# Self-reported oral health behavior and attitudes of dental and technology students in Lithuania

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### SUMMARY

The aim of the present study was to assess self-reported oral health habits, attitudes, lifestyle between the sample groups of preclinical and clinical dental and technology students in Lithuania using the Hiroshima University Dental Behavioral Inventory (HU-DBI), and to evaluate the impact of education on their behavior and self-reported oral health. A sample of 183 dental and 75 technology students at the Lithuanian University of Health Sciences, Medical Academy, Faculty of Odontology, and Kaunas University of Technology completed the Lithuanian version the HU-DBI questionnaire with 11 additional items. The data were analyzed using the "SPSS 19.0 for Windows" software package. The mean HU-DBI score of clinical final-year dentistry students was significantly higher (p=0.001) than the score of the preclinical group (6.81 (1.2) and 5.96 (1.5), respectively). The mean scores of both groups of dental students were significantly (p<0.05) higher than that of the technology group (5.37 (1.8)). Oral health behaviors and knowledge were superior in dental students. Dental education had a significant positive impact on the oral health and behavior improvement. The attitudes of the Lithuanian dental students should be further improved by initiating a comprehensive program that would emphasize the importance of oral hygiene before the clinical program starts.

**Key words:** oral health behavior, attitudes, education, dental students, HU-DBI, Lithuanian.

## INTRODUCTION

Oral health behaviors such as daily brushing, rinsing, flossing and regular dental visits are necessary to prevent rapid accumulation of plaque that can lead to long-term health problems such as periodontitis, dental caries, or tooth loss, and may be a risk factor for various systemic conditions and diseases, coronary heart disease (1), and even preterm birth (2). However, according to the World Oral Health Report, 30-60% of the adult population suffers from medium to severe periodontitis (3). The prevalence of periodontal diseases in the adult population of Lithuania regions is 37.6% in the female group, and 52.3% – in the male group (4).

All patient involvement in oral health is entirely behavioral (5). Despite the simplicity of plaque control measures, the majority of the population are unable to comply effectively and, as a result, develop dental caries and periodontal disease. In general, this depends on several factors, such as a patient's personality, attitude, lifestyle, education, and other social and demographic factors (6). Key factors in preventing of oral diseases are regular use of dental hygiene measures, and smoking cessation.

However, some positive changes in the dental care service, the public health education level, and oral health habits in Lithuania have been seen over the last decades. The behavior and the attitudes of oral health providers could affect the delivery of oral health care and, consequently, the oral health of their patients. Dental students are expected to be a good example for oral health behavior.

The Hiroshima University Dental Behavior Inventory (HU-DBI) was developed by Kawamura (7) to investigate oral health behavior, attitudes, and perceptions. The HU-DBI questionnaire has been suc-

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cessfully used for evaluating the differences in oral health behaviors between dental students from different countries (8-14). However, there is no data on oral health attitudes among dental students in Lithuania.

The aim of the present study was to assess self-reported oral health habits, attitudes, lifestyle, and dental office attendance between the sample groups of preclinical and clinical dental and technology students in Lithuania, and to evaluate the impact of education on their behaviors and self-reported oral health.

## MATERIALS AND METHODS

This study was carried out at the Lithuanian University of Health Sciences, Medical Academy, Faculty of Odontology, and Kaunas University of Technology.

The study was conducted during the academic year of 2011-2012, and included 268 students: 190 preclinical (PD) ($2^{nd}$ year of studies) and clinical dentistry (CD) students ($5^{th}$ year), and 78 technology (T) students. The participants were asked to fill out the Lithuanian modified version of the Hiroshima University-Dental Behavioral Inventory questionnaire which consisted of 30 items. One additional detailed question was included for clinical students in order to evaluate self-reported impact of education on their oral behaviors. The questionnaire showed good test reliability (Cronbach's alpha score 0.7). The oral behavior index (HU-DBI) was calculated from the responses to the twelve items of the HU-DBI (10).

