	84 (36.2)b	128 (29.4)	39.225	<0.001
Sufficient	4 (2)a	17 (7.3)b	21 (4.8)		
Absolutely Enough	8 (3.9)a	1 (0.4)b	9 (2.1)		
Have you ever heard the saying that all children should brush their teeth twice a day with fluoride toothpaste (at least 1000 ppm), using the age-appropriate amount of toothpaste?					
Yes	108 (52.9)a	162 (69.8)b	270 (61.9)	13.128	<0.001
No	96 (47.1)	70 (30.2)	166 (38.1)		

*Pearson Chi-square test

Discussion

In the context of dental practices, fluoride is known to be the most effective and reliable agent that provides benefits for individuals and communities when applied with the correct technique and dosage for protection against dental caries (8). Recently, it has been observed that negative news about fluoride, especially in visual and written media, has influenced individuals' perspectives on fluoride-containing products and has altered their preferences (9,10).

In our country, statements made about the harmful effects of fluoride applications and fluoride toothpastes have influenced even healthcare professionals' opinions about this preventive treatment (11). In our

study, it was observed that the majority of students (63.8%) sourced their information on fluoride from the internet, while 20% derived their knowledge from books. In response to remarks from some media personalities who are not experts on the topic, the Turkish Dental Association made a press release on 25.09.2017 to inform the public, clarifying that there's no direct relationship between fluoride and a decline in IQ levels (12). A situation report prepared by the Turkish Pediatric Dentistry Association (TPD) and the TDB Education Committee has stated that the fluoride content in toothpaste will not cause systemic problems and has listed the recommended fluoride dosages (3).

Topical fluoride applications have been scientifically

proven to play a significant role in preventing dental caries, and raising the awareness of dentistry students about this is of paramount importance. This survey study has evaluated the knowledge levels of dentistry students in our country about fluoride and current products containing fluoride compounds at the preclinical education level. One of the notable results of this study is that when we asked what they knew about fluoride, the number of students who said it prevents the formation of caries in the first year was 72.3%. This figure significantly rose to 94% in the second year as their education advanced. The number of students who claimed to have no knowledge about fluoride in the first year of dentistry significantly decreased when compared to those in the second year. In a 2018 study conducted by Arıkan et al. (13) with physicians and dentists, 90.9% of doctors believed dental caries are preventable, 94.8% believed in the importance of oral hygiene, and 80.5% highlighted the significance of fluoride supplementation in preventing dental caries. In a 2019 study conducted by Sabti et al. (14) in Kuwait, they found that 85.7% of dentists believed that fluoride application was beneficial in reducing caries in children. A study with dental students from Horasgan Azad University and Isfahan University of Medical Sciences reported that the dental students were not aware of the role of fluoride toothpaste in caries prevention (15). In Finland, which has a long history in preventive dentistry, dentists are quite informed about the crucial role of fluoride in preventing caries (16).

In a study conducted by Özer et al. (17) in 2019, it was found that 2% of physicians opposed fluoride varnish applications due to concerns that it might cause cancer. In a study carried out by Sabti et al. (14) in Kuwait in 2019, out of 273 dentists surveyed regarding whether fluoride applications could cause cancer, 111 expressed uncertainty. In our study, however, the question was posed more generally, and given the ongoing contemporary education dental students receive, 20% were found to believe that fluoride is harmful to health.

In a study by Arıkan et al. (13) when doctors were asked, 'Do you provide information to families about fluoride toothpaste?', 92.2% responded with 'yes'. In our study, when students were asked, 'Do you recommend fluoride toothpaste to your patients?', 76.3% responded with 'yes'. The difference in responses might be explained by the contribution of the dental education provided on patient information.

In a study by Eđri et al. (18) doctors who did not prescribe fluoride supplementation were asked why. 42.9% of them stated that the fluoride intake from food is sufficient. This rate aligns with the 50.2% affirmative responses in our study to the question: 'Is the fluoride intake from daily diet sufficient for dental health?'

Topical GDF applications are a fast, simple, and reliable treatment method. Moreover, it can effectively prevent the development of new cavities and halt existing ones without the risks of systemic toxicity and fluorosis. GDF can be used for root canal disinfection, treatment of dentin sensitivity, and protecting tooth hard tissues against cavities and fractures (6). Among the latest fluoride preparations, GDF is known by a very low rate, only 15.8%, of preclinical dentistry students. It has been observed that 56% of the students who have heard about the use of the GDF compound in dentistry learned about it from the internet, while the least, 17.9%, learned from conferences.

