Current Science International
Volume: 13 | Issue: 02| April - June| 2024

EISSN:2706-7920 ISSN: 2077-4435
DOI: 10.36632/csi/2024.13.2.20
Journal homepage: www.curresweb.com
Pages: 263-271

Evaluating Oral Hygiene Practices: Tooth Brushing and Miswak Use in Dental Students at King Abdulaziz University

Hisham I. Othman[1] and Tarek R. Abdelrehim[2]

[1]Professor, Department of Oral Diagnostic Sciences, Faculty of Dentistry, King Abdulaziz University. P.O. Box 80209, Zip Code: 21589, Jeddah, Saudi Arabia.
[2]Associate Professor, Oral and Maxillofacial Prosth. Department, Faculty of Dentistry, King Abdulaziz University. P.O. Box 80209, Zip Code: 21589, Jeddah, Saudi Arabia.

Received: 05 Mar. 2024 **Accepted:** 09 May 2024 **Published:** 20 May 2024

ABSTRACT

Objective: The aim of this study was to assess tooth brushing behavior and to determine the prevalence of toothbrush, miswak, toothbrush-plus-miswak usage for teeth cleaning among undergraduate dental students, faculty of dentistry at king Abdulaziz university (Jeddah, Saudi Arabia) based on gender and level of oral hygiene education **Materials and Methods**: Out of 500 registered dental students at the faculty of dentistry, 300 dental students (150 male and 150 female students) mean age = 20.1 ± 1.6 years) participated in the study (response rate 99.8%). The students were randomly selected from 2nd to 6th year dental students and they were classified based on the level of their oral hygiene education and gender. The data for this study was collected through self-administered questionnaires and was analyzed by using the SPSS-PC package. The statistical significance was determined by the chi-square test and cross tabulation, and the level of significance was set at $P \leq 0.05$. **Results:** Out of 299 dental students, 4% (11 students) have an excellent tooth brushing behavior, 57% (171 students) have good tooth brushing behavior and 39% (117 students) have poor tooth brushing behavior. The majority of the dental students, 77.26% (231 students) were used only tooth brush for teeth cleaning, especially females at the post education oral hygiene level with statistically significant difference. The level of education and gender were significantly associated with the type of oral cleaning tool used. The use of miswak alone for teeth cleaning among the dental students is poor **Conclusions:** Dental students had satisfactory tooth brushing behavior, particularly in the final clinical years, nevertheless, this improvement was limited and students should be advanced for more dental health training. Early exposure to dental health education was suggested to improve the dental students. Miswak is an effective and alternative tool for oral hygiene and should be promoted and recommended for use with the toothbrush for teeth cleaning

Keywords: tooth brushing behavior, chewing stick (miswak), prevalence, oral health behavior, dental students

1. Introduction

Oral self care with teeth cleaning agents like toothbrush and toothpaste, or chewing sticks, which require regular removal of dental plaque and food deposits from teeth and gingiva plays an important part in prevention of dental caries and periodontal disease especially if supplemented by professional healthcare (Petersen and Ogawa, 2012). Dental students are the future leadership in oral health care and are expected to be teachers of oral hygiene as well as role models of self-care regimes for their patients as their dental education progresses. Surveys have also indicated that dental students with positive oral health attitude are perfect models of oral health behavior and service as instructors to their acquaintances, family members, patients and their guild on how to maintain good oral health

Corresponding Author: Prof. Hisham I. Othman, Professor, Dental Anatomy and Oral Histology Division, Oral Diagnostic Science Department, Faculty of Dentistry, King Abdulaziz University, P.O. Box 80209, Zip Code: 21589, Jeddah, Saudi Arabia.
E-mail: hothman@kau.edu.sa

