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PERIODONTAL CONDITION AND ITS RELATIONSHIP TO KNOWLEDGE AND BEHAVIOR AMONG YOUNG SAUDI STUDENTS

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ABSTRACT

Purpose: The aim of this cross-sectional study was to report on the knowledge and behavior surrounding oral condition among young Saudi students and to relate this to periodontal status.

Materials & Methods: A representative sample of 3090 Saudi intermediate and high school and university students residing in Jeddah between the ages of eleven and twenty-four were randomly selected. Knowledge and behavior of students with regard to oral health were assessed with a dental health questionnaire. Standardized clinical examinations of periodontal conditions were carried out by trained examiners using the Community Periodontal Index of Treatment Needs (CPITN).

Results: Less than half of the subjects were aware that periodontal disease may cause bone loss. Only 23.5% of males knew that calculus cannot be removed by brushing. Females were consistently found to have greater knowledge about oral health than males. Only 16% of these students had a CPITN score of 0 (no treatment need). Students who used only miswak had the highest percentage of CPITN score of 2 (calculus and shallow pockets). The frequencies of toothbrush or dental floss use were associated positively with less need for periodontal treatment, but no association was found between the frequency of miswak use and periodontal condition. Preventive periodontal knowledge and habits should be reinforced through relevant oral health projects.

Conclusion: This study revealed gender differences in various issues. Females scored more favorably in knowledge and behaviors. There was a significant association between the periodontal treatment needs and the use of oral hygiene aids.

Keywords: *Periodontal disease, gender, Saudi Arabia, CPITN, oral hygiene*

INTRODUCTION

The association between periodontal disease and systemic disease has been demonstrated in various research studies [1-4]. Early control of periodontal disease is essential to prevent and manage these systemic diseases[5]. Poor oral hygiene appears to be a major factor in the progression of periodontal disease[6], and periodontal disease can be prevented by improving oral hygiene [7].

Routine tooth brushing and use of dental floss or other cleaning aids is the most cost-effective and easiest way for an individual to prevent periodontal disease. The most commonly used oral hygiene aid is the toothbrush; dental floss is rarely used. Both aids were less frequently used by males than females [8]. Chewing sticks are another type of oral hygiene aid, and miswak is one of the most widely used chewing sticks. It is obtained from a plant called *Salvador Persica*. Miswak has been used by Muslims for more than 1400 years as a hygiene aid and spiritual habit. Various researchers have studied the effect of miswak on periodontal health. Some studies found its use to be effective in removing plaque ([9,10] and lowering the need for periodontal treatment [9]. Others found its use to affect periodontal health negatively [11].

A number of studies and surveys have been conducted in various countries during the last several years to assess the epidemiology of periodontal disease [12-17]. In contrast, there have been a limited number of studies have addressed the periodontal condition among young adults in Saudi Arabia [9, 18-21]. In addition, most of the studies used convenient study samples that might not have been representative of the target populations. This research is part of a larger study addressing periodontal disease among the young Saudi population. The aims of this study were: (1) to report the knowledge and oral hygiene practices of students in Jeddah, (2) to assess the periodontal conditions of the students using CPITN, and (3) to describe the relationship between the individuals' oral hygiene practices and periodontal condition.

MATERIALS AND METHODS

Study design and sample

This was a cross-sectional study conducted in Jeddah, the second largest city in Saudi Arabia and the largest city in the western province. Approval for the study was obtained from the Ministries of Education and Higher Education.

The study sample was made up of intermediate, high school, and university students, aged 11-24 years old, attending schools in Jeddah. A pilot study was carried out on a sample of 50 students prior to the study to determine sample size and to test the questionnaire. Sampling was performed to provide a population representative of young adults in the city and to provide sufficient power to detect differences in periodontal disease where it existed. A sample size of 3100 Saudi students was selected based on the Lemeshow formula[22].

A list of all intermediate and high schools was stratified according to gender (male schools and female schools), source of income (private schools and public schools), and six geographic locations. Schools were then selected randomly from each stratum with proportional allocation; 21 Intermediate schools (15 public and 6 private) and 14 high schools (10 public and 4 private) were included in the study, out of a total of 260 intermediate and 210 high schools. Regarding colleges, students from eight colleges (four female and four male) were selected using a proportional allocation technique.

All students in selected schools and colleges were eligible to take part in the study.