Conclusions

There is a need for more information on this subject. Another reason for this is believed to be that the pediatric dentistry course starts after the second year.

Conflict of interest

The authors report no conflict of interest.

Funding source

No funding was required.

Ethical approval

The ethics committee approval for the study was obtained from the Dicle University Non-Interventional Clinical Research Ethics Committee (Decision Date: 27.05.2020; Protocol No: 2020-14).

Informed consent

Written informed consent was obtained from all individual participants and/or their guardians.

Acknowledgments

No

Peer-review

Externally. Evaluated by independent reviewers working in at least two different institutions appointed by the field editor.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Contributions

Research concept and design: **EEC, AG, SC**

Data analysis and interpretation: **EEC, AG, SC**

Collection and/or assembly of data: **EEC, AG, SC**

Writing the article: **EEC, AG, SC**

Critical revision of the article: **EEC, AG, SC**

Final approval of the article: **EEC, AG, SC**

References

- Öter B, Karabulut B, Güven Polat G, Çehreli SB. Evaluation of perspectives and attitudes of patients towards oral care products with fluoride. *J Dent Fac Atatürk Uni.* 2019;29(3):373-80.
- Toumba KJ, Twetman S, Splieth C, Parnell C, van Loveren C, Lygidakis NA. Guidelines on the use of fluoride for caries prevention in children: an updated EAPD policy document. *Eur Arch Paediatr Dent.* 2019;20(6):507-16.
- http://www.tdb.org.tr/ekler/Florur_Durum_Raporu_2019.pdf
- WHO. Oral health promotion through schools. WHO information series on schoolhealth. Document 11, WHO, Geneva 2003:49-50.
- American Academy of Pediatric Dentistry. Guideline on caries-risk assessment and management for infants, children, and adolescents. *Pediatr Dent.* 2013;35(5):E157-64.
- Ballıkaya E, Çehreli ZC. The role of silver diamine fluoride on the management of dental caries. *Türkiye Klinikleri J Dental Sci.* 2020;26(2):276-84.
- Polat Y, Çelenk S. Overview of current fluoride-free remineralization materials and methods as an alternative to topical fluoride: An up-to-date. *J Clin Trials Exp Investig.* 2022;1(3):75-8.
- Ergin E, Eden E. Does Fluoride Have Negative Impact on Human Health? *EU Dişhek Fak Derg.* 2017;38(1):13-20.
- Blumer S, Ratson T, Benjamin Peretz, Nurit Dagon. Parents' attitude towards the use of fluorides and fissure sealants and its effect on their children's oral health. *J Clin Pediatr Dent* 2018;42:6-10.
- Turska-Szybka A, Świątkowska M, Walczak M, Olczak-Kowalczyk D. What do parents know about the use of fluoride products in children. *Fluoride* 2018;51(2):114-21.
- <https://www.posta.com.tr/ali-ihsan-yavuz-dis-macunuinsanlari-koyun-gibi-yapiyor-1335512>.
- http://www.tdb.org.tr/basin_goster.php?id=342.
- Arıkan V, Sert T, Yelken N, Döğür C. Knowledge of Pediatricians Regarding Oral and Dental Health. *Kırıkkale Üniversitesi Tıp Fakültesi Derg.* 2018;20(1):73-83.
- Sabti MY, Al-Yahya H, Al-Sumait N, Akbar AA, Qudeimat MA. Dental and medical practitioners' perception of community water fluoridation as a caries preventive measure. *Eur Arch Paediatr Dent.* 2019;20(1):53-61.
- Nilchian F, Kazemi Sh, Abbasi M, Ghoreishian F, Kowkabi M. Evaluation of Isfahan's Dental Students' Awareness about Preventive Dentistry. *J Dent (Shiraz).* 2014;15(1):1-5.
- Vehkalahti MM, Widström E. Teaching received in caries prevention and perceived need for Best Practice Guide- lines among recent graduates in Finland. *Eur J Dent Educ.* 2004;8:7-11.
- Özer H, Ağmaz O, Abaklı M. Dental And Medical Practitioners' Perception of Fluoride Varnish Application As A Caries Preventive Measure. *Necmettin Erbakan University Dental Journal.* 2019;1(1):13-23.
- Eğri M, Çetinkaya F. Dentists and fluor supplementation. *Journal of Turgut Ozal Medical Center.* 1998;5(1):60-3.

Publisher's Note: Unico's Medicine remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.