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Insights into Parental Views and Utilization of Professionally Applied Fluoride Products in Paediatric Dentistry: A Multi-Center Study

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ABSTRACT

Purpose: To determine the knowledge, attitude, and practices of parents of pediatric patients coming to the dental OPDs about using professionally applied fluoride products.

Methods: A multicenter, cross-sectional study, from Paedodontics OPDs of three different colleges of Karachi was conducted. Parents arriving in these OPDs for treatment of their children aged 7-12 years were included. A customized self-administered questionnaire was used where the first section recorded the demographics of the participants. The second section assessed the responses of the participants for their perception and practices related to the use of professionally applied fluoride products in their children. The items in this section were based on a 3-point Likert scale and each descriptor was given scores (Yes=3, Unsure=2 and No=1). Two items with option of response selection were related to the perceived age of application of fluoride products and source of dental awareness of parents. Frequencies were calculated for categorical variables. The mean and standard deviation along with confidence interval was calculated for the scores of responses on the Likert scale. Chi-square test compared the parents' education with items related to perception. ($p<0.05$)

Results: With 296 questionnaires (88.4% response rate), it was found that 151 boys and 145 girls were brought to the OPD for their dental treatment. Only 26.4% of the parents were aware of the use of fluoride in dentistry and even lesser knew about the professionally applied fluoride products in dentistry (12.8%). A large majority of the parents (64.5%) were not sure if the fissure sealants benefitted by preventing caries development in children, or the appropriate age for professional application of fluoride (n=180). The parents main source of dental awareness were dentists (66%).

Conclusions: Regarding their perception and awareness about professionally applied fluoride products, most parents were found to be unsure. Previous experience of the parents with professional fluoride application were also sparse. This could be possibly explained by the limited educational background of the majority of the parents.

Keywords: *Fissure sealants, Fluoride Varnish, Professionally applied fluoride*

INTRODUCTION

Twenty-three years into the 21st century, dental caries still remains a global health problem burdening many countries, especially the developing nations. Those children are explicably more affected who belong to parents who have a low level of education or low socioeconomic status.[1] It is more likely that the daily activities of a child will be restricted or may be severely affected if he or she suffers from poor oral health as compared to those with relatively healthy oral cavities.[2] Children with oral diseases tend to suffer a great deal, including pain, a lower quality of life, and increased number of missed school days.[3]

The prevalence of dental caries is still high among preschool children in developing countries, despite a decreasing trend in developed nations.[4-6] A study done in Karachi; Pakistan showed an alarmingly high caries prevalence of 51% among preschool children.[7] Another study conducted in the city of Lahore reported a prevalence of around 40% among children aged 3-5 years.[8] A study done in Saudi Arabia stated an alarmingly high prevalence of 83% of dental caries among 6 to 8-year-olds.[9] In another study carried out in India, dental caries prevalence was reported to be 59.4% among 11 to 13-year-old children.[10]

Early childhood caries is very much preventable in the initial stages by undertaking timely and appropriate measures.[11] These measures include, but are not limited to, educating parents regarding the importance and maintenance of deciduous dentition and enforcing oral hygiene practices in their children as well as provision of a healthy, low-cariogenic diet. Awareness of parents, particularly mothers about preventive dental care is fundamental to improving the oral health of children.[12] Dental caries in children and adolescents is mostly confined to pits and fissures of first molars[13], necessitating the need for effective utilization of preventive measures like professionally applied fluoride products and fissure sealants.[14] Professionally applied topical fluorides can effectively reduce the incidence of dental caries.[15] These products include fluoride gels and varnishes which are relatively safe[16] and low-cost and are easily applied to arrest the progression of caries.[17] In addition, there is a substantial amount of evidence established through consistent studies regarding the effectiveness of pit and fissure sealants in preventing dental caries.[18-20] When fluoride is applied to a tooth, calcium fluoride is deposited onto the tooth surface, which is not readily soluble and can act as a fluoride reservoir. Fluoride enhances enamel remineralization, inhibits demineralization and gets incorporated into the apatite structure of the tooth as fluorapatite crystals, making the surface more resistant to acid attack.[21] However, due to a lack of awareness of public about these professionally applied fluoride treatment options, the percentage of pediatric patients on which these modalities are utilized is low.[22] A study assessed the knowledge and attitudes of parents of school children in Melbourne and reported that more than half of the parents included in the study had deficient knowledge of sealants and fluoride therapy.[23] Similarly, another study regarding fissure sealants and professional fluoride therapy showed that the majority of the parents had low knowledge regarding fissure sealants (12.9%) and professional fluoride therapy (16%).[24]

