

# EVALUATING THE KNOWLEDGE, ATTITUDE AND PERFORMANCE OF DENTISTS AND PEDIATRICIANS ON SYSTEMATIC FLUORIDE TREATMENT OF CHILDREN IN AHVAZ SOUTHWEST OF IRAN

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## ABSTRACT

**Aim:** Given importance of fluoride in preventing tooth decay and the necessity for properly and timely prescribing and using it for some children, the current research was conducted to evaluate the knowledge, attitude and performance of dentists and pediatricians on systemic fluoride treatment of children in Ahvaz, Southwest of Iran.

**Materials & Method:** This descriptive-analytical research was conducted in 2016, in which 112 general dentistry students, pedodontist, and pediatrician in Ahvaz, selected by census method, participated. The data collection tool included a researcher-developed questionnaire, which contained demographic characteristics and questions on knowledge, attitude and performance of the samples with regard to systemic fluoride. Data were analyzed by using descriptive statistics and inferential statistics in SPSS 22 software.

**Results:** Findings revealed that only 26.8% of the samples prescribed fluoride supplement for their patients and 13.4% evaluated the level of fluoride in drinking water of patients. In addition, 92.9% of the samples had no information on proper time to start taking fluoride supplement and 83% of them had no information on proper time to stop its taking. More than 80% of the samples viewed that level of fluoride in drinking water is an effective factor in prescription of fluoride supplement. Significant relationship was found between performance and knowledge. It means that samples' action was in contrast with their knowledge.

**Conclusion:** Given relatively undesirable performance of samples and gaps between properly using and prescribing of this treatment, it is essential to consider educational programs with regard to properly prescribing of systemic fluoride in patients, both at the general and specialized levels.

**Key words:** Dentists, Systemic Fluoride, Tooth Decay.

## Introduction

The word "Fluoride" is derived from the Russian word "Flor", which it derived from the Greek word "Floris", meaning "destruction". It is also derived from Latin word "Flour" means "to flow". The history of fluoride in dentistry backs to more than one hundred years ago, when MacKay in Colorado Springs in USA observed permanent pigments on teeth of a number of patients, called as "stain Colorado". MacKay called it "spotted enamel", and later, he recorded various grades of enamel. Following him, a chemist called Churchill introduced the element fluoride that is responsible for the spotted enamel. Later, the term "spotted enamel" changed more accurately to dental fluorosis.<sup>1</sup> Almost all food sources contain a small amount of fluoride, but water and non-dairy foods are the main sources of fluoride taken by human. Fluoride can be found in some mineral ores, soil, foods, fruits, some fish, and tea. The coal found in China includes large quantities of fluoride. Fluorosis is high in homes using coal as fuel, because of vapors created as a result of burning coal.<sup>2</sup>

Fluoride can decrease dental decays through two mechanisms:

1. Systemically through swallowing fluoride and its entering to developing enamel structure.<sup>1-3</sup>
2. Topically through re-mineralization and preventing the demineralization of dental surfaces after tooth growth.<sup>4</sup>

There are two fluoride distribution systems to prevent dental decays:

1. Systemic fluoride, such as fluoride found in water, milk, salt, etc.,
2. Topical fluoride provided in two methods. In one method, it is used by an individual such as fluoride toothpastes, fluoride mouthwashes. In other method, it is used by the dentist in clinic, such as sodium fluoride, stannous fluoride, etc..<sup>2</sup>

Tooth decay is considered as an infectious, multi-factorial and contagious disease, caused by the interaction of decaying oral flora (biofilm) with dietary fermentable carbohydrates on dental surfaces over time. Thus, tooth decay is caused due to dynamic trend of demineralization and remineralization of dental material. These events takes place several times over a lifetime of teeth, which is moderated by many factors, such as the number and type of microbial flora in biofilm, diet, oral health, genetics, dental anatomy, using fluoride and other chemicals, saliva and its buffering capacity and inherent strength of tooth structure and its composition. These factors vary from one person to another person, from one tooth to another tooth, and from one place to another place.<sup>5</sup> Developments have been made during the 20 years on prevalence of decay in permanent teeth of children and adolescents.<sup>6</sup> From the most of dentists' point of view, teeth health has improved since 1988 to 1994.<sup>7</sup> Permanent teeth decay has been also reduced among adolescents and adults, and prevalence of dental root decay has been reduced among adults. Reduced

