

## Evaluation of Oral Hygiene Practices, Oral Health Status and Behaviours among Dental Students at Qassim University

Khalid Al-Otaibi\*

Department of Oral and Maxillofacial Surgery, College of Dentistry, Qassim University, Saudi Arabia

### Abstract

**Objectives:** The aim of this study was to compare the differences in self-reported oral health attitudes and behaviour between preclinical and clinical dental students in among Dental Students at Qassim University.

**Method:** A cross-sectional study through survey was carried out in Qassim University dental clinics during the academic year 2020-2021, among dental students of Qassim University, All the 100 participants undergone a self-administered questionnaire survey followed by a dental check-up to access the dental health and oral hygiene status.

**Result:** Caries prevalence revealed mean DMFT 5.99 teeth. The significant differences were found in mean of total DMFT score and its 'Decayed' component. Gingival index score was  $0.72 \pm 0.37$  which indicate good gingival condition. There's a highly statistical significant difference between the male and female students ( $p > 0.001$ ). Plaque index score was  $0.92 \pm 0.33$ , 72% of the students had good oral hygiene. 86% reported they brush at least once a day. There significant difference between male and female students ( $p = 0.001$ ). Flossing was adopted by 59% of students. Female students reported significantly higher frequencies ( $p = 0.005$ )

**Conclusions:** Dental students should have a comprehensive program, including their self-care regimes, starting from their first year of education.

**Keywords:** Oral health; Oral hygiene; Dental care; Dental students

### Introduction

Health behavior as defined by Steptoe and colleagues is 'the activities undertaken by people in order to protect, promote or maintain health and to prevent disease' [1].

The broad categories of factors that may influence individual and community health behavior include: knowledge, beliefs, values, attitudes, skills, finance, materials, time and the influence of family members, friends, co-workers, opinion leaders and even health workers themselves [2]. Oral health is an integral part of general health. It is defined as a standard of health of oral and related tissues which enable an individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contribute to general well-being". Poor oral health can have adverse effects on general health [3]. Oral health habits are measures of people learn and practice regularly in order to maintain good oral health or prevent oral diseases. Periodontal diseases and dental caries are the two most common oral diseases affecting mankind since the dawn of civilization [4]. Periodontal diseases can be defined as a wide spectrum of diseases that affect the gum and the surrounding structures of the teeth. Plaque induced gingivitis is the most common of these diseases, and is prevalent in all age groups. Gingivitis presents with clinical signs of inflammation (swelling, reddening and easy bleeding upon probing) that are confined to the gums, and is not associated with periodontal attachment loss [5, 6]. Mechanical methods of plaque control such as the use of toothbrush and dental floss, when applied effectively can promote oral health and decrease the incidence of dental caries and gingival inflammation [7, 8]. Attitudes towards oral health determine the condition of the oral cavity. In addition, the behavior of oral health providers and their attitudes towards oral health could affect their capacity to deliver oral health care and thus might affect the oral health of their patients [9]. Comprehensive programs in preventive care, including oral self-care regimens, should be an essential part of undergraduate dental education [10]. Professional education of dental students should create stable health behaviours that will overcome differences in personal characteristics [11].

By virtue of their profession, dentists play a pivotal role in health promotion and dissemination of preventive information among their patients, family and society. It is therefore important that their own health knowledge is good and their oral health behavior conforms to the expectation of the population [12]. Similarly, dental students have an important role in oral health promotion either during their studying/practicing or when they graduate and start working so they are expected to be role models to their patients.

Students studying dentistry are generally expected to have good oral health. There is evidence to suggest that the oral health knowledge and behavior of dental students varied in the clinical and pre-clinical years of dental education [13]. Moreover, the oral health attitudes and behavior of dental students vary in different countries and cultures [14, 15].

One of the general objectives of teaching dentistry is to train experts whose principal task is to motivate patients to adopt good oral hygiene practices. They are more likely to be able to do this if they themselves are motivated [16].

Cortes observed that dental students in general have been found to be motivated about maintaining a good oral health attitude [17].

