

# Evaluation of Oral Health Behavior of Female Dental Hygiene Students and Interns of Saudi Arabia by Using Hiroshima University Dental Behavioural Inventory (HU-DBI)

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## Abstract

**Aim:** To evaluate and compare oral health behavior of female dental hygiene students/interns (stu/int) studying in private and government universities of Saudi Arabia.

**Methods:** An English version of Hiroshima University Dental Behavioral Inventory (HU-DBI) was self-administered by 85 dental hygiene stu/int of government and private university colleges and responses were collected. Descriptive statistics, Chi-square test, logistic regression models and independent t tests were performed.

**Results:** A significantly higher mean HU-DBI score was observed among the clinical dental hygiene stu/int ( $7.50 \pm 1.55$ ) and students of government universities ( $7.59 \pm 1.72$ ) as compared to the preclinical students ( $6.61 \pm 2.03$ ) stu/int studying in private university ( $6.69 \pm 1.46$ ).

**Conclusion:** Considerable differences in oral health behaviours were observed between dental hygiene stu/int of government and private universities and preclinical and clinical level of dental hygiene education.

*Key Words:* Dental Hygiene, Hiroshima University Dental Behavioral Inventory (HU-DBI), Interns, Oral Health, Saudi Arabia, Students, University

*Abbreviations:* RCsDP: Riyadh Colleges of Dentistry and Pharmacy; KSU: King Saud University; PSMCH: Prince Sultan Military College of Health Sciences; Stu/int: Students and Interns

## Introduction

Health behaviour is the human action taken to maintain and promote health. It also helps to prevent diseases. Oral health behaviour consists of individual and professional care and includes tooth brushing, dental flossing, visiting dentist and following proper diet [1]. It has been found that oral health care providers exhibit a positive attitude towards oral health and dental care [2]. Dental hygiene students as oral health care provider, to become a role model for their patients, families and friends it is essential to improve their own oral health behaviors [3-5]. Oral health care provider's oral health attitudes developing during the undergraduate training reflect their understanding of the importance of disease prevention and their commitment to improving their patient's oral health. Therefore positive oral health attitudes should be taught, developed and reinforced during undergraduate training [6].

Diploma or Bachelors of Science degree in Dental hygiene is the requirement for entering into the dental hygiene profession in Saudi Arabia. The students for dental hygiene training in private universities get admitted based on their grades in previous exams. The program comprised of four years (Eight levels), divided into two parts: preclinical years [1<sup>st</sup> year (level 1&2), 2<sup>nd</sup> year (level 3&4)] and clinical years [3<sup>rd</sup> year (level 5& 6), 4<sup>th</sup> year (level 7&8)] followed by one year internship. Training in government universities is almost similar. Medium of instruction for teaching dental

hygiene courses is English. Preclinical students take basic science and preclinical laboratory courses during early years of the program. In the clinical years, students manage and treat patients under supervision of the instructor. In the dental hygiene curriculum, no specific course in preventive dentistry was offered rather, the related subjects were taught as parts of courses in restorative dentistry, periodontics, community dentistry and Pedodontics. The principles and practical application of preventive dentistry are taught during the community dentistry and the conservative dentistry courses in Year 4 (level 7 and 8). The dental hygiene program is at its infancy stage in private universities whereas in government universities it was started well before and is established.

Research on dental students has shown that the oral health attitudes and behaviours differed between preclinical and clinical years of training [7,8] and it differed among different cultures and countries [9-12]. Moreover, these varied among the students pursuing different training programs in dentistry, dental hygiene, dental technician and pharmacy [13,14]. Clearly such studies are of paramount importance as the present global trend of standardization of dental education requires inclusion of oral health promotion in dental practice. To measure the advances in this trend, comparative evaluation studies of oral health behaviours and attitudes of dental professionals coming from various cultures, educational and health care systems are required [11-15]. However, until now no attention has been given to oral self-care beliefs, attitudes

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and behaviour of dental hygiene stu/int enrolled in the dental hygiene program in Saudi Arabia. Hence, the present study was undertaken with an aim to evaluate and compare the oral health behavior of female dental hygiene stu/int studying in government and private universities by using HU-DBI.