**Table 1.** Distribution of the subjects by education, age, and sex

|  | Total (n=258) | Clinical Dentistry (n=83) | Preclinical Dentistry (n=100) | Technology (n=75) | p level |
|---|---|---|---|---|---|
| Mean age (SD) | 21.8 (1.9) | 23.4 (1.6) | 20.4 (1.6) | 21.9 (0.6) | p<0.001 |
| Males (%) | 13.6 | 18.1 | 12.0 | 10.7 | p>0.05 |
| Females (%) | 86.4 | 81.9 | 88.0 | 89.3 | |

**Table 2.** Questionnaire items and the percentage of the "agree" responses by the level of education *(continued on next page)*

| Item description | Clinical dentistry (n=83) % | Preclinical dentistry (n=100) % | Technology (n=75) % | p value |
|---|---|---|---|---|
| 1.  I have been to a dentist office before | 97.6 | 97.0 | 98.7 | n. s. |
| 2.  I don't worry much about visiting the dentist. | 81.9** | 71.0 | 57.3** | **p<0.001 |
| 3.  My gums tend to bleed when I brush my teeth (D) | 3.6*,** | 19.0* | 21.3** | *p=0.002 **p<0.001 |
| 4.  I have noticed some white sticky deposits on my teeth (A) | 51.8 | 47.0 | 45.3 | n. s. |
| 5.  I think I cannot help having false teeth when I am old (D) | 3.6*,** | 14.0* | 17.3** | *p=0.02 **p=0.005 |
| 6.  I am bothered by the color of my gums. | 7.2 | 8.0 | 9.3 | |
| 7.  I worry about the color of my teeth. | 25.3** | 35.0 | 46.7** | **p=0.006 |
| 8.  I think my teeth are getting worse despite my daily brushing (D) | 9.6*,** | 27.0* | 34.7** | *p=0.004 **p<0.001 |
| 9.  I brush my teeth twice daily or more. | 92.8** | 92.0*** | 73.3**,*** | **p=0.001 ***p<0.001 |
| 10. I brush each of my teeth carefully (A) | 41.0** | 31.0*** | 13.3**,*** | **p<0.001 ***p=0.007 |
| 11. I have never been taught professionally how to brush (D) | 69.9* | 47.0*,*** | 64.0*** | *p=0.002 ***p=0.03 |
| 12. I think I can clean my teeth well without using toothpaste (A) | 8.4 | 4.0 | 6.7 | n. s. |
| 13. I often check my teeth in a mirror after brushing (A) | 53.0 | 61.0*** | 42.7*** | ***p=0.02 |
| 14. I worry about having bad breath. | 26.5 | 34.0 | 37.3 | n. s. |
| 15. It is impossible to prevent gum disease with tooth brushing alone (D) | 30.1* | 53.0*,*** | 36.0*** | *p=0.002 ***p=0.03 |
| 16. I put off going to the dentist until I have toothache (D) | 6.0*,** | 18.0*,*** | 37.3**,*** | *p=0.02 **p<0.001 ***p=0.005 |
| 17. I use a toothbrush that has hard bristles. | 8.4** | 12.0 | 20.0** | **p=0.04 |

This research was approved by the Ethics Committee of the Lithuanian University of Health Sciences. Participation was voluntary, and all participants remained anonymous.

**Statistical analysis**

The data obtained were introduced into a database, and analysis was performed with an "SPSS 19.0 for Windows" personal computer statistics software package (SPSS, Inc., Chicago, IL, USA).

Cronbach's alpha coefficient was used in order to check the internal validity of the scales of the questionnaire. Continuous values were evaluated using the following statistical characteristics: mean, standard deviation (SD), and confidence intervals (CI). Every data set was tested for normality with the Kolmogorov-Smirnov test. Two independent groups of quantitative variables were compared using the parametric Student's test and the nonparametric Mann-Whitney test, while for more than two groups, the parametric analysis of variance (ANOVA), and the nonparametric Kruskal-Wallis tests were used. For a complex evaluation of probability, the multivariate logistic regression model was used calculating the OR (odds ratio) and its 95% CI.

In all cases, a $p$ value of 0.05 was used for the level of significance.

**RESULTS**

A total 258 students (males: 35, females: 223) completed the questionnaire: 100 preclinical dentistry (PD) (2nd year of studies) students; 83 clinical (CD) – 5th year students, and 75 – technology students (T) (3rd year of studies). The response rate was 96.3%.

