

## Self-Reported Oral Health Attitudes and Behavior of Dental and Medical students, Yemen

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### Abstract

**Objectives:** To assess self-reported oral health attitudes and behavior among undergraduate dental and medical students, and to analyze the variations in oral health attitudes based on gender, level of education, study discipline, academic average, and type of university.

**Methods:** A self-administered questionnaire based on the Hiroshima University-Dental Behavioural Inventory (HU-DBI) was distributed to 1269 undergraduate dental and medical students at two universities (one public and one private) in Sana'a, Yemen.

**Results:** Overall, the mean questionnaire score for the total sample was markedly low ( $4.91 \pm 1.58$ ), with no significant difference between dental and medical students ( $P > 0.05$ ). Females had better oral health attitudes and behavior, especially towards visiting the dentist, tooth-brushing habits and oral hygiene practices ( $P < 0.05$ ). Students attending the public university had better oral health attitudes and behaviors than those attending the private university ( $P = 0.049$ ). On the other hand, no significant associations were observed between students' oral health attitudes/behavior and level of education and academic performance ( $P > 0.05$ ).

**Conclusion:** Yemeni dental and medical students have shown markedly poor oral health attitude and behavior. Further studies are required to reveal possible shortcoming in these schools' education process. Dental and medical curricula should emphasize the importance of proper oral hygiene, and further participation of medical and dental students in oral hygiene seminars is highly encouraged.

**Keywords:** attitudes, behavior, dental students, oral health

### 1. Introduction

Attitude is a mirror of individuals' beliefs, experiences, perception of the cultures, and social interactions. It is also considered an essential prerequisite for health related behaviors. Basically, positive health attitude means positive health behavior. This also applies to a great extent to oral health attitude and is of paramount importance when it relates to oral health professionals (Park, 2005). Previous studies have found that the behavior of oral health providers and their attitudes towards their own oral health reflect their understanding of the importance and priority of preventive dental procedures and improving the oral health of their patients (Al-Wahadni, Al-Omiri, & Kawamura, 2004; Okoh & Enabulele, 2014).

In line with that, dental and medical students, the future professionals, who will specialize in treatment of diseases as well as in preventive services, should have a good oral health knowledge and attitude and endorse to the expert recommendations. In their daily practices, these students examine a huge number of patients of different age groups and diverse backgrounds. Therefore, with appropriate oral health knowledge and behavior, they can act as role models for these patients and play a positive role in improving oral health condition of the general population.

In this context, many previous studies have revealed that dental students have better attitude towards oral health than students in other disciplines (Al-Wahadni et al., 2004, Santosh, Idris, Jyothi, & Faisal, 2012; Jaramillo et al., 2013; Pacauskiene, Smaliene, Siudikienė, Savanevskyte, & Nedzelskiene, 2014). This finding is expected and is probably attributed to the fact that dental students have always been exposed to many academic subjects that reinforce their knowledge and behavior toward oral health. The surprising finding, however, is the reported differences in dental students' attitude toward oral health by countries, cultures and years of study (Komabayashi et al., 2006; Kumar et al., 2010; Al-Omiri et al., 2012; Ahamed et al., 2015).

In developing countries like Yemen, where the prevalence of dental caries and periodontal diseases is still a public health issue (Al-Maweri & Zimmer, 2015; Dhaifullah et al., 2015), the role of dental and medical students in increasing the level of awareness of the community towards oral health is crucial. Regrettably, a previous study in Yemen revealed unsatisfactory oral health condition and behavior among university students including dental and medical students (Halboub, Dhaifullah, & Yasin, 2013). Moreover, data concerning self-reported oral health attitude and behavior of dental and medical students in Yemen is lacking. Therefore, the objectives of this study were to assess the self-reported oral health attitude and behavior of Yemeni dental and medical students using Hiroshima University Dental Behavioral Inventory (HU-DBI), and to investigate the influence of various factors such as gender, level of education, field of study and academic achievement on students' oral health attitude and behavior.

