# An Assessment of Oral Self-Care among Romanian Dental Students using the Hiroshima University Dental Behavioural Inventory

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Objective: To determine the differences in oral self-care levels between 322 Romanian dental students.

**Materials and Methods:** The design of the study was a cross-sectional survey of dental students in Romania. The examination was based upon responses to a questionnaire entitled 'Hiroshima University – Dental Behavioural Inventory' (HU-DBI) and three additional questions.

**Results:** Statistically significant differences of the mean HU-DBI scores were observed between year 1 and 2 (level of basic science course) and year 5 and 6 (level of clinical course) and between genders (p < 0.001). Statistically significant differences were notable in 10 items out of 20 between three levels of dental education (basic, preclinical and clinical levels). The most striking results were that year 5 and 6 students were less likely to use a toothbrush with hard bristles (p < 0.001), and less likely to worry about the colour of their teeth (p < 0.01). While 20% of year 1 and 2 students reported daily flossing, almost 46% was reported in year 5 and 6 students (p < 0.001). A significant difference was also observed on flossing behaviour between genders (p < 0.001). Of 205 year 1–4 students, 176 (85.9%) were correctly predicted by the models, and 177 of 193 female students (91.7%) were correctly predicted.

**Conclusions:** There were considerable differences in dental health attitudes/behaviour between the three levels of dental education and between genders.

Key words: dental education, dental students, gender, oral health behaviour, Romania

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Baseline information on oral health, associated with adequate preventive procedures, is fundamental to promote self-preventive behaviour. This latter includes many factors such as consistent modalities of oral hygiene, appropriate diet and lifestyles, and compliance toward professional counselling and care. It has been demonstrated that plaque is an important factor in the development of hard and soft tissue dis-

eases and that the reduction of its accumulation decreases the prevalence of dental caries, gingivitis and periodontal diseases in the population. Toothbrushing and flossing are reported to be fundamental to reduce the amount of bacterial plaque and its virulence potential and, since they are easy, effective and low cost, they are considered the pillar of self-prevention strategy (Glickman, 1972; Tromp et al, 1986; Dumitrescu, 1996; Rimondini et al, 2001; Christensen et al, 2003; Ciancio, 2003; Lindhe et al, 2003; Sadoh et al, 2004; Honkala and Al-Ansari, 2005).

Although much published research has been concerned with how to motivate the patient to follow a prescribed, effective oral health programme throughout their life, little attention has been given to the context of when and how dental students undergo attitudinal and behavioural changes with respect to their oral

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health. As the education of dental students progresses, they are expected to be role models for their patients, becoming teachers of oral hygiene (Frazier, 1983; Schou, 1985; Watt et al, 2001; Komabayashi et al, 2005). Patterns of oral health behaviour, beliefs and attitudes in dental students may be therefore particularly significant.

To investigate dental health attitudes, perceptions and behaviour, Kawamura (1988) developed the Hiroshima University – Dental Behavioural Inventory (HU-DBI). The questionnaire, based on a 20-item scoring scale, provided an instrument capable of measuring students' perceptions and attitudes to prevention as well as students' oral self-care behaviour. Apart from Japanese students, the inventory has been recorded and investigated in dental students in Australia, Belgium, Brazil, China, Finland, France, Germany, Greece, Hong Kong, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Thailand, and the UK, in an effort to gain further insight into their health attitudes (Kawamura et al, 1997, 2000, 2001, 2002, 2005; Polychronopoulou et al, 2002; Komabayashi et al, 2005).

The aim of the present study was to describe the oral health attitudes/behaviour between different levels of education and between genders of Romanian undergraduate dental students.