## Methods

The Hiroshima University-Dental Behavioral Inventory (HU-DBI), developed by Kawamura [16] has been used to examine the oral health-related attitudes and behavior of dental students in different countries. The English version has also shown good test-retest reliability and translation validity. Considerable differences in oral health attitudes/behavior between dental hygiene students in the USA and Korea have been reported by Kawamura et al. [17] by using HU-DBI. Similar, HU-DBI instrument consisting of 20 questions with agree/disagree responses along with information pertaining to the type of university, level of education and age of the dental hygiene int/stu is utilized in the present study.

At the time of this study, Riyadh Colleges of Dentistry and Pharmacy (RCsDP) a private university, King Saud University (KSU) Riyadh and Prince Sultan Military College of Health sciences (PSMCH) Dammam were providing dental hygiene training program for females in government universities of Saudi Arabia. Eighty five female dental hygiene stu/interns studying in RCsDP, KSU and PSMCH participated in the survey. A group of four dental hygiene interns were trained to collect the data from different university colleges of Saudi Arabia. Female Students from four academic years were invited to take part in the study and the participation in the study was voluntary. At the end of the didactic lecture students were requested to stay back in the classroom and the purpose of the study was explained. Dental hygiene interns completed the questionnaire in the female lounge of the clinics. The survey was completed anonymously, and no stu/int's personal, demographic or academic information was collected. On an average five to seven minutes was taken by the stu/int to complete the questionnaire. All the data was collected before the end of first semester of academic year 2011-2012. Ethical clearance for the study was obtained from the Research Centre of RCsDP.

## Statistical Analysis

The HU-DBI questionnaire consists of 20 items in a dichotomous agree/disagree response scheme. Frequency distribution tables were obtained for age, type of college, university, year and level of dental hygiene education. Chi-square tests were used to evaluate differences in the distribution of all variables in the HU-DBI survey by type of university and level of education. A stepwise backward selection strategy was used to construct multivariate logistic regression models with private/government and preclinical/clinical status as dependent variables. Wald chi square and Nagelkerke's  $R^2$  statistics were calculated. While calculating the HU-DBI scores, single point was awarded for every agree responses to the items 4, 9, 11, 12, 16, 19 and similarly single point was given for each of disagree responses to the items 2, 6, 8, 10, 14 and 15. Thus adding all these points a maximum HU-DBI score of 12 will be observed. The summary estimate

of oral health behavior was calculated from the responses to the twelve items. Independent sample t-tests were used for group comparison between government and private and preclinical and clinical levels of stu/int. Statistical level of significance was adjusted at  $p \leq 0.05$  and all the data was analyzed by using IBM SPSS statistics 19.

## Results

The distribution of the participating dental hygiene stu/int in private and government colleges according to type of university, level of dental hygiene study and age of the students were shown in *Table 1*. Age of the study participants ranged from 19 years to 25 years with mean age of  $21.56 \pm 1.76$  years.

*Table 2* presents the distribution of the agree responses to the 20 items based on different years of education. An overall less than 25% agreed responses were seen with the statements; I use a child sized toothbrush (Item 5); I use toothbrush with hard bristles (Item 17); I don't feel I have brushed well unless i brush with strong strokes (Item 18); I have never been taught professionally how to brush (Item 10); My gums tend to bleed when i brush my teeth (Item 2). Similarly, 25% - 50% agreed responses observed with the statements; I think my teeth are getting worse despite my daily brushing (Item 8); I think that i cannot help having false teeth when i am old (item 6); I am bothered by the color of my gums (Item 7); I have noticed some white sticky deposits on my teeth (item 4); I feel i sometimes take too much time to brush my teeth (Item 19) and I don't worry much about visiting the dentist (Item 1). Fifty to seventy five percentages of the agreed responses were observed with the statements; I put off going to the dentist until i have tooth ache (Item 15); I have used a dye to see how clean my teeth are (Item 16); It is impossible to prevent gum disease with tooth brushing alone (Item 14). More than 75% agreed responses were recorded with the statements; I have had my dentist tell me that i brush very well (Item 20); I worry about having bad breath (Item 13); I brush each of my teeth carefully (Item 9); I often check my teeth in a mirror after brushing (Item 12) and I worry about the color of my teeth (Item 3). Dental hygiene interns showed higher awareness in items - 4, 6, 10, 12 and 16 compared to other year students for the selected 12 HU-DBI score.