## 2. Methods

This study, conducted in January and February 2015, consisted of a cross-sectional survey of dental and medical students attending two well-known universities, one public (Sana'a University) and one private (University of Science and Technology), in Sana'a city, Yemen. All dental and medical students (1st-5th year) enrolled during the 2014-2015 academic year were eligible to participate. Participation was voluntary, and participants were informed that their responses would be anonymous and treated confidentially. The study was approved by the Research and Ethics Committee, Faculty of Medicine and Health Sciences, University of Science and Technology (UST).

We used a bilingual (Arabic and English) format of Hiroshima University-Dental Behavioral Inventory (HU-DBI) that was developed by Kawamura, and consists of 20 items in a dichotomous (agree/disagree) responses (Table 1). Additionally, information pertaining to the type of university, age, gender, level of education, the academic average and oral habits like khat chewing were collected from each participant. The questionnaire was delivered to all students during routine lectures. The evaluation of the oral health attitude and behavior of students is provided by calculating the scores of 12 items. Higher scores indicate better oral health attitude and behavior.

Data were coded, computerized and analyzed by IBM SPSS program for Windows, Version 21.0. (Armonk, NY: IBM Corp). "Agree" and "disagree" responses were presented as percentages and tested for association with different grouping factors by chi-square test. Calculation of a total score was based on 12 items only. Each correct answer was given one point while each incorrect answer was given zero. So "agree" responses for items 4, 10, 11, 12, 16, and 19 were given one point each. "Disagree" responses for items 2, 6, 8, 9, 14 and 15 were given one point each. Hence the total score of oral health attitude and behavior was out of 12 for each student. The scores, for the whole sample and by different grouping factors, were presented as means with their corresponding standard deviations, and checked for normal distribution by Kolmogorov-Smirnov test. Differences in score means were tested by independent t-test. A P value of <0.05 was considered significant.

Table 1. Items of the HU-DBI questionnaire

Items	Description	Response
Item 1	I do not worry much about visiting the dentist	
Item 2	I do not worry if my gums bleed during brushing	D
Item 3	I worry about the color of the teeth	
Item 4	I am concerned about sticky deposits on my teeth	A
Item 5	Using of child- sized tooth brush is improper	
Item 6	I think that I cannot help having false teeth when I am old	D
Item 7	I am bothered by the color of my gums	
Item 8	I am worried that my teeth are getting worse despite my daily brushing	D

Item 9	Spending much time on brushing will damage the tooth structure	D
Item 10	It is necessary to teach the correct brushing procedure	A
Item 11	I think I can clean my teeth well without using toothpaste	A
Item 12	I often check my teeth in a mirror after brushing	A
Item 13	I am bothered having bad breath	
Item 14	It is impossible to prevent gum disease with tooth brushing alone	D
Item 15	It is not necessary to visit a dentist until I get a toothache	D
Item 16	Use of tooth brush with hard bristles will damage the gums	
Item 17	Brushing of teeth with strong strokes is not ideal	
Item 18	I feel sometimes I take too much time to brush my teeth	A
Item 19	Brushing the teeth more than once is ideal	
Item 20	I have used a dye to see how clean my teeth are	A

D: disagree is the correct response  
A: agree is the correct response

### 3. Results

From a total of 1269 students to whom questionnaires were distributed, 1029 (80.1%) completed and returned their questionnaires. The mean age of the participants was 21.6±1.67 years (range: 17-29). More than one half of the sample (55.5%) were females, dental students (57.6%), had an academic achievement less than or equal to 80% (55.1%), and were in preclinical levels (55.2%; Table 2).

