



# Parental Knowledge and Awareness of Fluoride Varnish Application on Their Children - A Cross-Sectional Study

Ahmad H Almeahmadi <sup>1</sup>, Abraar Bannan<sup>2</sup>, Asmahan Ahmad<sup>2</sup>, Rahaf Alqadi <sup>2</sup>, Areej Alhindi<sup>2</sup>

<sup>1</sup>Department of Oral Biology, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia; <sup>2</sup>Department of General Dentistry, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia

Correspondence: Ahmad H Almeahmadi, Department of Oral Biology, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia, Email [ahalmehmadi@kau.edu.sa](mailto:ahalmehmadi@kau.edu.sa)

**Introduction:** Fluoride varnishes are forms of topical fluoride that are applied on the surfaces of teeth to prevent from dental caries. It contains sodium fluoride, which is the active ingredient in the varnish and the concentration is about 22,600 ppm. Fluoride can promote enamel remineralization which protect against dental caries and it can be professionally applied by dentists and physicians for infants and young children.

**Methods:** In this, cross-sectional study, a close-ended survey containing 14 items was given to 399 randomly assigned parents in Jeddah, Saudi Arabia. The questionnaire included demographic data and items to assess the general knowledge about fluoride and fluoride varnish. The responses were coded and statistical analysis was performed.

**Results:** About 65.3% of males and 47.4% females were not sure if fluoride application was safe for their children, however, 67.2% of the population revealed that tooth pastes were one among the fluoride sources for their children. Pearson's correlation test showed high statistical significance between the parents' educational background and awareness level of fluoride varnish was of with p-value-0.000 and correlation coefficient (r-value-0.427).

**Conclusion:** The lack of awareness among parents on an important caries-control measure warrants the implementation of special awareness programs on fluorides and its benefits in young children.

**Keywords:** fluoride, fluoride varnish, caries-control, awareness

## Introduction

Dental caries is considered one of the most common oral disease among the young and old.<sup>1</sup> It can be defined as the damage to the tooth structure and it is caused by plaque bacteria. A lack of adequate oral hygiene enables the bacteria to ferment the carbohydrates to acid which in turn leads to the demineralization of the tooth structure.<sup>2</sup> According to a global study conducted in 2010 on the prevalence of dental caries, it affects 2.43 billion people worldwide.<sup>3</sup> In Saudi Arabia, the prevalence of carious lesions is around 80% in children.<sup>4</sup> Fluoride is taken from the element fluorine and some traces can be found naturally occurring in water. Usually, it is added to toothpastes and public water in some countries by a process known as fluoridation in order to prevent dental caries.<sup>5</sup> Another source of fluoride is the professional application in dental offices and it can be in the form of gels, foams, or varnishes.<sup>5,7</sup>

One of the widely-used fluoride varnish contains sodium fluoride (Concentration-22,600 ppm).<sup>6</sup> Fluoride can promote enamel remineralization which protect against dental caries.<sup>5</sup> It can be applied by dentists and physicians for infants and young children every 3, 6, or 12 months according to their risk for caries development.<sup>6</sup> The American Academy of Paediatric Dentistry recommends using fluoride varnish for infants who are at high risk for dental caries. Fluoride varnish application should start from the time of primary teeth eruption.<sup>5</sup> The professionally applied topical fluoride varnish is the easiest and quickest as it takes only 1–4 minutes for its application. Then, special care instructions are given to refrain from eating or drinking for at least two hours.<sup>4</sup> It is recommended not to brush the teeth on the day of application for the fluoride to be retained

on the tooth surface for a longer time.<sup>6</sup> Several studies in the existing literature have reported that fluoride varnishes could reduce the development of dental caries by 18–63%.<sup>8–11</sup>