The distribution of students according to the education level, age, and sex is given in Table 1. Statistically significant difference (p<0.001) was found between the respondents' age.

Table 2 presents the percentage distribution of the students with the "agree" responses to the questionnaire by the groups of education.

**Table 2.** Questionnaire items and the percentage of the "agree" responses by the level of education *(continued from previous page)*

| Item description | Clinical dentistry (n=83) % | Preclinical dentistry (n=100) % | Technology (n=75) % | p value |
|---|---|---|---|---|
| 18. I don't feel I've brushed well unless I brush with strong strokes. | 12.0 | 20.0 | 21.3 | n. s. |
| 19. I feel I sometimes take too much time to brush my teeth (A) | 16.9 | 13.0 | 13.3 | n. s. |
| 20. I use a child-sized toothbrush | 2.3 | 3.1 | 4.0 | n.s. |
| 21. My dentist has told me that I brush very well. | 57.8*,** | 41.0*,*** | 21.6**,*** | *p=0.02 **p<0.001 ***p=0.008 |
| 22. I do use dental floss on a regular basis. | 44.6** | 41.0*** | 17.3**,*** | **p, ***p<0.001 |
| 23. I do use mouthwash on a regular basis. | 27.7** | 29.0*** | 12.0**,*** | **p=0.02 ***p=0.05 |
| 24. I am a smoker. | 12.0** | 9.0*** | 26.7**,*** | **p=0.02 ***p=0.002 |
| 25. I have been smoking for more than one year. | 12.0** | 9.0*** | 24.0**,*** | **p=0.05 ***p=0.007 |
| 26. I wear/have worn orthodontic appliances. | 72.3 | 32.0 | 4.0 | *, **, ***p<0.001 |
| 27. Knowledge from university made me visit my dentist more often. | 54.5*,** | 31.3*,*** | 16.0**,*** | *p=0.002 **p<0.001 ***p=0.03 |
| 28. I have undergone a professional oral hygiene procedure once a year. | 71.1*,** | 48.0*,*** | 32.0**,*** | *p=0.001 **p<0.001 ***p=0.03 |
| 29. I have used a dye to see how clean my teeth are (A) | 3.6 | 6.0 | 4.0 | n. s. |
| 30. My family pays a lot of attention to dental care and prophylaxis. | 74.7*,** | 57.0*,*** | 33.3**,*** | *p=0.01 **p<0.001 ***p=0.002 |

In the calculation of the HU-DBI: (A), one point is given for the 'agree' response; (D), one point is given for the 'disagree' response. n.s. – non-significant differences.

**Oral behaviors and habits**

About 92% of dental students brushed their teeth twice per day, compared to 73.3% of technology students. There was no significant difference between preclinical and clinical students, but both groups brushed each tooth carefully significantly more often than technology students did (p<0.001; p=0.007). Almost all students disagreed that they could clean teeth well without using any toothpaste (p>0.05).

A higher percentage of dental students used a soft brush, floss or interdental cleaning tools, or mouth rinsing solutions (p<0.05). Few students –without any significant difference between the groups – used a dye to see how clean their teeth were.

Also, 61% of preclinical students said they often checked their teeth in a mirror after brushing, and only 42.7% of technology students agreed with this statement (p=0.02). Despite this, all groups of students without significant difference between them confirmed that they had noticed some sticky deposits on their teeth.

A high proportion of students (69.9% of clinical; 53.0% of preclinical, and 64% of technology students) reported that they had never been taught professionally how to brush. Nevertheless, 57.8% and 41.0% of clinical and preclinical students (accordingly) versus 21.6% of technology students agreed that they were told by the dentist that they brushed their teeth very well.

The rate of daily smoking was significantly higher (p<0.05) in the technology student group (26.7%) than in the groups of dental students (9.0% of preclinical, and 12.0% of clinical students).