*Table 3* shows the percentage of "agree" responses in the dichotomous response (agree-disagree) to the HU-DBI questionnaire. The data were classified based upon type of university and level of dental hygiene education. Significant differences were found between government and private university and preclinical and clinical level stu/int. About 83 percent of the total participants said they brushed each of their teeth carefully. Overall 52% agreed for the statement, I put off going to the dentist until i have tooth ache. However, private university dental hygiene stu/int more likely to put off going to the dentist until tooth ache knocks (Item 15,  $p < 0.01$ ).

About, 28.2% of the total participants agreed for the statement "I think that i cannot help having false teeth when i am old". A higher proportion of the preclinical than clinical students agreed for the above statement (Item 6,  $p < 0.001$ ). Nearly 18.8% of the participants thought that they can clean

their teeth well without using toothpaste. Preclinical students were more likely to clean their teeth without using toothpaste than the clinical students (Item 11,  $p < 0.05$ ). Almost 82.4% of participants worried about having bad breath. A high number of clinical students/interns worried about bad breath than the preclinical students (Item 13,  $p < 0.01$ ). A total of 51.8% of the subjects said that they put off going to the dentist until they have tooth ache. High number of preclinical students than the clinical student/interns put off going to dentist until they have toothache (Item 15,  $p = 0.050$ ). Thirteen percentages

of the total participants tend to use toothbrush with hard bristles. Preclinical students were more likely to use hard bristle toothbrush than the clinical students/interns (Item 17,  $p < 0.001$ ).

Table 4 presents the details of the logistic regression model that predicts the group membership for type of university and level of dental hygiene education of the study subjects.

Dental hygiene stu/int studying in private dental college would likely to visit the dentist only when they had a

**Table 1.** Distribution of dental hygiene students/interns according to years of study, level of study and age.

Characteristics	Private (RCSDP n=26)			Government (KSU n=52; PSMCH n=7)	
		N	%	N	%
Years of study	1st year	3	11.5	6	10.2
	2nd year	0	0.0	9	15.3
	3rd year	8	30.8	20	33.9
	4th year	11	42.3	23	39.0
	Intern	4	15.4	1	1.7
	<b>Total</b>	<b>26</b>	<b>100</b>	<b>59</b>	<b>100.</b>
Level of study	Preclinical	3	11.5	15	25.4
	Clinical	23	88.5	44	74.6
	<b>Total</b>	<b>26</b>	<b>100.</b>	<b>59</b>	<b>100.</b>
Age of student	19 Years	2	7.7	11	18.6
	20 Years	3	11.5	6	10.2
	21 Years	10	38.5	13	22
	22 Years	4	15.4	15	25.4
	23 Years	2	7.7	5	8.5
	24 Years	1	3.8	5	8.5
	25 Years	4	15.4	4	6.8
	<b>Total</b>	<b>26</b>	<b>100.</b>	<b>59</b>	<b>100.</b>

RCSDP=Riyadh Colleges Of Dentistry and Pharmacy; KSU=King Saud University; PSMCH=Prince sultan military college of health sciences.