**\*Corresponding author:** Khalid Al-otaibi, Department of Oral and Maxillofacial Surgery, College of Dentistry, Qassim University, Saudi Arabia, E-mail: Kh.Alotaibi@qu.edu.sa

**Received:** 19-Nov-2022, Manuscript No: JOHH-22-80431, **Editor assigned:** 21-Nov-2022, PreQC No: JOHH-22-80431(PQ), **Reviewed:** 05-Dec-2022, QC No: JOHH-22-80431, **Revised:** 10-Dec-2022, Manuscript No: JOHH-22-80431(R), **Published:** 17-Dec-2022, DOI: 10.4172/2332-0702.1000349

**Citation:** Al-Otaibi K (2022) Evaluation of Oral Hygiene Practices, Oral Health Status and Behaviours among Dental Students at Qassim University. J Oral Hyg Health 10: 349.

**Copyright:** © 2022 Al-Otaibi K. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Considerable differences were found in dental health attitudes and behaviours among students from different countries, cultural groups and courses [18, 19, 20].

There are very few reports on the behaviours and attitudes of dental students toward oral health in Saudi Arabia, as only two reports were published for dental students of Riyadh colleges of dentistry and pharmacy [21], and Jazan University [22]. On the other hand, no previous studies were conducted to measure the oral health status of dental students either in Qassim or in Saudi Arabia as a whole. The present study was conducted to measure the oral status of dental students in Qassim University and evaluate their practices and behaviours related to oral hygiene.

## Materials and Methods

### Study Design

A cross-sectional study through survey was carried out in Qassim University dental clinics during the academic year 2020-2021, among dental students of Qassim University. This study has been approved by the Dental Research Center of Qassim University with the approval number #32/2013.

The target population comprised of one hundred dental students of undergraduate program (BDS) of Qassim University. 20 students has been randomly selected from each academic year (1st–5th) in both males and females sections. Only those agreeing to participate in the study were considered. General purpose and organization of the study has been clarified to all participants.

All the participants undergone a self-administered questionnaire survey followed by a dental check-up to access the dental health and oral hygiene status.

All the students present on the days of the survey were considered for inclusion and the questionnaires that were unfilled or partly filled constituted the exclusion criteria. However, none of the questionnaires were incomplete.

### Clinical Examination

Examination was carried out by 2 examiners; one for males and the other one for females. The examiners were calibrated under supervision of faculty members from College of Dentistry, Qassim University.

Each student has been received an examination for dental, plaque and gingival health. The examination was performed using proper light, mouth mirror and explorer, additionally; calibrated periodontal probe (Williams' probe) for the Examination of the periodontium.

**DMFT:** Dental caries experience of the subjects was recorded by counting the number of teeth that were decayed (D), missing due to caries (M), and filled (F) for calculation of the DMFT score according to criteria proposes by World Health Organization. Dental caries was detected visually at the frank cavitation level and early caries was not recorded [23].

**Plaque index:** Plaque index was recorded according to the criteria given by Loe and Silness. The examination was done using mouth mirror and William probe to examine 4 surfaces (Mesial, distal, buccal and lingual) giving the score from 0-3 [24]. The score was recorded from six index teeth [12, 16, 24, 36, 32 and 44].

The score criteria as following:

- 0 = No plaque

- 1 = A film of plaque adhering to the free gingival margin and adjacent area of the tooth, which can't be seen with the naked eye. But only by using disclosing solution or by using probe.

- 2 = Moderate accumulation of deposits within the gingival pocket, on the gingival margin and/ or adjacent tooth surface, which can be seen with the naked eye.

- 3 = Abundance of soft matter within the gingival pocket and/ or on the tooth and gingival margin.

**Gingival index:** Gingival index was recorded according to the criteria given by Loe and Silness. The examination was done using mouth mirror and William probe to examine 4 surfaces (Mesial, distal, buccal and lingual) giving the score from 0-3 [25]. The score was recorded from six index teeth [12, 16, 24, 36, 32 and 44].

The score criteria as following:

- 0 = No inflammation.

- 1 = Mild inflammation, slight change in color, slight edema, no bleeding on probing.

- 2 = Moderate inflammation, moderate glazing, redness, bleeding on probing.