#### MATERIALS AND METHODS

The subjects of the study were 322 first- to sixth-year dental students at the University of Medicine and Pharmacy "Carol Davila", who were invited to this survey using the HU-DBI and three additional questions about frequencies of brushing, flossing and mouthwash, at the end of the academic year. The HU-DBI questionnaire, which consists of 20 dichotomous responses (agree/disagree) regarding oral health-related behaviour, was completed by students anonymously in class, during normal faculty hours. All students selected for the survey answered the questionnaire. A total score was calculated based on the response on each statement. Higher scores of the HU-DBI indicate better oral health attitudes/behaviour. The maximum possible score is 12. The HU-DBI scoring system has been reported previously (Kawamura et al, 1997). Each additional item has four categories [4 times and more, 3 times, twice, and everyday for toothbrushing frequency (BRUSHING), and once a week, once a month, and never for flossing (FLOSSING) and mouthwash frequency (RINSE)]. The mean age (±SD) of dental students was 22.4 (0.5) years. The percentage of female students was high in the sample (65%).

#### Data analysis

Descriptive statistics were used on all variables. Group comparisons were made using chi-square tests for categorical data and t-tests for HU-DBI scores. Statistical significance was based on probability values of less than 0.05. The hypothesised model was tested by logistic regression analysis in order to examine whether years 5 and 6 dental students have similar oral health behaviours as years<sup>1-4</sup>, and whether female students have similar oral health behaviours as males. Backward stepwise regression was carried out on the dependent variable (grade or gender). The Wald statistic was used to test the null hypothesis that the regression coefficients were zero. The Nagelkerke R<sup>2</sup> statistic was used to discriminate how well the model is able to distinguish between students. Data were analysed using SPSS 10.0 (SPSS, Chicago, USA).

### RESULTS

Table 1 presents the distribution of responders and mean age by grade and gender. The number of respondents by grade ranges between 46 and 67 respondents, and 196 female students and 105 male students participated in the study.

Fig 1 shows the mean HU-DBI scores classified by grade (years 1, 2, 3, 4, 5 and 6). There was no statistically significant difference in the mean HU-DBI score between grades. However, statistically significant differences were observed between years 1 and 2 (level of basic science course) and years 5 and 6 (level of clinical course) (p < 0.01) and between genders (p < 0.001).

Since the differences between years 1 and 2 (basic science level), between years 3 and 4 (preclinical level), and between years 5 and 6 (clinical level) were very small respectively, years 1 to 6 were grouped into three levels: years 1 and 2, years 3 and 4, and years 5 and 6. Table 2 reveals the HU-DBI statements and percentage distribution of the students who agreed with the statements, by level of dental education and gender.

The differences were notable in 10 items (numbers 3, 5, 6, 9, 10, 13, 14, 15, 16 and 17) out of 20 between different levels of education. The most striking results were that years 5 and 6 students were more likely to have used a dye to see how clean their teeth are (item 16: years 1 and 2, 26%; years 3 and 4, 56%; years 5 and 6, 58%) (p < 0.001), less likely to use a toothbrush which has hard bristles (item 17: years 1 and 2, 37%; years 3 and 4, 24%; years 5 and 6, 11%) (p < 0.001),

Table 1 Distribution of responders and mean age by grade and gender						
	Female	Male	Unknown	Total	Mean age ± SD	
Year 1	47	16	4	67	19.7 ± 0.8	
Year 2	27	18	5	50	$20.7 \pm 1.4$	
Year 3	28	17	1	46	$22.1 \pm 2.0$	
Year 4	29	11	8	48	$23.2 \pm 2.3$	
Year 5	29	20	3	52	$23.9 \pm 1.7$	
Year 6	36	23	0	59	$24.9 \pm 0.9$	
Total	196	105	21	322	$22.4 \pm 0.5$	

less likely to worry about the colour of their teeth (item 3: years 1 and 2, 50%; years 3 and 4, 35%; years 5 and 6, 30%) (p < 0.01), and less likely to have never been taught professionally how to brush (item 10: years 1 and 2, 30%; years 3 and 4, 23%; years 5 and 6, 12%) (p < 0.01).

Table 3 presents toothbrushing, flossing and mouthwash behaviour by level of dental education and by gender. While 20% of year 1 and 2 students reported daily flossing, almost 46% was reported in year 5 and 6 students (p < 0.001). Significant differences were observed regarding toothbrushing, flossing and mouthwash frequency between males and females (p < 0.05, p < 0.01, p < 0.05 respectively).