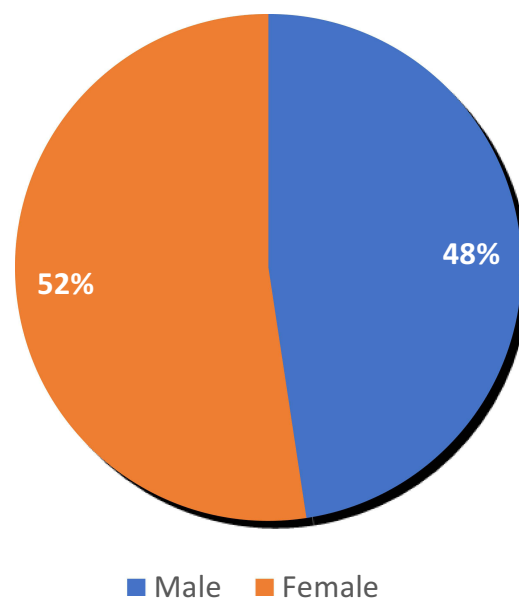
There is a dearth of studies in the existing literature on the parental awareness of the potential benefits of fluoride in a major city like Jeddah. In this cross-sectional study, we have surveyed the parental knowledge and awareness of fluoride varnish application for children and to assess the need for future awareness campaigns related to this important issue.

## Materials and Methods

This cross-sectional study through a survey was conducted in the city of Jeddah, Saudi Arabia. The study was conducted between March and May 2018 and it included 399 parents who were mall-goers in Jeddah. The Ethical approval for our study was obtained from the Dental school of King Abdulaziz University, the Research Ethics Committee, IRB# 074–03–19A and the study complies with the Declaration of Helsinki. A validated questionnaire in Arabic language was given electronically through assigned tablets. An informed consent was obtained electronically prior to the start of the questionnaire stating their participation was voluntary and the information provided would be confidential. The parents were chosen randomly and one parent for each house-hold with a child aged 1–12 years were eligible to participate in the study. In this study, the age range of the parents was between 18 and 40 years and the age range of the children was from below 3 years till 12 years of age.

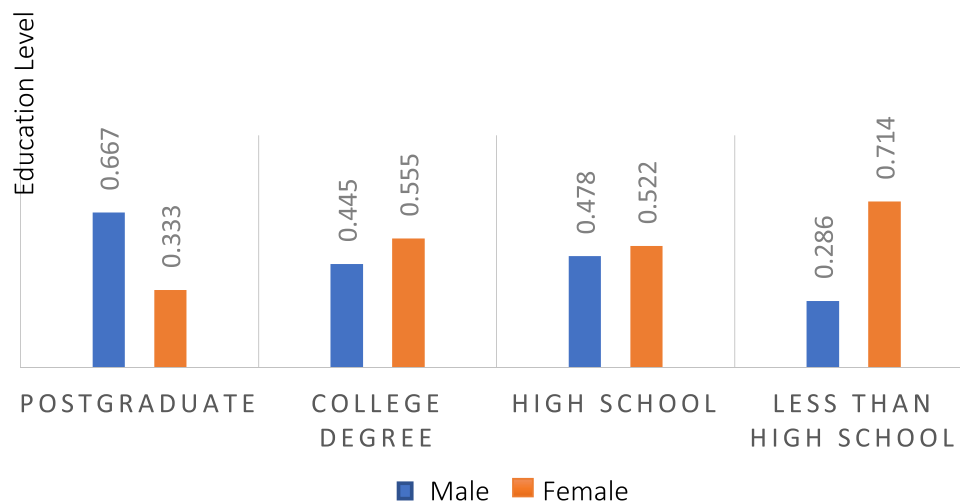
The survey included 52% females and 48% of the male population to avoid any bias among the genders (Figure 1). The questionnaire included 14 items to assess the demographic data, general knowledge and awareness of fluoride and fluoride varnishes. The educational level of the parents was also assessed and distributed as: postgraduate, college degree, high school, and lesser than high school (Figure 2). Responses were coded and the data were revealed as frequency distribution and percentages comparing between gender and degree of parents' education.

### Gender-wise distribution of the Study Population



**Figure 1** Percentage wise distribution of the study population according to gender.

## GENDER-WISE DISTRIBUTION OF EDUCATIONAL LEVEL OF PARENTS



**Figure 2** The graph represent the percentages of respondents according to educational level of parents among different genders.