Since parents and primary caregivers of children play a pivotal role in taking health care decisions for children which includes dental health, therefore it is essential to determine their opinions and knowledge regarding relatively non-invasive preventive procedures which could be provided to the children, and which could prevent dental decay in the future. This study was designed since pertinent literature, which determined the perception and practices of parents of pediatric patients toward preventive dental procedures, including professionally applied fluoride application, was found to be scant in the local context. The data from this study will help us identify the possible causes related to the lack of awareness regarding professionally applied fluoride products among parents. Based on the factors identified as deterrents to opting for professional fluoride product application, recommendations to educate and create awareness in the public regarding the option of using professionally applied fluoride products in children and adolescents to prevent or halt the carious process will be put forth. This would encourage familiarity with these products among parents so such services can be timely availed by them for their children.

Thus, with this background, the objective of our research was to determine the knowledge, attitude, and practices of parents of pediatric patients coming to the dental OPDs about the use of professionally applied fluoride products.

METHODOLOGY

This was a multicenter, cross-sectional study, where data was collected from Paedodontics OPD of Jinnah Medical and Dental College (JMDC), Jinnah Sindh Medical University (JSMU), and Liaquat College of Medicine and Dentistry (LCMD) in Karachi. Data was gathered after approval from ERC (approval no. 000164/22) from the principal institute (JMDC) and taking permission from the collaborating institutes (JSMU and LCMD).

Inclusion and Exclusion criteria:

Parents arriving in Paediatric departments for treatment of their children aged 7-12 years were included in our study. However, any parents who were not willing to give consent or were in distress due to their child's condition were not made to be the part of our study.

Data collection instrument:

A customized self-administered questionnaire (Appendix 1) was used, composed of items that were compiled after an extensive literature search of published studies with similar methodologies and considering contextual elements. All relevant studies were downloaded, and all items of each questionnaire form were carefully reviewed. The common themes and items were collated to develop the questionnaire which had two sections. The first section recorded the demographics of the participants including age, gender, education level, number of children, and residential address. The second section recorded the responses of the participants related to their perception and practices related to the use of professionally applied fluoride products in their children. The items in this section were based on a 3-point Likert scale (Yes, Unsure, No) and each descriptor was given scores (Yes=3, Unsure=2 and No=1). Two items with the option of response selection were related to the perceived age of application of fluoride products and source of dental awareness of parents.

Data collection procedure:

The customized self-administered questionnaire was evaluated by two specialists in Pediatric dentistry for adequacy of content, followed by translation to the local language (Urdu) and then re-evaluated. It was then pre-tested on a sample of 10 parents of pediatric patients coming to the OPD. Any ambiguities in the questions or responses were removed before its final implementation. Using the reference of the study by Deep et al., [Deep 2020] and keeping a confidence level of 95%, our sample size came out to be 335. The duration of data collection was from April 2022 to Oct 2022. The primary investigators approached parents of pediatric patients, aged between 7-12 years, coming to the Paediatric OPD in their respective institutes. The parents were approached when it was least intrusive for them. Each participant was given instructions regarding filling out the questionnaire and made aware of the aims and objectives of the study. Any queries were addressed thoroughly until parents were satisfied. Privacy was ensured by getting the forms filled out in the private room. Parents were given ample time to read and understand the consent form before signing it. The identity of any participants, who chose to mention their names, was not disclosed. Only the researchers had access to the completed questionnaire forms. Any incomplete forms were also excluded.

