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Comparative evaluation of oral health attitudes and behaviors among dental and medical students during COVID-19 pandemic in Saudi Arabia

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Abstract. – OBJECTIVE: The purpose of the study was to compare the oral health attitudes and behaviors of medical and dental students/interns during the Corona pandemic in Saudi Arabia using Hiroshima University Dental Behavioral Inventory (HU-DBI).

SUBJECTS AND METHODS: This cross-sectional study was conducted to assess the oral health attitudes and behaviors of dental and medical students/interns in Saudi Arabia using an online Hiroshima University-Dental Behavioral Inventory (HUDBI). An English version of the questionnaires consisting of personal information and 20 HUDBI items were responded by the 638 (46.8%) dental and 726 (53.2%) medical students/interns. The mean score of oral health attitude and behavior of the study participants was calculated based on 12 point scale of the HUDBI items. The Mann-Whitney U and Kruskal-Wallis tests compared the HUDBI scores across different groups.

RESULTS: The study sample's overall mean HUDBI score was 6.44±1.80 (Median 7). Dental students/interns (825.60) demonstrated a significantly higher HUDBI mean score than medical students/interns (556.75) (p<0.001). Similarly, female students (712.25) than the male students (712.25 *vs*. 642, p=0.001), and those studying in private universities compared to government universities (741.56 *vs*. 673.52, p=0.028) showed significantly higher HUDBI mean scores.

CONCLUSIONS: During the COVID-19 pandemic, dental students/interns displayed a better oral health attitudes and behaviors than medical students/interns. Therefore, oral health promotion programs aimed at medical and dental students/interns are essential for improving oral health attitudes and behaviors.

Key Words:
Attitude, Behavior, COVID-19, Dental, HU-DBI, Oral health, Medical, Student, Intern.

Introduction

Oral health is linked to many systemic diseases and is an essential component of overall health[1,2]. Nowadays, oral health is seen as a symbol of the individual's social health and quality of life. This concept of oral health embraces more than just having good teeth[3]. However, the sudden emergence of COVID-19 impacted students' psychological, physiological, and behavioral outcomes[4].

An individual's oral health concern is determined by his or her attitude. An attitude is a generally long-lasting arrangement of beliefs centered on an object, subject, or concept that predisposes one to behave in a particular way[5]. These attitudes reflect their personal experiences, cultural perspectives, familial beliefs, and other life conditions, and they substantially affect oral health behavior[6]. The Hiroshima University-Dental Behavioral Inventory (HU-DBI), founded by Kawamura[7], is a valuable tool for assessing oral health attitudes and behavior, and it has demonstrated good cross-cultural adaptations[8]. Furthermore, the questionnaire has been successfully translated into English and other languages and showed high test-retest reliability. Therefore, it has been used in many countries to assess the oral health attitudes and behaviors of dental students[7,9].

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Medical and dental students are future health care professionals and they can play an essential role in oral disease prevention by endorsing recommendations and exhibiting appropriate oral health behaviors. Moreover, they can serve as role models for patients and help to improve the general population's oral health. However, studies[10,11] comparing oral health attitudes and behaviors between medical and dental students have shown different results.

A recent study[12] summarized COVID-19's psychological effects on college students. Many students experience high levels of stress, anxiety, and depression symptoms due to changing educational delivery and technical glitches in online courses. Furthermore, being away from home, social isolation, a drop in family income, and uncertainty about future jobs were reported among university students worldwide[13]. In addition, recommendations to remain at home and curfew restrictions to manage the pandemic has disrupted people's routine activities and social interactions[14]. Such atypical circumstances can lead to sadness and stress[15] affecting medical and dental students' general and oral health.

It is generally regarded that medical and dental students possess good oral health attitudes and behavior. However, the effect of COVID-19 on the dental and medical students/interns' oral health attitudes and behaviors in Saudi Arabia is unclear. Therefore, evaluating students' oral health attitudes and behaviors is vital in designing appropriate oral health promotion strategies for medical and dental students/interns.