- 3 = Severe inflammation, marked redness and hypertrophy, ulceration, tendency to spontaneous bleeding.

### Questionnaire

A structured, self-administered and close-ended questionnaire was designed and distributed after the clinical examination.

The questionnaire consisted of the following:

- Demographic data:

Academic level

Gender

- Questions related to behaviours and practices:

Smoking status

Teeth brushing frequency, times and duration

Brushing techniques and movements

Toothbrush "types bristle type and frequency of changing it"

Toothpaste fluoridation and the amount applied on toothbrush

Secondary methods used to clean teeth "mouth rinses, toothpick, Miswak, interdental brush, water irrigation device"

Frequency of using of dental floss

Tongue brushing

Time since last dental visit and the purpose of it

Check-up and oral prophylaxis frequency

### Statistical analysis

The mean and standard deviation were calculated. t-test and Chi-square test was used to compare overall differences between groups using SPSS v.21.0 software.

Differences were considered statistically significant for  $p < 0.05$ .

## Results

Results were grouped into two categories of:

- Clinical Examination (caries prevalence, oral hygiene and gingival health).
- Questionnaire (oral health behaviours and practices).

### Clinical examination

**Caries prevalence:** Table 1 shows the mean DMFT index of the study population. It revealed a mean DMFT 5.99 tooth with F 'Filled' component had the greatest value, which the mean of 'decayed' component was 2.37 teeth, the mean of 'missing' component was 0.26, and the mean of 'filled' one was 3.36 teeth. Within each student sample, there were statistical significant differences between students of both genders in mean of total DMFT score ( $p=0.011$ ) and its 'Decayed' component ( $p=0.038$ ).

**Gingival health:** The clinical examination revealed that the overall mean gingival index was found to be  $0.72 \pm 0.37$ . There's a highly statistical significant difference between the male and female students ( $p > 0.001$ ), which the score was significantly greater among the male students.

The difference between the academic year and the gingival condition wasn't statistically significant (Figure 1).

**Oral hygiene:** The mean plaque index of the students was  $0.92 \pm 0.33$  which majority (72%) had good oral hygiene, and 28% had fair oral hygiene. The differences among academic years as well as between both genders weren't statistically significant.

### Questionnaire

**Oral health behaviours:** The rate of smoking, one of the risk factors for periodontal disease, was (18%) of male students and absent

Table 1: The mean DMFT index of the study population.

	Mean $\pm$ SD		Independent Sample t-test	p-value
	Male	Female		
DMFT index	4.88 $\pm$ 4.104	7.10 $\pm$ 4.482	-2.583	0.011*
Decayed	1.80 $\pm$ 2.268	2.94 $\pm$ 3.080	-2.108	0.038*
Missing	0.28 $\pm$ 0.73	0.24 $\pm$ 0.744	-0.271	0.787
Filled	2.80 $\pm$ 3.464	3.92 $\pm$ 3.51	-1.606	0.112

\*: Significant at  $p < 0.05$

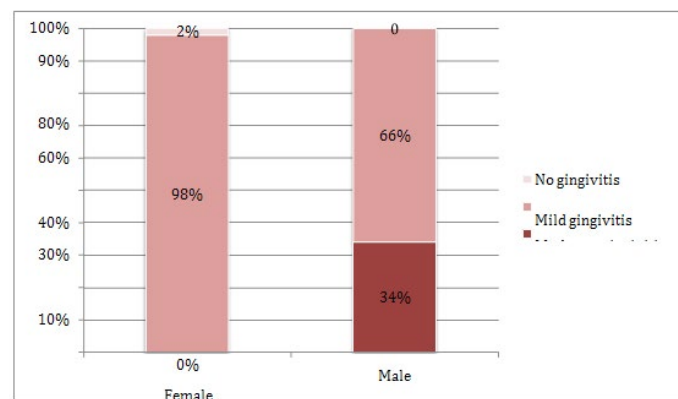


Figure 1: A statistically significant difference of gingival index between male and female students.

in females. The difference in smoking habit between male and female students was statistically significant ( $p=0.003$ , fisher's exact test).

