Knowledge of the Relationships between Oral Health, Diabetes, Body Mass Index and Lifestyle among Students at the Kuwait University Health Sciences Center, Kuwait

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Abstract

Objectives: To evaluate the level of knowledge regarding the relationships between oral health, diabetes, body mass index (BMI; obesity) and lifestyle among students of the Health Sciences Center (HSC), Kuwait, and to explore any possible correlation between students' oral health knowledge, BMI and lifestyle choices. ***Subjects and Methods:*** A stratified random sample was proportionally selected according to the size of each faculty from the 1,799 students. The questionnaire was divided into 3 sections (i.e. demographics, evaluation of oral health knowledge in relation to diabetes, and evaluation of diabetes knowledge in relation to lifestyle) and distributed to 532 students. Oral health knowledge was categorized as limited, reasonable or knowledgeable. Lifestyle was classified as healthy or nonhealthy. The BMI was calculated as weight (kg) divided by the square of the height (m). ANOVA and χ^2 tests were used to test for differences between independent variables. A Pearson correlation coefficient test was used to assess correlations. $p < 0.05$ was considered statistically significant. ***Results:*** Of the 532 questionnaires, 498 (93.6%) were completed. The mean knowledge score was 47.7 ± 25.2; of the 498 students, 235 (47.3%) had a BMI within the normal range, 184 (37.0%) were pre-obese and 67 (13.5%) were obese. Of the 498 students, 244 (49%) had a healthy lifestyle. There was no correlation between oral health knowledge and the other variables; however, there was a correlation between lifestyle and obesity. ***Conclusion:*** In this study, the majority of the students had limited knowledge of oral health in association with diabetes and lifestyle. More than half of the students fell in the pre-obese/obese range.

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Introduction

Nearly one third of Kuwaiti adults are considered obese, and this is partly due to swift modernization leading to changes in dietary habits in parallel with reduced physical activity [1, 2]. A sedentary lifestyle and an unhealthy diet are among the factors that may lead to obesity and hypercholesterolemia, as well as diabetes mellitus and cardiovascular diseases [3]. Other factors that influence obesity include genetics, education and socioeconomic status [4]. Kuwait is reported to have the third highest prevalence (21.1%) of diabetes worldwide. Developing countries are also reporting similar trends, signaling a potential for increases in diabetes and cardiovascular diseases [5].

In 2008, the American Diabetes Association indicated that dental health care should be a part of comprehensive health care for diabetic patients [6]. According to this in-

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dication, the focus on the relationship between diabetes and oral health should be similar to that between diabetes and other body systems. Regarding dentistry, while there are no specific oral lesions associated with diabetes, there are a number of oral manifestations associated with the presence of prolonged hyperglycemia, such as periodontal diseases, dry mouth, delayed healing, loose teeth, premature tooth loss, taste problems and burning mouth syndrome [7, 8]. In 1993, Löe [9] proposed that diabetes acts as a significant risk factor for periodontal diseases, which are thought to be the 'sixth complication of diabetes'. Diabetes may also be linked to a range of oral conditions, including acute and recurrent oral infections, salivary gland dysfunction and caries and the potential for early tooth loss [7, 8]. Additionally, Chapple and Genco [10] reported that there is consistent and robust evidence that periodontitis is associated with uncontrolled blood glucose levels.

The body mass index (BMI) is the foundational criterion of the World Health Organization (WHO) classification of obesity. Adult obesity is categorized as a BMI >30 [11]. The relationship between obesity and diabetes has been investigated, and it has been suggested that obesity can increase the risk of developing type 2 diabetes [12]. The lifestyles of study participants can be assessed based on their engagement in physical activities, their consumption of fruits and vegetables and the frequency with which they visit a physician each year [13]. Oral health habits can be estimated based on the frequency of brushing, the frequency of use of dental floss and the frequency of visits to the dentist; oral health status can also be assessed through clinical examination with the assistance of diagnostic tools [14].

