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Oral health knowledge among female primary school teachers in Riyadh city, Kingdom of Saudi Arabia

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Abstract
Aim: To investigate the oral health knowledge and the contributing factors among primary school teachers in Riyadh city, Kingdom of Saudi Arabia.
Methods: A cross-sectional survey of primary school teachers in Riyadh city, Kingdom of Saudi Arabia was carried out using stratified random sampling technique. A validated Arabic questionnaire was used to determine teachers' oral health knowledge. Data was entered into a computer and analysed using SPSS. Differences between groups were examined using Chi-square test.
Results: Of the 1420 school teachers responded to the survey, majority had adequate knowledge of causes (56.3%) and prevention of dental caries (92.3%). Statistically significant results were found between the type of school, age, and years of teaching experience with the knowledge of dental caries and its prevention (p<0.05).
Conclusion: The oral health knowledge of the primary school teachers was satisfactory with private primary school teachers having a better knowledge than government school teachers. It is recommended that the effectiveness of oral health education programs in primary schools be evaluated.

Keywords: Knowledge, teachers, oral health

Introduction
Promoting oral health is essential to improving public health outcomes. The World Health Organization (WHO) defines oral health as "a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss. Poor oral health affects the quality of life due to impaired oral functioning, disfigurement, missing school time, loss of work hours, including having an effect on many chronic diseases [1, 2]. Although oral health in many developed countries has remarkably improved over the past years, with a declining prevalence of dental caries, the prevalence especially in developing countries including the Middle East, appear to be on the rise, thereby increasing disparities in oral health [3]. It has been reported that 60-90% of school children worldwide are affected with dental caries [4].
To prevent oral diseases among children, it is crucial to understand the main influencing factors and plan for prevention. Children in primary schools spend most of their time with their teachers [5]. Previous research that explored primary school teachers knowledge and practices of oral hygiene method in Riyadh, Kingdom of Saudi Arabia (KSA) found satisfactory [6] and poor knowledge [7]. Moreover, other studies conducted in Riyadh region found a high prevalence of dental caries among school children, despite the introduction of school oral health education programs in 1997 [8-11]. Several studies have revealed that lack of knowledge about oral health can increase the risk of dental caries [12, 13]. It has been shown that children with poor knowledge are significantly more likely to be caries active [14].
School children need to be more aware of the oral health and its risk factors to improve and develop oral hygiene practices on a regular basis. It is therefore essential to encourage teachers to play a major role in developing healthy oral habits among students. Teachers can play a key role in promoting students oral health education [5]. Teachers must receive enough training to increase contributions to health promotion in the school community and hence it is very important for the policy makers and oral health authorities to develop teachers skills and encourage them to use their skills and knowledge to improve children's health [15]. Recent research highlighted the main factors considered as barriers to health promotion in primary

schools including "a lack of knowledge" and a "lack of consensus" [16]. School environment, curriculum, and additional activity could be used to promote students oral health and general health status [17]. In addition, school teachers can actively contribute to student's health promotion and adopt healthy oral lifestyles [18, 19].

A cross sectional study among pre-school teachers in Karachi to evaluate their oral health awareness, attitude, and behaviors reported a high level of knowledge about dental caries [20]. Similar studies previously have shown that most school teachers have a good knowledge and positive attitude towards educating children about oral health [21-23]. Lack of teacher's knowledge about oral health may be a substantial barrier to the success of health promoting school activities [24]. Several studies have been carried out to examine primary school teachers oral health knowledge, attitude, and readiness to participate in oral health programmes [25]. Most of these studies reported that the majority of developing countries have primary school teachers lacking sufficient level of knowledge about oral health [26]. Besides, they were not aware of the current methods of prevention [14].

There has been a substantial reduction in the prevalence of dental caries in many developed countries [27]. In contrast, the prevalence of caries has been growing in developing countries [28, 29]. A study conducted in KSA reported high caries prevalence in preschool children [30]. Other previous research pointed out that the proportion of caries free children aged 6 years old in the Middle-East ranged from 10-28% [31, 32]. Dental caries has been known as the main cause of tooth loss of primary dentition in KSA [33]. A cross sectional study among schoolchildren in Dammam, KSA, to assess the prevalence of dental caries reported that the prevalence of dental caries in primary and permanent teeth was almost 73%. The primary teeth caries prevalence was higher compared to permanent teeth caries (78% and 68%, respectively) [34].

