

# Self-Reported Knowledge and Attitude of Dentists towards Prescription of Fluoride

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## Abstract

**Objectives:** This study aimed to assess the self-reported knowledge and attitude of dentists towards fluoride prescription.

**Materials and Methods:** A questionnaire survey was conducted at the national annual dental congress in 2010 in Tehran-Iran. Dentists' level of knowledge about the preventive effects of systemic and topical administration of fluoride was assessed as well as their attitudes towards its application. Self-reported practice for two paper patients (a child and an adult with high risk of dental caries) was assessed. Data were analyzed using SPSS, chi-square test and logistic regression.

**Results:** A total of 347 dentists including 232 (73.4%) males and 84 (26.6%) females responded; 84.7% agreed/strongly agreed with addition of fluoride to water and 66% agreed with prescription of fluoride tablets/drops in fluoride-deficient areas. Fluoridated toothpastes were considered useful by 85.3%; this rate was 78.7% for fluoride rinse and 87.6% for fluoride varnish, foam or gel. The majority of dentists (67.4%) reported no access to clear guidelines on fluoride application; 83% considered fluoride to be effective for caries prevention in children less than 12 years and 39.2% believed it was useful for adults and adolescents; 50% of the respondents correctly managed the high-risk child and adult with respect to appropriate selection of fluoride product. Younger dentists (OR=0.94; 95% CI 0.8-0.9; P=0.043) and new graduates (OR=0.94; 95% CI 0.89-0.99; P=0.034) were more likely to correctly manage the high-risk child.

**Conclusion:** Dentists had good knowledge and positive attitudes towards fluoride application. New graduates were more likely to correctly manage the young high-risk patient.

**Keywords:** Fluorides; Risk; Case Management

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## INTRODUCTION

In the recent decades, a considerable decline has been reported in prevalence of dental caries especially in developed countries, which is mainly due to the widespread use of fluoride products systemically or topically [1, 2].

According to the Center for Disease Control “the laboratory and epidemiologic research that has led to the better understanding of how fluoride prevents dental caries indicates that fluoride’s predominant effect is post-eruptive and topical and that the effect depends on

fluoride being in the right amount in the right place at the right time. Fluoride works primarily after teeth have erupted, especially when small amounts are maintained constantly in the mouth especially in saliva and plaque". This is in contrast to the previously accepted belief that the main benefit of fluoride is pre-eruptive and systemic [3].

Many studies have been conducted in the recent years to assess the dental practitioners' knowledge and practice in relation to fluoride. In 2012, 94% of American dentists reported that they routinely perform fluoride therapy in their clinics. Of all, 20% agreed that topical fluoride application is not beneficial for low-risk patients. For high-risk children under six years of age, 93% correctly responded that topical fluoride should be prescribed every three to six months. Dentists' knowledge about the mechanism of action of fluoride was reported to be weak. Accordingly, effective use of fluoride was emphasized based on caries risk of patients and adherence to evidence-based guidelines [4].

A similar survey on detection of caries, clinical decision-making process by use of caries risk assessment guidelines and applying preventive techniques showed that 69% of practicing dentists performed caries risk assessment and they were more likely to deliver individualized caries prevention including applying sealant and fluoride [5]. In another study, only 9% of Florida residents received at least one fluoride application but 75% received dental cleaning and high-need subjects were less likely to receive preventive services [6].

In a study on 6,681 dentists and dental hygienists practicing in Indiana, use of fluoride in children and adults with and without active or recent caries was evaluated. Responses were provided in Likert scale from "always" to "never" including "don't know" and "not applicable". Almost all (95%) reported fluoride therapy for children with active caries while 62% of respondents reported the use of fluoride for adult patients with the same conditions.

In their study, only one-fourth of the respondents correctly identified the predominant mechanism of action of fluoride with regard to enhancing remineralization of incipient carious lesions. The results of their study revealed the educational need on the appropriate use of fluoride [7].

Dentists are the main source of health information for their patients and can transfer evidence-based information to the public. Moreover, they play an important role in implementation of community programs.