A toothbrush with toothpaste is the most common oral hygiene tool used by dental students for cleaning their teeth, which was adopted by (98%) of the students while only (2%) never brush their teeth.

67% of students were brushing two times or more daily, (19%) brushing once a day while (12%) claimed to not brushing their teeth on a daily basis. There was significant statistical difference in teeth brushing habits between the male and female students ( $p=0.001$ ).

Half of the students (50%) spent 1-2 min. in teeth brushing (Figure 2).

88% reported that they applied the toothpaste on half or less than half of the toothbrush. Similarly, a statistically significant difference ( $p=0.030$ ) was found among different academic years regarding the amount of toothpaste that applied on the toothbrush (Table 2).

Majority of the students (89%) reported that they used the manual toothbrush only, 4% used electric toothbrush, and 7% used them both. 51% used medium toothbrush bristles, 46% used soft toothbrush bristles. There was significant statistical difference between the male and female students ( $p=0.007$ ) regarding the bristle type they were using (Table 3).

Regarding brushing techniques the students were using to brush their teeth; it was found that 40% reported that they don't know what the technique they are using is. While 37% of the students were using Modified Bass technique with highly statistical significance the difference in the used brushing techniques among the academic years ( $p < 0.001$ ). On the other hand, it was statistically not significance between both genders (Figure 3).

Regarding changing toothbrush, 52% reported that they replaced their toothbrush within 3 months, while 48% replaced it in over 3 months with no statistically significant difference between males and females.

Table 2: The amount of toothpaste that applied on the toothbrush.

		Year				
		1st year	2nd year	3rd year	4th year	5th year
Toothpaste amount	less than half	4	6	13	10	12
	half	10	12	6	9	6
	more than half	6	2	1	1	2

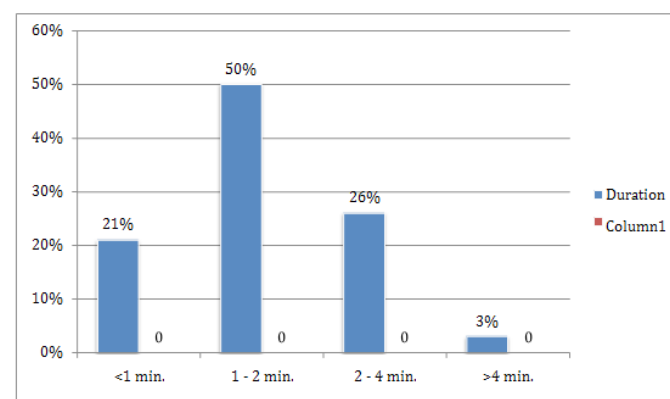
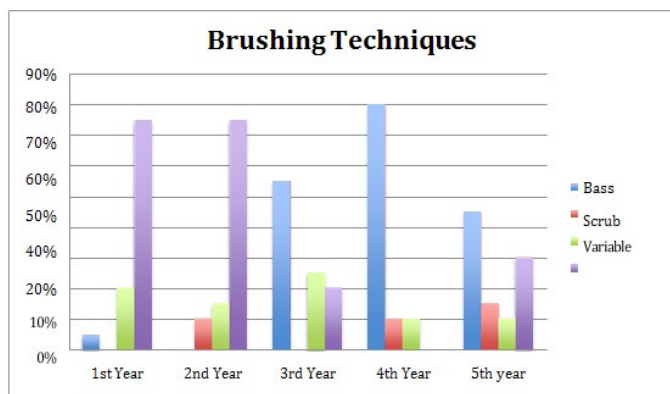


Figure 2: Significant statistical difference in teeth brushing habits between the male and female students.

