

Dental caries, hygiene, fluorosis and oral health knowledge of primary school teachers of Riyadh, Saudi Arabia

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كانت أهداف من هذه الدراسة هو تحديد حالة نخر الأسنان وصحة الفم والتسوس الفلوري لدى معلمي المدارس الابتدائية في مدينة الرياض وتقييم بعض من معلوماتهم الأساسية عن بعض الأمراض والعادات الفموية لدى هؤلاء الأشخاص. ضمت هذه الدراسة ٢٩٧ معلماً في المرحلة الابتدائية وتم اختيارهم عشوائياً من ١٦ مدرسة حكومية باستخدام "النموذج العشوائي للمجموعة الكلية" لوحظ وجود نسبة نخر الأسنان والتسوس الفلوري عالية مقارنته مع عامة الناس. ووجد أنه ٥٪ من المعلمين لا ينظفون أسنانهم، وأن معلومات ثلث المعلمين عن نخر الأسنان وأمراض اللثة ضعيفة ولكن أكثر من ٩٠٪ وافقوا على أن هذا النوع من الدروس ضروري ومفيد للطلاب. على الرغم من أن عدد قليل منهم شارك في إعطاء دروس عن التدابير الوقائية وأمراض الفم.

The objectives of this study were to determine the status of caries, oral hygiene condition and fluorosis of primary school teachers of Riyadh urban area and to assess some basic knowledge about oral diseases and habits of these subjects. Two hundred ninety seven male school teachers were selected randomly from 16 public schools, using stratified cluster random sampling. High caries experience and fluorosis level were observed when compared with the general normal population of Riyadh region. Five percent of the teachers did not clean their teeth. One-third of the teachers showed poor knowledge about caries and gum diseases. Even though very few teachers were involved in giving lectures about preventive measures and oral diseases, nevertheless more than ninety percent of them agreed that these types of lectures were beneficial to the students.

Introduction

Education of oral health awareness to schoolchildren is important. School teachers can play a major role in imparting knowledge of the causes and prevention of common oral diseases. A school-based program is most effective because children are approached at a time when their health habits are forming. However, previous studies have indicated that teachers' knowledge about oral health and current methods of prevention were inadequate and was inaccurate in some instances.^{1-3,5} In contrast to these studies, Chikte *et al*⁴ reported that majority of South African teachers showed adequate knowledge of causes of tooth decay, frequency of brushing, dental visits and fluoride advantages.

In determining the teachers' willingness to participate in oral health education, Peterson *et al*⁶ showed that teachers were aware of poor dental health condition in children and wanted to become involved in oral health education. Studies concerning the prevalence of dental caries, oral health awareness of children, mothers and school teachers in China and Zanzibar showed that about 90% of the teachers were of the opinion that they should teach the children about the causes of tooth decay and bleeding gums.^{7,8} Al-Tamimi and

Peterson⁹ reported that 85% of the teachers in Saudi Arabia agreed that children were in need of dental treatment. However, only 56% were in favour of teaching the children about oral health. Khan *et al*¹⁰ in a recent study reported that the mean DMFT of secondary and intermediate school teachers of Saudi Arabia was 8.83. One percent of these teachers do not use anything for oral hygiene. Furthermore, only thirty-five percent of the teachers were involved in providing information about oral health and preventive measures to their pupils. However, almost hundred percent agreed that these types of lectures were beneficial.

In a comprehensive study, Shammery *et al*¹¹ showed that the mean DMFT of 24-44 years-old Riyadh adults was 9.78. In the same study, they indicated that 54% of the adults between 25 and 44 years of age were fluorosis free, while 1% had severe level of fluorosis. Almas *et al*¹² showed that a sample of 35 to 44 years-old Saudi adults had mean DMFT of 8.36. Almas and Jasser¹³ found the mean DMFT of a sample of Riyadh population of age-group 35-44 years was 9.63.

Review of the literature showed that no study has been done on primary school teachers of Saudi Arabian schools for caries status, hygiene condition and dental fluorosis along with practices and knowledge about oral diseases. Therefore, there was a need for such a study. The objectives

Received 18 Nov. 2000; Revised 17 Feb. 2001;

Accepted 26 Feb. 2001

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of this study were: 1) to determine the prevalence and severity of the caries, 2) to determine the oral hygiene condition and fluorosis of primary school teachers in Riyadh urban area, and 3) to assess some basic knowledge about oral diseases and habits of these subjects. The research hypotheses were the condition of fluorosis and caries status of primary school teachers would be in lower degree than the normal general population of Saudi Arabia.