(Neeraja *et al.,* 2011; Al-Omari and Hamasha, 2005; Nusair *et al.,* 2006; Peker and Alkurt, 2009). Some studies demonstrated that oral health behavior and attitudes differ between preclinical and clinical European dental students (Halawany *et al.,* 2015; Rahman *et al.,* 2013), studies of this nature are still rare in the Middle East and Arab countries (Barrieshi-Nusair *et al.,* 2006; Al-Wahadni *et al.,* 2004). Moreover, dental students from dissimilar cultural backgrounds reported different oral health attitudes and behavior (Rabbani *et al.,* 2022; Komabayashi *et al.,* 2006). Previous studies reported poor oral health attitudes among Jordanian dental students (Al-Omari and Hamasha 2005; Al-Wahadni *et al.,* 2004). They are acquainted with the preventive dental courses during their clinical years (4^{th} and 5^{th} years) and therefore their level of education might potentially affect their oral health behaviors. Furthermore, the gender-based differences in psycho-physiological behavior might affect oral health attitudes and behavior. One survey of self-reported dental health attitudes and behavior among dental students showed that gender was not a major characteristic, but that favorable attitude/behavior toward oral health appeared to reflect students' clinical training experience (Rabbani *et al.,* 2022). In another study, the gender difference was significant among dental students. In Jordan, female students reported brushing their teeth more often than male students and believed in the necessity of using toothpaste during brushing more frequently than did male students (Al-Omari and Hamasha, 2005). Chewing sticks (miswak) are a widely used procedure for teeth cleaning and when applied properly, it can be effective in removing dental plaque due to the combined result of mechanical cleaning, antimicrobial action and enhanced salivation (Komabayashi *et al.,* 2006). The increase prevalence of using chewing sticks for mouth cleaning relates to its accessibility, costs, socio-cultural and therapeutic reasons and religious backgrounds (Al-Otibi, 2004) and it is taken that the mechanical plaque-removing properties of chewing sticks may be similar to that of a conventional toothbrush (Halawany, 2012). People in Jordan may use both the traditional toothbrush and miswak, or a toothbrush without miswak. Nevertheless, using miswak among younger generations in Jordan is dependent on the religious beliefs of the person. Among older generations, miswak use is perceived as both traditional practice and religious ritual (Darout *et al.,* 2002). Few studies have measured people's perceptions of miswak especially for dental students in Saudi Arabia.

2.1. Objectives of the study

The purpose of this study was to assess tooth brushing behavior and to determine the prevalence of toothbrush, miswak, toothbrush-plus-miswak usage for teeth cleaning among undergraduate dental students, faculty of dentistry at the King Abdulaziz University (Jeddah, Saudi Arabia) based on level of oral hygiene education and gender

2.2. Participants and methods

An ethical approval from a research ethics committee of the faculty of dentistry, King Abdulaziz University was held. 300 dental students (150 female and150 male students) out of total 500, randomly selected from 2nd to 6th year dental students participated in this work, from each year the student's number was 60. The collected data were received through self anonymous-administered questionnaires from the students based on the level of oral hygiene education and gender. The two education levels were: pre-education oral hygiene course level (includes 2^{nd} and 3^{rd} year dental students) and post- education oral hygiene course level (include 4^{th}, 5^{th} and 6^{th} year dental students). At king Abdulaziz University the dental course is 5 years. The mean age of the pre-clinical (second and third year) students was 20 years and the average age of the clinical year students was 23 years. Students were interviewed by trained dental students, and completed the questionnaires by themselves in the classroom, under the supervision of the dental students. The given questionnaire consisted of twenty questions primarily associated with tooth brushing behavior (Kawamura *et al.,* 2001). For toothbrush behavior evaluation, we used the following questions and their answers and they were classed into three grades: excellent (6/6), good (4-5/6) and bad (1-3/6):

1. How often do you brush your teeth each day?

□ Once a day. □ Twice a day. □ Three times/day. □ More than 3 times.

2. Do you brush your teeth immediately after eating the main meal?

□ Yes. □ No.

3. Do you brush your teeth at any time not related to the main meal?
□ Yes. □ No.

4. How much toothpaste do you normally put on your toothbrush?
□ Full length of bristles □ Half-length of bristles
□ About the size of a pea. □ About the size of a grain of rice.

5. How long do you normally take to brush your teeth?
□ About 30 seconds. □ About 1 minute. □ about 2 minutes.
□ More than 2 minutes. □ I don't know**.**

6. Do you know the ideal tooth brushing technique?
□ Yes. □ No.

7. If yes, Did you follow ideal tooth brushing technique?
□ Yes. □ No.

2.3. Answers

1. Brush the teeth 2 times or more.
2. Brush the teeth immediately after eating the main meal.
3. Brush the teeth at any time not related to the main meal
4. Amount of toothpaste should be are not the size of a pea or the size of a grain of rice.
5. Time of brushing at least 2 minutes or more.
6. Knowing the ideal tooth brushing technique.