**Table 2.** Distribution of questionnaire items of the HU-DBI by agree responses.

Items	Items of HU-DBI	1styr	2ndyr	3rdyr	4thyr	Interns
1	I don't worry much about visiting the dentist	55.6%	77.8%	42.9%	38.2%	60.0%
2	My gums tend to bleed when i brush my teeth(D)	44.4%	11.1%	7.1%	17.6%	60.0%
3	I worry about the color of my teeth	88.9%	77.8%	96.4%	85.3%	100.0%
4	I have noticed some white sticky deposits on my teeth(A)	44.4%	44.4%	32.1%	44.1%	80.0%
5	I use a child sized toothbrush	22.2%	0.0%	3.6%	14.7%	0.0%
6	I think that i cannot help having false teeth when i am old(D)	77.8%	44.4%	14.3%	26.5%	0.0%
7	I am bothered by the color of my gums	44.4%	22.2%	32.1%	44.1%	0.0%
8	I think my teeth are getting worse despite my daily brushing(D)	11.1%	55.6%	10.7%	32.4%	60.0%
9	I brush each of my teeth carefully(A)	88.9%	66.7%	75.0%	97.1%	40.0%
10	I have never been taught professionally how to brush(D)	33.3%	22.2%	25.0%	8.8%	0.0%
11	I think i can clean my teeth well without using toothpaste(A)	44.4%	33.3%	17.9%	11.8%	0.0%
12	I often check my teeth in a mirror after brushing(A)	55.6%	88.9%	82.1%	88.2%	100.0%
13	I worry about having bad breath	66.7%	55.6%	85.7%	88.2%	100.0%
14	It is impossible to prevent gum disease with toothbrushing alone(D)	66.7%	66.7%	46.4%	55.9%	100.0%
15	I put off going to the dentist until i have tooth ache (D)	66.7%	77.8%	60.7%	32.4%	60.0%
16	I have used a dye to see how clean my teeth are(A)	55.6%	66.7%	53.6%	47.1%	100.0%
17	I use a toothbrush with hard bristles	33.3%	44.4%	10.7%	0.0%	20.0%
18	I don't feel i have brushed well unless i brush with strong strokes	33.3%	11.1%	25.0%	0.0%	20.0%
19	I feel i sometimes take too much time to brush my teeth(A)	66.7%	44.4%	42.9%	50.0%	20.0%
20	I have had my dentist tell me that i brush very well	66.7%	55.6%	82.1%	73.5%	100.0%

In the calculation of the HU-DBI, one point was given for each of the agree responses marked with (A), and one point was given for each of the disagree responses marked with (D). yr=year

**Table 3.** Questionnaire items of the HU-DBI and percentage of “agree” responses by type of university and level of education.

HU-DBI items	Type of university				Level of education			
	Private (%)	Government (%)	Total (%)	P value	Preclinical (%)	Clinical (%)	Total (%)	P value
Item 1	42.3%	49.2%	47.1%	0.560	66.7%	41.8%	47.1%	0.060
Item 2	26.9%	15.3%	18.8%	0.205	27.8%	16.4%	18.8%	0.274
Item 3	84.6%	91.5%	89.4%	0.340	83.3%	91.0%	89.4%	0.345
Item 4	42.3%	42.4%	42.4%	0.996	44.4%	41.8%	42.4%	0.840
Item 5	11.5%	8.5%	9.4%	0.656	11.1%	9.0%	9.4%	0.781
Item 6	26.9%	28.8%	28.2%	0.858	61.1%	19.4%	28.2%	<0.001
Item 7	30.8%	37.3%	35.3%	0.562	33.3%	35.8%	35.3%	0.845
Item 8	26.9%	27.1%	27.1%	0.985	33.3%	25.4%	27.1%	0.500
Item 9	65.4%	89.8%	82.4%	<0.01	77.8%	83.6%	82.4%	0.566
Item 10	23.1%	15.3%	17.6%	0.383	27.8%	14.9%	17.6%	0.204
Item 11	11.5%	22.0%	18.8%	0.254	38.9%	13.4%	18.8%	<0.05
Item 12	80.8%	84.7%	83.5%	0.649	72.2%	86.6%	83.5%	0.145
Item 13	80.8%	83.1%	82.4%	0.799	61.1%	88.1%	82.4%	<0.01
Item 14	65.4%	54.2%	57.6%	0.338	66.7%	55.2%	57.6%	0.383
Item 15	73.1%	42.4%	51.8%	<0.01	72.2%	46.3%	51.8%	0.05
Item 16	69.2%	49.2%	55.3%	0.086	61.1%	53.7%	55.3%	0.576
Item 17	15.4%	11.9%	12.9%	0.656	38.9%	6.0%	12.9%	<0.001
Item 18	11.5%	15.3%	14.1%	0.650	22.2%	11.9%	14.1%	0.266
Item 19	38.5%	50.8%	47.1%	0.292	55.6%	44.8%	47.1%	0.416
Item 20	69.2%	78.0%	75.3%	0.390	61.1%	79.1%	75.3%	0.116
Item 15	73.1%	42.4%	51.8%	<0.01	72.2%	46.3%	51.8%	0.05
Item 16	69.2%	49.2%	55.3%	0.086	61.1%	53.7%	55.3%	0.576
Item 17	15.4%	11.9%	12.9%	0.656	38.9%	6.0%	12.9%	<0.001
Item 18	11.5%	15.3%	14.1%	0.650	22.2%	11.9%	14.1%	0.266
Item 19	38.5%	50.8%	47.1%	0.292	55.6%	44.8%	47.1%	0.416
Item 20	69.2%	78.0%	75.3%	0.390	61.1%	79.1%	75.3%	0.116