Hence, our study compared the oral health attitudes and behaviors of medical and dental students/interns during the Corona pandemic in Saudi Arabia using Hiroshima University Dental Behavioral Inventory (HU-DBI).

Subjects and Methods

This study assessed medical and dental students/intern's oral health attitudes and behaviors during the COVID-19 pandemic in Saudi Arabia. The study proposal was submitted to Riyadh Elm University's research center and was approved by the University's Ethics Committee (FIRP/2020/69/235/232). This study was conducted from July 2020 to December 2020. The study's purpose and the nature of the questions were thoroughly explained to the students. The students who agreed to participate were requested to fill out an online questionnaire implying participation agreement. This study was conducted in accordance with the declaration of Helsinki.

Study Design

A descriptive cross-sectional study evaluated and compared the oral health attitudes and behaviors of medical and dental students/interns in Saudi Arabia.

Study Sample

The study sample consisted of students from the first to the final years of their studies and interns pursuing medical and dentistry programs in Saudi Arabia. A convenient sampling methodology was employed to select the study participants.

Sample Size

A sample size of 1362 (medical=726, dental=638) students/interns were calculated based on the small effect size of (0.196), alpha error probability (0.05), power (0.95), and an allocation ratio of dental to medical students (0.88). The small effect size was calculated by considering the mean difference of HU-DBI scores reported in a prior study by Halboub et al[10] (2016). Sample size calculation was performed using the G*Power sample size calculator.

Study Instrument

A structured, close-ended, and self-administered English version of the HU-DBI questionnaire evaluated the study participants' oral health attitudes and behaviors. The English version of HU-DBI has demonstrated good translation validity and test-retest reliability[16]. HU-DBI consists of 20 items to assess the oral health attitudes and behaviors based on dichotomous agree/disagree responses, as shown in (Table I). HU-DBI is a score was based on a 12-point scale, the higher score indicating better oral health attitudes and behaviors. In addition, the participants were enquired about their field of study (medicine, dentistry), gender (male, female), age, nationality (Saudi, non-Saudi), region of Saudi Arabia (central, Eastern, Western south, Eastern, and North). Moreover, type of university (government, private), academic level of the program (1st year, 2nd year, 3rd year, 4th year, 5th year, 6th year, and internship), and self-rated oral health (good, fair, and poor) were also noted in the questionnaire.

Table I. HU-DBI questionnaire items with agree/disagree responses.

HU-DBI items	Correct responses
1. I do not worry much about visiting the dentist	
2. My gums tend to bleed when I brush my teeth	Disagree[1]
3. I worry about the color of my teeth	
4. I have noticed some white sticky deposits on my teeth	Agree[1]
5. I use a child-sized toothbrush	
6. I think that I cannot help having false teeth when I am old	Disagree[1]
7. I bothered by the color of my gums	
8. I think my teeth are getting worse despite my daily brushing	Disagree[1]
9. I brush each of my teeth carefully	Agree1
10. I have never been taught professionally how to brush	Disagree[1]
11. I think I can clean my teeth well without using toothpaste	Agree[1]
12. I often check my teeth in a mirror after brushing	Agree[1]
13. I worry about having bad breath	
14. It is impossible to prevent gum disease with brushing alone	Disagree[1]
15. I put off going to the dentist until I have toothache	Disagree[1]
16. I have used a dye to see how clean my teeth are	Agree[1]
17. I use a toothbrush with hard bristles	
18. I do not feel I have brushed well unless I brush with strong strokes	
19. I feel I sometimes take too much time to brush my teeth	Agree[1]
20. I have had my dentist tell me that I brush very well	

A total of 12 items were selected and one point was given for each one of the agree and disagree responses.