Technology students had more complaints concerning their oral health than dentistry students did, but only gum bleeding was reported significantly more often among them and clinical dental students (p<0.001). Clinical students (25.3%) worried about the color
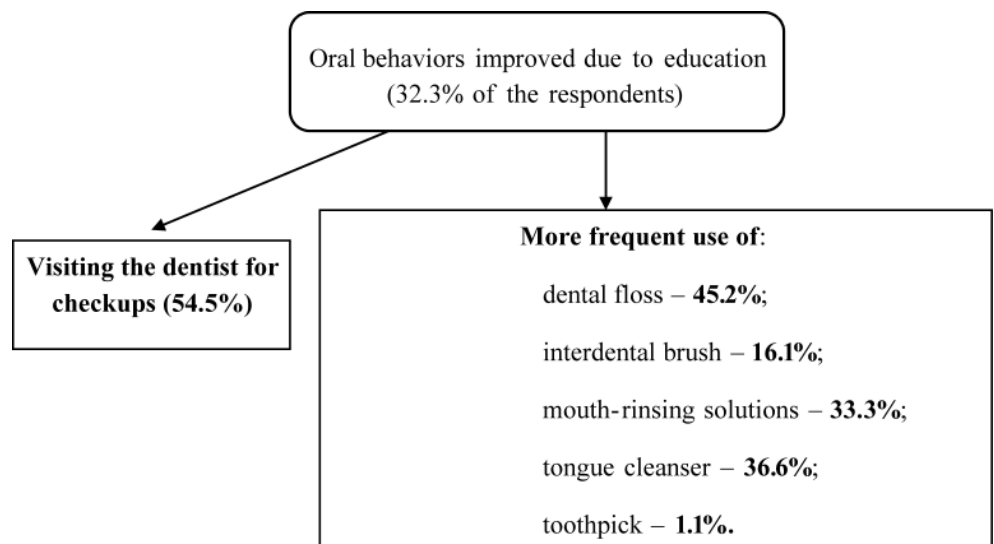


**Fig. 1.** Self-reported impact of education on the oral behaviors of clinical dental students

of their teeth significantly less (p=0.006) than technology students did (46.7%).

In total, 32.3% of clinical dentistry respondents reported that their oral behaviors improved due to dental education (Figure 1). In addition to that, 54.5% of final year students regularly visited the dentist for checkups. According to the self-reported data, improved knowledge about oral health and prophylaxis led to a more frequent use of dental floss (45.2% of the respondents), mouth rinsing solutions (33.3%), and tongue cleanser (36.6%). The majority of clinical students (71.1%) underwent professional oral hygiene procedures once a year.

**Mean HU- DBI scores**

The summative estimate of dental health behavior was calculated from 12 items in the HU-DBI questionnaire (Table 2). The mean HU-DBI scores between the study groups were significantly different according to the analysis of variance (ANOVA) (F=17.9; df=2; p<0.001) and the nonparametric

**Table 3.** Results of multivariate logistic regression analysis for clinical dental (CD) and technology (T) students

| Variable | | OR [95 % CI] |
|---|---|---|
| I think my teeth are getting worse despite my daily brushing | | |
| | CD | 1.0 |
| | T | 2.91 [1.04-8.15] |
| I brush each of my teeth carefully | | |
| | CD | 3.42 [1.26-9.31] |
| | T | 1.0 |
| I put off going to the dentist until I have toothache | | |
| | CD | 1.0 |
| | T | 6.29 [1.98-19-96] |
| My dentist has told me that I brush very well | | |
| | CD | 3.41 [1.49-7.8] |
| | T | 1.0 |

