

Knowledge and Practice of Dental Professionals towards Fluoride Use: Descriptive Study

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ABSTRACT

Background: There is a systematic delivery of fluoride to the teeth, which helps in prevention of dental caries.

Aim: To determine the knowledge and practice of dental professionals towards fluoride in Eastern Province Military Hospitals, Saudi Arabia.

Study design: Descriptive study.

Methodology: A total number of 80 dental professionals responded to the questionnaire. The ethical approval was obtained from PSMCHS review ethical committee, after completing and submitting the research proposal. The plan for this study was to distribute the questionnaires by three members of the research team to the Military Hospitals Dental Clinics in the eastern province and Prince Sultan Military College of Health Sciences in Dhahran. **Statistical analysis:** Data was analyzed by SPSS version 23. Chi-square test was applied for categorical variables to find the differences in knowledge and practices by dental professionals with p-value ≤ 0.05 as significant.

Results: Among 80 enrolled subjects, more than 63.7% of dental professionals had adequate knowledge about fluoride regarding its benefits and adverse effects in dental field with significant p-value. Most of the dental professionals who responded to the questionnaire accurately identified the approximate concentration ppm of fluoride present in a dentifrice, about two third 53 (66.3%) correctly chose 1.000 ppmF.

Conclusion: It was concluded that there is significant difference in knowledge and practice towards fluoride between dentists, dental assistants, dental hygienists and dental therapists. However, there is insignificant difference in the knowledge and practice of fluoride among female and male dental professionals.

Keywords: Dental Professionals, Fluoride and Knowledge.

INTRODUCTION

The dental practice is an ancient historical practice providing excellent dental and oro-facial care using the mixture of science and art.¹ In recent decades, the better understanding of pharmacological agents has opened new ways of providing dental care. One of the major advances in dental care is the use of fluoride. Its use has reduced dental caries, restoration of functions and to try to achieve a perfect smile as revealed by literature review.^{1,2}

Fluoride is the 13th most abundant element on earth. The mineral is found naturally in soil, foods, and several products, such as fluoride toothpaste. It is absorbed from the gastrointestinal tract and once it reaches the plasma, it is rapidly deposited in new teeth that are forming in children. Topical fluoride is extremely beneficial in post eruptive re-mineralization, while systemic fluoride is required in the developing tissues to produce its pre-eruptive effects.³ Research has been done to develop strategies for improving effectiveness of fluoride.⁴ Fluoride treatment is gaining popularity as a rapid, non-surgical procedure with reported effectiveness in reducing dental caries and teeth development.⁵

The results of a consensus conference on fluorides in dentistry was published in 2002, by the CDC. The report summarized fluoride actions with emphasis on the most important benefit being in post eruptive re-mineralization, rather than the earlier belief that fluoride is required in the developing tissues as a pre-eruptive and systemic effect. In Addition, since it is known that fluoride can re-mineralize lesions that occur in their early stages in all teeth, adults can also benefit from fluoride treatments, contrary to prior belief that only children could benefit from it. Thus, it is now

recommended for the dentist to decide on treatment according to the state and risks involved in the caries, past caries experiences, and not simply on the age of the patient.⁶

Despite further revisions of fluoride supplement programs, increased fluorosis was observed in children living in non-optimum fluoridated regions. Disagreement among researchers lead to some advocating no change of the fluoride supplement program while others supporting either reduction in dosage or opposing it in total. This strengthens the belief that knowledge of dental practitioners regarding fluoride is an essential element lack of which may lead to detrimental effects such as fluorosis. Studies have been done for assessing the level of knowledge of dentists towards fluoride⁷ but seemingly few have been published on dental professionals of eastern province.

Dental caries starts when acid, formed as a result of bacterial action on dietary fermentable carbohydrate, acts on the tooth structure and dissolves its mineralized component.⁸ Although major improvements have been seen over the last two decades in occurrence of dental caries in permanent teeth of children and young adults, caries still remains a major problem today especially among the primary school children and low socio economic class. According to a study done in Riyadh and Al Qaseem, prevalence of caries in primary school children was 91.2%.⁹

There is a complex relationship between fluoride and tooth decay, which is probably not understood by many people due to lack of knowledge about benefits of fluorides. Hence, the current study was planned to determine the

knowledge and practice regarding fluoride among dental professionals.