To improve the validity of students' responses, no teachers or other dental students were allowed in the classroom during data collection. Verbal consent was given by the students after explaining the intent of the written report and highlighting that surveys would be anonymous and data would be kept confidential during handling and storage.

2.4. Statistical Analysis:

The collected data were analyzed using the SPSS-PC package. Analysis of data included simple descriptive statistics and chi-squared test to study the correlation between variables. P - values of less than 0.05 were considered to be statistically significant. All the tests and results were obtained with Confidence Interval of 98%.

3. Results

In this study, the collected data were classified according to the oral hygiene level education and gender. Out of a total of 300 students, one male student refused to participate; making the response rate of 99.8%, and the total sample count was 299 participants. Based on the education level, the pre education of OH course was 40%, while the post education of OH course was 60%. While based on the gender differences, the male students were 49.8% and the female students were 50.2% (Table1).

Table 1: The number of enrolled and respondent students

Variables		Count	%	Total
Gender	Males	149	49.8 %	100%
	Females	150	50.2%	
OH Education	Pre educated	120	40%	100%
	Post educated	179	60%	

3.1. Toothbrush Usage and Behavior

As regards to the question (Do you use a toothbrush?) In the given questionnaire, table 2 shows that the prevalence of using a toothbrush among the dental students is the same whether they received OH education course or not and also whether they are males or females (Table 2). In regards to tooth

brushing behavior evaluation, of the 299 dental students who answered the questionnaire, 4% (11 student of 299) represents excellent tooth brushing behavior, while 57% (171 students of 299) was good tooth brushing behavior, and 39% (117 students of 299) was poor tooth brushing behavior (Table 3).

Table 2: Toothbrush usage according to level of oral Hygiene education (OH) and Gender *P-value = 0.120*

		Oral Hygiene education course		Gender	
Do you use a toothbrush?		Pre education	Post education	Males	Females
	Total	120	179	149	150
		40.1%	59.9%	49.8%	50.2%
		299		299	
		100.0%		100.0%	

Table 3: General profile of tooth brushing behavior grades among the students

Tooth brushing behavior, grades	Count	Percentage
Excellent	11	4%
Good	171	57%
Poor	117	39%
Total	299	100%

3.2. According to education level

Of the 299, the students at the pre education of OH course that have an excellent behavior grade of tooth brushing was 54.5% (6 students of 11), good behavior grade was 39.8% (68 students of 171) and poor behavior grade was 39.3% (46 students of 117), while at the post education of OH course, the students that have an excellent behavior grade of tooth brushing was 54.5% (5 students of 11), good behavior grade was 60.2% (103 students of 171) and poor tooth brushing behavior grade was 60.7% (71 students of 117). (Table 4).

Table 4: Tooth brushing behavior grades in relation to the education of OH level *P-value = 0.609*

		Group		Total
		Pre Education OH Course	**Post Education OH Course**	
Excellent	Count	6	5	11
	%	54.5%	45.5%	100.0%
Good	Count	68	103	171
	%	39.8%	60.2%	100.0%
Poor	Count	46	71	117
	%	39.3%	60.7%	100.0%
Total	Count	120	179	299
	%	40.1%	59.9%	100.0%

3.3. According to gender

Of 299 dental students, excellent tooth brushing behavior was (45.5% of male and 54.5% of female). Good tooth brushing behavior was (45.0% of male and 55.0% of female) and poor tooth brushing behavior was (57.3% of male and 42.7% of female) (Table 5).

3.4. Miswak Usage

As regards to the prevalence of using miswak, table 6 shows that the majority of the students were not using miswak for teeth cleaning.