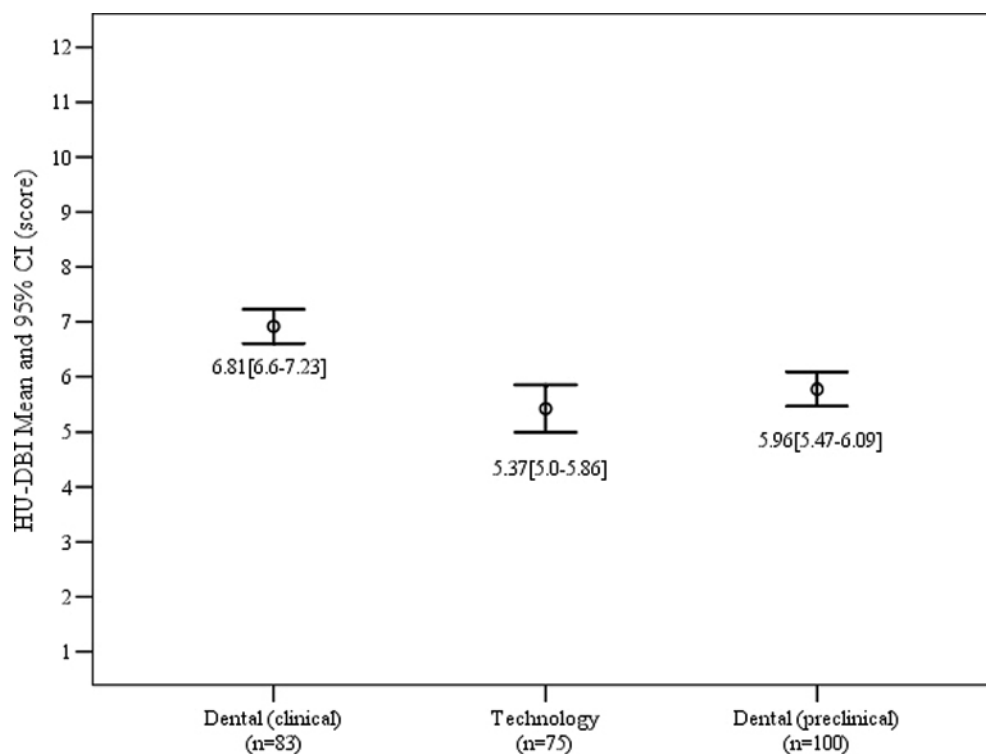Overall percentage – 78.3%. Constant – 3.478; p<0.05; Negelkerke R²=0.48.

**Fig. 2.** HU-DBI scores of dental and technology students

Kruskal-Wallis ($\chi^2$=29.3) tests (Figure 2). The mean HU-DBI score in clinical final-year dentistry students (6.81 (1.2)) was significantly higher (p=0.001) than the score in the preclinical student group (5.96 (1.5)). The mean scores of both groups of dental students were significantly (p<0.05) higher than the score of the technology group 5.37 (1.8).

According to the parametric Student's t test and the non-parametric Mann-Whitney test, the mean score of the HU-DBI was not statistically significant between males and females (p>0.05).

**Logistic regression analysis**

For the complex evaluation of probability, the multivariate logistic regression model was used.

**Table 4.** Results of multivariate logistic regression analysis for clinical dental (CD) and preclinical dental (PD) students

| Variable | | OR [95 % CI] |
|---|---|---|
| My gums tend to bleed when I brush my teeth | | |
| | CD | 5.847 [1.59-21.53] |
| | T | 1.0 |
| I think my teeth are getting worse despite my daily brushing | | |
| | CD | 2.48 [1.0-6.14] |
| | T | 1.0 |
| I have never been taught professionally how to brush | | |
| | CD | 1.0 |
| | T | 2.44 [1.27-4.7] |
| I put off going to the dentist until I have toothache | | |
| | CD | 3.531 [1.18-10.61] |
| | T | 1.0 |

Overall percentage – 67.83%. Constant – 0.639; p=0.005; Negelkerke $R^2$=0.262.

The results of the logistic regression analysis are presented in Table 3 and Table 4. Final-year dentistry students were more likely to brush each tooth carefully, and they were also more likely to receive good feedback about their brushing. Technology students were more likely to seek dental care when symptoms arise and to think that daily brushing had no effect on their teeth. 78.3% of the respondents were correctly predicted by the model.

Preclinical dental students – similarly to technology students – were more likely to seek dental care when symptoms arise and to think that daily brushing had no effect on their teeth. Their gums were more likely to bleed after brushing, and they had never been taught professionally how to brush their teeth. 67.83% of respondents were correctly predicted by the model.

**DISCUSSION**

This study was the first assessment of the impact of dental education on the oral health behaviors of Lithuanian dental and technology students using the HU-DBI questionnaire, which has been used worldwide in other studies (15).