Statistical Analysis:

Data was analyzed on SPSS version 23 (IBM Corporation, Armonk, New York, USA). Frequencies were calculated for categorical variables. The mean and standard deviation along with confidence interval was calculated for the scores of responses on the Likert scale. Chi-square test compared the parents' education with items related to perception. P-value of less than 0.05 was kept as significant. The statistical significance of the coefficients in the study was tested at a 95% confidence level. Frequencies and percentages of each variable were calculated. To compare categorical variables, Chi-square was used.

RESULTS

At the completion of the data collection phase, 296 completed questionnaires were returned (88.4% response rate). A total of 182 of patients were accompanied by their mothers whereas 114 were accompanied by their fathers. Out of the 296 children, 151 were boys and 145 were girls. In terms of parents' education, most of them had a Bachelor's degree (40.2%). 72.3% of the parents had less than 4 children and remaining 27.7% of the parents had 4 or more children. (Table 1)

Regarding the knowledge of parents, only 26.4% of them were aware about the use of fluoride in dentistry and even fewer knew about the professionally applied fluoride products in dentistry (12.8%). Vast majority of the parents believed that these products would prevent caries and wanted the dentist to use them for their child (70.6%). However almost half of the parents (51.7%) were not sure if they were harmful or not. Almost one-third of the parents (32.4%) believed that these products would be expensive to use. More than half (52.7%) of the parents were of the view that these products will definitely be cost effective and will prevent future

development of caries. A large majority of the parents (64.5%) were unsure about the benefit of fissure sealants in preventing caries development in children and consequently most of them were not sure if application of fissure sealants in children would cause them any anxiety or fear. Again, the majority of parents were not sure if application of fissure sealants was an invasive procedure (75.4%) and if they thought sealants would wear out after application (76.3%). Table 2 shows the perception of parents regarding the professionally applied fluoride products and fissure sealants. The mean scores and standard deviation was calculated for each response. The highest mean score obtained was for the item which asked regarding the availability of products which the dentist could apply to a child's tooth to prevent the initiation of caries (2.63±0.64) and the lowest was for the item about the awareness regarding any professionally applied fluoride products used in dentistry (1.49±0.71). The overall mean score for the parents' perception about professionally applied fluoride products was found to be 2.03±0.26.

Parents were also questioned regarding their experience of professionally applied fluoride products (Table 3) Only 11.8% of the parents reported that they had the experience of getting information regarding these products by their dentists and even less parents reported their children having had any such treatment (6.1%). The overall mean score for the parents' experience about professionally applied fluoride products was 1.38±0.55. On response to the item regarding the age the parents thought was appropriate for children and adolescents to receive professionally applied fluoride therapy, majority of the parents (n=180) were not sure (Figure 1). Majority of the parents mentioned that dentists were their main source of any knowledge and awareness regarding dentistry and dental products (Fig 2). There was a statistically significant association found between the items related to perception of parents regarding professionally applied fluoride products and their level of education ($p<0.05$) on application of Chi-square test.

Table 1. Demographic details of the parents and their children included in the study

		n (%)
1.	**Accompanying parent**	
	Mother	182 (61.5)
	Father	114 (38.5)
2.	**Education level of parents**	
	Matriculation	49 (16.6)
	Intermediate	82 (27.7)
	Bachelors	119 (40.2)
	Masters	46 (15.5)
3.	**No of children**	
	< 4	214 (72.3)
	≥ 4	82 (27.7)
4.	**Gender of pediatric patient**	
	Male	151 (51)
	Female	145 (49)

Table 2: Scores of parents' responses on Likert scale regarding their perception about professionally applied fluoride products