Subjects and Methods

The urban area of Riyadh had 345 primary schools in 1998 and had employed 7587 teachers.¹⁴ These schools are distributed in five sections of the city (north, south, east, west and centre). A very comprehensive study of Riyadh region showed that 24-44 year old adults had mean DMFT of 9.78 and standard deviation of 6.3.¹¹ Using the above information, the sample size of 276 was calculated with 95% confidence interval and maximum error of 0.8 in the estimated mean DMFT. The sample size was further divided into 5 parts according to the proportion of teachers in each section of the city.

The study examined a random sample of 297 male primary school teachers from 16 public schools of Riyadh urban area. The schools were selected randomly using stratified cluster sampling, considering the sections of the city as strata. One, two or three schools were selected randomly according to the required sample sizes from the list of schools of each section of the city. All the teachers of the selected were examined clinically and interviewed for questionnaire. A special form was developed to collect the information about caries, hygiene condition, fluorosis and knowledge about oral diseases and habits. The WHO criteria¹⁵ for caries and fluorosis assessment were used for clinical assessment. A senior member of Department of Preventive Dental Sciences, King Saud University, calibrated the examiners. He was also designated as a reference examiner for inter-examiner reliability.

The schools administration were informed before the visit. Each teacher was examined by one of the two examiners (BZ or MM) in the classroom sitting on the chair. The subjects were examined using a disposable mirror in natural light. In case of any doubt, the tooth was marked sound. No radiograph was taken. Same examiner interviewed the teacher to collect non-clinical information.

Statistical Package for Social Sciences (SPSS window version 9.0) was utilized for all computational purposes. The frequency tables and descriptive statistics were computed to assess the severity of caries, hygiene status, fluorosis and knowledge of the teachers. Analysis of variance (ANOVA) was used to determine the differences of DMFT for different age and fluorosis groups etc. Tukey multiple range test was applied as post-hoc test for significant ANOVA.

Calibration. Tooth by tooth inter-examiner reliability showed that examiners were in agreement with the reference examiner of 90%, using percent agreement and about 70%, using kappa statistic

Results

Two hundred and ninety-seven male primary school teachers were examined from 16 schools. Table 1 shows the descriptive statistics of age of the teachers and their caries experience. The mean age was 33.38±5.48 years (Range: 22-52 years). Thirty-nine percent (n=112) of the teachers were below thirty years of age while only 11.8% (n=34) were above forty-one years. The mean D (decay) value was 7.72±4.56, the mean M (missing) value was 2.57±3.27 and the mean F (filled) value was 4.24±3.13. The mean DMFT was 14.53±5.62. The lowest mean DMFT was in the 36-40 years age group, while the highest mean was found in the age group of ≥ 41 years. ANOVA test demonstrated that there is a significant difference between the groups (p< 0.05). Post hoc test revealed that only the mean DMFT of age group 36-40 and ≥ 41 years are significantly different.

The frequency about the sweets and soft drink availability in the school and responses about oral

Table 1. Descriptive statistics of decay, missing, filled and DMFT of teachers categorized by age group.

Age groups	≤ 30	31-35	36-40	≥ 41	Total
	n=112 (38.7%)	n=98 (33.9%)	n=45 (15.6%)	n=34 (11.8%)	n=289 (100.0%)
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean (SD)
Decay	8.25(4.31)	7.44(4.38)	6.47(4.63)	7.97(5.36)	7.72(4.56)
Missing	1.78(2.44)	1.99(2.61)	2.64 (2.93)	6.97(4.44)	2.57(3.27)
Filled	4.29(2.91)	4.98(3.03)	4.07(3.32)	2.00(2.87)	4.24(3.13)
DMFT	14.31(5.44)	14.38(5.37)	13.18(6.17)	16.94(5.78)	14.53(5.62)

Mean age 33.38±5.48 years

ANOVA test: for DMFT: p =0.028

Significance: 36-40 years vs ≥ 41 years

Table 2. Teachers' response about oral health lectures and availability of soft drinks.

	Yes (%)	No (%)
1. Availability of soft drinks and sweets in school	163 (55.1)	133 (44.9)
2. Classroom and groups instructions to the students	21(7.1)	276 (92.9)
3. Health lectures given by the teachers	58 (19.5)	239 (80.5)
4. Success about oral health lectures	270 (90.9)	27 (9.1)

health lectures are discussed in Table 2. Fifty-five percent (n=163) teachers affirmed the availability of sweets and soft drinks. Only 7.1% (n=21) of the teachers responded positively about formal classroom or group instructions about oral health in the last academic years. About one in five teachers (n=58) agreed that they spent some time to inform the students about oral health and preventive measures. Nevertheless, 90.9% (n=270) teachers agreed that these types of lectures were beneficial to the students (Table 2).