About 92% of dental and 73.3% of technology students brushed their teeth twice per day, while the respective percentage of Indian, Jordanian, and Turkish students was lower (12, 13, 16). Only 41% of clinical students brushed each tooth carefully, which was a smaller proportion than that in Finnish (78%), Japanese (56%), Turkish (65%), and Greek (57%) students (8, 11, 14), but much higher than that among Indian (13%) dental students (12). More than fifty percent of respondents often checked their teeth in a mirror

after brushing; such behavior was reported by a similar percentage of Japanese and Greek students (14), while the respective percentage of Turkish and British students was higher (11, 10). A very low proportion of Lithuanian students agreed that they could clean their teeth well without using any toothpaste. Probably they lacked knowledge about the importance of the mechanical removal of dental plaque and the secondary role of the toothpaste. Advertisements of toothpastes and the refreshing sensation after their used may be important in the formation of students' opinion. Only a small percentage of respondents, compared to their Japanese or Jordanians peers, used hard-bristled toothbrushes or brushed their teeth with strong strokes (13, 14).

Regular dental flossing has been widely recommended to prevent periodontal diseases (5). An interesting finding is that 44.6% of clinical and 41.0% of preclinical students started to use dental floss regularly, while only about 17.3% of technology students used it at all. Although all the clinical dental students studied how to evaluate the quality of tooth brushing, a very small percentage of them – without any significant difference between the study groups – reported that they used a plaque-disclosing dye.

Smoking is one of the risk factors for periodontal disease and has a negative effect on whole oral and systemic health (17). In accordance with the study in Turkey – albeit with a lesser percentage – the rate of smoking was much lower among Lithuanian dental students than in the technology student group (16). Other studies reviewing smoking habits among dental students confirmed that the prevalence of smoking among dental students was lower than that in the general population (18).

Gum bleeding is one of the first signs of gingivitis or periodontitis, and is an indicator of the quality of personal oral hygiene. Only 3.6% of clinical dental students complained of gum bleeding while tooth brushing, compared to 25% of Japanese, 45% of Finnish, and 15% of Greek students (8, 14). Our study confirmed that preclinical and technology students who demonstrated lower oral behavior scores and higher prevalence of smoking reported significantly higher levels of gum bleeding.

Although the level of aesthetic demands is high in our country, in the present study, students were more satisfied with the color of their teeth and gums than Japanese, Greek, British, Jordanian, or Turkish students were (10, 13, 14, 16). A lesser proportion of students worried about bad breath, compared to those in other countries, and technology students had more complains – but not significantly so (10, 14, 16).

The most striking finding was that a very high percentage of students agreed that they had never been taught professionally how to brush their teeth. Clinical students interpreted this question that they had never been taught by their dentists, as all of them had had lectures and practice on oral hygiene. However, this finding showed a lack of effective oral health and prevention programs which should motivate all dentists concerning not only the treatment, but prevention as well.

The results of our study showed a high level of oral health care, motivation, and perception of Lithuanian dental students. The mean HU-DBI score of clinical dental students was significantly higher than that among the preclinical and technology respondents (6.81 (1.2) and 5.96 (1.5); 5.37 (1.8), respectively). According, to literature (10, 16), the lowest scores were observed among Chinese (5.07) dental students, and highest – among the British (7.33) and the Japanese (7.4).

Clinical (and even preclinical) dental students were more motivated, and their oral behaviors were higher, compared to technology students. This might be explained by the fact that many dental students (about 30% of preclinical students) had parents or relatives working as dentists or that some of them were already better motivated in oral care as their families were more careful about oral health. Several studies have confirmed that dental health attitudes become more positive with increasing age and education level (9, 10, 12, 14, 16). In accordance with them, our results showed that positive attitudes and behaviors among students developed as the level of their dental education increased.

The course of preventive dentistry at our University starts at the 3rd year of studies - when the course of clinical dentistry begins. We agree with the authors of other studies indicating that dental students still have insufficient knowledge, and should thus be earlier introduced to oral health care education in order to allow them to have a positive impact on the dental health attitudes of their patients (10, 13, 16).

**CONCLUSIONS**

Lithuanian dental students were better motivated concerning their oral health than technology students were. Dental education had a significant positive impact on the oral health and behavior. The attitudes of Lithuanian dental students should be further improved by initiating a comprehensive program that would emphasize the importance of oral hygiene before the start of the clinical program.

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