Another cross-sectional study measured knowledge about tooth decay and oral hygiene habits among basic school teachers in Khartoum province using a questionnaire. The results of the study revealed that 53.3% of the participants had good, 44% fair, and 2.7% poor knowledge of oral health [35]. The results of a study in Trinidad showed that school teachers were generally well aware of the causes and prevention of dental decay and gum disease. On the other hand, their knowledge about the appropriate management of serious dental trauma was very poor [25].

A study to determine the status of caries and their knowledge about oral health among school teachers in Riyadh, KSA revealed that 34% of teachers had good knowledge of oral health, 50.2% fair, and, 15.8% poor [36]. In contrast, a study among school teachers in seven primary schools in Madinah, KSA reported that female teachers had a higher score of oral health knowledge (80%) [37]. The prevalence of caries is not the same in all cities in KSA and the factors that affect oral health knowledge of school teachers may vary. The rationale for this survey was to have a quick and an extensive understanding of female primary school teachers' knowledge of oral health in Riyadh city. The aim of this study was to understand and evaluate the knowledge of oral health among primary school female teachers in Riyadh city, KSA.

Materials and methods

This study involved an online questionnaire survey of female primary school teachers in Riyadh city, KSA. A validated questionnaire [38] was used to ascertain the level of knowledge of oral health and their determinants such as type of school and years of experience. The questionnaire had 15 closed questions about the teachers demographic details, knowledge of tooth decay, oral hygiene method, frequency of tooth brushing, and visits to the dentist. The questionnaire was translated to Arabic by forward-backward translation method used by the WHO. The questionnaire was piloted on a sample of 50 teachers who were not part of the study for its feasibility and validity (Cronbach's alpha=0.8). A stratified random sample of female primary school teachers were recruited from both private and government schools to represent the population of primary school teachers in Riyadh city.

A total of 2000 female primary school teachers was selected based on the findings from the pilot study and using the sample size formula [39]. A cross-sectional survey of the female primary school teacher in Riyadh city, KSA was conducted. Recruitment and data collection took place between December 2015 and January 2016. Teachers were sent a cover letter and informed about the research via the supervisors of the selected schools. The questionnaire was hosted in a freely available Google survey web page; docs. Google.com and were then sent links to the consent forms and questionnaire via WhatsApp. The questionnaire was provided in Arabic and took about 5 – 10 minutes to complete. A thank you message was sent to the teachers who completed the questionnaire and a reminder was sent via the schools' supervisors to teachers who agreed to participate in the study but have not yet responded.

Riyadh College of Dentistry and Pharmacy Ethics Committee approved the protocol for this study of female primary school teachers and the questionnaire instrument. Completion and submission of the questionnaires were also regarded as consent to participate in the study. Participants were assured of anonymity and confidentiality. No names or identifiers were written on the questionnaires. The data was entered into the Statistical Package for Social Science (IBM SPSS) Version 20 for analysis. Descriptive analysis was used to present an overview of the findings from this sample with an analysis by age and teaching experience. Differences between groups were examined using Chi-square test for linear trends across the rated questions and cross tabulations to compare responses from different groups. The level of significance was set at $p \leq 0.05$.

Results

Of the 2000 questionnaires distributed to the government and private school teachers, 1420 were completed and returned giving an overall response rate of 71%. The majority of the respondents were between 35-44 years old (66%, n=941) and from private schools (58.2%, n=826). Almost half the respondents (49.2%, n=699) had 5-10 years of teaching experience (Table 1).

Only 14.1% (n=200) had the knowledge that plaque is soft debris. However, the majority (56.3%, n=800) knew that plaque causes dental caries (Table 2). Table 3 shows the majority of the respondents had the knowledge that sweets (99.1%, n=1407) and soft drinks (99.9%, n=1418) affect dental health. Moreover, majority knew that regular teeth brushing prevents dental decay (96.7%, n=1373) and using fluoride strengthen the teeth (94.6%, n=1344). Figure 1 shows that majority (80%, n=1136) had knowledge about the regular visit to the dentist. Furthermore, the majority of the participants (92.3%, n=1311) stated that limiting sugar and brushing teeth is the best method to prevent tooth decay. Three quarter (75.6%, n=1073) of the participants reported brushing with fluoride toothpaste is best for cleaning teeth.