METHODOLOGY

This descriptive study targeted dental professionals who were working in the Eastern Province Military Hospitals and Prince Sultan Military College of Health Sciences in Dhahran, Saudi Arabia. A questionnaire was distributed among study participants who were randomly selected to avoid bias. The questionnaire was filled up by People included were dentists, dental assistants, dental hygienists and dental therapists. Written consent following approval by the Hospital's Ethical Committee was taken. A total number of 80 dental professionals responded to the questionnaire. Students and interneers were excluded from present study. **Statistical analysis:** Data was analyzed by SPSS version 23. Chi-square test was applied for categorical variables to find the differences in knowledge and practices by dental professionals with p-value ≤0.05 as significant. Frequencies and percentages were calculated for demographic data.

RESULTS

In current project, females constituted 51.2% of the sample, while males were 48.8%. Included 43 dentists (53.8%), 13

dental assistants (16.3%), 7 dental hygienists (8.8%) and 17 dental therapist (21.3%) in the sample. 33(41.3%) were in the age group 30-39 years, while 20(25%) were in groups 20–50 and only 7(8.8) were above 50 years. Among dental professionals 32(40%) had more than 11 years experience, while 23(28.7%) of them had 1 to 6 years experience, 21(26.3%) had 6 to 10 years experience and 4(5%) claimed to have less than one year experience. Among enrolled dental professionals, varying levels of knowledge and attitude were found regarding Fluoride use as summarized in table-1.

Among enrolled subjects, knowledge about effects of serum fluoride levels in the body was elaborated in table-2. Most of the dental professionals who responded to the questionnaire accurately identified the approximate concentration ppm of fluoride present in a dentifrice, about two third 53 (66.3%) correctly chose 1.000 ppmF as shown in table-3.

Relation between fluoride practice and gender showed that there was no significant difference among the respondents as shown in table-4.

Sample t-test was used to compare the mean practice scores of applying fluoride products by dental professionals and gender, no significant differences in mean scores were detected (Table-5).

Table-1: Differences between dental professional about fluoride knowledge in Saudi Arabia.

Is the bottled drinking water in Eastern Province, Saudi Arabia fluoridated?				
Specialty	I don't know	No	Yes	Chi square p-value
	n (%)	n (%)	n (%)	
Dentist	9 (11.3)	5 (6.3)	29 (36.3)	0.013*
Dental assistant	7 (8.8)	3 (3.8)	3 (3.8)	
Dental hygienist	3 (3.8)	0 (0.0)	4 (5.0)	
Dental therapist	2 (2.5)	0 (0.0)	15 (18.8)	
Total	21 (26.3)	8 (10.0)	51 (63.7)	
According to your information, are there any other water fluoridation programs in Saudi Arabia?				
Dentist	24 (30.0)	12 (15.0)	7 (8.8)	0.469
Dental assistant	10 (12.5)	1 (1.3)	2 (2.5)	
Dental hygienist	5 (6.3)	1 (1.3)	1 (1.3)	
Dental therapist	9 (52.9)	7 (8.8)	1 (1.3)	
Total	48 (60.0)	21 (26.3)	11 (13.8)	
Identify the most important mode of action of fluorides in caries prevention.				
Specialty	Posteruptive remineralization	Pre eruptive systemic deposition	Interference with glycolysis	p- value
	n (%)	n (%)	n (%)	
Dentist	25 (31.3)	16 (20.0)	2 (2.5)	0.227
Dental assistant	8 (10.0)	5 (6.3)	0 (0.0)	
Dental hygienist	2 (2.5)	3 (3.8)	2 (2.5)	
Dental therapist	8 (10.0)	8 (10.0)	1 (1.3)	
Total	43 (53.8)	32 (40.0)	5 (6.3)	

*Statistically Significant

Table-2: Knowledge about effects of serum fluoride levels in the body among dental professionals