The severity of fluorosis and the mean DMFT according to each fluorosis group are shown in Table 3. Twenty-five percent (n=73) of the teachers had normal, 21.5% (n=64) had mild and 6.4% (n = 19) had moderate level of fluorosis. The mean DMFT showed an increasing trend from 10.59 to 16.63 for normal to moderate fluorosis. The ANOVA test showed highly significant difference between the mean DMFTs ($p < 0.0001$). The mean DMFT of teachers with normal fluorosis were significantly different from all other groups of fluorosis. Table 4 illustrates the oral hygiene condition of the subjects with summary statistics of DMFT

Table 3. Descriptive statistics of teachers' DMFT categorised by severity of fluorosis.

	n (%)	Mean	SD
Normal	73 (24.6)	10.59	6.60
Questionable	45 (15.2)	14.67	5.79
Very Mild	96 (32.3)	15.75	4.45
Mild	64 (21.5)	16.47	4.06
Moderate	19 (6.4)	16.63	3.55
Total	297(100.0)	14.53	5.62

ANOVA test : $p < 0.0001$

Significance : Normal vs (Questionable, mild, very mild and moderate)

Table 4. Descriptive statistics of teachers' DMFT categorised by hygiene condition.

	n (%)	Mean	SD
Good	101(34.0)	9.58	5.12
Fair	149 (50.2)	16.09	3.23
Poor	47 (15.8)	20.45	3.62
Total	297 (100)	14.53	5.62

ANOVA Test : $p < 0.0001$

Significance : all groups 'good', 'fair' or 'poor' are significantly different from each other.

according to each hygiene group. Thirty-four percent (n=101) of the teachers had 'good' oral hygiene, while 15.8% (n=47) had 'poor' hygiene condition. As expected, the mean DMFT was in increasing order from good to poor. All the three categories were different from each other ($p < 0.0001$).

Table 5 discusses the knowledge of the teachers about tooth decay and gum disease and descriptive statistics of DMFT. Sixty-five percent (n=193) teachers reported to have knowledge of tooth decay, while only 45.8% (n=136) agreed that they were knowledgeable about gum diseases. There was no significant difference between the means ($p = 0.077$). However, the mean DMFT of the teachers with no knowledge showed lower value than those who had the knowledge. The same table describes the descriptive statistics of DMFT with the knowledge about gum disease. Again, the teachers who claimed that they had knowledge of gum diseases showed high DMFT compared to those who did not have ($p < 0.0001$).

Table 5. Descriptive statistics of teachers' DMFT categorised by the knowledge of tooth decay and gum disease.

	Tooth decay			Gum disease		
	n (%)	Mean	(SD)	n (%)	Mean	(SD)
Yes	193(65.0)	15.04	(5.20)	136 (45.8)	15.82	(4.48)
No	85(32.0)	13.45	(6.33)	116 (39.1)	13.06	(6.28)
Not sure	9 (3.0)	15.00	(5.43)	45 (15.2)	14.40	(6.11)
Total	297(100.0)	15.53	(5.62)	297(100.0)	14.53	(5.62)

ANOVA test : tooth decay $p = 0.077$ Gum disease $p < 0.0001$;
Significance : 'No' vs 'Yes'

Table 6 demonstrates the cleaning instruments the respondents use for hygiene and mean DMFT according to the cleaning instruments. Thirty-one percent (n=91) teachers use brush only, 27.9% (n=83) use miswak only and 36.0% (n=107) use both the brush and miswak. Five percent (n=16) do

Table 6. Descriptive statistics of teachers' DMFT categorised by cleaning instruments used for oral hygiene.

	n (%)	Mean	SD
Brushing	91 (30.6)	13.40	4.90
Miswak	83 (27.9)	16.20	4.92
Brush & miswak	107 (36.0)	13.32	5.94
Nothing	16 (5.4)	20.31	5.40
Total	297 (100.0)	14.53	5.62

ANOVA test : $p < 0.0001$

Significance : Brush vs. ('Miswak' and 'nothing'):

Brush & miswak vs (Miswak and nothing)

Miswak vs. nothing

not use any thing for oral hygiene. The teachers who use both brush and miswak showed the least mean DMFT, while the teachers who do not use any thing for oral hygiene showed the highest DMFT. ANOVA test shows that the differences are highly significant ($p < 0.0001$). Post hoc test revealed that the teachers who use 'only brush' and 'brush and miswak' had significantly lower DMFT than 'only miswak' users and who don't use anything. For the respondents who were using the brush, 34.7% (n=68) use once, 54.1% (n=106) use twice and 11.2% (n=22) use three times a day (Table 7). For the teachers who use the miswak, 42.8% (n=81) use thrice and 34.4% (n=65) use five times a day. The teachers who reported to do brushing three times had the significantly lower mean DMFT than one and two-times brush users ($p < 0.01$). The mean DMFT of five-times miswak users were significantly lower than the other groups ($p < 0.0001$) (Table 7).