**Table 4.** Results of logistic regression analysis for type of university and level of dental hygiene education.

HU-DBI items		Wald Chi-square	df	Sig.	Exp (B)	95% CI
	<b>Type of university</b>					
Item 9	I brush each of my teeth carefully	4.09	1	<b>0.043</b>	0.28	0.08-0.96
Item 15	I put off going to the dentist until i have tooth ache	4.11	1	<b>0.042</b>	2.95	1.03-8.41
	Intercept	0.43	1	0.51		
	<b>Level of dental hygiene education</b>					
Item 14	It is impossible to prevent gum disease with toothbrushing alone	3.63	1	0.057	4.37	0.95-19.90
		8.82	1	<b>0.003</b>	14.55	2.48-85.24
Item 1	I don't worry much about visiting the dentist	7.71	1	<b>0.005</b>	12.27	2.09-72.06
Item 11	I think i can clean my teeth well without using toothpaste	5.01	1	<b>0.025</b>	5.81	1.24-27.14
	I put off going to the dentist until i have tooth ache	6.14	1	<b>0.013</b>	10.26	1.62-64.67
Item 15	I use a toothbrush with hard bristles	18.23	1	0.000		
Item 17	Intercept					

Data were available for 85 students. B: is the estimated coefficient as the predicted change in log hazard for unit increase in the predictor.

S.E: standard error, 95% CI: 95% confidence interval at Exp (B)

Backward stepwise elimination with likely hood ratio criterion was used to select the variable for removal.

Type of university: Variables entered on step 1: Items No (1-20) and type of university.

Variables removed at step: 2= No 17, 3=No 4, 4=No 14, 5=No 6, 6=No 13, 7=No 12, 8=No 20, 9=No 5, 10=No 3, 11=No 8, 12= No 10, 13=No 16, 14=No 19, 15=No 2, 16=No 7, 17=No 11, 18= No 18, 19= No 1

Level of dental hygiene education: Variables entered on step 1: items No (1-20) and level of dental hygiene

Variables removed at step: 2= No 2, 3=No 18, 4=No 5, 5=No 3, 6=No 7, 7=No 16, 8=No 8, 9=No 13, 10=No 6, 11=No 4, 12= No 10, 13=No 9, 14=No 12, 15=No 19, 16=No 20.

toothache (Item 15, OR 2.95, 95% CI 1.03 – 8.41). In contrast, government dental hygiene stu/int were more likely to brush their each teeth carefully than the private counter parts (Item 9, OR 0.28, 95% CI 0.08– 0.96). However, dental hygiene students in preclinical levels less likely to worry about visiting dentist (Item 1, OR 14.55, 95% CI 2.48-85.24), that they could clean their teeth well without toothpaste (Item 11, OR

12.27, 95% CI 2.09-72.06), could use toothbrush with hard bristles (Item 17, OR 10.26, 95% CI 1.62-64.67) and likely to put off going to the dentist until they had tooth ache (Item 15, OR 5.81, 95% CI 1.24-27.14).