### Statistical Analysis

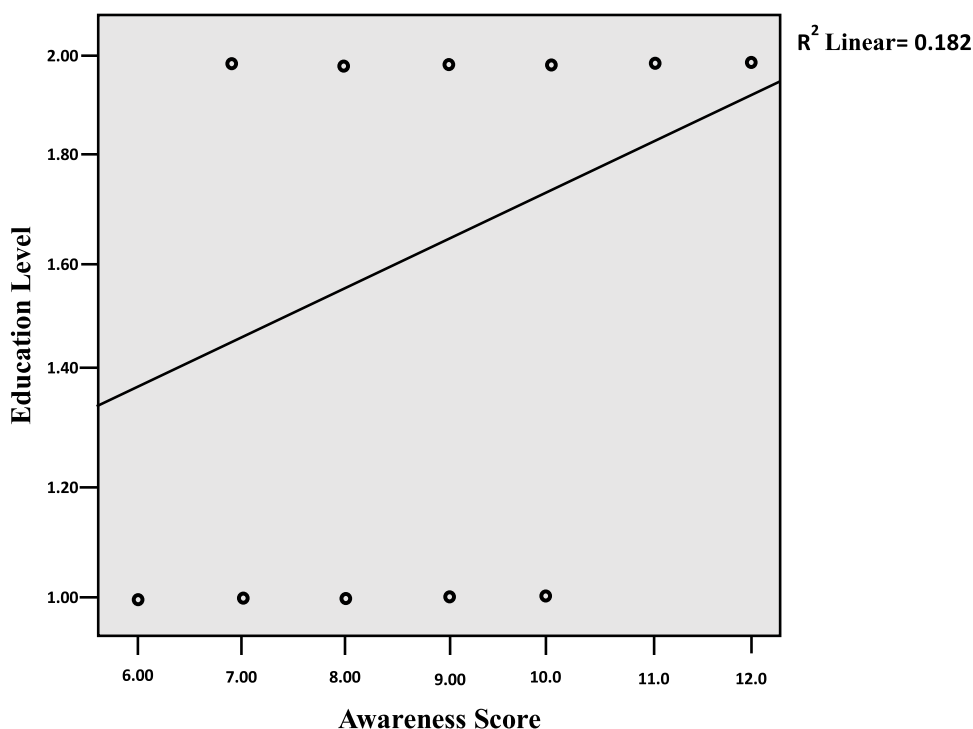
The variables were subjected to Kolmogorov-Smirnov and Shapiro–Wilks normality tests and it followed parametric distribution. The frequency distribution of the survey answers among the study population was depicted and chi-square test was performed to assess the gender-wise difference in the awareness levels. Also, Pearson’s correlation test was performed to analyze the association between educational background of the parents’ and awareness level of fluoride varnish. All the tests were performed using SPSS statistical software, version 17.

### Results

Among the 399 participants included in this cross-sectional survey, 52% females and 48% males were reported (Figure 1). Most of the female participants were college degree holders (55.55%) and about 71.2% of the female population were housewives (Figure 2). The study assessed the population’s awareness about fluoride varnish and graded according to the literacy background of the parents (Figure 3). The study showed that the majority of its participants were not aware of fluoride varnishes (66.2%) (Table 1). About 65.3% of males and 47.4% females were not sure if fluoride application was safe for their children. An important issue such as fluoride toxicity received negative feedback with 75.9% of the population not being aware of it (Table 1).

About 67.2% of the population constituting the majority revealed that tooth pastes were one among the fluoride sources for their children [Males (n = 122) and females (n = 146)]. A percentage of parent population (6.8% males; 4.4% females) recognized that water is another source of fluoride. A very small percentage of parents (1.7%) used fluoride varnish for their children. Also, very few of them knew about the availability of fluoride as supplements (1.0%). Majority of the respondents (26.8% males, 37.8% females) answered correctly regarding the main effect of fluoride on teeth while 40.7% females and 58.4% of males did not know the said effect. Also, most of the participants were not sure about when to visit the dental office for fluoride varnish application for their children (56.8% males and 49.3% females). Moreover, most participants (82.1% males, 67.9% females) did not know the exact time to stop brushing after fluoride varnish application (Table 1).