Questionnaire Administration

An electronic version of the questionnaire was prepared using the online survey monkey platform. A mandatory answer questionnaire was created so that every participant must complete each question before going to the next item. The electronic questionnaire's functioning and response recording were verified by sending the link to ten students over their WhatsApp. After making necessary adjustments, a final version was prepared and published on prominent Saudi medical and dental students' social networking platforms. Data collection was performed for five months. There was no effort made to capture clinical indicators and person identifiers. The excel sheet containing the participant's responses was downloaded from the survey monkey program. After removing the incomplete and duplicated responses, data were coded and entered in the statistical program for analysis. The Checklist for Reporting Results of Internet E-Surveys (CHERRIES) was followed in this study.

Statistical Analysis

The HU-DBI provides a quantifiable assessment of individuals' attitudes about oral health based on the total of agree/disagree responses. Oral health attitudes and behaviors were measured by calculating 12 selected items of HUDBI on dichotomous responses (agree or disagree). While calculating scores, one point was awarded for each answer favoring good oral health, similar to earlier reported studies[8,10]. The maximum possible score is 12 points due to the omission of eight items from scoring (1, 3, 5, 7, 13, 17, 18 and 20) (Table I). Higher scores indicate better attitudes and behaviors toward oral health. Normality distribution of the data was determined using the Kolmogorov-Smirnov test, and it was found that the data were not normally distributed. Frequency distribution, percentages, mean, standard deviation, and mean ranks were calculated for the study variables.

The chi-square test compared medical and dental students' individual HUDBI item responses. The Mann-Whitney U test compared the study participants' HUDBI scores across different specialties, gender, country, and university. Kruskal-Wallis test compared the participant's HUDBI score in different educational levels and self-reported oral health. A p-value of <0.05 was considered significant for all the statistical tests. All the data analysis was performed using SPSS software (IBM Corp., IBM-SPSS Statistics, Version 25.0, Armonk, NY, USA).

Results

A total of 1364 students/interns studying dentistry and medicine programs in various universities of Saudi Arabia participated in this study.

Of them 726 (53.2%) were studying medicine; 784 (57.5%) were females; and 1322 were Saudi nationals (96.9%). In addition, many of the study participants were from the central region 530 (38.9%), studying in government universities 1184 (86.8%) in their third year of education 275 (20.2%). Nearly 71.2% of the students reported having good oral health. The mean age of the study participants was 22.04±1.99 years shown in (Table II).

Most of the study participants would worry about bad breath (93.2%) and the color of their teeth (93%). While 90.1% would check their teeth in the mirror after brushing, and 81.5% would not worry much about visiting the dentist. Contrarily, 11.4% subjects use dye to see the cleanliness of their teeth, and 12.5% clean their teeth without using toothpaste. Nearly 15.2% participants were bothered by their gum color, and 16.6% used a hard bristle toothbrush. The HU-DBI items and the study participants' responses are displayed in (Table III).

All HUDBI items revealed a statistically significant difference between dental and medical students except for cleaning teeth without toothpaste p=0.163 (item 11) and having bad breath p=0.106 (item 13). A significantly higher percentage of dental students compared to the medical students disagreed with gum bleeding when brushing teeth (83.90 *vs.* 60.50, p<0.001) (item 2) and having false teeth in old age (77.90 *vs.* 70.20, p=0.001) (item 6). Similarly, statistically significant differences were observed concerning the items: my teeth getting worse despite daily brushing (81.80 *vs.* 69.60, p<0.001) (item 8), I have never been taught professionally how to brush (76.80 *vs.* 58.40, p<0.001) (item 10), and I put off going to the dentist until the toothache (70.50 *vs.* 36.90, p<0.001) (item 15).On the contrary, a significantly higher percentage of medical students/interns than dental students/interns disagreed with preventing gum disease with brushing alone (37.50 *vs.* 30.90, p=0.011) (item 14).