	Questions	Scores of the parent's responses				
		YES	UNSURE	NO	Mean±SD	95% CI
		n (%)	n (%)	n (%)		
1.	Are you aware about the use of fluoride in dentistry?	78 (26.4)	59 (19.9)	159 (53.7)	1.73±0.85	1.63-1.82
2.	Are you aware about professionally applied fluoride products used in dentistry?	38 (12.8)	71 (24)	187 (63.2)	1.49±0.71	1.41-1.57
3.	Do you think there are products available that the dentist can put on your child's teeth to prevent caries from starting?	209 (70.6)	61(20.6)	26 (8.8)	2.63±0.64	2.55-2.70
4.	Do you think such a product could be beneficial to your child?	117 (39.5)	153 (51.7)	26 (8.8)	2.31±0.62	2.24-2.38
5.	Do you think such a product would be inexpensive?	55 (18.6)	145 (49)	96 (32.4)	1.86±0.7	1.78-1.94
6.	Do you think such a product would help prevent extensive dental treatment for your child in the future?	156 (52.7)	117 (39.5)	23 (7.8)	2.45±0.64	2.38-2.52
7.	Do you think fissure sealants help prevent caries in children?	62 (20.9)	191 (64.5)	43 (14.5)	2.06±0.59	2.0-2.13
8.	Do you feel that applying fissure sealants in children will cause them anxiety or fear?	47 (15.9)	168 (57.1)	80 (27)	1.89±0.65	1.81-1.96
9.	Do you think the procedure of professional application of fluoride products is an invasive?	14 (4.7)	221 (75.4)	59 (19.9)	1.85±0.48	1.79-1.90
10.	Do you think fissure sealants need reapplication after some time?	34 (11.5)	225 (76.3)	36 (12.2)	1.99± 0.49	1.94-2.05

Table 3: Scores of parents' responses on Likert scale regarding their experience about professionally applied fluoride products

	Questions	Scores of the parent's responses				
		YES	UNSURE	NO	Mean, SD	95% CI
		n (%)	n (%)	n (%)		
1.	Have you ever been informed by your child's dentist about any such products?	35 (11.80)	60 (20.3)	201 (67.9)	1.44±0.7	1.36-1.52
2.	Has your child/any of your children ever received any such treatment?	18 (6.1)	57 (19.3)	221 (74.6)	1.31±0.59	1.25-1.38

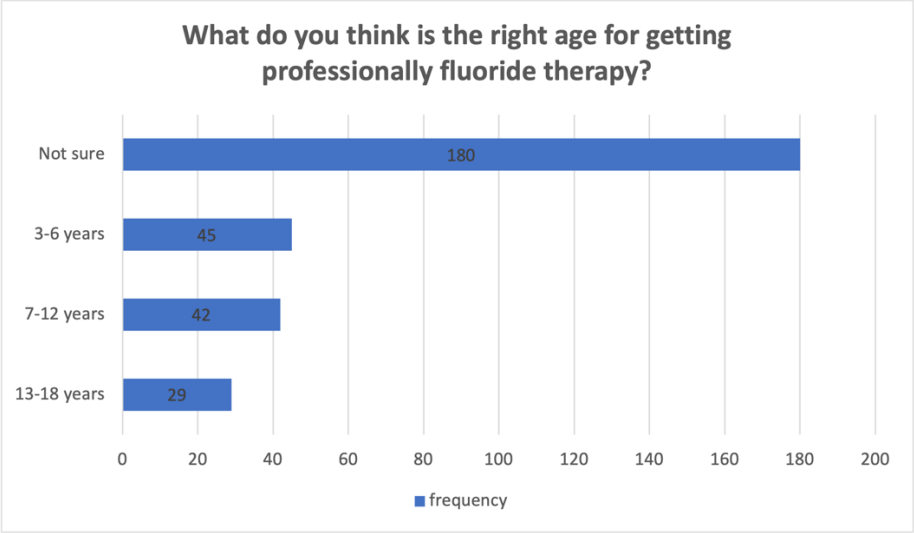

Figure 1. Parents' responses regarding the most appropriate age for the application of professionally applied fluoride products