Table 2. Characteristics of the study sample by different factors

Factor	Categories	University		Subtotal A n (%)	Total B N (%)
		Sana'a n (%)	UST n (%)		
Gender	Males	144 (30)	341 (70)	485 (44.5)	1029 (100)
	Females	279 (49)	292 (51)	571 (55.5)	
College	Dental	268 (45.2)	325 (54.8)	593 (57.6)	1029 (100)
	Medical	155 (35.6)	281 (64.4)	436 (42.4)	
Academic average	≤80	185 (32.6)	382 (67.4)	567 (55.1)	1029 (100)
	>80	238 (51.5)	224 (48.5)	462 (44.9)	
Level	2nd level†	73 (29.8)	172 (70.2)	245 (23.8)	1029 (100)
	3rd level†	148 (45.8)	175 (54.2)	323 (31.4)	
	4th level‡	140 (72.2)	54 (27.8)	194 (18.9)	
	5th level‡	62 (31)	138 (69)	200 (19.4)	
Qat Chewing	Yes	92 (43)	122 (57)	214 (22)	978 (100)
	No	331 (43.3)	433 (56.7)	764 (78)	

†, Preclinical; ‡, Clinical; A, Total reported responses for the individual categories of the corresponding factor; B, Total reported responses for the corresponding factor.

Table 3 reveals the percentages of “agree” responses to the 20 items of the HU-DBI questionnaire. Generally, dental students had better oral health attitudes/behavior than medical students. For examples: significantly more dental than medical students reported that they would concern about sticky deposits on teeth (76.9% vs. 68.3;  $P=0.003$ ); and they believed that using a toothbrush with hard bristles will damage the gums (80.3% vs. 84.6 %;  $P=0.008$ ). In addition, significantly fewer dental than medical students reported that they cannot help having false teeth when they are old (17.1% vs. 22.9;  $P=0.021$ ), that they bother of the color of their gums (30.2% vs. 41.5%;  $P<0.001$ ), and that they postpone visiting a dentist until they get a toothache (31.1% vs. 47.2%;  $P<0.001$ ).

Regarding gender, significantly fewer female than male students reported that they worry about visiting a dentist

(58.1% vs. 67.6%;  $P=0.002$ ), and that they do not worry if their gums bleed during brushing (49.9% vs. 61.8%;  $P<0.001$ ). Furthermore, significantly more female than male students reported that tooth-brushing with strong strokes was not ideal (89.4% vs. 85.2%;  $P=0.042$ ), and that tooth-brushing more than once is ideal (78.2% vs. 70%;  $P=0.003$ ). With regards to type of university, significantly fewer students at Sana'a university (public university) than UST (private) reported that they do not worry if their gums bleed during brushing (45.2% vs. 62.2%;  $P<0.001$ ).

Table 3. Questionnaire items of the HU-DBI and percentage of “agree” responses by college, gender, and university

Items	College		P-value	Gender		P-value	University		P-value	Total
	Dental	Medical		M	F		Sana'a	UST		
Item 1	60.8	64.4	0.24	67.6	58.1	0.002	62.2	62.4	0.932	62.3
Item 2	53.1	58	0.13	61.8	49.9	<0.001	45.2	62.2	<0.001	55.2
Item 3	69.9	70.1	1	69	70.8	0.54	70.4	69.8	0.89	70
Item 4	76.9	68.3	0.003	72.1	74.2	0.48	73.8	72.9	0.78	73.3
Item 5	39.5	42.2	0.37	44	38.2	0.064	39.3	41.8	0.44	40.8
Item 6	17.1	22.9	0.021	22.2	17.4	0.048	22	17.9	0.11	19.6
Item 7	30.2	41.5	<0.001	38.9	31.9	0.021	38.1	32.8	0.09	35
Item 8	71	69.3	0.58	71.4	69.4	0.49	70.9	69.8	0.73	70.3
Item 9	69.6	63.3	0.038	68.1	66	0.51	68.6	65.8	0.38	67
Item 10	94.1	92.6	0.37	91.7	94.9	0.042	94.8	92.6	0.2	93.5
Item 11	17.7	22.7	0.057	24.9	15.8	<0.001	21	19	0.43	19.8
Item 12	76.1	73.6	0.38	73.1	76.7	0.19	73	76.5	0.21	75.1
Item 13	84.2	81.2	0.24	84.2	81.5	0.63	84.8	81.6	0.21	82.7
Item 14	77.7	79.1	0.59	78.6	78.1	0.88	75.8	80	0.12	78.3
Item 15	31.1	47.2	<0.001	41.7	35	0.028	40.1	36.5	0.24	38
Item 16	80.3	73.2	0.008	76	78.3	0.41	78.7	76.2	0.37	77.3
Item 17	89.7	84.6	0.016	85.2	89.4	0.046	88.9	86.6	0.29	87.6
Item 18	26.1	26.8	0.83	24.3	28.1	0.18	27.4	25.7	0.57	26.4
Item 19	78.1	69.8	0.003	70	78.2	0.003	71.6	76.7	0.08	74.6
Item 20	0	0	NC	0	0	NC	0	0	NC	0