tooth decay indicates the success of prevention.<sup>8</sup> In addition to observing the oral health and using proper diet, using toothpaste and using fluoride supplements reduced dental decays. The most effective method was using fluoride.<sup>7</sup> In a study conducted by Bansal *et al.*<sup>9</sup> in the United States, they evaluated the knowledge, trend, and the use of fluoride among American dentists in Texas. This study indicated lack of knowledge on fluoride function among dentists. Pakdaman *et al.*<sup>10</sup> evaluated the knowledge of dentists, participating in the annual congress of dentistry in Iran, to prescribe fluoride for children and adults. It was found that dentists had positive knowledge and attitude toward using fluoride. Among the methods mentioned, adding fluoride to drinking water is the most effective and safe method to reduce dental decay in children. However, due to inadequate knowledge on level of using fluoride in different parts of Iran and considering the fact that maximum benefits of fluoride are obtained when it is used in several ways, other ways of using fluoride have been welcomed by public and dentists. Given significant prevalence of dental decay among children and adults, especially in Iran, relatively low oral and dental health, and the importance of fluoride in preventing dental decay, this research was carried out to evaluate the knowledge, attitude, and performance of dentists and pediatricians on systemic fluoride treatment of children in Ahvaz, Southwest of Iran."

#### Materials and Method

The current research was descriptive. It was conducted based on evidence and information contained in the questionnaire that was developed by Ahvaz dental community. Accordingly, a questionnaire was developed by the researcher based on the considered objectives and it was provided for subjects of study. In addition to the questionnaire mentioned, a questionnaire based on demographic and educational information was provided for dentists. This information included age, gender, time of being graduated, continuing or non-continuing the education, and university degree (general or specialized PhD and type of specialization). The questionnaire validity was confirmed by faculty members of the Oral Diseases and Diagnosis Educational Department and the Pediatric Dentistry Educational Department of Dentistry Faculty of Ahvaz University of Medical Sciences, and its reliability was determined to be 82% using Cronbach's alpha. The population of research included all general dentists, pediatric dentistry specialists, and pediatricians in Ahvaz. Subjects of research consisted of 205 dentists and physicians including 200 general dentists, 20 pediatric dentists, and 30 pediatricians working in Ahvaz. Out of them, 86 general dentists, 15 specialized dentists, 11 pediatricians (112 subjects in total) completed the questionnaire. Given limited access to physicians and specialist dentists, census method was used. Data were analyzed statistically after collecting questionnaires. In order to analyze the data, descriptive statistics (mean and SD and tables describing the frequency) were used. In addition, Pearson correlation was used to measure the

relationship between knowledge and performance variables, and t-test and analysis of variance were used to examine the relationship between demographic variables and the variables mentioned. All data were analyzed using SPSS 22 at the 5% significance level.

#### Results

The studied population included 205 dentists and physicians, including 200 general dentists, 20 pediatric dentist, and 30 pediatricians working in Ahvaz. Out of them, 86 were general dentists, 15 were specialized dentists, and 11 were pediatricians (112 subjects in total), who completed the questionnaire. The demographic information of the samples is shown in Table 1:

<i>Gender</i>	<i>N</i>	<i>%</i>
Male	66	58.9
Female	39	34.8
No answer	7	6.3
<b>Total</b>	<b>112</b>	<b>100</b>
<i>Age</i>		
	<i>N</i>	<i>%</i>
Less than 30 years	20	17.9
31 to 51 years	48	42.9
Older than 51	18	16.1
No answer	26	2/23
<b>Total</b>	<b>112</b>	<b>100</b>
<i>Job status</i>		
	<i>N</i>	<i>%</i>
General dentist	86	76.8
Specialist dentist	15	13.4
Pediatrician	11	9.8
<b>Total</b>	<b>112</b>	<b>100</b>
<i>Workplace</i>		
	<i>N</i>	<i>%</i>
Private office	89	79.5
Private clinic	12	10.7
Public clinic	8	7.1
University clinic	3	2.7
<b>Total</b>	<b>112</b>	<b>100</b>
<i>Faculty member</i>		
	<i>N</i>	<i>%</i>
Yes	24	21.4
No	85	75.9
No answer	3	2.7
<b>Total</b>	<b>112</b>	<b>100</b>
<i>Work experience</i>		
	<i>N</i>	<i>%</i>
Less than 5 years	26	23.2
5 to 10 years	23	20.5
Over 10 years	36	32.1
No answer	27	24.1
<b>Total</b>	<b>112</b>	<b>100</b>

Table 1: Demographic characteristics of respondents.

Data of Table 2 suggest that most of samples of research (43.8%) treated less than 5 patients aged less than 16 years per week. Additionally, the mean treatment of patients aged less than 16 years was 16.64 with SD of 33.76, and the minimum number of patients under age of 16 was zero and maximum number was 200. Data of this table also show that a small percentage of samples (26.8%) prescribed fluoride supplement for their patients, and 73.2% of the samples did not prescribe cytotoxic fluoride supplement. In addition, small percentage of samples (13.4%) evaluated the level of fluoride in drinking water of their patients. Data

of this table also show that the most appropriate age to prescribe systemic fluoride supplement, such as tablet and fluoride drop (50%) is the age higher than 12 months. Most of samples of research (37.5%) were not sure of the appropriate age to stop taking fluoride supplement. Additionally, in this research, the status of true and false answers with regard to the appropriate age for prescription of fluoride supplement was studied considering the appropriate time of prescribing the drug at the age of 4 to 6 months. Findings suggest that 92.9% of the samples did not have information of appropriate time to start using fluoride supplement in patients. In addition, the status of true and false answers of the samples with regard to appropriate age to stop taking fluoride supplement in patients was studied in this research, with regard to the appropriate time to stop taking drug at the age of 6 years (5 to 7 years). Findings revealed that 90.2% of the samples did not have information on time to stop taking fluoride supplement in patients.

<i>Number of Patient's Visit Under 16 Years in Week</i>	<i>N</i>	<i>%</i>
Less than 5 cases	49	43.8
6 to 10 cases	29	25.9
11 to 20 cases	10	8.9
Over 20 cases	14	12.5
No answer	10	8.9
<b>Total</b>	<b>112</b>	<b>100</b>
<b>The Status to Prescribe Fluoride Supplement</b>		
<i>The Status to Prescribe Fluoride Supplement</i>	<i>N</i>	<i>%</i>
Yes	30	26.8
No	82	73.2
<b>Total</b>	<b>112</b>	<b>100</b>
<b>Evaluation of Level of Drinking Water Fluoride</b>		
<i>Evaluation of Level of Drinking Water Fluoride</i>	<i>N</i>	<i>%</i>
Yes	15	13.4
No	97	86.6
<b>Total</b>	<b>112</b>	<b>100</b>
<b>Appropriate Age to Prescribe Fluoride Supplement</b>		
<i>Appropriate Age to Prescribe Fluoride Supplement</i>	<i>N</i>	<i>%</i>
Prenatal	2	1.8
Less than 3 months	4	3.6
4 to 6 months	8	7.1
7 to 12 months	29	25.9
Over 12 months	56	50
I am not sure	13	11.6
<b>Total</b>	<b>112</b>	<b>100</b>
<b>Appropriate Age to Stop Fluoride Supplement</b>		
<i>Appropriate Age to Stop Fluoride Supplement</i>	<i>N</i>	<i>%</i>
Three years	10	8.9
5 to 7 years	11	9.8
7 to 9 years	9	8.0
10 to 12 years	15	13.4
13 to 15 years	6	5.4
16 years	19	17.0
I am not sure	42	37.5
<b>Total</b>	<b>112</b>	<b>100</b>

Table 2: Questions in performance of samples

Table 3 illustrates the samples' answer status with regard to factors affecting the prescription of fluoride supplement in a child. It suggests that 50.9% of the samples strongly agree which level of fluoride in drinking water is one of the factors affecting the prescription of fluoride supplement in a child and using fluoride-containing toothpastes and age of the patient were other factors that had the highest impact from the viewpoint of samples.