Just under two third (63.2%, n=898) reported that an individual should brush for 2-3 minutes and 41.5% (n=590) stated individuals should brush their teeth twice daily (Table 3).

Government school teachers are more likely to be 45 years old and above and have more than ten years of teaching experience and private schools teachers are more likely to be below 45 years old and less than Ten years of teaching experience (p=0.000). Private school teachers are more likely to report plaque leads to dental caries and that brushing the teeth, fluoride, and limiting sugar consumption prevent dental decay (p=0.000). Moreover, private school teachers are more likely to report that brushing the teeth with toothpaste is the best method to prevent dental decay, but government school teacher are more likely to state that using miswak is the best method (p=0.000). Private school teachers are more likely to report that individuals need to brush their teeth twice daily and for 2-3 minutes (p=0.000) (Table 4).

Teachers aged 35-44 years old were more likely to report that dental plaque leads to dental caries and brushing teeth, fluoride, and limiting sugar intake prevent dental caries; and that brushing teeth is the best method to prevent dental caries (p=0.000) (Table 5). Teachers with 5-10 years' experience are more likely to state dental plaque leads to dental caries. Moreover, they are more likely to report brushing and fluoride prevent dental caries; and limiting sugar intake and brushing their teeth is the best method to prevent dental caries (p=0.000). Furthermore, they were more likely to state that brushing with toothpaste is the best way to prevent dental caries (p=0.000) (Table 6).

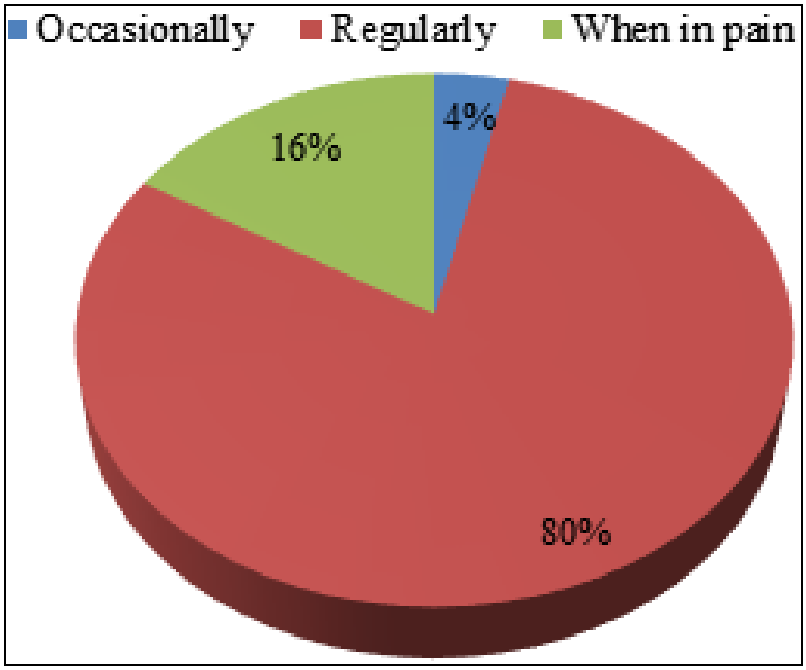

Fig 1: Participants knowledge on dental visits

Table 1: Distribution of participants based on demographic characteristics (n=1420)

	Frequency (n)	Percent (%)
Age in years		
25-34	220	15.5
35-44	941	66.3
45 & above	259	18.2
School type		
Government	594	41.8
Private	826	58.2
Teaching experience in years		
< 5	145	10.2
5-10	699	49.2
>10	576	40.6

Table 2: Knowledge of dental plaque among the participants

	Frequency (n)	Percent (%)
What is Dental Plaque?		
Soft debris	200	14.1
Stains	554	39.0
Hard debris	625	44.0
Don't know	41	2.9
What does Dental Plaque lead to?		
Inflammation of gum	166	11.7
Staining of teeth	426	30.0
Dental caries	800	56.3
Don't know	28	2.0