Low serum fluoride levels in the body					
Specialty	increase the risk of dental caries	decrease the risk of dental caries	have no effect on dental health	cause systemic problems with no effect in oral cavity	p-value
	n (%)	n (%)	n (%)	n (%)	
Dentist	34 (42.5)	3 (3.8)	6 (7.5)	0 (0.0)	0.005*
Dental assistant	8 (10.0)	5 (6.3)	0 (0.0)	0 (0.0)	
Dental hygienist	5 (6.3)	1 (1.3)	0 (0.0)	1 (1.3)	
Dental therapist	15 (18.8)	2 (2.5)	0 (0.0)	0 (0.0)	
Total	62 (77.5)	11 (13.8)	6 (7.5)	1 (1.3)	
Higher than recommended levels of Serum fluoride in the body					
Specialty	increase the risk of dental caries	decrease the risk of dental caries	have no effect on dental health	cause dental fluorosis	p-value
	n (%)	n (%)	n (%)	n (%)	
Dentist	3 (3.8)	0 (0.0)	2 (2.5)	39 (48.8)	0.154
Dental assistant	0 (0.0)	2 (2.5)	2 (2.5)	9 (11.3)	
Dental hygienist	0 (0.0)	0 (0.0)	0 (0.0)	7 (8.8)	
Dental therapist	0 (0.0)	1 (1.3)	0 (0.0)	15 (18.8)	
Total	3 (3.8)	3 (3.8)	4 (5.0)	70 (87.5)	

*Statistically Significant

Table-3: Distribution of dental professional knowledge about ppm fluoride present in a dentifrice and APF gel

Approximately how many ppm of fluoride according to your knowledge is/are usually present in a dentifrice?						
Specialty	1.000	5.000	12.000	50.000	I don't know	p-value
	n (%)	n (%)	n (%)	n (%)	n (%)	
Dentist	26 (32.5)	1 (1.3)	1 (1.3)	1 (1.3)	14 (17.5)	0.148
Dental assistant	6 (7.5)	1 (1.3)	0 (0.0)	0 (0.0)	6 (7.5)	
Dental hygienist	7 (8.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Dental therapist	14 (17.5)	2 (2.5)	1 (1.3)	0 (0.0)	0 (0.0)	
Total	53 (66.3)	4 (5.0)	2 (2.5)	1 (1.3)	20 (25.0)	
Approximately how many ppm of fluoride would you say is/are usually present in Acidulated Phosphate Fluoride gel?						
Dentist	4 (5.0)	10 (12.5)	13 (16.3)	1 (1.3)	15 (18.8)	0.026*
Dental assistant	3 (3.8)	5 (6.3)	0 (0.0)	0 (0.0)	5 (6.3)	
Dental hygienist	1 (1.3)	5 (6.3)	1 (1.3)	0 (0.0)	0 (0.0)	
Dental therapist	4 (5.0)	7 (8.8)	0 (0.0)	2 (2.5)	4 (5.0)	
Total	12 (15.0)	27 (33.8)	14 (17.5)	3 (3.8)	24 (30.0)	

*Statistically Significant

Table-4: Relationship between fluoride practice and gender

	Male	Female	Total	Chi square p-value
	n (%)	n (%)	n (%)	
As far as fluoride and its action is concerned, which of the following would you advocate?				
Mass fluoridation through fluoridation of public water supplies	4 (5.0)	8 (10.0)	12 (15.0)	0.138
Individual fluoride application to cases selected by dental officers	2 (2.5)	3 (3.8)	5 (6.3)	
Use of fluoridated toothpastes	4 (5.0)	0 (0.0)	4 (5.0)	
All of the above	29 (36.3)	30 (37.5)	59 (73.8)	
None of the above	0 (0.0)	0 (0.0)	0 (0.0)	
Which method of fluoride application is most often used in your dental practice?				
Fluoride foam in tray	24 (30.0)	28 (35.0)	52 (65.0)	0.295
Fluoride rinse	1 (1.3)	0 (0.0)	1 (1.3)	
Fluoride varnish	9 (11.3)	9 (11.3)	18 (22.5)	
Any other	3 (3.8)	0 (0.0)	3 (3.8)	
I don't know/not applicable	2 (2.5)	4 (5.0)	6 (7.5)	