NC, not calculated; UST: University of Science and Technology.

The overall mean HU-DBI score was  $4.99\pm 1.58$ . Dental and medical students presented a mean HU-DBI score of  $5.06\pm 1.63$  and  $4.91\pm 1.50$ , respectively, with no significant differences ( $P>0.05$ ). Female students scored significantly higher ( $5.1\pm 1.57$ ) than male students did ( $4.87\pm 1.58$ ,  $P=0.02$ ). In line with that, students at Sana'a university scored slightly higher score ( $5.11\pm 1.59$ ) than UST students did ( $4.91\pm 1.59$ ;  $P=0.049$ ). Moreover, students who reported khat chewing had significantly lower scores ( $4.74\pm 1.48$ ) than non-khat chewers ( $5.05\pm 1.58$ ;  $P=0.013$ ). On the other hand, the mean HU-DBI score was not found to be affected by the students' level of study or their academic average (Table 4).

Table 4. Mean scores of HU-DBI by different factors

Factors	Mean (SD)	P-Values
Gender		0.02
Male (n=452)	4.87 (1.58)	
Female (n=562)	5.1 (1.57)	
Level		0.61
Preclinical (n=560)	4.97 (1.52)	

Clinical (n=454)	5.02 (1.65)	
Academic Average		0.804
≤80 (n=560)	5.01 (1.59)	
>80 (n=454)	4.98 (1.57)	
University		0.049
Sana'a (n=419)	5.11 (1.59)	
UST (n=595)	4.91 (1.56)	
College		0.124
Dental (n=579)	5.06 (1.63)	
Medical (n=435)	4.91 (1.5)	
Qat Chewing		0.013
Yes (n=207)	4.74 (1.48)	
No (n=755)	5.05 (1.58)	
Total (N=1014)	4.99 (1.58)	

#### 4. Discussion

In order to perfectly perform their future health mission of preventing systemic and oral diseases, dental and medical students should have good and evidence-based knowledge regarding educating their patients about health behaviors/habits. First and foremost, successful achievement of this mission entails evaluating knowledge, attitude and behaviors of these students. To our best knowledge, this is the first study assessing self-reported oral health attitude and behavior of dental and medical students in Yemen.

Unfortunately, the results of the present study showed very poor attitudes and behavior of Yemeni future health care providers towards oral health. The overall mean HU-DBI score was markedly low (4.9), suggesting a defective social background and/or educational system. In an appropriately-designed health education system, students transform their acquired knowledge into positive attitude and behavior.

Surprisingly, the mean HU-DBI score of dental student was low (5.06). Although this value is very close to the reported scores in China (5.07) (Komabayashi et al., 2005) and Sudan (5.08) (Al-Shiekh, Muhammed, Muhammed, El-Huda & Hashim, 2015), it was much lower than that reported in other countries, where the reported mean HU-DBI score ranged from 6.0 to 7.4 (Al-Wahadni et al., 2004; Dagli, Tadakamadla, Dhanni, Duraiswamy, & Kulkarni, 2008; Yildiz & Dogan, 2011; Polychronopoulou & Kawamura, 2010; Badovinac et al., 2014; Pacauskiene et al., 2014). It seems that the preventive dentistry courses and the knowledge and experience dental students gained from their basic dental subjects had low impact on their oral self-care. In addition, cultural differences and diversity of educational systems should not be overlooked. In a similar fashion, the mean HU-DBI score reported for medical students was lower than that reported among medical students in United Arab Emirate (UAE) (Al Kawas, Fakhruddin, & Rehman, 2010) and Greece (Chrysanthakopoulos, 2012). On the whole, Yemeni medical and dental students showed very poor oral health attitude and behavior in comparison to their peers in other counties.