Items	Strongly Agree		Agree		I am not sure		Disagree		Strongly Disagree	
	N	%	N	%	N	%	N	%	N	%
Fluoride Level in Home Drinking Water	57	50.9	46	41.1	7	7.1	0	0.0	1	0.9
Fluoride Level in Drinking Water in Kindergarten and School	29	25.9	51	45.5	29	25.9	3	2.7	0	0.0
Patient Age	37	33.0	52	46.4	17	15.2	6	5.4	0	0.0
Decay Activity in Patient	27	24.1	76	67.9	9	8.0	0	0.0	0	0.0
Recommended Dose by Protocol	19	17.0	71	63.4	18	16.1	4	3.6	0	0.0
Patient Weight	13	11.6	20	17.9	58	51.8	19	17.0	2	1.8
Patient and Parent Motivation	15	13.4	55	49.1	34	30.4	6	5.4	2	1.8
Fluoride Prescribed by other Physicians	24	21.4	64	57.1	24	21.4	0	0.0	0	0.0
Use of Fluoride-containing Toothpastes	37	33.0	54	48.2	19	17.0	2	1.8	0	0.0
Parents' Decay History	33	29.5	43	38.4	36	32.1	0	0.0	0	0.0
Decay History in Older Brother and Sister	32	28.6	32	28.6	46	41.1	2	1.8	0	0.0

Table 3: Answer status of the samples with regard to factors affecting the prescription of fluoride supplement in a child.

Table 4 illustrates that fluoride in toothpaste and drinking water with 32.1% answer of "strongly agree" was the most important cause of exposure to excessive fluoride in children aged less than 6 years.

Items	Strongly Agree		Agree		I am not Sure		Disagree		Strongly Disagree	
	N	%	N	%	N	%	N	%	N	%
Food Fluoride Supplement	27	24.1	47	42.0	31	27.7	7	6.3	0	0.0
Fluoride Mouthwash	26	23.2	33	29.5	42	37.5	10	8.9	1	0.9
Fluoride in Drinking Water	36	32.1	63	56.3	13	11.6	0	0.0	0	0.0
Fluoride in Toothpaste	36	32.1	40	35.7	31	27.7	5	4.5	0	0.0

Table 4: Samples' answer status with regard to possible cause of excessive fluoride exposure in children aged less than 6 years

Data of Table 5 illustrate that from the point of view of samples, the most important factor in determining the need for fluoride-containing toothpaste in children aged 2 years (90.2%) was the "fluoride level of drinking water", followed by "level of fluoride in toothpaste" (88.4%) and "using fluoride supplement" (86.6%).

	Important		No Important		I do not Know	
	N	%	N	%	N	%
Fluoride Level of Drinking Water	101	90.2	9	8.0	2	1.8
Clinical View of Teeth	92	82.1	17	15.2	3	2.7
Parents' Dental Decay History	93	83.0	15	13.4	4	3.6
Brother and Sister's Dental Decay History	70	62.5	31	27.7	11	9.8
Fluoride Level in Toothpastes	99	88.4	6	5.4	7	6.3
Use of Fluoride Supplement	97	86.6	7	6.3	8	7.1

Table 5: Samples' answer status with regard to important factors in determining the need for fluoride-containing toothpastes in children aged 2 years