**Table 3:** Significant statistical difference between the bristle types used by the male and female students.

	Gender		Total	p-value
	Male	Female		
<b>Brushing Duration</b>				
<1 min.	9 (18%)	12 (24%)	21 (21%)	0.481
1-2 min.	23 (46%)	27 (54%)	50 (50%)	
2-4 min.	16 (32%)	10 (20%)	26	
>4 min.	2 (4%)	1 (2%)	3	
<b>Movements</b>				
Vertical Horizontal	17 (34%)	20 (40%)	37 (37%)	0.394
	7 (14%)	3 (6%)	10 (%)	
Combined	26 (52%)	27 (54%)	53	
<b>Techniques</b>				
Bass	16 (32%)	21 (42%)	37	0.051
Scrub	7 (14%)	0 (0%)	7	
Variables	8 (16%)	8 (16%)	8	
Don't know	19 (38%)	21 (42%)	40	
<b>Brush Type</b>				
Manual Electric	42 (84%)	47 (94%)	89 (%)	0.109
	4 (8%)	0 (0%)	4 (%)	
Both	4 (8%)	3 (6%)	7 (%)	
<b>Brush bristles</b>				
Soft Medium	15	31	46	0.007 *
	33	18	51	
Hard	1	1	2	
<b>Changing toothbrush</b>				
<3 months	12	6	18	0.423
3 months	15	19	34	
3-6 months	17	20	37	
>6 months	6	5	11	
<b>Toothpaste</b>				
Fluoridated				
Yes	39	41	80	0.613
No	7	4	11	
don't know	4	5	9	
<b>Amount on toothbrush</b>				
less than half	20	25	45	0.167
more than half	21	22	43	

\* Significant at (p<0.05)



**Figure 3:** Brushing techniques.

Majority of the students (80%) chose fluoride toothpaste, and 20% reported that they are uncertain about type of toothpaste they are using. There was significant statistical difference among the academic years

regarding use of fluoridated toothpaste (p = 0.033), which it increased in final years. While male and female students showed no statistically significant difference.

Most of the students (78%) used one or more means complementary to brushing, Mouthwash (32%), toothpick (29%), Miswak (28%) interdental brush (17%), water irrigation device (4%), and others (4%). There was significant statistical difference between male and female students regarding use of Miswak (p=0.008) as well as using of water irrigation device (p = 0.04) (Figure 4).

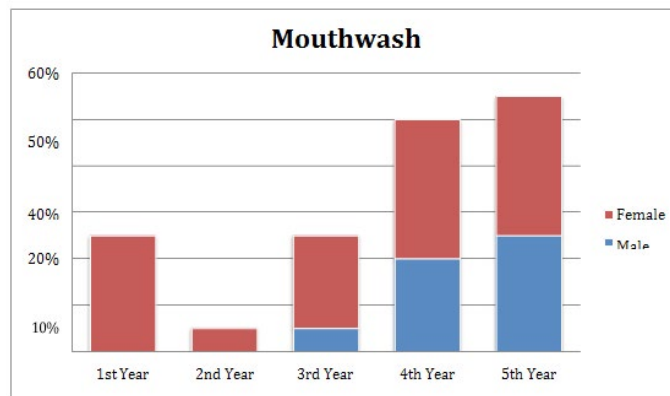
Regarding the using of mouthwash, both gender and academic years showed statistical significant (p=0.01, 0.004 respectively).

Flossing, as mostly used preventive method, was adopted by more than half of the students (59%), 32% reported that they flossed at least once a day. Female students reported significantly higher frequencies (p=0.005) compared with male students. And the difference among the academic years was not statistically significant (Figure 5).

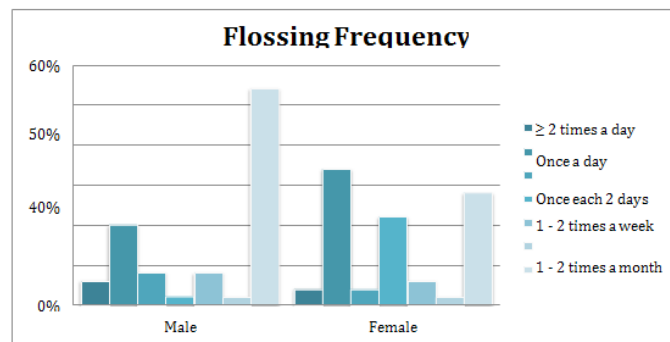
Regarding tongue brushing habit, 25% reported that they clean their tongues regularly, 25% occasionally, 29% rarely, and 21% were not brushing their tongues at all. There was a statistically significant difference among the academic years (p=0.048). And the difference between male and female students was not statistically significant.