The HU-DBI scores of dental and medical students were not statistically different. This can be attributed to the inherent nature of the HU-DBI score; the correct answer is “agree” in some items and “disagree” in others. Indeed, there were eight items out of 20 (Table 3), in which the dental students revealed better oral health attitude and behavior than their medical peers; a considerable proportion of dental students reported that they were more concerned about the sticky deposit on their teeth (Item 4), believed that having false teeth is not inevitable with age (Item 6), were much aware of destructive effect of hard bristles on gums (Item 16), were happy with the color of their gums (Item 7), believed in negative effect of brushing with strong stroke (Item 17), and believed in importance of brushing more than once a day (Item 19). For the same items, the proportions for the medical students were significantly lower than the dental students. This may explain how beneficial preventive and periodontology courses are in shaping the dental students' attitudes and behavior.

Moreover, majority of medical students reported that they “put off going to the dentist until they have toothache”, which is similar to other studies reported in United Arab Emirate (Al Kawas et al., 2010) and Kuwait (Al-Hussaini et al., 2003). The most likely reason for that is the high cost of dental services. Other potential reasons may include fear of pain, previous bad dental experiences, the time required for frequent visits, and lack of sufficient knowledge about dentistry, as one's knowledge and positive attitude toward good health care are

very important in the preventive cycle (Dagli et al., 2008; Kawamura, Honkala, Widström, & Komabayashi, 2000).

An unexpected finding was the higher mean HU-DBI score reported for the public university (Sana'a university; 5.11) than that reported for the private university (UST; 4.91). It is a difficult issue to be explained in light of the fact that most of students who join public universities have low socioeconomic status compared to the private university students. Low socioeconomic status is a well-known deteriorative factor of oral health and oral health attitude and behavior (Ronis, Lang, Farghaly, & Passow, 1993).

Gender had an influence on the total HU-DBI mean scores. Females showed better oral health attitude than males did. This was obvious in many items such as being more worried to visit the dentists, concerned with bleeding tendency of the gum and its color, and they prefer to brush their teeth more than once without strong stroke. Females, for internal psychological reasons, usually care more about their body and appearance and they would thus tend to visit health professionals for treatment or advice. This finding is in accordance with several previous studies (Ostberg, Halling, & Lindblad, 1999; Al-Omiri, Barghout, Shaweesh, & Malkawi, 2012; Vangipuram, Rekha, Radha, & Pallavi, 2015).

In the current study, substantial differences in oral health behavior and attitudes between different levels of academic education were not observed. Similar results were reported elsewhere (Dagli et al., 2008; Al-Shiekh et al., 2015; Vangipuram et al., 2015). However, many other studies found a profound difference in oral health attitude between clinical and preclinical students (Peker, Uysal, & Bermek, 2010; Yildiz & Dogan, 2011; Badovinac et al., 2013; Sato et al., 2013; Ahamed et al., 2015). Moreover, a recent study by Okoh and Enabulele (2014) reported a significant improvement in dental students' oral health behavior and attitudes with increasing level of dental education. The result of the current study may imply a defect in translation of the acquired knowledge into positive attitude and behaviors which necessitates critical revision of the curricula.

A potential positive effect of the better academic performance on oral health attitude and behaviors has been reported (Asawa et al., 2014). However, this is not the case in our study. Again, such a finding raises many questions regarding the practical self-applicability of the curricula.

## 5. Conclusions

In conclusion, Yemeni dental and medical students have shown markedly poor oral health attitude and behavior. Moreover, dental education has only shown limited impact on the oral health and behavior improvement. Prompt initiatives should be launched to critically revise the dental and medical curricula and the education processes, and to redesign these curricula in a constructive and productive manner to positively influence students' behavior and attitudes.