The summary estimate of oral health behavior was calculated from the responses to the twelve items of the HU-DBI, as shown in Table 5. The maximum score is 12,

**Table 5.** The observed and predicted group membership.

Predicted type of university			
Type of university	Private	Government	Percentage correct
Private	13	13	50.0%
Government	5	54	91.5%
<b>Total</b>			<b>78.8%</b>
<b>Note: The cut value is 0.50 and Nagelkerke R<sup>2</sup> = 0.34</b>			
Predicted level of dental hygiene education			
Level of education	Preclinical	Clinical	Percentage correct
Preclinical	12	6	66.7%
Clinical	4	63	94%
<b>Total</b>			<b>88.2%</b>

**Note: The cut value is 0.50 and Nagelkerke R<sup>2</sup> = 0.60.**

**Table 6.** Independent t test of the mean value of the HU-DBI score and type of university and level of study.

	Variable	N	Mean	Std. Deviation	t	P value
<b>Type of University</b>	Private	26	6.69	1.46	-2.32	<b>0.023*</b>
	Government	59	7.59	1.72		
<b>Level of study</b>	Pre-clinical	18	6.61	2.03	-2.03	<b>0.045*</b>
	Clinical	67	7.50	1.55		

\*Indicates  $p < 0.05$ .

and higher scores signify better oral health behaviour. The mean score of dental hygiene students/interns studying in government universities was 7.59, whereas mean score of private university students/interns was found to be 6.69, and the difference was statistically significant ( $p < 0.05$ ). Similarly, overall clinical dental hygiene students/interns showed higher mean score of 7.50 as compared to the preclinical students 6.61 and the difference was statistically significant ( $p < 0.05$ ) (Table 6).

As the age increased from 19 years to 22 years the mean HU-DBI score was also increased among the dental hygiene students studying in private as well as government universities. Highest HU-DBI score of 8.4 was observed at 24 years of age among the government dental hygiene stu/int. Similarly, a highest HU-DBI score of 8.25 was observed at 22 years of age among private dental hygiene stu/int.

## Discussion

Dental hygiene students as a future primary oral care specialist could play an important role in oral health education and promotion of individual and community. However, oral self-care attitude and behaviour of dental hygiene stu/int from Saudi Arabia remained undisclosed until now. Hence, present study was undertaken with objectives to evaluate the dental health behaviours of dental hygiene stu/int and to compare between dental health behavior of dental hygiene stu/int studying in private and government universities of Saudi Arabia by using Hiroshima University Dental Behavioral Inventory. This was the first formal study which assessed and compared the oral health attitude and behaviour of female dental hygiene stu/int from similar culture, but studying in government and private universities.

Increased knowledge of the oral self-care among the dental hygienists through academic learning helps to motivate their patients for the primary prevention of oral diseases.

Recent studies have clearly highlighted the importance of personal oral hygiene among dental students and showed its relationship with the curriculum [2,7,8].

The present study showed an overall mean HU-DBI score of 7.31 among dental hygiene stu/int. This mean HU-DBI score was lower than that of U.S and Japanese dental hygiene students [18] but higher than that of Korean dental hygiene students [17] and Jordanian dental hygiene/dental technology students [13]. In contrast, dental students from Jazan University Saudi Arabia [14], Turkey [6,19] and India [5] showed lower mean HU-DBI score compared to the present study.

The mean HU-DBI score 7.59 of the government university dental hygiene stu/int was significantly higher than that of the private university 6.69. This difference could be due to the curriculum improvements observed over the years after establishment of the government universities.

A variable positive attitude and behaviours was observed among the dental hygiene students as they progressed through the curriculum from first to final year of training. In fact, they showed a more positive dental health attitude and behaviours during their internship level. This positive behaviour was reflected by their worrying about visiting the dentist; worrying about the colour of teeth; worrying about having bad breath. This could be due to the increased knowledge and awareness of oral health received as they advanced through the curriculum.