Table-5: Mean practice scores for dental professionals applying fluoride product

	Gender	N	Mean	Std. Deviation	t-test p-value
Children with recent or active caries	Male	39	4.38	0.747	0.116
	Female	41	4.02	1.214	
Children without recent or active caries	Male	39	3.82	0.942	0.676
	Female	41	3.73	0.949	
Adults with recent or active caries	Male	39	3.44	1.071	0.292
	Female	41	3.68	1.011	
Adults without recent or active caries	Male	39	3.08	0.984	0.342
	Female	41	3.29	1.031	

DISCUSSION

Regarding fluoridated bottled drinking water in Eastern Province, Saudi Arabia we saw that dentists had significantly more knowledge compared to dental therapists, dental hygienists, and dental assistants (p=0.013). In contract to this observation dental professional's knowledge regarding presence of any other water fluoridation program in Saudi Arabia was lacking with a striking 60% reporting not knowing about such programs. In contrast to this finding, a study conducted in Texas about the knowledge of fluoride and its use reported that only 2.4% of respondents did not know about water fluoridation programs in the region.¹⁰

In our study we observed dentist's knowledge regarding effects of lower than recommended serum fluoride levels in human body to be significantly accurate (p=0.005) compared to other specialties while 13.8% professionals also reported that it would decrease the risk of dental caries which suggests lack of knowledge regarding effects of serum fluoride in the body. reported that fluoride in drinking water and fluoride-containing products reduces tooth decay.¹¹

Although most of the dental professionals (66.3%) accurately identified the approximate concentration ppm of fluoride in a dentifrice, but still 25.0% lacked this piece of information while only 13 dentists and 1 dental hygienist accurately identified the approximate concentrations of fluoride in Acidulated Phosphate Fluoride (p=0.026) suggesting review courses for dental professionals regarding fluoride levels and its action. This lack of fluoride knowledge supported that suggested significant difference among dental professionals in the knowledge towards fluoride. This is in line with study conducted in 2007 in Indiana, in which 53% of dental professionals reported "not knowing" the approximate concentration of fluoride in APF foam even though 30% of them reported using it most commonly in their practice.¹²

Regarding use of fluoride in dental practice, although no significant difference was observed among the dental professionals about applying fluoride product to pediatric patients with or without recent or active caries but significant difference was seen among dental professionals when it came to their fluoride practice in adults with (p=0.011) or without (p=0.026) recent or active caries. This result high lights the important fact that most dental professional only practice fluoride modalities on children while it can cause remineralization of initial carious lesions in adults as well. A study done by Pakdaman and colleagues reported 83% of respondents had knowledge about effectiveness of fluoride for caries prevention in children younger than 12 years of age, but only 39.2% believed that fluoride had preventive effect on caries in adults and adolescents over 12 years of age.^{13,14} Similar results were observed in another study in which 95% reported fluoride therapy for children with active caries while 62% of respondent reported the use of fluoride for

adult patients.¹² Hence our study results signify that although dental professionals do believe topical fluoride use prevents caries in children, they lack the awareness that it has same benefits in adults as well.

73.8% participants of our study advocate mass fluoridation of public water supplies and 65% reported using fluoride foam in tray as topical fluoride application in their practice which is a good sign as current evidence suggests post eruptive topical effect of fluoride being its predominant mode of action in caries prevention. Our study results are different from Bansals' et al.'s study in Texas in which 18.8% of surveyed dentists reported fluoride varnish as the topical fluoride most often used.⁴

CONCLUSION

It was concluded that there is significant difference in knowledge and practice towards fluoride between dentists, dental assistants, dental hygienists and dental therapists. However, there is insignificant difference in the knowledge and practice of fluoride among female and male dental professionals.

Limitations: As the time frame was limited and we had faced some difficulty with obtaining the questionnaire last semester, our project was unavoidably and regretfully delayed in data collection. Other limitation was a decrease in our sample size from 150 to a total of 80.

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