A higher percentage of dental students/interns than medical students/interns brush each of their teeth carefully (83.20 *vs.* 63.50, p<0.001) (item 9), often check teeth in the mirror after brushing (92.90 *vs.* 87.60 p=0.001) (item 12), use dye to see teeth cleanliness (18.30 *vs.* 5.40, p<0.001) (item 16) and took a long time to brush teeth (46.40 *vs.* 39.30, p=0.008) (item 19). In contrast, a significantly large percentage of medical students noticed some white sticky deposits on their teeth (46 *vs.* 32.40, p<0.001) (item 4), as shown in (Table IV).

Table II. Characteristics of the study participants (N = 1364).

Characteristics		N	%
Specialty	Dental	638	46.8%
	Medical	726	53.2%
Gender	Female	784	57.5%
	Male	580	42.5%
Nationality	Non-Saudi	42	3.1%
	Saudi	1322	96.9%
Region	Central	530	38.9%
	Western	244	17.9%
	Eastern	207	15.2%
	Northern	152	11.1%
	Southern	231	16.9%
University	Private	180	13.2%
	Government	1184	86.8%
Education	1st year	68	5.0%
	2nd year	174	12.8%
	3rd year	275	20.2%
	4th year	231	16.9%
	5th year	181	13.3%
	6th year	207	15.2%
	Intern	228	16.7%
Self-Rated Oral Health	Good	971	71.2%
	Fair	355	26.0%
	Poor	38	2.8%
Age (22.04 ± 1.99 years)			

Table III. Distribution of questionnaire items of the HU-DBI.

HU-DBI items	Agree	Disagree
1. I do not worry much about visiting the dentist	1111 (81.5%)	253 (18.5%)
2. My gums tend to bleed when I brush my teeth	390 (28.6%)	974 (71.4%)
3. I worry about the color of my teeth	1269 (93%)	95 (7%)
4. I have noticed some white sticky deposits on my teeth	541 (39.7%)	823 (60.3%)
5. I use a child-sized toothbrush	546 (40%)	818 (60%)
6. I think that I cannot help having false teeth when I am old	357 (26.2%)	1007 (73.8%)
7. I bothered by the color of my gums	208 (15.2%)	1156 (84.8%)
8. I think my teeth are getting worse despite my daily brushing	337 (24.7%)	1027 (75.3%)
9. I brush each of my teeth carefully(A)	992 (72.7%)	372 (27.3%)
10. I have never been taught professionally how to brush	450 (33%)	914 (67%)
11. I think I can clean my teeth well without using toothpaste	170 (12.5%)	1194 (87.5%)
12. I often check my teeth in a mirror after brushing	1229 (90.1%)	135 (9.9%)
13. I worry about having bad breath	1271 (93.2%)	93 (6.8%)
14. It is impossible to prevent gum disease with brushing alone	895 (65.6%)	469 (34.4%)
15. I put off going to the dentist until I have toothache	646 (47.4%)	718 (52.6%)
16. I have used a dye to see how clean my teeth are	156 (11.4%)	1208 (88.6%)
17. I use a toothbrush with hard bristles	227 (16.6%)	1137 (83.4%)
18. I do not feel I have brushed well unless I brush with strong strokes	439 (32.2%)	925 (67.8%)
19. I feel I sometimes take too much time to brush my teeth	581 (42.6%)	783 (57.4%)
20. I have had my dentist tell me that I brush very well	829 (60.8%)	535 (39.2%)

The study sample's overall mean HUDBI score was 6.44±1.80 (median 7). However, dental students/interns (825.60) demonstrated a significantly higher HUDBI mean rank than medical students/interns (556.75) (p<0.001). Similarly, female students (712.25) than the male students (642.29), (p=0.001), and those students studying private universities (741.56) compared to govern-

Table IV. Comparison of HU-DBI responses between Dental and medical students.