In a study in Iran, it was reported that the level of knowledge of dentists about preventive dental care (i.e. the efficacy of cutting down sugar consumption, application of sealants and water fluoridation in prevention of caries) was high while knowledge about the efficacy of fluoride and its use was low [8] This is despite the fact that the prevalence of caries among Iranian children and adolescents is high. In 2004, a report by the Ministry of Health and Medical Education indicated the mean dmft of 5 for 6-year-olds [9]. The mean DMFT for 15 to 19 year-old adolescents was reported to be 4.1 [10].

Among all health promotion interventions, fluoride has reported to be the most effective in a review study by Kay and Locker [11]. However, literature shows inadequate knowledge about fluoride and practice of fluoride therapy.

In a study by Narendran et al, only 15% of the responding dentists answered correctly to the proper age to start and discontinue fluoride supplements and only one-third correctly mentioned considerations with regard to patient's weight [12].

There is not enough information on general knowledge of dentists practicing in Iran about fluoride and its applications. The present study was carried out to assess the self-reported level of knowledge of dentists about systemic and topical effects of fluoride, their attitude towards its use and prescription of fluoride products for high-risk patients.

## MATERIALS AND METHODS

A cross-sectional survey was conducted among general dentists attending a national annual congress held in March 2009 in Tehran. Ethical approval was obtained from the Ethics Committee of Tehran University of Medical Sciences. Dentists attending a national annual dental congress were approached by the researcher (ZY) and briefed about the purpose of study. The volunteer participants were asked to anonymously fill out the questionnaires after giving their consent and drop it in the collection box. The collected questionnaires were checked by the researcher.

### Questionnaire

A researcher-made self-administered questionnaire comprised of three sections based on the relevant literature was used in this survey. The questionnaire consisted of demographic information including age, gender, level of education, work experience and current occupational status. Knowledge about the effects of systemic and topical applications of fluoride (six questions), having access to clear guidelines in the workplace (one question) and source of information regarding fluoride (one open question) were questioned. Attitude towards fluoride application and its efficacy in children and adults was assessed as well. The last section evaluated self-reported practice including: (I) willingness to prescribe fluoride (two questions); (II) recent application of fluoride in the past year for patients and self-use (two questions); (III) preferred management including fluoride prescription (varnish, mouth-rinse, tablet/drop, gel) in addition to restorative treatment or no intervention for two paper patients, one child and one adult with high risk of caries [7, 13]. The face validity of the questionnaire was assessed by experts (three experts with a PhD degree in community oral health). For assessing the reliability of the questionnaire, a pilot study was carried out on 12 volunteer dentists with private practice before the survey and the

Cronbach's alpha was calculated to be 0.75, which was within the acceptable range [14].

### Statistical analysis

Descriptive statistics including percentage of correct answers and the sum of scores for each questionnaire domain were calculated using SPSS ver. 16 (Microsoft, Chicago, IL, USA). Chi-square test and the Spearman's correlation test were used to assess the correlations. Proper management of each case was entered into the logistic regression model and tested for the effect of demographic variables.

## RESULTS

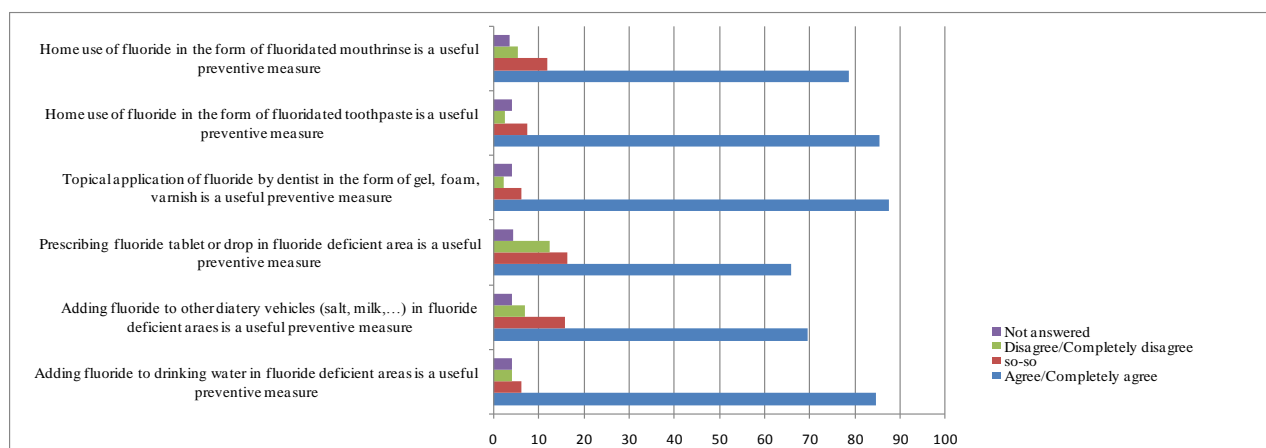
A total number of 347 dentists completed the questionnaires. Of all respondents, 232 (73.4%) were males and 27% were females. The average work experience was 16.4 years, 92.5% of the participants had an active dental practice at the time of survey. Of those, 58.5% had private practices, 19.9% were working in public health centers, and 50% were working in dental clinics (more than one answer was allowed).