Questionnaire

The dental health questionnaire was distributed to 3200 subjects. Of these, 3122 were returned, giving a response rate of 97.5%. The questionnaire included questions about demographic data, as well as knowledge about and periodontal disease and methods of prevention. Questions about oral hygiene habits included tools used for oral hygiene and the frequency of their use.

Questionnaires were administered and collected by one of the dentists in class, and emphasis was placed on the anonymity of the participants.

Clinical examination

Of 3200 students, who answered the questionnaires, 32 refused to be examined resulting in 3090 students undergoing clinical examination in schools.

Students were examined in classrooms by trained dentists using a lightweight portable examination light, plane mouth mirrors, and CPITN probes. Teeth were examined using the World Health Organization (WHO) Community Periodontal Index of Treatment Needs (CPITN) [23]. Teeth were examined in the following sequence: upper right sextant, upper anterior sextant, upper left posterior sextant, lower left posterior sextant, lower anterior sextant, and lower right posterior sextant. Scores of 0 to 4 were ascribed to each of the six sextants examined according to the following clinical criteria: (0) healthy gingiva, (1) bleeding observed directly or with use of a mouth mirror, (2) calculus felt during probing but black area of the probe was visible in its entirety (3.5-5.5mm from ball tip), (3) pocket 4 or 5mm with the gingival margin situated on black area of probe (3.5-5.5mm from probe tip), and (4) pocket >6mm, black area of probe not visible. From the clinical findings of each subject examined, the subject was placed into one of four treatment groups on the basis of the most severe condition found.

The four treatment categories were as follows:

No treatment (Code 0), Improved oral hygiene (Code 1), Improved oral hygiene and scaling (Codes 2, 3), Improved oral hygiene and complex treatment (Code 4).

Six dentists underwent training and standardization of exam style at King Abdulaziz University (K.A.U.) dental clinics prior to the study, and Kappa statistics among the examiners for CPITN was calculated. Examining a total of 50 students for CPITN gave an inter-examiner kappa value of 0.65 and an intra-examiner kappa value of 0.72.

Statistical analysis

The data were analyzed statistically using the computer statistical package SPSS versions 13 and 16. Both descriptive and analytic bi-variate and tri-variate statistical analyses between the dependent variable and the independent variables were carried out. Two-sided likelihood ratio chi-square tests were used to test the statistical relationship in the bi-variate and tri-variate analyses. A p-value of less than 0.05 was considered to be statistically significant.

RESULTS

Description of the study population

The study sample consisted of 3090 students, aged 11- 24 years old. Of these, 1752 were female (56.7%) and 1338 were male (43.3%). There were 1292 students between the ages of 11 and 15, 1097 between the ages of 16 and 19, and 701 between the ages of 20 and 24. Approximately 48%, 29%, and 23% of students attended intermediate school, high school and university, respectively.

Knowledge of periodontal disease

The knowledge of students regarding periodontal disease and preventive methods is summarized in Table 1. Regarding periodontal disease, 47.9 % and 73.1% of subjects thought periodontal disease might cause bone loss and systemic disease, respectively. Regarding prevention, 64.2% disagreed or did not know that floss use helps prevent periodontal disease, and 34.5% of females and 23.5% of males thought calculus could not be removed by brushing($P<0.001$). There was a statistically significant difference between male and female subjects in their knowledge of periodontal disease and preventive measures; females were found to have more knowledge than males in all questions asked.

TABLE (1) Gender and knowledge of periodontal disease.

Knowledge of periodontal disease	Total		Gender				P value*
			Male		Female		
	N	(%)	n	(%)	n	(%)	
Bleeding with brushing is the first sign of periodontal disease							
Agree	1660	(56.7)	626	(49.3)	1034	(62.5)	
Don't know	1003	(34.3)	505	(39.7)	498	(30.1)	<0.001
Disagree	263	(9)	140	(11)	123	(7.4)	
Using floss helps prevent periodontal disease							
Agree	1059	(35.8)	415	(32.3)	644	(38.50)	
Don't know	1336	(45.2)	620	(48.2)	716	(42.8)	<0.002
Disagree	562	(19)	251	(19.5)	311	(18.6)	
Periodontal disease may cause bone loss							
Agree	1406	(47.9)	577	(45.2)	829	(50.1)	
Don't know	1333	(45.4)	598	(46.8)	735	(44.4)	<0.004
Disagree	194	(6.6)	102	(8)	92	(5.6)	
Periodontal disease may cause systemic disease							
Agree	2151	(73.1)	896	(70.3)	1255	(75.2)	
Don't know	600	(20.4)	277	(21.7)	323	(19.4)	<0.003
Disagree	193	(6.6)	102	(8)	91	(5.5)	
I've heard about calculus							
Yes	2537	(86.3)	1062	(83.4)	1475	(88.6)	<0.001
No	402	(13.7)	212	(16.6)	190	(11.4)	
Calculus can be removed by brushing							
Yes	883	(29.9)	433	(33.7)	450	(27)	
No	877	(29.9)	302	(23.5)	575	(34.5)	<0.001
I don't know	1192	(40.1)	549	(42.8)	643	(38.5)	