Items	Dental		Medical		
	A (%)	DA (%)	A (%)	DA (%)	p
1. I do not worry much about visiting the dentist	86.50	13.50	77.00	23.00	< 0.001
2. My gums tend to bleed when I brush my teeth (D)	16.10	83.90	39.50	60.50	< 0.001
3. I worry about the color of my teeth	95.30	4.70	91.00	9.00	0.002
4. I have noticed some white sticky deposits on my teeth (A)	32.40	67.60	46.00	54.00	< 0.001
5. I use a child-sized toothbrush	44.00	56.00	36.50	63.50	0.005
6. I think that I cannot help having false teeth when I am old (D)	22.10	77.90	29.80	70.20	0.001
7. I bothered by the color of my gums	12.40	87.60	17.80	82.20	0.006
8. I think my teeth are getting worse despite my daily brushing (D)	18.20	81.80	30.40	69.60	< 0.001
9. I brush each of my teeth carefully (A)	83.20	16.80	63.50	36.50	< 0.001
10. I have never been taught professionally how to brush (D)	23.20	76.80	41.60	58.40	< 0.001
11. I think I can clean my teeth well without using toothpaste (A)	13.80	86.20	11.30	88.70	0.163
12. I often check my teeth in a mirror after brushing (A)	92.90	7.10	87.60	12.40	0.001
13. I worry about having bad breath	92.00	8.00	94.20	5.80	0.106
14. It is impossible to prevent gum disease with brushing alone (D)	69.10	30.90	62.50	37.50	0.011
15. I put off going to the dentist until I have toothache (D)	29.50	70.50	63.10	36.90	< 0.001
16. I have used a dye to see how clean my teeth are (A)	18.30	81.70	5.40	94.60	< 0.001
17. I use a toothbrush with hard bristles	7.70	92.30	24.50	75.50	< 0.001
18. I do not feel I have brushed well unless I brush with strong strokes	18.50	81.50	44.20	55.80	< 0.001
19. I feel I sometimes take too much time to brush my teeth (A)	46.40	53.60	39.30	60.70	0.008
20. I have had my dentist tell me that I brush very well	72.90	27.10	50.10	49.90	< 0.001

A = Agree, DA = Disagree. In the calculation of the HU-DBI, a total of 12 items were selected and one point was given for each one of the agree (A) and disagree (D) responses.

ment universities (673.52) showed significantly higher HUDBI mean ranks (p=0.028). Contrarily, the mean HUDBI rank did not differ significantly between Saudi and non-Saudi nationals. However, a comparison of HUDBI ranks across different years of education showed a statistically significant difference (p=0.001). Lower HUDBI ranks were observed at lower education levels, while final-year students and interns showed high mean ranks. Similarly, the HUDBI differed significantly across different categories of self-reported oral health (p<0.001). Study participants with a good rating of oral health demonstrated significantly higher HUDBI ranks than those with fair and poor ratings (p<0.001), as shown in (Table V).

Discussion

The COVID-19 pandemic has affected university students' psychological health and well-being worldwide. Medical and dental students are not immune to this effect. The pandemic has deteriorated health-related behaviors and raised general anxiety among adults. Sedentary behavior and sleep quality were most significantly affected during the forced lockdown[17]. In addition, the pandemic has negatively impacted the students' quality of life, as expressed by dissatisfaction and poor oral health behavior[18,19]. However, the impact of a current pandemic on oral health attitudes and behaviors is not reported among medical and dental students. Hence, this study assessed and compared medical and dental students/interns' oral health attitudes and behaviors during the COVID-19 pandemic in Saudi Arabia using HUDBI. Due to the scarcity of similar reports during the outbreak, we compared our findings to those published before the pandemic.