The results of the chi-square test on the gender-wise comparison on the level of fluoride awareness revealed that the females had better knowledge and awareness when compared to their male counterparts in terms of fluoride varnish, their effects, their application, brushing following application and their safety measures (p-value <0.05). However, questions



**Figure 3** Scatter plot depicts the correlation between educational background of parents' and the level of fluoride awareness.

about sources of fluoride and the potential effects of fluoride toxicity did not show difference among both the genders (Table 1).

The potential effect of fluoride on teeth was accurately reported in a majority of the post-graduate degree holders (38.6%), followed by college degree holders (34.5%), high school (28.3%), and less than high school subjects (14.3%). The awareness about fluoride varnish was prominent among post-graduate and college degree holders with 35.1% and 34.5%, respectively. It was relatively low among parents who completed high-school (33.7%) and less than high school (23.8%). Regarding fluoride varnish safety, nearly half of participants were not concerned about it and that included parents with different educational backgrounds; post-graduate parents (52.6%), college degree parents (54.6%), high school parents (60.9%), and less than high school (57.1%) (Table 2) Pearson's correlation test revealed that the level of correlation between the parents' educational background and awareness level of fluoride varnish was of high statistical significance with p-value-0.000 and correlation coefficient (r-value-0.427) with post-graduate and college degree holders being more aware about the effects of fluoride and fluoride varnishes, when compared to their counterparts who had completed school-level education (Table 2).

## Discussion

This cross-sectional survey conducted among 399 parents in Jeddah aimed to examine the parental knowledge and awareness about fluoride varnishes and its importance in their children's oral health. To our knowledge, this is the first study of its kind to be conducted in Saudi Arabia. A similar study in the gulf region was reported by Hendaus MA et al in Doha, however the sample size observed in our study is larger with 399 participants.<sup>12</sup> Our study showed that the majority of the parents, irrespective of their genders, did not know the effect of fluoride and its possible toxicity and resistance to caries. This study showed that there is a lack of parental knowledge on important preventive modalities where the national level of caries index is high. This crucial finding is important to encourage media and health-care providers to invest more time and efforts in awareness campaign related to the benefits and potential use of fluorides.

The findings of this study also showed that the knowledge about fluoride varnishes was not related to the level of parents' education. This is in discordance to various studies that show that the parent's oral health knowledge and

**Table 1** Gender-Wise Comparison of Parents' Knowledge and Awareness Towards Fluoride Varnish and Their Application in Children

Questions	Male	Female	Total	Chi-Square Value	P value
<b>Sources of Fluoride</b>					
1) Tooth paste	122 (62.8%)	146 (71.2%)	268 (67.2%)	8.067	0.153
2) Fluoride varnish	2 (1.0%)	7 (3.4%)	9 (2.3%)		
3) Supplement	2 (1.0%)	2 (1.0%)	4 (1.0%)		
4) I do not know	50 (25.8%)	39 (19.0%)	89 (22.3%)		
5) Water	13 (6.8%)	9 (4.4%)	22 (5.5%)		
6) Mouthwash	5 (2.6%)	2 (1.0%)	7 (1.7%)		
<b>Parents that heard about fluoride varnish</b>					
1) Yes	43 (22.6%)	92 (44.0%)	135 (33.8%)	18.93	0.001**
2) No	147 (77.4%)	117 (56.0%)	264 (66.2%)		
<b>Worried about fluoride varnish safety</b>					
1) Yes	31 (16.3%)	56 (26.8%)	87 (21.8%)	13.07	0.004*
2) No	35 (18.4%)	54 (25.8%)	89 (22.3%)		
3) I do not know	124 (65.3%)	99 (47.4%)	223 (55.9%)		
<b>Think that fluoride varnish causing fluoride toxicity</b>					
1) Yes	14 (7.4%)	10 (4.8%)	24 (6.0%)	5.37	0.147
2) No	25 (13.2%)	47 (22.5%)	72 (18.0%)		
3) I do not know	151 (79.5%)	152 (72.7%)	303 (75.9%)		
<b>Times child visit the dentist to apply it</b>					
1) Every 3 months	10 (5.3%)	8 (3.8%)	18 (4.5%)	13.30	0.010*
2) Every 6 months	24 (12.6%)	54 (25.8%)	78 (19.5%)		
3) Every year	8 (4.2%)	11 (5.3%)	19 (4.8%)		
4) Only if needed	40 (21.1%)	33 (15.8%)	73 (18.3%)		
5) I do not know	108 (56.8%)	103 (49.3%)	211 (52.9%)		
<b>Child stop brushing after applying fluoride varnish</b>					
1) 1 hour	8 (4.2%)	17 (8.1%)	25 (6.3%)	10.54	0.032*
2) 6 hours	10 (5.3%)	16 (7.7%)	26 (6.5%)		
3) 8 hours	7 (3.7%)	13 (6.2%)	20 (5.0%)		
4) 24 hours	9 (4.7%)	21 (10.0%)	30 (7.5%)		
5) I do not know	156 (82.1%)	142 (67.9%)	298 (74.7%)		
<b>Effect of fluoride varnish</b>					
1) Increase tooth resistance against caries	51 (26.8%)	79 (37.8%)	130 (32.6%)	14.92	0.021*
2) Incorrect answer	28 (14.7%)	45 (21.5%)	73 (18.3%)		
3) I do not know	111 (58.4%)	85 (40.7%)	196 (49.1%)		