3.5. According to education level:

Tables 7 shows that among the 22.74% of student's user miswak (68 students), the majority of the pre-education OH course students (55.9%) were using miswak for tooth cleaning, while the majority of the students of the post-education OH course (64.5%) were not using miswak during teeth cleaning. In comparison between the two groups, the highest prevalence of using miswak was in the pre-education OH course students

Table 5: Grades of tooth brushing behavior in relation to gender. *P-value = 0.120*

		Sex		Total
		Male	**Female**	
Excellent	Count	5	6	11
	%	45.5%	54.5%	100.0%
Good	Count	77	94	171
	%	45.0%	55.0%	100.0%
Poor	Count	67	50	117
	%	57.3%	42.7%	100.0%
Total	Count	149	150	299
	%	49.8%	50.2%	100.0%

Table 6: Distribution of miswak users among dental students.

	Value	**Count**	**Percent**
Do you use miswak?	Yes	68	22.74%
	No	231	77.26%

Table 7: Prevalence of miswak user among dental students according to the education level *P-value = 0.003*

Do you use miswak?		**Group**		**Total**
		Pre Education OH Course	**Post Education OH Course**	
Yes	Count	38	30	68
		55.9%	44.1%	100.0%
No	Count	82	149	231
		35.5%	64.5%	100.0%
Total	Count	120	179	299
		40.1%	59.9%	100.0%

3.6. According to gender

Table 8 shows that among the 22.74% of student's user miswak for teeth cleaning, the majority were males (70.6%) students, while the female user miswak was 29.4%. In comparison between the two groups, the higher prevalence of using miswak was in males.

Table 8: Prevalence of miswak user among dental students according to gender. *P-value = 0.0001*

Do you use miswak?		**Gender**		**Total**
		Male	**Female**	
Yes	Count	48	20	68
		70.6%	29.4%	100.0%
No	Count	101	130	231
		43.7%	56.3%	100.0%
Total	Count	149	150	299
		49.8%	50.2%	100.0%

3.7. Tooth brushing and Miswak usage

3.7.1. According to education level

Table 9 shows that the students were using toothbrush and miswak for teeth cleaning at the pre-education OH course, had a higher percentage (30.70%) than those students at the post-education OH course (16.80%). While for those students using toothbrush regularly only at the pre-education OH course had a lower percentage (69.30%) than those in the post-education OH course (83.20%).

Table 9: Comparison between tooth brushing and miswak-use according to OH education course.

Group				Do you use miswak? Yes	Do you use miswak? No	Total	X^2	P-value
Pre Education of OH Course	**Do you brush your teeth regularly?**	Yes	Count	35	79	114	0.981	0.322
			%	30.70%	69.30%	100.00%		
		No	Count	3	3	6		
			%	50.00%	50.00%	100.00%		
	Total		Count	38	82	120		
			%	31.70%	68.30%	100.00%		
Post Education of OH Course	**Do you brush your teeth regularly?**	Yes	Count	28	139	167	0.000	0.993
			%	16.80%	83.20%	100.00%		
		No	Count	2	10	12		
			%	16.70%	83.30%	100.00%		
	Total		Count	30	149	179		
			%	16.80%	83.20%	100.00%		

3.7.2. According to gender

Table 10 shows that the male students using both toothbrush and miswak had a higher percentage (31.9%) than female students (13.3%), whiles the female students using toothbrush regularly only, had a higher percentage (86.7%) than male students (68.1%)

Table 10: Comparison between tooth brushing and miswak-use according to gender.

Sex				Do you use miswak? Yes	Do you use miswak? No	Total	X^2	P-value
Male	**Do you brush your teeth regularly?**	Yes	Count	44	94	138	0.094	0.760
			%	31.9%	68.1%	100.0%		
		No	Count	4	7	11		
			%	36.4%	63.6%	100.0%		
	Total		Count	48	101	149		
			%	32.2%	67.8%	100.0%		
Female	**Do you brush your teeth regularly?**	Yes	Count	19	124	143	0.006	0.939
			%	13.3%	86.7%	100.0%		
		No	Count	1	6	7		
			%	14.3%	85.7%	100.0%		
	Total		Count	20	130	150		
			%	13.3%	86.7%	100.0%		

4. Discussion

The World Health Organization has recommended and encouraged the use of chewing sticks as an effective and alternative tool for oral hygiene. This recommendation is also consistent with the objectives of the primary health care (WHO, 1998). Approach that focus on prevention, community participation, and the utilization of appropriate technology However, like tooth cleaning with modern

toothbrushes, chewing sticks also need to be used properly to be efficacious in preventing dental diseases and promoting oral health (Haq *et al.,* 2017).