Our study results revealed an overall mean HU-DBI score of 6.44±1.80 among the study participants during the COVID-19 pandemic. This finding is higher than that reported from students in Yemen (4.99±1.58) and Nigeria (5.86±1.93)[10,20]. In this study, dental students/interns demonstrated a mean HU-DBI score of 7.09 ±1.67, which is higher than that reported in Yemen (5.06)[10], China (5.07)[21], and Sudan (5.08)[22]. On the contrary, the mean HU-DBI score reported in this study was lower than in Germany (14.31)[23] and Brazil (8.16)[24]. However, our study's mean HUDBI score is consistent with findings reported by Japanese dental students[25]. Similarly, medical students in

Table V. Comparison of HUDBI score across different variables.

Variables		N	Mean	SD	Mean Rank	p
Specialty	Dental	638	7.09	1.67	825.60	< 0.001¶
	Medical	726	5.86	1.72	556.75	
Gender	Female	784	6.57	1.81	712.25	0.001¶
	Male	580	6.26	1.79	642.29	
Nationality	Non-Saudi	42	6.45	1.90	683.87	0.981¶
	Saudi	1322	6.43	1.80	682.46	
University	Private	180	6.73	1.71	741.56	0.028¶
	Government	1184	6.39	1.81	673.52	
Education	1st year	68	6.26	1.80	647.10[A]	< 0.001§
	2nd year	174	6.13	1.94	621.56[A]	
	3rd year	275	6.13	1.67	611.81[A]	
	4th year	231	6.29	1.76	657.70[A]	
	5th year	181	6.65	1.83	729.63[B]	
	6th year	207	6.87	1.78	776.64[B]	
	Intern	228	6.67	1.78	727.07[B]	
Self Rated Oral Health	Good	971	6.82	1.67	764.39[A]	< 0.001§
	Fair	355	5.57	1.74	499.01[B]	
	Poor	38	4.58	1.67	304.07[C]	

¶Mann-Whitney U test, §Kruskal-Walli's test, Similar alphabet across education and self-rated oral health category indicates no significant difference. Overall mean HUDBI Score 6.44 ± 1.80, Median 7.

this study demonstrated a mean HUDBI score of (5.86±1.72) which is close to that reported among Yemeni (4.91±1.50)[10] and Nigerian (4.87±1.41)[20] students.

Surprisingly, dental students/interns (7.09±1.67) in our study demonstrated a significantly higher mean HUDBI score than medical students/interns (5.86±1.72) (p<0.001), indicating better oral health attitudes and behaviors. Our hypothesis of no difference is rejected due to the significant differences observed in oral health attitudes and behaviors of dental and medical students/interns during the COVID-19 pandemic. This finding is similar to the Nigerian study[26] in which dental students demonstrated significantly higher HUDBI scores than medical students. At the same time, the study[10] conducted in Yemen reflected poor oral health attitudes and behavior of dental and medical students without any significant differences in HUDBI scores.

The significant increase in HUDBI score among dental students has been related to their motivation to pursue a dental vocation[27]. Moreover, dental students/interns have more opportunities to receive dental health topics in their learning, provide oral hygiene instructions to their patients, and debate with their colleagues about what may contribute to this shift in oral hygiene practice, attitudes, and beliefs. In addition, they learn several behavioral approaches for minimizing dental fear in dental patients[28]. Furthermore, preventive dental science courses and the information and experience dental students obtained from their fundamental dental topics could have influenced the HUDBI score. Therefore, dental students/interns who experienced dental anxiety probably learned to manage their oral health far more positively than the medical students/interns during the COVID-19 pandemic.

In our study, clinical year students (4th, 5th, 6^{th,} and internship) demonstrated significantly higher HUDBI scores than preclinical students (1st, 2nd, and 3rd year). This might be due to clinical students gaining more experience with oral health care when they contact patients in their clinical settings. Furthermore, as they move through their education, students may become more aware of general health and highly sensitive to oral health concerns, leading to better health attitudes and behaviors. This finding is consistent with earlier research carried out in Egypt, Turkey, Lithuania, and India[29-33], which discovered that clinical students had better attitudes toward oral health than preclinical students. In contrast, studies[22,23] conducted in Sudan and Germany did not find any significant differences in preclinical and clinical dental students' oral health attitudes and behaviors.