For students' dental visit behaviours, most of the students (74%) visited the dentist during the last year, while 21% reported that their last visit was in more than year ago, and only 5% of the students have never visited a dentist. There was significant statistical difference between male and female students (p=0.01).

More than half of the students (58%) visited the dentist to seek treatment/because they felt pain, while 24% visited the dentist for



**Figure 4:** Mouthwash techniques between male and female students.



**Figure 5:** Flossing frequency.



preventive purpose and examination, and 16% reported that they were going for regular check-up. The difference was statistically significant among the academic years ( $p=0.006$ ).

In the asking about check-up behaviour (For check-up frequency), 38% of the students reported that they are going only in problem, 22% every year, 19% each 6 months, and 14% have not gone before.

Regarding going to the dentist for prophylaxis purpose, 40% of the students reported that they are going in one year or more, 38% never gone before, and 22% in 6 months or less. There was significant statistical difference among the academic years students regarding check-up frequency ( $p=0.000$ ) and prophylaxis (0.006).  $\geq$  and the differences between male and female students were not statistically significant in both check-up and prophylaxis behaviours.

## Discussion

Informing the patients about the correct oral habits and raising their awareness on how to prevent oral diseases are important accountabilities of oral health providers. Since dental students are future of dental health professional, they must adopt accurate oral health attitudes and behaviour in their school years for directing their patients properly.

The health care professionals working in King Fahd Medical City KFMC come across a number of patients in their routine practices. With proper knowledge and oral health behavior, they can play an important role in the oral health education of individuals and groups and act as role models for patients, friends, families and the community at large. Before health professionals are trained as oral health educators, there is a need to determine the status of their own oral health knowledge and behaviours. Moreover, there were no reported studies on oral health knowledge, attitude and behaviours of health professionals working in the medical cities of Saudi Arabia [26]. Our present study was conducted to measure the oral status of dental students in Qassim University and evaluate their practices and behaviours related to oral hygiene.

In the current study, the clinical examination revealed that there is significant difference between students of both genders in the mean DMFT index and its components of decayed, missing and filled teeth. However, the higher 'filled' statistic can be viewed as a positive aspect indicative of their better access to dental care (Table 1).

Also a statistically significant difference was found in mean gingival index between male and female students which the score was significantly greater among the male students (Figure 1). The mean plaque index of the students was  $0.92 \pm 0.33$  which majority (72%) had good oral hygiene, and 28% had fair oral hygiene. The differences among academic years as well as between both genders weren't statistically significant.

The frequency of twice daily brushing among dental students in present study is low 67% compared to their counterparts in Mongolia 81% [27], France 78% [28], and Australia 80% [29], while over 80% of the students use fluoridated toothpastes higher than what is observed in Mongolia [27] and Iran [30].

Regarding reports of oral self-habits, it was found differences between male and female including; tooth brushing, the use of fluoridated toothpaste and flossing, were highly significant. This finding is in line with results from previous studies of lay people [31, 32] and dental students at all stages of their education [33, 34].

Smoking affects whole oral and systemic health. Dentists are important role models for their patients, and those using tobacco probably are less likely to counsel their patients to quit. In the present study, the rate of smoking was 18% only from male student. The prevalence of smoking in this study was in accordance with studies on Turkish dental students where low number of dental students included 22% [35]. However, the present smoking rate was lower than dental students in Greece 47%, Serbia 43%, Hungary 34%, France 33% and Italy %33 which has been conducted from an international review of tobacco smoking among dental students in 19 countries [36, 37].

In accordance with the study from College of Dentistry, University of Dammam More preclinical than clinical students did not worry about visiting the dentist, but more preclinical than clinical students delayed dental visits until they experienced toothache [38] Similarly to the present study However, a study from India showed no significant differences between preclinical and clinical dental students [39].

Howat reported that students' oral hygiene improves from the preclinical to clinical years of study [40]. In this study, clinical students had better oral health attitudes than preclinical students. This difference is probably due to clinical students' greater levels of dental education and clinical experience.