**Table 1.** Demographic characteristics of respondents

Variable	n	%	
Age	22-34 years	70	24.6
	35-44 years	102	35.9
	45-54 years	57	20.1
	55-64 years	38	13.4
	65+ years	17	6
	Total*	284	100
Gender	Male	232	73.4
	Female	84	26.6
	Total	316	100
Educational degree	GP#	277	86.6
	Specialist	43	13.4
	Total	320	100
Current work status	Practicing	321	92.5
	Not practicing	20	7.5
	Total	341	100

\* Mean: 43±12; range: 22-79

# General practitioner



**Fig. 1.** Frequency distribution (%) of responses regarding the knowledge about systemic and topical effects of fluoride on caries prevention (n=347)

Of all respondents, 87% were general dentists and the rest were specialists; only two had Master's degree in pediatric dentistry (Table 1). Knowledge scores about the systemic and topical effects of fluoride are presented in Figure 1. Of all respondents, 87.6% chose "agree" or "strongly agree" that application of topical fluoride in the form of gel, foam, or varnish was effective for caries prevention. This value was 85.3% for the positive preventive effect of fluoridated toothpastes and 84.7% for adding fluoride to drinking water. Also, 66% responded "agree" or "strongly agree" about the prescription of fluoride in the form of tablet and drop.

In the second domain, 25.1% of respondents "agreed/strongly agreed" with the statement that they did not have time to take preventive measure due to time-consuming restorative procedures and 86.5% responded disagree/strongly disagree that preventive service including oral hygiene instruction and fluoride therapy are not so effective. Also, 83% of respondents gave a positive answer regarding the effectiveness of fluoride for caries prevention in children younger than 12 years of age but 39.2% believed that fluoride has a preventive effect on caries in adults and adolescents over 12 years of age. The results also showed that 67.4% of respondents did not

have access to clear guidelines on the use of fluoride in their workplace except for a few who used manufacturers' brochures; 94.9% of the respondents did not have previous training in this field and did not attend continuing education courses or related workshops in the past six months. Knowledge about fluoride products was weakly correlated with the respondents' attitude (Spearman's rho=0.273,  $P<0.05$ ); 80.57% of dentists used fluoride products for themselves or their own family, whereas 69.5% prescribed that for their patients; 79% of 277 subjects who used fluoride products for themselves or their families prescribed fluoride products for their patients as well (Chi-square,  $P<0.05$ ). Regarding self-reported practice, of all respondents, 71.5% believed that taking a dental history including past dental caries is essential before prescription of any fluoride product and 30.8% "agreed/strongly agreed" that they would not prescribe fluoride due to its toxic effects.

For management of paper patients, in the first case (a child at high risk of caries), 52.7% chose the correct answer (any combination of topical fluoride except for fluoride mouth rinse and none, which were incorrect) in addition to restorative treatment. For the adult at high risk of caries, 50.1% chose the correct answer (any combination of topical fluoride except

for fluoride tablet/drop and none, which were incorrect) in addition to restorative treatment. Logistic regression analysis controlling for the effect of demographic factors including age, gender and having a specialty degree showed that recently graduated dentists were more likely to correctly manage a high-risk child (OR= 0.95, 95% CI 0.89-0.99; P=0.034).