Notes: \*p-value <0.05 Statistically significant \*\*p-value <0.01- High statistical significance.

prevalence of dental caries are inter related.<sup>13-15</sup> It was found that children had lower prevalence of dental caries when the parents had better oral health literacy.<sup>15</sup> Regarding the source of fluoride, most of the parents had chosen toothpaste as the potential source, regardless of their education level. Although it was reported that a large percentage of the parents never had worrying thoughts and had not acknowledged its safety, 60.8% thought it would resist the caries. Hendous et al reported that 60% of their participants showed some concern regarding the fluoride varnish.<sup>12</sup> They were worried about ingestion of fluorides and potential systemic effects, if any. Our study showed that around 73% of parents did not know about tooth brushing after applying fluoride varnish and 55% did not know when to visit their dentist for fluoride varnish application for their children.

In this study, it was observed that there was a high level of statistically significant positive correlation between the educational background of parents and level of fluoride awareness. This finding was chiefly due to post-graduate and college degree holders accurately reporting the effects of fluoride and usage of fluoride varnish. The present study's

**Table 2** Pearson's Correlation Between the Educational Background of Parents' and Fluoride Level Awareness

Questions	Post Graduate	Collage	High School	Less than High School	Total	Pearson Correlation Coefficient (r-Value)	P value
<b>Sources of Fluoride</b>						0.427	0.001**
1) Tooth paste	42 (63.7%)	153 (70.2%)	58 (65.9%)	15 (71.4%)	268 (67.2%)		
2) Fluoride varnish	0 (0%)	5 (2.3%)	2 (2.3%)	0 (0%)	9 (2.3%)		
3) Supplement	1 (1.5%)	2 (0.9%)	1 (1.1%)	0 (0%)	4 (1.0%)		
4) I do not know	19 (28.8%)	44 (20.2%)	19 (21.6%)	6 (28.6%)	89 (22.3%)		
5) Water	3 (4.5%)	11 (5.0%)	8 (9.1%)	0 (0%)	22 (5.5%)		
6) Mouthwash	1 (1.5%)	3 (1.4%)	0 (0%)	0 (0%)	7 (1.7%)		
<b>Parents that heard about fluoride varnish</b>							
1) Yes	20 (35.1%)	79 (34.5%)	31 (33.7%)	5 (23.8%)	135 (33.8%)		
2) No	37 (64.9%)	150 (65.5%)	61 (66.3%)	16 (76.2%)	264 (66.2%)		
<b>Worried about fluoride varnish safety</b>							
1) Yes	16 (28.1%)	45 (19.7%)	17 (18.5%)	9 (42.9%)	87 (21.8%)		
2) No	11 (19.3%)	59 (25.8%)	19 (20.7%)	0 (0%)	89 (22.3%)		
3) I do not know	30 (52.6%)	125 (54.6%)	56 (60.9%)	12 (57.1%)	223 (55.9%)		
<b>Think that fluoride varnish causing fluoride toxicity</b>							
1) Yes	6 (10.5%)	10 (4.4%)	6 (6.5%)	2 (9.5%)	24 (6.0%)		
2) No	9 (15.8%)	51 (22.3%)	10 (10.9%)	2 (9.5%)	72 (18.0%)		
3) I do not know	42 (75.7%)	168 (73.4%)	76 (82.6%)	17 (81.0%)	303 (75.9%)		
<b>Times child visit the dentist to apply it</b>							
1) Every 3 months	2 (3.5%)	14 (6.1%)	2 (2.2%)	0 (0.0%)	18 (4.5%)		