Chi-square test

Oral hygiene practices

The toothbrush was the most common aid to be used daily (73.7% of subjects), followed by miswak (22.2%) and dental floss (10.6%) (Table2). Daily toothbrush use was found in 87.4% of females and 56.1% of males (P<0.001). Daily miswak use was more common among males (27.3%) than among females, (17.8%) with a highly significant difference. The daily use of dental floss was uncommon, 12.2% of female subjects and 8.7% of males (P <0.001).

Periodontal status

The association between CPITN and gender is illustrated in Figure 1. Approximately 22% of male subjects and 11.1% of female subjects had healthy periodontium. Fifty eight percent of males and 54.1% of females had calculus and shallow pockets.

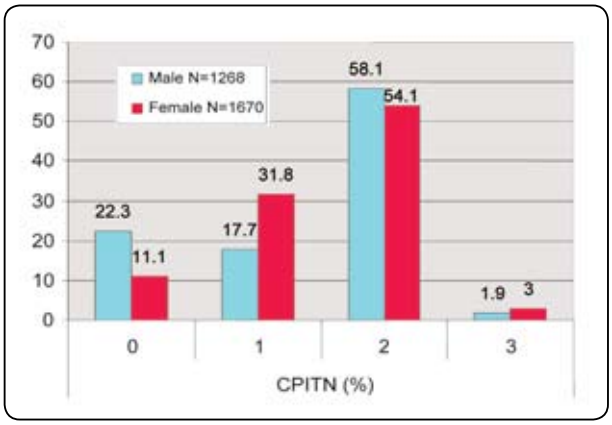

Fig. (1) CPITN and gender.

TABLE (2) Gender and the frequency of use of oral hygiene aids.

Frequency of using different oral hygiene aids	Total		Male		Female		P value*
	N	%	n	%	n	%	
Frequency of using toothbrush							
Never & < 1/month	230	(7.6)	188	14.6	40	2.4	
>1/month & <1/day	567	(18.7)	376	29.2	171	10.2	<0.001
1/ day or more	2231	(73.7)	722	56.1	1463	87.4	
Frequency of using floss							
Never & < 1/month	2243	(75.4)	1015	46.4	1171	71.4	
>1/month & <1/day	417	(14)	142	11.2	269	16.4	<0.001
1/ day or more	315	(10.6)	110	8.7	201	12.2	
Frequency of using Miswak							
Never & < 1/month	1339	(44.6)	438	34.4	874	52.7	
>1/month & <1/day	995	(33.2)	489	38.4	488	29.5	<0.001
1/ day or more	665	(22.2)	348	27.3	295	17.8	

Chi-square test

Periodontal status and oral hygiene

Subjects using three tools in oral hygiene showed the best periodontal condition, with only 47.8% of these subjects needing scaling and 1.5% needing complex treatment. Among subjects who used one tool, those who used miswak required the most scaling 62.6% (Table 3). The association between CPITN and frequency of the oral hygiene practice is shown in Table 4. Significant differences were found in CPITN between individuals as a function of the frequency of toothbrush or dental floss use but not as a function of miswak use (*P* 0.230).

TABLE (3) CPITN and type of aids used to clean teeth.

Aids used to clean teeth*	Total		CPI TN %			
	(N)	(%)	0	1	2	3
Toothbrush	1283	(42.3)	15.8	25.1	55.9	3.2
Miswak	187	(6.2)	10.7	24.6	62.6	2.1
Floss	45	(1.5)	13.3	26.7	57.8	2.2
Toothbrush + floss	340	(11.2)	17.6	27.9	53.2	1.2
Toothbrush + miswak	782	(25.8)	16.4	26.1	55.6	1.9
Miswak + floss	31	(1.0)	19.4	9.7	67.7	3.2
Three tools	205	(6.8)	18.5	32.2	47.8	1.5
None	157	(5.2)	15.9	14.6	66.2	3.2
Overall Total	3030	(100%)	16	25.6	55.9	2.5

**** P value = 0.024***

TABLE (4) CPITN and the frequency of oral hygiene aids use.