The results of this study characterize the oral health attitudes and behaviours of dental students from Qassim, KSA. Similar studies of dental students from other regions

## Conclusion

Qassim University dental students reported good oral hygiene and attitudes to oral health behavior. Furthermore, The oral health attitudes and behavior of dental students improved with increasing level of education. Results of this study highlight considerable differences in the oral health attitudes of clinical and preclinical dental students. Clinical students demonstrated better attitudes thus dental health awareness programs and education in positive oral health attitudes should be implemented in the early stage of dental training.

## Recommendations

Dental student's background variables such as gender and study level inform differences in their oral health status and preventive dental care. Future researches should help identify how and why such background variables are significant determinants of oral health behaviour in dental students despite their professional training.

## Acknowledgement

The authors would like to acknowledge all the participants for their co-operation.

## References

1. Steptoe A, Wardle J, Vinck J, Tuomisto M, Holte A, et al. (1994) Personality and attitudinal correlates of healthy and unhealthy lifestyles in young adults. *Psychology and Health* 9: 331-343.
2. K Park (2011) Park's Textbook of Preventive and Social Medicine. 21st Edition, M/s Banarsidas Bhanot Publishers.
3. Carneiro L, Kabulwa M, Makyao M, Mrosso G, Choum R (2011) Oral health knowledge and practices of secondary school students, tanga, Tanzania. *Int J Dent* 806258.
4. Vaish S, Ahuja S, Dodwad V (2010) A comparative evaluation of oral hygiene practices and periodontal status among dental and paramedical students: an epidemiological survey. *Journal of Indian Dental Association* 4: 343-346
5. Mariotti A (1999) Dental plaque-induced gingival diseases. *Ann Periodontol* 4: 7-19.