When comparing dental students to medical students in their last year of university education, it was shown that dental students/interns had improved oral attitudes and habits than medical students throughout the first year of the program[34]. Similarly, second-year dental students of UAE reported significantly higher mean HU-DBI scores than medical students[35]. This variation in the HU-DBI score reflects cultural differences observed in 18 of the 20 items questionnaire between medical and dental students/interns on oral health attitudes and behaviors[34].

Previous studies[26,36,37] have shown that oral health attitudes and behaviors vary among genders. Our study also found significant gender differences, with the females demonstrating significantly higher HU-DBI scores than males indicating better oral health attitudes and behaviors. It should be noted that more females than males participated in the current study. Higher HUDBI scores in females could be attributed to their psychological causes as they are more concerned with their physique and looks, and thus, are more likely to seek therapy or guidance from health specialists[10]. On the contrary, Badovinac et al[38] did not find gender differences in the HUDBI score.

An interesting finding was the significantly higher mean HUDBI score observed among the participants studying in private universities than the government universities. It could be because most of the students admitted to government universities come from low socioeconomic backgrounds than the students joining the private universities. The low socioeconomic level is a well-known detriment to oral health attitudes and behaviors[39]. In contrast, Halboub et al[10] found a significantly higher mean HUDBI score among public university students than the private university students.

A recent epidemiologic study has pointed out that poor self-rated oral health is linked to socioeconomic status, gender, age, smoking, and dental visits. In addition, this self-perception of poor oral health is associated with severe periodontitis and higher caries experience[40]. In line with these findings, our study observed that self-rated poor oral health is significantly associated with lower HUDBI scores indicating poor oral health attitudes and behaviors.

Previous studies[9,16,21] have reported a difference in the HUDBI scores based on nationality

and ethnicity. However, no such difference was observed in the present study. Similar HUDBI scores were reported between Saudi and non-Saudi medical and dental students. It should be noted that of the total study sample, non-Saudi students constituted a minimal number in our study.

The relatively large sample size, utilization of the reliable and valid English version of the HUDBI questionnaire, and online data collection by avoiding personal contact during the COVID-19 pandemic were considered the strength of our study.

Limitations

Because various circumstances influence an individual's oral health attitude and behavior, it is less appropriate to attribute the present study's findings entirely to the impact of the COVID-19 pandemic. In addition, the study's cross-sectional design made it impossible to assess the temporality of oral health attitudes and behaviors. Finally, the study participants risk over or under-reporting oral health attitudes and behaviors due to social desirability.

Conclusions

During the COVID-19 pandemic, dental students/interns displayed a better oral health attitude and behavior than medical students/interns. Of the 20 items on the HUDBI scale, 18 items significantly differed between dentistry and medical students/interns. Therefore, oral health promotion programs aimed at medical students/interns are critical for improving oral health attitudes and behaviors.

Conflict of Interest

The Authors declare that they have no conflict of interests.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of Riyadh Elm University's research and innovation center (FIRP/2020/69/235/232). The purpose of the study was explained to the subjects, and informed consent to participate in the study was obtained.

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Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Authors' Contribution

Osamah Mohammed AlMugeiren: conception and design of the study, acquisition of data, analysis, and interpretation of data, drafting the article, supervision, and final approval. Mohammad Abdul Baseer: Analysis and interpretation of data, drafting the article, supervision and final approval. Yara Abdulelah AlSenani: Acquisition of data, revising the paper, final approval. Muslat Assaf Bin Rubaia'an: Interpretation of data, revising the article, final approval. Rahaf Mohammed AlObaida: Acquisition of data, analysis and interpretation of data. Latifa Sulaiman AlSuwayyid: Acquisition of data, drafting the article, final approval. Nada Hamad AlSebayel: Acquisition of data, drafting the article, final approval.

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