It was also demonstrated that younger dentists were more likely to use appropriate form of fluoride in addition to restorative treatment for the high-risk child (OR= 0.95, 95% CI 0.89-0.99; P=0.043) (Table 2). No significant association was found between proper management of a high-risk adult and demographic variables.

## DISCUSSION

The findings of the current study showed acceptable level of knowledge about the effects of topical and systemic administration of fluoride and positive attitude of dentists towards the preventive effect of fluoride especially in children. Self- and professional use of fluoride was found to be common among dentists. Younger and newly graduated dentists were more likely to properly manage high-risk children. In our study, the majority of respondents had high level of knowledge about the preventive effect of topical fluoride on caries, which is in accord with the statement of CDC that the most important effect of fluoride is post-eruptive and topical.

This may enhance the application of fluoride as a remineralizing agent in children and even in adult subjects [3,7], although only a few respondents had a positive attitude towards application of fluoride in adults. Regarding the systemic effect of fluoride, despite having a positive attitude towards water fluoridation, other carriers like tablets, drops and salt were not that much recognized. It is important to mention that there is no established fluoridation program in Iran and the mean fluoride concentration in the groundwater resources at the national level is reported to be 0.47 ppm [15]. In our study most respondents mentioned that they would not skip oral hygiene instruction and fluoride therapy due to lack of time. On the other hand, concerns regarding the toxic effects of fluoride were reported by about one-third of dentists. This finding might explain the fact that although dentists acknowledge the caries prevention effects of fluoride, they are reluctant to use it due to its toxic side effects. It was also believed that preventive measures are effective and dentists correctly responded that patient's caries experience should be considered before fluoride therapy. However, only half of the respondents properly managed the high-risk child and the high-risk adult patients presented as patient scenarios. This is in line with previous studies reporting that only 40% of senior dental students considered fluoride

**Table 2.** Logistic regression analysis of proper management of case 1 (high-risk child) with socio-demographic variables<sup>1</sup>

	B	S.E.	df	Sig.	Exp(B)	95% C.I. for EXP (B)	
						Lower	Upper
Age (years)	-.048	.029	1	.094	.953	.901	1.008
Gender	-.299	.318	1	.347	.742	.398	1.382
<b>Step 1a</b>							
Years since graduation	-.052	.027	1	.056	.949	.900	1.001
Constant	6.385	3.125	1	.041	592.995		
Age (years)	-.056	.028	1	.043	.946	.896	.998
<b>Step 2a</b>							
Years since graduation	-.057	.027	1	.034	.945	.897	.996
Constant	6.846	3.096	1	.027	939.645		

<sup>1</sup>age, gender, years since graduation, education (GP vs. Specialist), working (private vs. public sector)

therapy for high-risk patients [16]. More than 80% of the respondents considered fluoride therapy to be effective for pediatric patients; however, less than half of the respondents considered it to be effective for adult patients. A similar finding was reported [5] showing underutilization of preventive measures for adults. This might reflect the fact that there is uncertainty regarding the positive effects of preventive agents on adults especially regarding the post-eruptive remineralizing effects of fluoride. According to recent guidelines on risk-based management by the American Dental Association it is recommended to use topical fluoride for adult patients [17]. The current study shows that about only half of respondents properly managed the high-risk child presented as patient scenario; however, younger dentists and recently graduated ones are more likely to manage that correctly. It is also shown in the study of Riley et al, [5] that recently graduated dentists are more likely to perform caries risk assessment for their patients. It was also reported in another study [18] that dentists who practiced for fewer years were more likely to provide preventive procedures and educational services for patients. The other finding of this study is that the majority of the respondents acknowledged that they do not have access to clear guideline on fluoride therapy and a few reported using company's catalogue. This is due to the fact that there is no evidence-based guideline on fluoride application distributed for use in general practice available for local dentists and hence there is a need to prepare national preventive guideline for use in dental practice. A valid and reliable instrument was used in this study, in which dentists' knowledge was assessed. Self-reported practice of dentists was assessed using paper patient scenario similar to the local study assessing preventive practice of senior dental students [16]; however, using this method might not reflect the real patient situation. A large number of dentists responded in our survey; however, this study was

conducted in a national congress and despite the obligation of getting continuing education point for dentists, the representativeness of the sample is not warranted.