Table 4 shows the results of logistic regression analysis using the HU-DBI questionnaire. Of 205 years 1-4 students, 176 students (85.9%) and 177 of 193 female students (91.7%) were correctly predicted by the models. However, 59 of 107 years 5 and 6 students (55.1%) and 70 of 99 male students (70.7%) were not predicted.

#### DISCUSSION

The present study explored the self-reported oral health attitudes and behaviour of Romanian dental school students. No previous study has examined the modification of the abovementioned issues during the years of university study in Romania. Three hundred and twenty-two undergraduate students of the University of Medicine and Pharmacy "Carol Davila" Dental School were examined, with a female to male ratio of 1.86:1, reflecting the large number of females compared with males entering the dental field in Romania. The Romanian dental school curriculum is a six-year study programme. First to fourth level time is spent on medical courses; dental courses are primarily taken in the third level, whereas clinical work occupies the fifth



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**Fig 1** Comparison of HU-DBI scores classified by level of dental education (years 1 and 2, 3 and 4, and 5 and 6) and gender. \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001.

and sixth level. The quantitative summary estimate of oral health attitudes/behaviour, as provided by the questionnaire scores, increases from first to sixth level, but statistically significant increments are observed in the third and fifth level compared with the entry level score. Likewise, females tend to gain higher overall scores compared with males.

Similar results have been previously reported among dental undergraduates. In a cross-national study using the HU-DBI, Komabayashi et al (2005) reported that the mean HU-DBI score of British students was 7.33, which was significantly higher than that of Chinese students (5.07; p < 0.001). When 126 dental hygiene students in the USA and 246 in Korea were surveyed using the HU-DBI, the overall mean HU-DBI score of the US peers was greater than that of the Korean (Kawamura et al, 2002). Similarly, Finnish dental students had a higher level of dental health awareness than that of their Japanese peers (Kawamura et al, 2000).



## Table 2 Questionnaire items of the HU-DBI (Romanian version) and percentage of 'agree' response by grade and gender

Nie				Grade		ĺ	Gender	0
INO.	item description		1 and 2	3 and 4	5 and 6	М	-3611	F
1	I don't worry much about visiting the dentist	% p	15	22 NS	17	29	***	12
2	My gums tend to bleed when I brush my teeth $^{(\ensuremath{D})}$	% p	22	20 NS	20	23	NS	19
3	I worry about the colour of my teeth	% p	50	35 **	30	31	*	44
4	I have noticed some white sticky deposits on my teeth	% p	21	23 NS	14	17	17 NS	
5	I use a child's-sized toothbrush	% p	6	3 *	0	4	NS	3
6	I think that I cannot help having false teeth when I am $\mbox{old}^{(D)}$	% p	25	29 *	14	26	NS	20
7	I am bothered by the colour of my gums	% p	20	13 NS	17	17	NS	16
8	I think my teeth are getting worse despite my daily brushing <sup>(D)</sup>	% p	21	18 NS	14	23	*	13
9	I brush each of my teeth carefully $^{(\mathrm{A})}$	% D	83	66 *	78	70	NS	80
10	I have never been taught professionally how to brush <sup>(D)</sup>	р % р	30	23 **	12	30	*	18
11	I think I can clean my teeth well without using toothpaste $^{\left( A\right) }$	% p	9	10 NS	10	17	**	6
12	I often check my teeth in a mirror after $\ensuremath{brushing}^{(A)}$	% p	76	77 NS	75	69	*	81
13	I worry about having bad breath	% D	33	32 **	16	32	NS	26
14	It is impossible to prevent gum disease with toothbrushing alone <sup>(D)</sup>	р % р	59	38 **	41	53	NS	44
15	I put off going to the dentist until I have toothache^{(D)} $% \left( {{{\bf{D}}} \right)_{{\bf{D}}}} \right)$	% p	29	33 *	18	34	*	21
16	I have used a dye to see how clean my teeth $\mbox{are}^{(A)}$	% p	26	56 ***	58	38	NS	49
17	I use a toothbrush that has hard bristles	% p	37	24 ***	11	29	NS	20
18	I don't feel I've brushed well unless I brush with strong strokes	% p	37	27 NS	26	33	NS	26
19	I feel I sometimes take too much time to brush my teeth <sup>(A)</sup>	% p	31	26 NS	21	28	NS	26
20	I have had my dentist tell me that I brush very well	% p	60	73 NS	71	65	NS	70