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## Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

## References

- Ahamed, S., Moyin, S., Punathil, S., Patil, N. A., Kale, V. T., & Pawar, G. (2015). Evaluation of the Oral Health Knowledge, Attitude and Behavior of the Preclinical and Clinical Dental Students. *J Int Oral Health*, 7(6), 65-70.
- Al Kawas, S., Fakhruddin, K. S., & Rehman, B. U. (2010). A comparative study of oral health attitudes and behavior between dental and medical students; the impact of dental education in United Arab Emirates. *J Int Dent Med Res.*, 3(1), 6-10.
- Al-Hussaini, R., Al-Kandari, M., Hamadi, T., Al-Mutawa, A., Honkala, S., & Memon, A. (2003). Dental health knowledge, attitudes and behaviour among students at the Kuwait University Health Sciences Centre. *Med Princ Pract.*, 12(4), 260-265. <http://dx.doi.org/10.1159/000072295>
- Al-Maweri, S. A., & Zimmer, S. (2015). Oral Health Survey of 6-14-Year-Old Children with Disabilities Attending Special Schools Yemen. *J Clin Pediatr Dent*, 39(3), 272-276. <http://dx.doi.org/10.17796/1053-4628-39.3.272>
- Al-Omiri, M. K., Barghout, N. H., Shaweesh, A. I., & Malkawi, Z. (2012). Level of education and gender-specific self-reported oral health behavior among dental students. *Oral Health Prev Dent*, 10(1), 29-35.

- Al-Shiekh, L., Muhammed, M. E., Muhammed, A. E., El-Huda, M. A., & Hashim, N. T. (2015). *Evaluation of dental students' oral hygiene attitude and behavior using HU-DBI in Sudan*.
- Al-Wahadni, A. M., Al-Omiri, M. K., & Kawamura, M. (2004). Differences in self-reported oral health behavior between dental students and dental technology/dental hygiene students in Jordan. *J Oral Sci*, 46(3), 191-197. <http://dx.doi.org/10.2334/josnusd.46.191>
- Asawa, K., Chaturvedi, P., Tak, M., Nagarajappa, R., Bhat, N., Bapat, S., et al. (2014). The Association between Educational Achievements, Career Aspirations, Achievement Motives and Oral Hygiene Behavior among Dental Students of Udaipur, India. *Ethiop J Health Sci.*, 24(4), 291-298. <http://dx.doi.org/10.4314/ejhs.v24i4.3>
- Badovinac, A., Bozic, D., Vucinac, I., Vesligaj, J., Vrazic, D., & Plancak, D. (2013). Oral health attitudes and behavior of dental students at the University of Zagreb, Croatia. *J Dent Educ*, 77(9), 1171-1178.
- Chrysanthakopoulos, N. A. (2012). Self-Reported Oral Health Attitude and Behaviour of Greek Medical Students. *Acta Stomatol Croat.*, 46(2), 126-135.
- Dagli, R. J., 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(3), 267-272. <http://dx.doi.org/10.2334/josnusd.50.267>
- Dhaifullah, E., Al-Maweri, S. A., Al-Motareb, F., Halboub, E., Elkhatat, E., Baroudi, K., et al. (2015). Periodontal Health Condition and Associated Factors among University Students, Yemen. *J Clin Diagn Res.*, 9(12). <http://dx.doi.org/10.7860/JCDR/2015/16435.6964>
- Halboub, E., Dhaifullah, E., & Yasin, R. (2013). Determinants of dental health status and dental health behavior among Sana'a University students, Yemen. *J Investig Clin Dent*, 4(4), 257-264. <http://dx.doi.org/10.1111/j.2041-1626.2012.00156.x>
- Jaramillo, J. A., Jaramillo, F., Kador, I., Masuoka, D., Tong, L., Ahn, C., et al. (2013). A comparative study of oral health attitudes and behavior using the Hiroshima University-Dental Behavioral Inventory (HU-DBI) between dental and civil engineering students in Colombia. *J Oral Sci*, 55(1), 23-28. <http://dx.doi.org/10.2334/josnusd.55.23>
- Kawamura, M. (1988). (Dental behavioral science. The relationship between perceptions of oral health and oral status in adults). *Hiroshima Daigaku Shigaku Zasshi*, 20(2), 273-286.
- Kawamura, M., Honkala, E., Widström, E., & Komabayashi, T. (2000). Cross-cultural differences of self-reported oral health behaviour in Japanese and Finnish dental students. *Int Dent J*, 50(1), 46-50. <http://dx.doi.org/10.1111/j.1875-595X.2000.tb00546.x>
- Komabayashi, T., Kawamura, M., Kim, K. J., Wright, F. A., Declerck, D., Goias Mdo, C., 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(5), 310-316. <http://dx.doi.org/10.1111/j.1875-595X.2006.tb00106.x>
- Komabayashi, T., Kwan, S. Y., Hu, D. Y., Kajiwara, K., Sasahara, H., & Kawamura, M. (2005). A comparative study of oral health attitudes and behaviour using the Hiroshima University-Dental Behavioural Inventory (HU-DBI) between dental students in Britain and China. *J Oral Sci*, 47(1), 1-7. <http://dx.doi.org/10.2334/josnusd.47.1>
- Kumar Tadakamadla, S., Kriplani, D., Shah, V., Tadakamadla, J., Tibdewal, H., Duraiswamy, P., 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(2), 195-202.
- Okoh, M., & Enabulele, J. (2014). Influence of clinical experience on oral health attitude and behaviour of dental students attending a Nigerian university. *Odontostomatol Trop*, 37(148), 25-31.
- Ostberg, A.-L., Halling, A., & Lindblad, U. (1999). Gender differences in knowledge, attitude, behavior and perceived oral health among adolescents. *Acta Odontol Scand.* 57(4), 231-236. <http://dx.doi.org/10.1080/000163599428832>
- Pacauskiene, I. M., Smailiene, D., Siudikiene, J., Savanevskyte, J., & Nedzelskiene, I. (2014). Self-reported oral health behavior and attitudes of dental and technology students in Lithuania. *Stomatologija*, 16(2), 65-71.
- Park K. *Park's textbook of preventive and social medicine* (pp. 10-32). Jabalpur (India): M/s Banarsidas Bhanot Publishers. (2005).