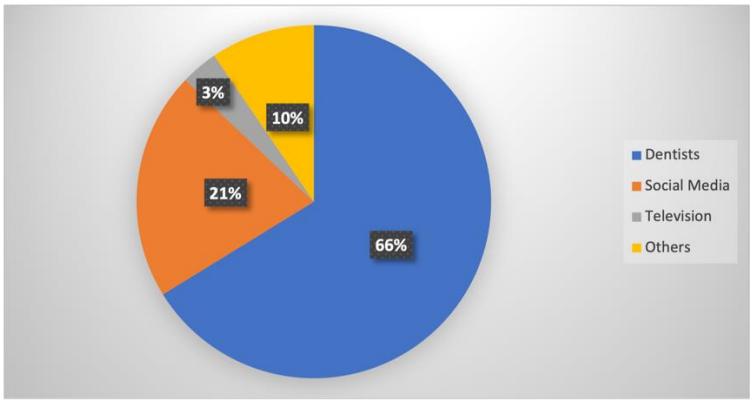

Figure 2: Sources of dental awareness or knowledge for parents

DISCUSSION

Our study aimed to evaluate the parents' perception and practices related to professionally applied fluoride products in children and adolescents. Parents accompanying their children to Paediatric OPDs were approached and requested to participate in the study. In general, the parents were unsure regarding professionally applied fluoride products and fissure sealants and had a deficient experience in terms of use of such products.

A study done on Iranian population reported a much higher level of knowledge by parents in which 57.6% of parents knew about the preventive action of fissure sealants and 44.5% believed it was important to prevent caries.[25] However, in our study only 26.4% of the parents had awareness regarding the use of fluoride in dentistry and even lesser (12.8%) had any knowledge about the professionally applied fluoride products used in dentistry. A study done in Turkey on parents refusal of fluoride varnish for their primary school children revealed that of the parents who took part in the survey, 56.5% were unaware of the purpose of the application of F varnish, and 58.9% were unsure of its safety.[26]

We reported having only a small percentage of children (6.1%) having received professionally applied fluoride treatment or sealants previously. The placement of fissure sealants in children was about 10% in an Iranian study [24] and 9% in a Saudi study .[27] These estimates are indicative of the fact that parents have a very low tendency towards professionally applied preventive dental care.

Significant correlation has been observed between the level of parents' education and their awareness regarding preventive treatment and professionally applied fluoride products in previously

published literature.[28] Likewise, in our study, the years of education of parents was found to be significantly associated with their awareness regarding fluoride use in dentistry. Among parents who had 12 years or less of schooling, less than 10% were aware about fluoride whereas a third and nearly half of the parents understood the preventive role of fluoride when they had education up to Bachelor's and Master's level, respectively. Similar correlation was observed for all items assessing general awareness about professionally applied fluoride product. Additionally, for all items regarding fissure sealants, a statistically significant correlation between parent education and their awareness was observed ($p<0.05$). It was also seen that even though most parents were unaware of the professionally applied fluoride products, or thought these products would be expensive, nonetheless, a greater proportion of parents who reported otherwise had a higher level of education.

Majority of the parents (60.8%) were unsure about the correct age for receiving professionally applied fluoride therapy. The correct age for applying professionally applied fluoride therapy such as fluoride varnish or fissure sealants can vary based on dental guidelines and recommendations. Fluoride products such as varnishes can be placed as early as 1st year of life.[29] Fissure sealants are usually placed after the eruption of 1st molars, which is typically around the age of 6-7 years. The low knowledge of parents from our study reflects the dire need for imparting preventive dental education to the parents, especially regarding the ages when they need to take their children to the dental office for receiving such treatment.