Studying Japanese and Australian dental students, oral hygiene behaviors became more conducive towards oral health in higher year levels, indicating a major curricular influence (Rabbani *et al.,* 2022). Additional instruction and teaching, clinical experience in dental school provides the dental students with the chance to discover the effects of inadequate oral health and treatment issues. In this study, the prevalence of toothbrush usage among the whole dental students despite their level of oral hygiene education or gender was excellent and this provides satisfactory oral hygiene awareness. The general profile of tooth brushing behavior of the dental students in our study was more favorable than that shown by dental students in reports from several other countries (Kumar *et al.,* 2010; Neamatollahi and Ebrahimi, 2010; Van der Weijden and Slot, 2015). The frequency and duration of tooth brushing correlates with oral hygiene. Twice-daily brushing gives optimal effect on oral hygiene and gingival condition of both males and females (Attin and Hornecker, 2005). Twice-daily brushing is recommended by most dentists in order to improve plaque control, since most patients are not able to achieve sufficient plaque removal by performing oral hygiene measures at home (Kirtiloglu and Yavuz, 2006). In this study, the dental students (57%) brushed for 3-5 minutes, providing a good performance according to the controlled criteria of tooth brushing. This is compared with 68%, twice or more daily brushing recorded among Turkish non-dental university students (Tseveenjav *et al.,* 2004), lower than 81% among Mongolian dentists (Ayanbadejo and Sofola, 2005) but higher than what was registered in many other similar studies (Udoye and Aguwa 2007; Ghasemi *et al.,* 2007; Dagli *et al.,* 2008). In cross tabulation between the effect of oral hygiene education course and the tooth brushing behaviors, the post education group is better than the pre education by 20.4% in the good grade, however it is poorer by 21.4% compared to the pre education in the poor grade. This indicates that the tooth brushing behavior is the same whether they received OH education or not according to the controlled criteria of toothbrush used in this study. These previous results were in agreement with the findings of other authors, who reported no effects of study year on oral health attitudes and behavior (Sharda and Shetty, 2010). On the contrary, it was found that the degree of dental education was related to oral health attitudes and behaviors. Better health attitudes and behaviors were recorded by the students as they progressed in their studies and education. This corresponds with the consequences of previous studies that showed the relationships between the level of education and Hisroshima University Dental Behaviour Inventory (HU-DBI) scores (Neeraja *et al.,* 2011; Peker and Alkurt, 2009; Halawany *et al.,* 2015). This could be due to the better education and exposure of students to more knowledge regarding oral health and preventive dentistry as they progressed in their studies. The present work demonstrated differences in toothbrush behavior between genders. Female are 9% more excellent in their brushing attitudes compared to male, and are 10% more in the good grade compared to males However, these differences are not statistically significant enough with p-value = 0.120. These previous findings could be excused on the basis that females usually care more about their physical structure and visual aspect. These results concur in general with the results of other autheros (Kassak *et al.,* 2001; Al-Ansari and Honkala, 2007), they found female dental students had better oral health attitudes and took better care of their teeth than their male colleagues. A survey conducted among new undergraduate students in Lebanon demonstrated that females brushed their teeth 4 times as often as males (Al-Ansari and Honkala, 2007). In a study in Kuwait, female students reported twice-a-day tooth brushing much more often than did male students, and use of fluoride toothpaste more often than males. Oral health knowledge in that work was also significantly higher among the female students than among the male students (Tubaishat *et al.,* 2005). Since males and females have different physiological and psychological behavior, it is possible that their oral health behavior might be different as well. Researchers have found that females participate in better oral hygiene behaviors, have a greater interest in oral health and perceive their own oral health to be better than do males (Khami *et al.,* 2007). In the present study, 22.74% (68 students of 299) use miswak only for teeth cleaning indicate the low prevalence of using miswak among the dental students. Based upon of the OH education level as well as gender, the majority of the students, particularly the post educated OH group of female students was not using miswak for teeth cleaning. It had been found that, there was a significant relationship between using miswak and OH education and the results shows that miswak is less likely to be used when students received their OH education courses. It implies that they are not believed in miswak as being the only