In the present study a large number of dental hygiene students brushed their teeth carefully. This result was similar to that reported by Kawamura et al. among the dental hygiene students of USA [17] and Japan [18]. However, government dental hygiene stu/int significantly differed in brushing their teeth as compared to their private university counter parts. This could be due to the higher level of motivation seen

among government stu/int regarding tooth brushing and oral hygiene practices.

The results of our study found that nearly half of the female dental hygiene stu/int would put off going to dentist until they had a tooth ache. The probable reason for such behaviour could be dental treatment anxiety [20], high cost of dental care [21] and lack of parental motivation and advice to visit the dentist [17] fear of pain and transportation difficulties [22] encountered by the females as driving is prohibited for them in Saudi Arabia. Moreover, it was reported that most of the female school children visited dentist when they had tooth ache rather than for a regular visit [23]. This finding is similar to that reported among Japanese dental hygiene students [18] and Jordanian dental hygiene/dental technology students [13].

Overall comparison of oral health behaviours between preclinical and clinical dental hygiene stud/int showed a significantly higher mean HU-DBI score among the clinical dental hygiene stu/int as compared to the preclinical counterparts. This could be due to the curriculum of the program in which the preclinical students were not exposed to the preventive and behavioral aspects of oral self-care practices. Similar finding was observed among Turkish preclinical dental students [6].

Lack of oral health educational and promotional activities during intermediate school level could have resulted in lowered interest in dental health care and preventive measures among intermediate school children [24]. This trend continued in the secondary school level with the development of inadequate oral health knowledge, negative attitudes and behaviours concerning various aspects of oral health among young students. As a consequence, when these students join dental hygiene program, the commonly prevailing attitudes and behaviours among young school students could be observed during preclinical level of dental hygiene education.

The above quoted information could be the reason that the preclinical students much more frequently worried less about visiting the dentist (Item 1), Cleaned their teeth well without using toothpaste (Item 11), Put off going to dentist until they get toothache (Item 15) and used tooth brush with hard bristles (Item 17) than the clinical dental hygiene stu/int. Hence there is urgent need to improve the oral health awareness during intermediate and secondary level of education by various approaches.

Statement "i think that i cannot help having false teeth when i am old" (Item 6) was reported by significantly high number of preclinical students than clinical stu/int. This

response could be due to the fact that high prevalence of tooth loss seen among Saudi adolescence [25] led preclinical students to believe that with old age tooth loss was inevitable. This result is in line with other reported studies among preclinical dental hygiene students [13,17,18] and preclinical dental students [20].

Increase in the age of the dental hygiene stu/int was related to the positive oral health behaviours as witnessed by increasing HU-DBI scores. This finding was similar to that reported by Kawamura et al. among selected Japanese and Australian students [26].

Some limitations can be identified in this study. A total number of dental hygiene stu/int studying in private university was less as compared to the government university students. Interns and preclinical level students were under represented as compared to the clinical level students. Interns from government universities did not participate in the study as they were outside the college during the study period to serve the patients in different hospitals and health centers of Saudi Arabia as part of their internship program. Hence, authors did not have any methods to force them to respond to the questionnaire. Moreover, any change in HU-DBI scores cannot be solely attributed to the curriculum since data obtained was not of longitudinal in nature. Cultural factors shaping oral health attitudes and behaviours were not considered in the present study. Moreover, government and private universities differed with regards to certain factors such as educational setting, internship training program and patient flow which could have influenced the study results.

## Conclusion

Within the limitations of the study it can be noted that, considerable differences in oral health behaviours were observed between dental hygiene stu/int of government and private universities and preclinical and clinical level of dental hygiene education. However, future longitudinal studies involving dental hygiene interns from government universities and adequate number of dental hygiene stu/int from private universities will be required to get clearer insight into the oral health behaviour of female dental hygiene students and interns of Saudi Arabia.

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