Table 3: Knowledge and attitude of oral health among primary school teachers

	Frequency (n)	Percent (%)
Which is the best method for prevention of tooth decay?		
Limiting sugar & brushing teeth	1311	92.3
Using fluoridated water & fluoride tooth paste	94	6.6
Don't know	15	1.1
What is the best way for cleaning teeth?		
Brush with fluoride toothpaste	1073	75.6
Dental floss	108	7.6
Mouthwash	35	2.5
Miswak	204	14.4
How long should one brush his/her teeth?		
<1 minute	60	4.2
1 minute	181	12.7
2-3 minutes	898	63.2
>3 minutes	281	19.8
How many times a day should anyone clean teeth?		
Once daily	24	1.7
Twice daily	590	41.5
Thrice daily	806	56.8
When should one clean his/her teeth?		
Upon waking up	804	56.6
After breakfast	616	43.4

Table 4: Knowledge of participants by school type

	School type	Appropriate		Inappropriate		p-value
		n	%	n	%	
What is Dental Plaque?	Government	95	16	499	84	0.000
	Private	105	12.7	812	87.3	
What does Dental Plaque lead to?	Government	255	42.9	339	57.1	0.000
	Private	545	66	281	44	
Does brushing teeth prevent dental decay?	Government	558	93.9	36	6.1	0.000
	Private	815	98.7	11	1.3	
Does using fluoride strengthen the teeth?	Government	531	89.4	63	10.6	0.000
	Private	813	98.4	13	1.6	
Which is the best method for prevention of tooth decay?	Government	515	86.7	79	13.3	0.000
	Private	796	96.4	30	4.6	
How often should one visit the dentist?	Government	493	83	101	17	0.000
	Private	643	77.8	183	22.2	
What is the best way for cleaning teeth?	Government	338	56.9	256	43.1	0.000
	Private	735	89.0	91	11.0	
How long should one brush his/her teeth?	Government	249	41.9	345	58.1	0.000
	Private	649	78.6	177	21.4	
How many times a day should anyone clean teeth?	Government	193	32.5	401	67.5	0.000
	Private	397	48.1	429	51.9	
When should one clean his/her teeth?	Government	427	71.9	167	28.1	0.000
	Private	377	45.6	449	54.4	

Table 5: Knowledge of participants by age group

	Age group	Appropriate		p-value
		n	%	
What is Dental Plaque?	25-34	46	20.9	0.000
	35-44	122	13	
	45 & above	32	12.4	
What does Dental Plaque lead to?	25-34	113	51.4	0.000
	35-44	568	60.4	
	45 & above	119	45.9	
Does brushing teeth prevent dental decay?	25-34	209	95	0.000
	35-44	920	97.8	
	45 & above	244	94.2	
Does using fluoride strengthen the teeth?	25-34	198	90	0.000
	35-44	911	96.8	
	45 & above	235	90.7	
Which is the best method for prevention of tooth decay?	25-34	199	90.5	0.000
	35-44	888	94.4	
	45 & above	224	86.5	
How often should one visit the dentist?	25-34	166	75.5	0.024

	35-44	747	79.4	
	45 & above	223	86.1	
What is the best way for cleaning teeth?	25-34	171	77.7	0.000
	35-44	747	79.4	
	45 & above	155	59.8	
How long should one brush his/her teeth?	25-34	125	56.8	0.000
	35-44	665	70.7	
	45 & above	108	41.7	
How many times a day should anyone clean teeth?	25-34	67	30.5	0.000
	35-44	441	46.9	
	45 & above	82	31.7	
When should one clean his/her teeth?	25-34	109	49.5	0.000
	35-44	514	54.6	
	45 & above	181	69.9	