tool for teeth cleaning, or perhaps in that respect is an insufficient scientific knowledge about the importance of using miswak and its effects for teeth cleaning in the oral hygiene course. In this study, the students at the post education OH course represent the highest number of using toothbrush only for teeth cleaning and this indicates that the toothbrush is the most common favorite tool, while the students at the pre education OH course represent the highest prevalence of using miswak and a toothbrush for teeth cleaning. The dental students that are using only miswak represent the lowest figure among the whole participants. These previous findings were in accord with studies in other countries and found that the Jordanian people's beliefs about miswak and toothbrush use appear to have undergone significant alterations over the past 10 years. Improvement in global communications and western influences may lead some Jordanian people to view miswak as old fashion, i.e. using miswak is an ancient practice and using it to clean teeth is associated with old traditions. The present study demonstrated substantial differences in gender, especially in the female students using toothbrush only for teeth cleaning. In another oral health attitude and behavior study of senior Iranian dental students, female students reported significantly higher frequencies of tooth brushing, use of fluoridated toothpaste and flossing compared with their male colleagues (Tseveenjav *et al.,* 2002). This corresponds with our solutions. In a sample of 375 dental students at the Jordan University of Science and Technology, female students reported brushing their teeth more frequently than did male students. Roughly 47% of the male students brushed their teeth less than twice daily compared with 21% of the female students. Also, female students believed in the necessity of using toothpaste during brushing more often than did male students (Al-Omari and Hamasha 2005). In contrast, other studies of the oral health behavior of senior dental students

Ayanbadejo and Sofola, (2005) found no gender differences, likely because of the effect of professional preparation.

4. Conclusions

Dental students had satisfactory tooth brushing behavior, particularly in the final clinical years, nevertheless, this improvement was limited and students should be advanced for more dental health training. Early exposure to dental health education was suggested to improve the dental students. Miswak is an effective and alternative tool for oral hygiene and should be promoted and recommended for use with the toothbrush for teeth cleaning

Conflict of Interest

No conflict of interest to declare

References

Al-Ansari, J.M., and S. Honkala, 2007. Gender differences in oral health knowledge and behavior of the health science college students in Kuwait. Journal of Allied Health, 36(1):41-6.

Al-Omari, Q.D., and A.A. Hamasha, 2005. Gender-specific oral health attitudes and behavior among dental students in Jordan. J Contemp Dent Pract., 1:107-14.

Al-Otibi, M., 2004. The miswak (chewing sticks) and oral health studies on oral hygiene practice on urban Saudi Arabian. Swed. Dent. J. Suppl., 2-75.

Al-Wahadni, A., M.K. AL-Omiri, and M. Kawamura, 2004. Differences in self-reported oral health behavior between dental students and dental technology/dental hygiene students in Jordan. J Oral Sci., 46:191-7.

Attin, T., and E. Hornecker, 2005. Tooth brushing and oral health: how frequently and when should tooth brushing be performed? Oral Health Prev. Dent., 3:135-40.

Ayanbadejo, P.O., and O.O. Sofola, 2005. Primary oral preventive practices: knowledge and practice among College of Medicine University of Lagos students. Niger J Health Biomed Sci., 4:130-3.

Barrieshi-Nusair, K., Q. Al -Omari, and K. Said, 2006. Dental health attitudes and behavior among dental students in Jordan. Community Dent Health, 23:147-51.

Dagli, R.J., S. Tadakamadla, C. Dhanni, P. Duraiswamy, and S. Kulkarni, 2008. Self-reported dental health attitude and behavior of dental students in India. J. Oral Sci., 50:267-72.

Darout, I.A., J.M. Albandar, N. Skaug, and R.W. Ali, 2002. Periodontal status of adult Sudanese habitual users of miswak chewing sticks or toothbrushes. Acta Odontologica Scandinavica, 60(1):25-30.

Ghasemi, H., H. Murtomaa, M.M. Vehkalahti, and H. Torabzadeh, Determinants of oral health behavior among Iranian dentists. Int. Dent. J. 2007;57:237-42.

Halawany, H.S., 2012. A review on miswak (Salvadora persica) and its effect on various aspects of oral health. The Saudi Dental Journal, 24(2):63-9.

Halawany, H.S., N.B. Abraham, V. Jacob, and N.S. AlHussainan, 2015. Oral health behavior and attitudes among dental students in Saudi Arabia. The Saudi Dental Journal, 27(2):83-8.