Data and information related to performance, knowledge and attitude were analyzed using SPSS 22 software and using Pearson correlation coefficient and significance level was considered at the level of 5%. The following findings were obtained: Pearson correlation coefficient revealed a significant relationship between performance and knowledge of samples. It means that samples' actions were in contrast with their knowledge. ( $r = 0.27$  and  $R = 0.03$ ). No significant difference was found in relationship between knowledge, performance, and attitude and people gender by using Chi-square test ( $P = 0.918$ ). In addition, no significant difference was found in relationship between drinking water fluoride and gender from the samples' point of view ( $P = 0.262$ ). Additionally, no significant difference was found between knowledge of proper time of prescription of fluoride supplement and gender factor ( $P = 0.983$ ), and no significant difference was found between knowledge of proper time to stop taking fluoride supplement and gender factor ( $P = 0.548$ ). Most pediatricians visited more than 20 patients aged less than 16 years per week, which it was higher than two other job groups (general dentists and pediatric dentistry specialists). The visit of patients aged less than 16 years was evaluated using Chi-square test, and it was statistically significant ( $P = 0.000$ ). Findings also revealed that systemic fluoride prescription by different job groups was not statistically significant ( $P = 0.333$ ). Additionally, the evaluation of fluoride amount in the drinking water of the patient by different job groups was not statistically significant ( $P = 0.357$ ). Knowing of proper time to prescribe fluoride supplement in different job groups was not significant ( $P = 0.965$ ). Knowledge of proper time to stop taking fluoride supplement in different job groups was also not significant ( $P = 0.588$ ).

Data of Table 6 illustrate that samples' answer status with regard to factors affecting the fluoride supplement prescription in a child does not differ significantly among

the three job groups participating in this research ( $p > 0.05$ ). It noteworthy that all of the factors, listed in the table, are important in fluoride prescription.

Items	Job Status	Agree	Not Sure	Disagree	p	OR (95% CI)
Fluoride Level in Home Drinking Water	General Dentist	80	66	0	0.159	0.266-0.284
	Specialist Dentist	13	1	1		
	Pediatrician	10	1	0		
Fluoride Level in Drinking Water in Kindergarten and School	General Dentist	57	26	3	0.247	0.206-0.222
	Specialist Dentist	14	1	0		
	Pediatrician	9	2	0		
Patient Age	General Dentist	67	15	4	0.415	0.383-0.402
	Specialist Dentist	12	1	2		
	Pediatrician	10	1	0		
Decay Activity in Patient	General Dentist	79	7	0	0.972	1.000-1.000
	Specialist Dentist	14	1	0		
	Pediatrician	10	1	0		
Recommended Dose by Protocol	General Dentist	7	13	3	0.571	0.515-0.535
	Specialist Dentist	13	2	0		
	Pediatrician	7	3	1		
Patient Weight	General Dentist	24	27	15	0.435	0.433-0.453
	Specialist Dentist	5	5	5		
	Pediatrician	4	6	1		
Patient and Parent Motivation	General Dentist	53	26	7	0.918	0.912-0.923
	Specialist Dentist	10	4	1		
	Pediatrician	7	4	0		
Fluoride Prescribed by Other Physicians	General Dentist	65	21	0	0.291	0.258-0.275
	Specialist Dentist	14	1	0		
	Pediatrician	9	2	0		
Use of Fluoride-Containing Toothpastes	General Dentist	69	15	2	0.872	0.889-0.901
	Specialist Dentist	12	3	0		
	Pediatrician	10	1	0		
Parents' Decay History	General Dentist	59	27	0	0.941	1.000-1.000
	Specialist Dentist	10	5	0		
	Pediatrician	7	4	0		
Decay History in Older Brother and Sister	General Dentist	50	34	2	0.927	0.933-0.943
	Specialist Dentist	8	7	0		
	Pediatrician	6	5	0		

Table 6: Samples' answer status with regard to factors affecting the prescription of fluoride supplement in a child.

Table 7 illustrates that samples' answer status with regard to possible cause of exposure to excessive fluoride in children less than 6 years old does not differ significantly among the three job groups participating in this research ( $p > 0.05$ ).