Table 6: Knowledge of participants by teaching experience

	Teaching experience	Appropriate		p-value
		n	%	
What is Dental Plaque?	< 5 years	34	23.3	0.000
	5-10 years	81	11.6	
	> 10 years	85	14.8	
What does Dental Plaque lead to?	< 5 years	68	46.9	0.000
	5-10 years	451	64.5	
	> 10 years	281	48.8	
Does brushing teeth prevent dental decay?	< 5 years	138	95.2	0.000
	5-10 years	693	99.1	
	> 10 years	542	94.1	
Does using fluoride strengthen the teeth?	< 5 years	132	91	0.000
	5-10 years	687	98.3	
	> 10 years	525	91.1	
Which is the best method for prevention of tooth decay?	< 5 years	131	90.3	0.000
	5-10 years	675	96.6	
	> 10 years	505	87.7	
How often should one visit the dentist?	< 5 years	119	82.1	0.001
	5-10 years	537	76.8	
	> 10 years	480	83.3	
What is the best way for cleaning teeth?	< 5 years	111	76.6	0.000
	5-10 years	608	87	
	> 10 years	354	61.5	
How long should one brush his/her teeth?	< 5 years	84	57.9	0.000
	5-10 years	548	78.4	
	> 10 years	266	46.2	
How many times a day should anyone clean teeth?	< 5 years	46	31.7	0.000
	5-10 years	336	48.1	
	> 10 years	208	36.2	
When should one clean his/her teeth?	< 5 years	83	57.2	0.000
	5-10 years	340	48.6	
	> 10 years	381	66.1	

Discussion

Oral health awareness among school children is essential and school teachers play a prime role in introducing and imparting oral health knowledge. With the prevalence of dental caries among the Saudi primary school children being high [40], school teachers need to have appropriate oral health knowledge to communicate to the children. An adequate sample of primary school teachers was recruited for this study. Of the 2000 questionnaires distributed, 1420 were completed and returned giving an overall response rate of 71%. There was an average response rate (59.4%) from the government school teachers compared to the private schools (82.6%). The majority were 35-44 years (66.3%) old. These findings were similar to a study in India [41].

Only 14.1% school teachers responded with appropriate answers that plaque means soft debris on teeth. This was alike with a study in Nigeria [42] where only a few (12.6%) participants knew dental plaque as soft debris on teeth. However, 56.3% said plaque leads to dental caries which was higher and unlike from a study by Manjunath and Kumar (2013) where only 24.4% had similar views. Ninety nine percent responded that sweet affects dental health which is in line with a study in India [43]. Limiting sugar intake and tooth brushing were reported as the best method to prevent tooth decay by 92.3% of participants. This finding is similar to a study in India [25] where a higher number of participants (68%) reported that eating less sugar would prevent tooth decay. The majority (96.7%) were aware that tooth brushing prevents dental decay which is comparable to the study with a previous study [25].

American dental association has stated that fluoride is effective in preventing and reversing the early signs of dental caries. In this study, 94.6% school teachers reported that fluoride helped strengthen teeth with 75.6% considering tooth brushing using fluoride to be the best way of cleaning. This response was in contrast to a recent study [44] which reported

78.9% of school teachers lacked awareness of fluoridated water programmes and 45% were unaware of fluoridated toothpaste for children. The high percentage of teachers knowledge could be due to the constant public health awareness created through advertisement in the media and oral health awareness programmes conducted in Riyadh city.

With this inaccuracy, although school teachers from the government and private sectors had a good knowledge of oral health, the government school teachers were better informed and correctly answered the questionnaire in comparison to the private school teachers. This varied from a previous study in which government school teachers (56%) had a fair level of knowledge, while private school teachers (93.8%) had a good knowledge regarding oral health [25]. The difference in education level between the government and private sector teacher was believed to be the reason. In this study, the level of education was not included in the questionnaire.

This study compares positively to the oral health knowledge among primary school teachers of other studies conducted in KSA. In Madinah, an acceptable knowledge regarding oral health [37] and in Al-Kharj, a basic oral health knowledge was reported [45]. One of the limitations of this study is that these are just the views of female teachers from one city in KSA, thus the findings may not be generalizable to the population. Therefore the results of this study should be viewed with caution. However, the findings provide interesting insight into the knowledge of this group of teachers and will make a significant contribution to the body of knowledge. Further studies including the level of education and gender of the school teachers would throw further light on the differences in oral health knowledge between them. A qualitative study involving in-depth face to face interview could be used to explore the knowledge of primary school teachers.

Conclusion

In conclusion, the oral health knowledge of the primary school teachers from both government and private schools is adequate with primary school teachers in private schools having better knowledge than those in government schools. However, the response rate of the private schools was higher than government schools. All of these findings have significant implications for planning primary school oral health promotion in the future, in particular the need to reduce the high prevalence of dental caries, whilst acknowledging that female teachers knowledge of oral health in Riyadh city is good.

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