## CONCLUSION

There was good level of knowledge about preventive effect of topical fluoride and positive attitude towards fluoride application for children under 12 years of age. Most dentists preferred to prescribe fluoride for themselves and their families and about one-third were afraid to prescribe it due to its toxic effect. Younger and recently graduated dentists were more likely to manage high-risk children.

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## REFERENCES

- 1- Bratthall D, Hänsel-Petersson G, Sundberg H. Reasons for the caries decline: what do the experts believe. *Eur J Oral Sci.* 1996 Aug;104(4 ( Pt 2)):416-22.
- 2- Petersson GH, Bratthall D. The caries decline: a review of reviews. *Eur J Oral Sci.* 1996 Aug;104(4 ( Pt 2)):436-43.
- 3- Recommendations for using fluoride to prevent and control dental caries in the United States. Centers for Disease Control and Prevention. *MMWR Recomm Rep.* 2001;50 (RR-14):1-42.
- 4- Bansal R, Bolin KA, Abdellatif HM, Shulman JD. Knowledge, attitude and use of fluorides among dentists in Texas. *J Contemp Dent Pract.* 2012 May 1;13 (3):371-5.
- 5- Riley JL, Gordan VV, Ajmo CT, Bockman H, Jackson MB, Gilbert GH. Dentists' use of caries risk assessment and individualized caries prevention for their adult patients: findings from The Dental Practice-Based Research Network. *Community Dent Oral Epidemiol* 2011;39(6):564-73.

- 6- Gilbert GH, Bader JD, Litaker MS, Shelton BJ, Duncan RP. Patient-level and practice-level characteristics associated with receipt of preventive dental services: 48-Month incidence. *J Public Health Dent.* 2008 Fall;68(4):209-17.
- 7- Yoder KM, Maupome G, Ofner S, Swigonski NL. Knowledge and use of fluoride among Indiana dental professionals. *J Public Health Dent.* 2007 Summer;67(3):140-7.
- 8- Ghasemi H, Murtooma H, Torabzadeh H, Vehkalahti MM. Knowledge of and attitudes towards preventive dental care among Iranian dentists. *Eur J Dent.* 2007 Oct;1(4):222-9.
- 9- Pakshir HR. Oral health in Iran. *Int Dent J.* 2004 Dec;54(6 Suppl 1):367-72.
- 10- Eslamipour F, Borzabadi-Farahani A, Asgari I. The relationship between aging and oral health inequalities assessed by the DMFT index. *Eur J Paediatr Dent.* 2010 Dec;11(4):193-9.
- 11- Kay E, Locker D. A systematic review of the effectiveness of health promotion aimed at improving oral health. *Community Dent Health.* 1998 Sep;15(3):132-44.
- 12- Narendran S, Chan JT, Turner SD, Keene HJ. Fluoride knowledge and prescription practices among dentists. *J Dent Educ.* 2006 Sep;70(9):956-64.
- 13- Frame PS, Sawai R, Bowen WH, Meyerowitz C. Preventive dentistry: practitioners' recommendations for low-risk patients compared with scientific evidence and practice guidelines. *Am J Prev Med* 2000; 18(2): 159-162.
- 14- Yaghmaie F. Content validity and its estimation. *J Med Educ* 2003;3:25-27.
- 15- Mesdaghinia A, Vaghefi KA, Montazeri A, Mohebbi MR, Saeedi R. Monitoring of fluoride in groundwater resources of Iran. *Bull Environ Contam Toxicol.* 2010 Apr; 84(4):432-7.
- 16- Khami MR, Virtanen JI, Jafarian M, Murtooma H. Prevention-oriented practice of Iranian senior dental students. *Eur J Dent Educ.* 2007 Feb;11(1):48-53.
- 17- American Dental Association Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations. *J Am Dent Assoc.* 2006 Aug;137(8):1151-9.
- 18- Chen M-S. Preventive dentistry in Texas, USA. *Community Dent Oral Epidemiol.* 1990 Oct;18(5):239-43.