Items	Job Status	Agree	Not Sure	Disagree	p	OR (95% CI)
Food Fluoride Supplement	General Dentist	58	22	6	0.701	0.753-0.770
	Specialist Dentist	8	6	1		
	Pediatrician	8	3	0		
Fluoride Mouthwash	General Dentist	44	34	8	0.388	0.378-0.397
	Specialist Dentist	7	5	3		
	Pediatrician	8	3	0		
Fluoride In Drinking Water	General Dentist	78	8	0	0.210	0.171-0.186
	Specialist Dentist	13	2	0		
	Pediatrician	8	3	0		
Fluoride In Toothpaste	General Dentist	57	24	0	0.641	0.614-0.633
	Specialist Dentist	12	3	0		
	Pediatrician	7	4	0		

Table 7: The samples' answer status with regard to the possible cause of excessive fluoride exposure in children aged less than 6 years

Table 8 illustrates that the samples' answer status with regard to important factors in determining the need for fluoride-containing toothpastes in children aged less than 2 years in the three job groups participating in this study, except for the level of fluoride in drinking water ( $p < 0.05$ ), was significantly different ( $p > 0.05$ ), while in prescribing fluoride for a person, it is very important to pay attention to all of these factors.

Items	Job Status	Agree	Not Sure	Disagree	p	OR (95% CI)
Fluoride Level of Drinking Water	General Dentist	80	6	0	0.009	0.007-0.011
	Specialist Dentist	13	2	0		
	Pediatrician	8	1	2		
Clinical View of Teeth	General Dentist	73	11	2	0.165	0.140-0.154
	Specialist Dentist	10	5	0		
	Pediatrician	9	1	1		
Parents' Dental Decay History	General Dentist	73	9	4	0.180	0.172-0.187
	Specialist Dentist	1	5	0		
	Pediatrician	10	1	0		
Brother And Sister's Dental Decay History	General Dentist	76	3	7	0.185	0.162-0.177
	Specialist Dentist	14	1	0		
	Pediatrician	9	2	0		
Use of Fluoride Supplement	General Dentist	75	3	7	0.140	0.138-0.125
	Specialist Dentist	12	3	0		
	Pediatrician	10	0	1		

Table 8: Samples' answer status with regard to important factors in determining the need for fluoride-containing toothpastes in children aged less than 2 years

**Discussion**

In total, 55% of the samples completed the questionnaire in this research, which it is relatively desired percentage of participation, considering the high workloads of the groups investigated. Findings related to respondents' performance in systemic fluoride therapy also revealed that only 26.8% of dentists and pediatricians in Ahvaz prescribed the fluoride supplement for their patients, and 13.4% of them

evaluated fluoride level in drinking water of their patients. It seems that the performance of dentists and pediatricians investigated in this study is not at the desired status in terms of prescribing systemic fluoride supplements and investigating the level of fluoride in drinking water before prescription of supplements, and it can be even said that they have poor performance in this regard. Several studies have been conducted with regard to fluoride prescription and evaluations needed before prescription of fluoride supplements, which results similar and different from results of present study were obtained. However, more of the studies carried out in Iran were related to topical using of fluoride and this study was conducted with regard to using systemic fluoride, which limited studies have been conducted in this regard in Iran. In a research conducted by Narendran *et al.*<sup>11</sup> to evaluate the knowledge and performance of dentists about fluoride, more than half of dentists (51.1%) reported that they did not prescribe fluoride supplement for their patients and 48.9% of them stated that they use these supplements in their patients. Additionally, Gaskin *et al.*<sup>12</sup> reported in their study that 32% of dentists remineralized non-cavitated lesions only "sometimes" and 28 of them did such action "never". Some studies have also reported that only one of the 101 dental offices or only one of the 38 pediatric dental offices provide ADA of approval of professional fluoride products and techniques.<sup>13,14</sup> In general, research suggests lack of knowledge on benefits of fluoride and using it by American dentists and oral and dental health care providers.<sup>13,14</sup> In addition, investigating fluoride level in drinking water before prescription of fluoride supplements in this study revealed that only 13.4% of the samples reported that they evaluate the level of fluoride in drinking water in their patients and large percentage of samples do not evaluate it, indicating poor performance in this part. However, various studies carried out on oral and dental care providers in different therapeutic environments show that fluoride level in drinking water in patients is not evaluated before prescription of fluoride.<sup>11,15</sup> In line with our study, in a study conducted by Narendran *et al.*<sup>11</sup> only 6.7% of dentists participated in the study evaluated the level of fluoride in drinking water of patients routinely before prescribing fluoride supplement. However, in a research carried out by Roberts *et al.*<sup>15</sup> on a sample of university pediatricians, almost 70% of the samples stated that they evaluated the level of fluoride in drinking water of patients before prescription of fluoride supplement, which is different from present study, in which only 13.4% of the samples evaluated the fluoride level of their drinking water before prescribing fluoride supplement. This difference might be related to different attitudes with regard to using fluoride supplements systematically and difference in level of facilities in environments providing dental and oral care in various populations. On the other hand, in the current research, the knowledge dentists and practitioners in Ahvaz on systemic fluoride therapy as well as important factors in determining the need for fluoride-containing toothpaste in children were investigated. Results revealed that almost half of respondents (50.9%) reported that fluoride in