Haq, I.U., S. Batool, and A. Khan, 2017. Effectiveness of miswak as an oral hygiene tool among Pakistani school children. Journal of Ayub Medical College Abbottabad, 29(2):221-6.

Kassak, K.M., R. Dagher, and B. Doughan, 2001. Oral hygiene and lifestyle correlates among new undergraduate university students in Lebanon. Journal of the American College of Health., 50:15-20.

Kawamura, M., *et al.,* 2001. A cross-cultural comparison of dental health attitudes and behavior among freshman dental students in Japan, Hong-Kong and West China. International Dental Journal, 51:159-63.

Khami, M.R., *et al.,* 2007. Oral health behavior and its determinants amongst Iranian dental students. European Journal of Dental Education., 11:42-7.

Kirtiloglu, T., and U.S. Yavuz, 2006. An assessment of oral self-care in the student population of a Turkish university. Public Health,120:953-7.

Komabayashi, T., M. Kawamura, K.J. Kim, F.A. Wright, D. Declerck, C. Goiâs Mdo, *et al.,* 2006. The hierarchical cluster analysis of oral health attitudes and behaviour using the Hiroshima University-Dental Behavioural Inventory (HU-DBI) among final year dental students in 17 countries. Int. Dent. J., 56:310-6.

Kumar, S., K. Motwani, N. Dale, G. Balasubramanyam, P. Duraiswamy, and S. Kulkarni, 2010. Dental health behavior in relation to caries status among medical and dental undergraduate students of Udaipur district, India. Int. J. Dent. Hyg., 8:86-94.

Neamatollahi, H., and M. Ebrahimi, 2010. Oral health behavior and its determinants in a group of Iranian students. Indian J. Dent. Res., 20:84-8.

Neeraja, R., K.P. Bharath, and A.J. Sharda, 2011. Oral health attitudes and behavior among a group of dental students in Bangalore, India. European Journal of Dentistry, 5(2):163-7.

Nusair, K.B., Q. Alomari, and K. Said, 2006. Dental health attitudes and behavior among dental students in Jordan. Community Dent. Health, 23:147-51.

Peker, I., and M.T. Alkurt, 2009. Oral health attitudes and behavior among a group of Turkish dental students. Eur. J. Dent., 3:24-31.

Petersen, P.E., and H. Ogawa, 2012. The global burden of periodontal disease: towards integration with chronic disease prevention and control. Periodontology 2000., 60(1):15-39.

Rabbani, S., S.K. Sherwani, S. Shaikh, and N. Huda, 2022. Self-reported oral health attitudes and behavior among dental students in Pakistan. BMC Oral Health, 22(1):123.

Rahman, B., S.A. Kawas, and M.A. Hamdan, 2013. Assessing oral health attitudes and behaviors of dental students in the United Arab Emirates. International Journal of Dentistry, 1-6.

Sharda, A.J., and S. Shetty, 2010. Relationship of periodontal status and dental caries status with oral health knowledge, attitude and behavior among professional students in India. International Journal of Oral Science, 2(2):70-8.

Tseveenjav, B., M. Vehkalahti, and H. Murtomaa, 2002. Preventive practice of Mongolian dental students. European Journal of Dental Education, 6(2):74-8.

Tseveenjav, B., M. Vehkalahti, and H. Murtomaa, 2004. Oral health and its determinants among Mongolian dentists. Acta Odontol Scand., 62:1-6.

Tubaishat RS, Darby ML, Bauman DB, Box CE. Use of miswak versus toothbrushes: oral health beliefs and behaviors among a sample of Jordanian adults. Int J Dent Hyg. 2005 Aug;3(3):126-36.

Udoye, C.I, and EN. Aguwa, 2007. Oral health related knowledge and behavior among nursing students at the University of Nigeria Teaching Hospital, Enugu. J. Coll. Med., 12:13-7.

Van der Weijden, G.A., and D.E. Slot, 2015. Oral hygiene in the prevention of periodontal diseases: the evidence. Periodontology 2000, 69(1):135-49.

World Health Organization, 1998. Guidelines for controlling and monitoring the tobacco epidemic. Geneva, Switzerland: WHO.