Frequency of use of various oral hygiene aids	Total		CPITN (%)				P value*
	N	(%)	0	1	2	3	
Frequency of toothbrush use							
Never & 1/month	230	(7.6)	14.8	15.7	65.7	3.9	
>1/month & <1/month	567	(18.7)	14.8	23.8	59.1	2.3	0.003
1/day or more	2231	(73.7)	16.4	26.8	54.4	2.4	
Frequency of floss use							
Never & 1/month	2243	(75.4)	15.3	23.5	58.4	2.7	
>1/month & <1/month	417	(14)	18.9	29	50.6	1.4	<0.001
1/day or more	315	(10.6)	18.5	33.7	46.7	1.2	
Frequency of miswak use							
Never & 1/month	1339	(44.6)	15.9	25.6	55.2	3.3	
>1/month & <1/month	995	(33.2)	16.5	24.8	57.2	1.5	0.23
1/day or more	665	(22.2)	15.5	25.7	56.4	2.4	

****Chi-square test***

DISCUSSION

The present study reported the periodontal status and related knowledge and behavior among a representative sample of school and university students living in Saudi Arabia. A dental health questionnaire was used to assess knowledge and behavior concerning periodontal health status, and examination of periodontal health using CPITN was performed. Sampling was done using 35 selected schools that were stratified according to gender, source of funding, and geographic location, as well as eight colleges. This paper highlights the differences between genders in knowledge and behavior regarding periodontal health as well as differences in periodontal treatment needs.

With regard to knowledge, almost half of the subjects were not aware that bleeding is a sign of periodontal disease. Only a third knew that dental floss helps prevent periodontal disease, and less than half of the subjects were aware that periodontal disease may cause bone loss. Significantly more females knew correct answers than males. This finding differs from studies which found no difference in knowledge and attitude between males and females [24,25] and agrees with others [26].

Regarding oral hygiene practices, this study's results agree with those of previous studies, which indicated that more females used both a toothbrush and dental floss daily as compared to males [8,12,18,27]. In Sweden, Denmark, Germany, Australia, and Norway most children brush their teeth twice daily [8]. This study shows only 8.7% of students used dental floss daily. Various studies reported a higher percentage of floss use daily. More males than females were found to use miswak daily, in agreement with other studies [18].

These results indicate that improvement in knowledge of preventive measures for periodontal disease is needed, in particular among male students. Intervention to increase the knowledge and subsequent use of the various cleaning aids is essential.

As for periodontal condition, the presence of calculus dominates as the most common periodontal condition in both genders, but with a higher percentage among males than females, in accordance with the results found in previous studies [10,28].

The least need for treatment was found among individuals who used three aids, toothbrush, floss, and miswak, followed by individuals who used only brush and floss. The most important oral health habits are regular tooth brushing and flossing with appropriate frequency. This study showed that the periodontal health of individuals was significantly affected by the frequency of use of a toothbrush or dental floss but not by the use of miswak.

Previous studies on the effect of the use of miswak on periodontal health vary. Some studies reported that the use of miswak is as effective as the use of a toothbrush in removing oral deposits[10] and even results in less need for periodontal treatment[9]. Other studies found that miswak may be associated with gingival recession [19,29]. Moreover, miswak may not be sufficient for maintaining interproximal dental health when used without the support of other oral hygiene aids [30]. The results of this study and the previously mentioned results suggest that the proper use of miswak should be taught as was done in a study by Al-Otaibi, where miswak use became as effective as toothbrush use when preceded by professional instruction in its correct application [18].

One of the great limitations of this study is self-reported data. Measurement bias due to misinterpretation of questions and recall bias are subject to occur [31,32]. To overcome this problem, the questions were non-leading and simply worded. However, it should be noted that some studies found that self-report of daily flossing predicted plaque, calculus, and periodontal destruction[33,34]. Another limitation is that CPITN limits the inclusion of probe periodontal information to only probing depth measurement, and so it underestimates the prevalence and severity of clinical attachment loss in older age groups[35]. Despite these limitations, CPITN reflects unmet treatment needs and can give a fair idea of periodontal condition, especially in young age groups.

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