drinking water is very important factor in prescribing the fluoride supplement in a child. Additionally, almost half of respondents believed that fluoride level in drinking water in kindergarten and school is an important factor in prescribing the fluoride supplement, and person age was reported as another important factor in prescribing fluoride supplement in a child. These findings, importance of evaluating fluoride in drinking water, and lack of these evaluations in clinical environments by dentists and pediatricians might be attributed to inadequate treatment centers for evaluating the fluoride levels and lack of adequate information on the ways to evaluate the drinking water fluoride. Accordingly, one of the simple and effective methods in this regard can be equipping dental clinics and providing services for children, providing tools to evaluate the level of fluoride in drinking water, and training specialists and personnel working in these centers in order to evaluate the fluoride in drinking water. In addition, dentists and pediatricians of Ahvaz reported that dental decay; doses recommended by protocol, and using fluoride-containing toothpastes are important factors in the prescribing fluoride supplement. However, more than half of respondents have no information on relationship between patient's weight and prescription of fluoride supplement in child, and only 11.6% of them considered patient's weight was a very important factor in prescribing fluoride supplement. Another important factor in prescribing fluoride supplement in a child is fluoride prescribed by other physicians, according to 57.1% of pediatricians and dentists in Ahvaz. Parent's dental decay history and their motivation were also reported by less than half of respondents as important factors in prescribing fluoride supplement. Most of participants (41.1%) had no information on relationship between the history of dental decay in older sisters and brothers and prescribing fluoride supplement and only 28.6% of them considered it as a very important factor. Researchers believed that all the factors listed in Table 4 are important factors in determining the need of child to fluoride and they should be considered by dentists and pediatricians in clinical performances. Investigation of findings on attitude of dentists and pediatricians towards the systemic fluoride therapy revealed that from the viewpoint of samples, the proper age to start fluoride therapy (between four and six months) and the proper age to stop it (6 years) was stated by a small percentage of samples (less than 10%). However, most people (35%) stated that the most proper age for prescribing the systemic fluoride supplement, such as tablet and fluoride drops, was reported to be 12 months, and they had no information on the proper age to stop using fluoride. Several studies have been conducted in this regard. For example, in a study conducted by Jones *et al.*<sup>16</sup> in Houston, 61 percent of pediatric dentists and 52 percent of pediatricians participating in the study believed that knowing the level of fluoride in drinking water was a very important factor in prescribing fluoride supplements. In a research carried out by Narandran *et al.*<sup>11</sup> 75% of dentists believed that fluoride level in drinking water was one of the most important factors in prescribing fluoride supplement