2) Every 6 months	9 (15.8%)	50 (21.8%)	13 (14.1%)	6 (28.6%)	78 (19.5%)		
3) Every year	4 (7.0%)	10 (4.4%)	4 (4.4%)	1 (4.8%)	19 (4.8%)		
4) Only if needed	7 (12.3%)	41 (17.9%)	22 (23.9%)	3 (14.3%)	73 (18.3%)		
4) I do not know	35 (61.4%)	114 (49.8%)	51 (55.4%)	11 (52.4%)	211 (52.9%)		
<b>Child stop brushing after applying fluoride varnish</b>							
1) 1 hour	3 (5.3%)	14 (6.1%)	7 (7.6%)	1 (4.8%)	25 (6.3%)		
2) 6 hours	8 (14.0%)	14 (6.1%)	3 (3.3%)	1 (4.8%)	26 (6.5%)		
3) 8 hours	4 (7.0%)	13 (5.7%)	1 (1.1%)	2 (9.5%)	20 (5.0%)		
4) 24 hours	6 (10.5%)	19 (8.3%)	3 (3.3%)	2 (9.5%)	3 (7.5%)		
5) I do not know	36 (63.2%)	169 (73.8%)	78 (84.8%)	15 (71.4%)	75 (18.7%)		
<b>Effect of fluoride varnish</b>							
1) Increase tooth resistance against caries	22 (38.6%)	79 (34.5%)	26 (28.3%)	3 (14.3%)	130 (32.6%)		
2) Incorrect answer	11 (19.3%)	40 (17.5%)	13 (14.1%)	9 (42.9%)	73 (18.3%)		
3) I do not know	24 (42.1%)	110 (48.0%)	53 (57.6%)	9 (42.9%)	196 (49.1%)		

Note: \*\*p-value <0.01- High statistical significance.

findings are in discordance with Hendous' findings where there were no significant associations between parental education, siblings with dental caries, and parental knowledge of fluoride as an adjunct to maintenance of oral health.<sup>12</sup> However, Chahhbhra et al observed the parental knowledge and attitudes towards dental care in Indian pre-school children and concluded that the deficiency of awareness and dental apprehension prevented the parents from seeking treatment/prevention for dental caries among their children.<sup>16</sup> Similar study conducted on Chinese population showed different factors such as inadequate knowledge of oral hygiene, fear of dental anaesthesia, and lack of social support as the factors responsible for deferring visits to a dentist. A recent report has shown that parents are refusing topical fluoride treatment for their children that stemmed from both cultural and social factors.

According to a study conducted by Weinstein et al, in which a comparison of motivational interview approach to the traditional one was done and they found that children in the motivational interview group exhibited lower new carious lesions in contrast to the control group.<sup>17</sup> Our study is meritorious in its sample size but the potential limitation is its cross-sectional design and it did not inculcate any motivational interview or briefing on the benefits of fluorides. This study paves the way to implement special programs to create awareness among the population to reach caries prevention at a national-level. In a nation with a high caries index, the best preventive strategy would be made by reinforcing educational programmes (clinical and community-based), and motivational interviews during dental visits targeting the parents.