Most of the parents reported that their primary source of any information related to dental health and dental products were dentists, followed by social media, which can also be considered an effective tool for imparting any new information. However, face to face interaction with a dentist is more effective for dental education [30] but social media as a secondary source of imparting dental knowledge and awareness should also be explored by dental professionals in the light of the current findings.[31] Overall, it can deduced that the reason for parents' lack of knowledge and awareness regarding professionally applied fluoride products and their poor experience in this regard could be attributed partly to lack of the dental community in playing its part in dissemination of relevant information to the masses. Dentists are known to play a very crucial role in educating the parents of the children in promoting the dental health and disease prevention. They provide patients with the basic oral health information and potentially help them to make informed decisions about their oral health. Effective communication and guidance from primary care dentists can empower parents to establish good oral hygiene habits in their children from start and avail the professional interventions in a timely manner.

One of the strengths of our study is that, to our knowledge, this is the first study assessing the perceptions and knowledge of parents regarding professionally applied preventive measures in our region. The results of the study has identified gaps in parents' knowledge and any misconceptions they have about professionally applied fluoride products. We believe that insights from our study could be used as guidelines to design targeted educational materials such as brochures or leaflets to be distributed among the parents visiting the OPDs and in schools, so that parents are made aware of potentially low-cost preventive treatment strategies.

Dental professionals must be vigilant and make a conscience effort to guide and provide information to parents of pediatric patients visiting their practices about the benefits and availability of professionally applied fluoride products as a preventive treatment strategy for their children. Guidelines regarding fissure sealant therapy can be considered in continuing education courses for dentists so that they can implement these in their future dental practice. Policymakers and healthcare organizations and can also establish guidelines and evidence-based recommendations to establish standardized protocols for fluoride application and to provide guidance to parents as well as the dentists.

Measures to increase the knowledge of parents visiting the dental OPDs by dentists regarding the professionally applied fluoride products as well as fissure sealants can be very beneficial in improving the collective realization of the parents. Secondarily, social media can be the other effective strategy in imparting oral health related preventive measures. In Pakistan, which is a low resource and low-income country, a great benefit can be gained by active involvement of the primary care giver dentist in educating parents regarding availing the preventive care options which will consequently reduce the burden of disease in our region.

One of the limitations of this study is that the results cannot be generalized as data was only collected from limited centers. Parents visiting the OPDs of three different institutes were included. These parents can have diverse beliefs, backgrounds and life experiences that can eventually affect their knowledge, perceptions, and practices thus making it difficult to encompass the full range of this diversity in a single study. A similar study conducted on a larger scale to include multiple other centers could be expected to address this limitation.

Since our questionnaire was in Urdu language, any participant with an inability to understand the questions could have hindered their capacity to provide meaningful responses, thus contributing to information bias. Perhaps in another study, the same questionnaire can be used for collecting responses after being translated in the prevalent local language. Moreover, study participants of questionnaire-based studies may resort to providing answers that they feel are socially desirable or align with the anticipated norms, rather than truly reflecting their genuine behaviors and attitudes. Therefore, in-depth interviews and focus group discussions with parents could be conducted in order to further explore the reasons behind their responses.

CONCLUSIONS

The findings of our study offer an insight into overall parental perceptions, knowledge, and acceptance of professionally applied dental fluoride products. Our study concluded that most of the responses of the parents were towards being unsure regarding the perception and awareness about professionally applied fluoride products. Previous experiences of the parents with any application of professionally applied products were also sparse. The results could be possibly explained by the limited educational background of the majority of the parents. Increasing the knowledge of dentists and asking them to educate the patients regarding professionally applied dental fluoride products while providing services can mitigate the issue to a large extent. Involving the social media in providing public education can also be an effective strategy to raise the knowledge of society and collective consciousness in making use of professionally applied preventive fluoride therapies for their children in a timely manner.

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CONFLICT OF INTERESTS

None

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