- Peker, K., Uysal, Ö., & Bermek, G. (2010). Dental training and changes in oral health attitudes and behaviors in Istanbul dental students. *J Dent Educ.*, 74(9), 1017-1023.
- Polychronopoulou, A., & Kawamura, M. (2005). Oral self-care behaviours: Comparing Greek and Japanese dental students. *Eur J Dent Educ.*, 9(4), 164-170. <http://dx.doi.org/10.1111/j.1600-0579.2005.00387.x>
- Ronis, D. L., Lang, W. P., Farghaly, M. M., & Passow, E. (1993). Tooth Brushing, Flossing, and Preventive Dental Visits by Detroit-area Residents in Relation to Demographic and Socioeconomic Factors. *J Public Health Dent.*, 53(3), 138-145. <http://dx.doi.org/10.1111/j.1752-7325.1993.tb02692.x>
- Sato, M., Camino, J., Oyakawa, H. R., Rodriguez, L., Tong, L., Ahn, C., & Komabayashi, T. (2013). Effect of dental education on Peruvian dental students' oral health-related attitudes and behavior. *J Dent Educ*, 77(9), 1179-1184.
- Vangipuram, S., Rekha, R., Radha, G., & Pallavi, S. (2015). Assessment of oral health attitudes and behavior among undergraduate dental students using Hiroshima University Dental Behavioral Inventory HU-DBI. *Journal of Indian Association of Public Health Dentistry*, 13(1), 52. <http://dx.doi.org/10.4103/2319-5932.153587>
- Yildiz, S., & Dogan, B. (2011). Self reported dental health attitudes and behaviour of dental students in Turkey. *Eur J Dent.*, 5(3), 253.

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