## Conclusion

The study concluded that the level of awareness about fluorides and fluoride varnishes was low among the Arabic population in the city of Jeddah. The lack of awareness was unrelated to the parents' educational background. Topical fluorides are one among the few evidence-based preventive protocols available for dental caries prevention, and it is of utmost importance to educate the parents about its importance in their children's oral health.

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## Disclosure

The authors report no conflicts of interest in relation to this work.

## References

1. Kleinman DV. The future of the dental profession: perspectives from oral health in America: a report of the Surgeon General. *J Am Coll Dent.* 2002;69(3):6–10.
2. Featherstone JD. Dental caries: a dynamic disease process. *Aust Dent J.* 2008;53(3):286–291. doi:10.1111/j.1834-7819.2008.00064.x
3. Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012;380(9859):2163–2196. doi:10.1016/S0140-6736(12)61729-2
4. Al Agili DE. A systematic review of population-based dental caries studies among children in Saudi Arabia. *Saudi Dental J.* 2013;25(1):3–11. doi:10.1016/j.sdentj.2012.10.002
5. Carvalho DM, Salazar M, Oliveira B, Coutinho ESF. Fluoride varnishes and decrease in caries incidence in preschool children: a systematic review. *Revista Brasileira de Epidemiologia.* 2010;13(1):139–149. doi:10.1590/S1415-790X2010000100013
6. Affairs ADACo S. Professionally applied topical fluoride: evidence-based clinical recommendations. *J Dent Educ.* 2007;71(3):393–402.
7. Lewis C, Lynch H, Richardson L. Fluoride varnish use in primary care: what do providers think? *Pediatrics.* 2005;115(1):e69–e76. doi:10.1542/peds.2004-1330
8. Weintraub JA, Ramos-Gomez F, Jue B, et al. Fluoride varnish efficacy in preventing early childhood caries. *J Dent Res.* 2006;85(2):172–176. doi:10.1177/154405910608500211
9. Bader JD, Rozier RG, Lohr KN, Frame PS. Physicians' roles in preventing dental caries in preschool children: a summary of the evidence for the US Preventive Services Task Force. *Am J Prev Med.* 2004;26(4):315–325. doi:10.1016/j.amepre.2003.12.001
10. Lawrence HP, Binguis D, Douglas J, et al. A 2-year community-randomized controlled trial of fluoride varnish to prevent early childhood caries in Aboriginal children. *Community Dent Oral Epidemiol.* 2008;36(6):503–516. doi:10.1111/j.1600-0528.2008.00427.x
11. Slade GD, Baillie RS, Roberts-Thomson K, et al. Effect of health promotion and fluoride varnish on dental caries among Australian Aboriginal children: results from a community-randomized controlled trial. *Community Dent Oral Epidemiol.* 2011;39(1):29–43. doi:10.1111/j.1600-0528.2010.00561.x
12. Hendaus MA, Jama HA, Siddiqui FJ, Elsiddig SA, Alhammadi AH. Parental preference for fluoride varnish: a new concept in a rapidly developing nation. *Patient Prefer Adherence.* 2016;10:1227. doi:10.2147/PPA.S109269

13. Chu CH, Ho PL, Lo EC. Oral health status and behaviours of preschool children in Hong Kong. *BMC Public Health*. 2012;12(1):767. doi:10.1186/1471-2458-12-767
14. Department of Health. Oral health survey 2011; Hong Kong Special Administrative Region: the Government of Hong Kong; 2012.
15. Chen KJ, Gao SS, Duangthip D, Li SKY, Lo ECM, Chu CH. Dental caries status and its associated factors among 5-year-old Hong Kong children: a cross-sectional study. *BMC Oral Health*. 2017;17(1):121. doi:10.1186/s12903-017-0413-2
16. Chhabra N, Chhabra A. Parental knowledge, attitudes and cultural beliefs regarding oral health and dental care of preschool children in an Indian population: a quantitative study. *Eur Arch Paediatr Dent*. 2012;13(2):76–82. doi:10.1007/BF03262848
17. Chi DL. Parent refusal of topical fluoride for their children: clinical strategies and future research priorities to improve evidence-based pediatric dental practice. *Dent Clin North Am*. 2017;61(3):607–617. doi:10.1016/j.cden.2017.03.002

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