In the calculation of the HU-DBI: (A), one point is given for each of these agree responses; (D), one point is given for each of these disagree responses. Significant differences between the three groups of dental education level and between males and females: NS, not significant; \*p < 0.05; \*\*, p < 0.01; \*\*\*p < 0.001.

			Grade		Gen	der	Total
No. 21-23	Answer	Years 1 and 2	Years 3 and 4	Years 5 and 6	Male	Female	Selle
BRUSHING	Once/day	6	4	3	7	3	4
	Twice/day	55	50	53	60	49	53
	3 times/day	32	39	39	30	40	37
	4 times/day	7	6	5	3	8	6
р			NS			*	
FLOSSING	Never	39	22	17	38	20	27
	Once/month	19	9	5	8	13	11
	Once/week	22	37	32	30	30	30
	Every day	20	32	46	25	37	32
р			***			*:	k
RINSE	Never	35	33	37	46	31	35
	Once/month	16	15	10	14	14	14
	Once/week	11	21	20	11	20	17
	Every day	38	31	33	29	36	34
р			NS			*	

#### Table 3 Additional items and percentage of subjects' answer by grade and gender

Group	Predic	Percentage correct	
	Years 1-4	Years 5 and 6	
Years 1-4	176	29	85.9
Years 5 and 6	59	48	44.9
Total			71.8
	The cut-off Nagelker	value is 0.50 ke R <sup>2</sup> = 0.25	
	Male	Female	
Male	29	70	29.3
Female	16	177	91.7
Total			70.5

There were also considerable differences in dental health attitudes/behaviour among freshman dental students in the three cultural groups: Japan, Hong-Kong and West China (Kawamura et al, 2001). The mean DBI score of first year Australian students was significantly greater than that of their Japanese peers (Australian 6.56, Japanese 5.57; p < 0.001), which suggested a higher level of dental health awareness in Australian students on entry (Kawamura et al, 1997). In a Greek study, Polychronopoulou et al (2002) observed that for 539 Greek dental students the HU-DBI

score was 6.9, increasing from 6.0 during the first study year to 8.2 during the graduation year.

More recently, Kawamura et al (2005) observed considerable differences in oral health attitudes/behaviour among freshman dental students in 18 cultural areas, using the HU-DBI. Countries in Group 2 tended to belong to nations with an oriental culture background and were described as 'Orientals'. Three exceptions to this grouping were Greece, Israel and Brazil. The Oriental group was characterised by: dental visits with a painful tooth; perception of inevitability in having false



**Fig 2** Dendrogram using the complete linkage method between countries. Data of 17 countries/18 cultural areas (Kawamura et al, 2005) and Romanian data in this study were re-cluster-analysed on the basis of freshman dental students' answers toward 20 items of the HU-DBI. The squared Euclidean distance and the complete linkage method were used in the clustering.

teeth; and disbelief of the effectiveness of mechanical tooth cleaning on gingivitis. The data of 17 countries/18 cultural areas (Kawamura et al, 2005) and Romanian data in this study were re-cluster-analysed on the basis of freshman dental students' answers toward 20 items of the HU-DBI. Romania was most similar to Greece and Malaysia in to the Oriental group (Fig 2).

Some limitations can be identified in this study. Firstly, any change in HU-DBI scores cannot unequivocally be attributed to the curriculum, since these data were cross-sectional. They must be validated by longitudinal studies. Secondly, the school environments in this study may not be representative of other schools in Romania due to factors such as educational setting, training programme and geographic origin. The school in this study is one of the national schools located in Bucharest. It is unknown whether the results can be generalised to other samples. Therefore, a similar national study would need to be conducted to verify these findings.

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