in people, and only 29% believed on importance of patient's weight in fluoride prescription. In a research conducted by Pendrys *et al.*<sup>17</sup> high percentage of samples did not know completely that fluoride supplements are risk factor for dental fluorosis. However, as current research, in a research conducted by Nandarane *et al.*<sup>11</sup> samples of research have information on risk factors related to dental fluorosis, such as increased levels of fluoride in drinking water. In a research carried out by Euder *et al.*<sup>18</sup> findings revealed that only 17% of respondents in 2000 and 25% of them in 2005 had correct information on fluoride function. In a research carried out by Bansal *et al.*<sup>9</sup> almost 99% of dentists agree that using fluoride increases the strength of enamel and 16% did not believe that fluoride prevents bacterial metabolism in the mouth. In addition, more than 95% rightly reported that fluoride remineralizes decays. More than 88% of the samples rightly did not agree that the using fluoride can cause fluorosis, and almost 57% of respondents falsely believed that fluoride affects growing teeth. Additionally, in a research carried out by Autio-Gold *et al.*<sup>19</sup> to evaluate the views and knowledge of third-year and fourth-year dentistry students decay management and prevention, results revealed that 40 of respondents were not sure if fluoride varnish is associated with dental health risks, and 16% believed that there were risks in using fluoride varnish. More than one-third of samples (38%) were not sure if fluoride varnish permanently causes stain on teeth, and 5% believed that using this compound causes a stain on the tooth. In addition, 30% of the students stated they might not use fluoride varnish regularly for children aged less than 5 years. Considering the age to start and stop using systemic fluoride supplements, findings revealed that most of the samples did not have accurate information on time of starting and stopping the systemic fluoride. As current research, Narendran *et al.*<sup>11</sup> reported that less than 15% of general dentists and pediatricians can recognize the starting age (6 months) and stopping age (16 years) of fluoride supplements. It should be noted that less prescribing of fluoride supplements in this study and in similar studies can be related to the weak attitude of dentists and pediatricians on systemic prescription of these supplements and fear of their further complications compared to their relative advantages. However, Tellez *et al.*<sup>20</sup> found that for non-cavitated lesions, dentists prefer a follow-up and observation-based treatment approach. However, in a research carried out by Autio-Gold *et al.*<sup>19</sup> 30% of dentistry students participated in the research stated that they might not use fluoride varnish regularly for children aged less than 5 years.

### Conclusion

Maintaining the health of children and students is very important.<sup>21-23</sup> Dentistry is one of the most popular fields of studies in Iran,<sup>24-26</sup> and dentists are considered as initial source of dental information for public and as an important source for providing appropriate information and education to people in community, who can enhance oral and dental health knowledge of people. Therefore, they can improve the quality of life and general health of people, and

accordingly, their knowledge and using preventive regimes in order to prevent tooth decay and to increase oral and dental health knowledge among people is very important. However, findings revealed that despite relative knowledge of participants on various aspects of fluoride supplements, there are still shortcomings on knowledge of samples and their performance in prescribing systemic fluoride. Thus, this lack of knowledge on proper prescription of fluoride suggests the need for educational programs and strategies, both at the general and specialized levels for dentists and pediatricians. This issue has particular importance in pediatric dentistry specialists, and it is necessary that they have adequate knowledge on process and various aspects of prescribing the systemic fluoride. One of the very effective educational techniques is equipping dentistry clinics with fluoride testing equipment and training dentistry students in this regard. This educational technique not only enhances the knowledge level of dentistry students on fluoride, but also enhances their knowledge on testing fluoride in drinking water. This enhanced knowledge can help in their performance regarding fluoride prescription and by holding retraining courses, this knowledge can be improved. With regard to graduate dentists, their knowledge about fluoride and its prescription to patients can be enhanced by holding regular courses. Such measures could eliminate or minimize the inappropriate prescription of fluoride, especially increased use of this drug by dentists. Accordingly, dentistry training programs should focus on the importance of evaluating the dental decay risks and comprehensive dental decay prevention regimes. Dental decay risk evaluation instructions should include the following cases such as fluoride history, drinking water fluoride evaluation, dietary history, and comprehensive clinical evaluations. Comprehensive investigation of fluoride history can help dentist know if patient needs for fluoride supplement. Additionally, after evaluating the level of fluoride in drinking water of patient, dentist or dentistry student can consciously use the patient's fluoride history and make decision to eliminate, minimize, or add the fluoride supplement. Thus, dentistry students should be instructed on prescribing the fluoride supplement and find information on the fluoride testing in drinking water of patients. Research results revealed that while participants in this research have a relatively desirable level of knowledge and attitude in some aspects of systemic fluoride treatment, there are still gaps considering the prescription and using this treatment among the dentists and pediatricians in Ahvaz city. Hence, considering educational programs with regard to strategies and way of using systemic fluoride in patients by dentists and pediatricians, both at the general and specialized levels seems to be necessary.

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