6. Jenkins WMM, Papapanou PN (2000) Epidemiology of periodontal disease in children and adolescents. *Periodontol* 26: 16-32.
7. Bardal PA, Olympio KP, Bastos MR, Henriques FC, Buzalaf RA (2011) Education and motivation in oral health: Preventing disease and promoting health in patients undergoing orthodontic treatment. *Dental Press J Orthod* 16: 95-102.
8. Choo A, Delac DM, Messer LB (2001) Oral hygiene measures and promotion: Review and considerations. *Aust Dent J* 46: 166-173.
9. Neeraja R, Kayalvizhi G, Sangeetha P (2011) Oral Health Attitudes and Behavior among a Group of Dental Students in Bangalore, India. *Eur J Dent* 5: 163-167.
10. Kawamura M, Yip HK, Hu DY, Komabayashi T (2001) A cross-cultural comparison of dental health attitudes and behavior among freshman dental students in Japan, Hong Kong and West China. *Int Dent J* 51: 159-163.
11. Tseveenjav B, Vehkalahti M, Murtomaa H (2002) Preventive practice of Mongolian dental students. *Eur J Dent Educ* 6:74-78.
12. Singh MS, Tuli AK (2013) A comparative evaluation of oral hygiene practices, oral health status, and behavior between graduate and post-graduate dentists of North India: An epidemiological survey. *J Int Soc Pren Community Dent* 3: 19-24.
13. Polychronopoulou A, Kawamura M, Athanasouli T (2002) Oral self-care behavior among dental school students in Greece. *J Oral Sci* 44: 73-78.
14. Kawamura M, Honkala E, Widström E, Kobayashi T (2000) Cross-cultural differences of self-reported oral health behavior in Japanese and Finnish dental students. *Int Dent J* 50: 46-50.
15. Kawamura M, Yip HK, Hu DY, Kobayashi T (2001) A cross-cultural comparison of oral attitudes and behavior among freshman dental students in Japan, Hong Kong and West China. *Int Dent J* 51:159-163.
16. Maaatouk F, Maatouk W, Ghedira H, Ben Mimoun S (2006) Effect of 5 years of dental studies on the oral health of Tunisian dental student. *Eastern Mediterr Health J* 12: 625-631.
17. Cortes FJ, Nevot C, Ramon JM, Cuenca E (2002) The evolution of oral attitude in dental students at the University of Barcelona. *J Dent Educ* 66: 1203-1208.
18. Kawamura M, Honkala E, Widström E, Komabayashi T (2000a) Cross-cultural differences of self-reported oral health behavior in Japanese and Finnish dental students. *Int Dent J* 50: 46-50.
19. Komabayashi T, Kawamura M, Kim KJ, Wright FA, Declerck D, 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: 310-316.
20. Tadakamadla SK, Kriplani D, Shah V, Tadakamadla J, Tibdewal H, et al. (2010) Oral health attitudes and behaviour as predisposing factor for dental caries experience among health professional and other professional college students of India. *Oral Health Prev Dent* 8: 195-202.
21. Baseer MA, Rahman G (2014) Oral health attitudes and behavior among a group of female Saudi dental students. *Saudi J Oral Sci* 1: 25-29.
22. Kumar S, Busaly IA, Tadakamadla J, Tobaigy F (2012) Attitudes of dental and pharmacy students to oral health behaviour at Jazan University Kingdom of Saudi Arabia. *Arch Orofac Sci* 7: 9-13.
23. WHO (1997) Oral health surveys: basic methods. World Health Organization Geneva.
24. Loe H, Silness J (1963) Periodontal disease in pregnancy. I. Prevalence and severity. *Acta Odontol Scand* 21:533-551.
25. Silness J, Loe H (1964) Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. *Acta Odontol Scand* 22: 121-135.
26. Mohammad AB, Mohammad SA, Mohammad A, Mansoor A, Aleemullah M (2012) Oral health knowledge, attitude and practices among health professionals in King Fahad Medical City, Riyadh. *Dent Res J (Isfahan)* 9: 386-392.
27. Tseveenjav B, Vehkalahti M, Murtomaa H (2004) Oral health and its determinants among Mongolian dentists. *Acta Odontol Scand* 62: 1-6.
28. Cavaillon J-P, Conge M, Mirisch D, Nemeth T, Sitbon J-M (1982) Longitudinal study on oral health of dental students at Paris VII University. *Community Dent Oral Epidemiol* 10: 137-143.
29. Messer LB, Calache H (2012) Oral health attitudes and behaviours of final-year dental students. *Eur J Dent Educ* 6: 144-155.
30. Khami MR, Virtanen JI, Jafarian M, Murtomaa H (2007) Oral health behavior and its determinants amongst Iranian dental students. *Eur J Dent Educ* 11: 42-47.
31. Tada A, Hanada N (2004) Sexual differences in oral health behaviour and factors associated with oral health behavior in Japanese young adults. *Public Health* 118: 104-109.
32. Ostberg AL, Halling A, Lindblad U (1999) Gender differences in knowledge, attitude, behavior and perceived oral health among adolescents. *Acta Odontol Scand* 57: 231-236.
33. Almas K, Al-Hawish A, Al-Khamis W (2003) Oral hygiene practices, smoking habit, and self-perceived oral malodor among dental students. *J Contemp Dent Pract* 15: 77-90.
34. Al-Omari QD, Hamasha AA (2005) Gender-specific oral health attitudes and behavior among dental students in Jordan. *J Contemp Dent Pract* 6: 107-114.
35. Peker I, Alkurt MT (2009) Oral health attitudes and behavior among a group of Turkish dental students. *Eur J Dent* 3: 24-31.
36. CDC (2005) Tobacco use and cessation counseling-global health professionals survey pilot study, 10 countries, 2005. *MMWR Morb Mortal Wkly Rep* 54: 505-509.
37. Smith DR, Leggat PA (2007) An international review of tobacco smoking among dental students in 19 countries. *Int Dent J* 57: 452-458.
38. Alam Moheet I, Farooq I (2013) Self-reported differences between oral health attitudes of pre-clinical and clinical students at a dental teaching institute in Saudi Arabia. *The Saudi Dental Journal*.
39. Dagli RJ, Tadakamadla S, Dhanni C, Duraiswamy P, Kulkarni S (2008) Self-reported dental health attitude and behavior of dental students in India. *J Oral Sci* 50: 267-272.
40. Howat A, Trabelsi I, Bradnock G (1979) Oral hygiene levels and behaviour in pre-clinical and final year dental students. *J Clin Periodontol* 6: 177-185.