Table 7. Descriptive statistics of teachers' DMFT categorised by frequency of using brush and miswak.

Frequency of cleaning	Brush		Miswak	
	n (%)	Mean (SD)	n (%)	Mean (SD)
1	68(34.7)	13.26 (5.61)	6(3.2)	15.00 (2.83)
2	106 (54.1)	14.02 (5.18)	16 (8.5)	16.50 (4.44)
3	22 (11.2)	9.73 (4.85)	81 (42.8)	16.86 (4.26)
4			22 (11.1)	16.81 (4.43)
5			65 (34.4)	10.57 (5.93)
Total	196(100.0)	13.28 (5.43)	190(100.0)	14.62 (5.68)

ANOVA test: for brush $p = 0.003$; 3 times vs. (1 and 2 times); for miswak $p < 0.0001$ 5 times vs. (2, 3 and 4 times)

Discussion

In this study, majority of our school teachers

(88.2%) were below 40 years old. The study showed that there was a higher fluorosis level in this population as reported by Khan *et al*¹⁰ and Shammery *et al*¹¹ in their studies. Twenty-five percent of the teachers showed normal fluorosis in this study compared to 29% showed in Khan's¹⁰ study. The reason could be that most of the teachers of Riyadh come from the places where drinking water have high fluoride level.

It is interesting to note that 55% of the schools still keep sweets and soft drinks in their canteens, even though Ministry of Education has given very clear instructions to remove these items from schools.

Only seven percent of schools had received some formal classroom or group instructions about oral health in the last academic year. It shows a need of further community efforts by dental schools and the Ministry of Education to organize lectures on preventive measures and oral diseases in schools. Although only one of the five teachers was involved in delivering such type of lectures, 91% of school teachers agreed that these types of lectures were beneficial to the students. This agrees with the study of Loupe and Frazier², Petresen *et al*⁶, Petersen and Eshang⁷, Petersen and Mzee⁸ and Khan *et al*.¹⁰ Thirty-two percent of the school teachers did not know anything about tooth decay and thirty-nine did not have the knowledge about gum disease. These results are in accordance with Lang *et al*¹, Glasrud and Frazier³, Nyandindi *et al*⁵ and Khan *et al*¹⁰, all of which showed incomplete knowledge of schoolteacher about oral diseases. These responses emphasise the need to give basic knowledge and information of health science specially the knowledge of oral health diseases and practices to this population.

About 95% of school teachers used either brush or miswak or both to clean their teeth. Sixty-four percent teachers use miswak, which is lower than the figure reported by Khan *et al*.¹⁰ Five percent did not use any device for oral hygiene. However, Al-Shammery¹¹ showed that 9.9% did not clean their teeth. Majority of miswak users use miswak three or five times a day, most probably before the daily prayers.

As expected the DMFT of school teachers of age groups ≥ 41 was the highest, which is in accordance with other studies (Khan *et al*¹⁰ Al-Shammery *et al*¹¹, Almas and Jasser¹³). The mean DMFT was in increasing order according to the severity of fluorosis from 'normal' to 'moderate' fluorosis. It is interesting to note that the school

teachers who had some knowledge about tooth decay and gum diseases had higher mean DMFT than the school teachers who did not have. The reason could be that after getting caries experience and periodontal problems these school teachers started to seek information about these diseases through the dentists and other sources. This study indicated that cleaning of teeth by brush and miswak appeared to be the most efficient. However, the use of miswak only was found to be insufficient for oral hygiene. The teachers using brush three times a day have the lowest mean DMFT than one or two times user. The school teachers using miswak five times daily have lowest mean DMFT compared to the less frequent users. The mean DMFT in this study was higher than the mean DMFT reported by Shammery *et al.*¹¹ The reason could be a ten years time lapse between these two studies. In Middle East countries caries experience are showing an increasing trend due to the changing pattern of eating habits.¹⁶⁻¹⁸

In conclusion, we found that this population had higher caries experience and fluorosis condition than general normal population of Riyadh region of the same age group, which were against our research hypotheses.

Acknowledgement

We wish to gratefully acknowledge Dr. Ernest Guile, a former faculty member of the Department of Preventive Dental Sciences, College of Dentistry, King Saud University, for calibrating the examiners. We are also thankful to Dr. Mohammad Aleem Abdullah, Department of Prosthetic Dental Sciences, College of Dentistry, King Saud University, for reviewing this article and giving valuable comments. This research (NF-1459) was registered with the College of Dentistry Research Center (CDRC).

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