The aims of this study were to evaluate the knowledge of relationships between oral health, diabetes, BMI, obesity, and lifestyle factors among students at faculties of the Health Science Center (HSC), Kuwait University, and to explore any possible correlation between knowledge of oral health, BMI and lifestyle.

Subjects and Methods

This study was approved by the HSC Ethics Committee. Research assistants approached the students in the lobby areas of each faculty and asked then if they would like to participate in this study. The students were assured of anonymity and data protection. Furthermore, they were told that participation was voluntary and that they were free to withdraw from this study at any stage.

A stratified random sample was proportionally selected from the 1,799 students enrolled at the HSC in September 2013 according to the size and gender distribution of each faculty as follows:

Medicine, n = 537; Dentistry, n = 138, Pharmacy, n = 226, and Allied Health Sciences, n = 537. A power calculation with a confidence level of 99% and a margin of error of 0.05 indicated that a sample of 498 students would be satisfactory for this study. Questionnaires were distributed to 523 students. Written informed consent was obtained from all of the participants. Distribution and collection of the questionnaires were completed within a period of 4 months (September to December 2013).

The questionnaire contained 3 sections: (a) demographics, (b) an evaluation of oral health knowledge in relation to diabetes (periodontal diseases, dry mouth, delayed healing, gum bleeding on brushing, mouth ulcers, bad breath, caries, fungal infections, loose teeth, taste problems and burning mouth syndrome) and (c) an evaluation of diabetes knowledge in relation to lifestyle. The questionnaire can be viewed as online supplementary material (for all online suppl. material, see www.karger.com/doi/10.1159/000442162). The data from this section were categorized into scores ≤60 (i.e. limited knowledge of oral health in relation to diabetes), scores >60 but ≤80 (i.e. reasonable knowledge) and scores >80 (i.e. knowledgeable individuals). The selected cutoff points were based on multiple statistical trials of the collected data. These questions were clustered to develop a lifestyle index. A total of 7 questions were asked, and each question was assigned a certain score based on the points accumulated from the responses. The topics for these questions included physical activity, frequency of fruit and vegetable consumption, frequency of visits to the physician and frequency of sugar and fast food consumption. There were also questions that evaluated oral hygiene habits, including the frequency of visits to the dentist as well as the frequency of brushing and flossing. Each answer was assigned a certain value. For the frequency of brushing per day, participants received points as follows: 3 times a day or more, 4 points; twice a day, 3 points; once a day, 2 points, and 0 times a day, 1 point. Based on these points, a score was developed for lifestyle (range 7–25).

The participants were asked to report their weight (kg) and height (m) in order to calculate their BMI to classify the sampled population into the categories of underweight, overweight, preobese and obese. This classification was based on the WHO classification for BMI.

The reliability of the questionnaire was confirmed in a pilot study in which a pretest was administered to 30 randomly selected students. Cronbach's α test was used to evaluate the internal consistency, and based on the results the questionnaire was then refined accordingly to minimize measurement errors.

Two lifestyle groups were generated based on the calculated total score for each participant. Those who scored above the mean score were considered individuals with a healthy lifestyle, and participants who scored below the mean score were considered to have an unhealthy lifestyle.

Statistical Analysis

After data collection and categorization of the variables, SPSS version 20 (SPSS Inc., Chicago, Ill., USA) was used to perform data analysis. ANOVA and χ^2 tests were used to test for differences between independent variables at baseline. To test the correlation between any two categorical variables, the χ^2 test for independence was used. A Pearson correlation coefficient test was used to assess correlations between oral health knowledge, BMI and lifestyle. Scheffé's method, a type of post hoc test, was utilized to explore the presence of any relationships between the 4 faculties. $p < 0.05$ was considered statistically significant.

Results

The reliability coefficient of the questionnaire was 0.77, indicating a reasonable level of reliability. The result of the first Cronbach's α test of internal consistency was 0.69, and the retested Cronbach's α was 0.78. Of the 532 questionnaires distributed, 498 were completed, yielding a response rate of 93.6%. The mean age of the respondents was 22.4 ± 0.4 years (range 18–25) and the mean BMI was 25.7 ± 4.4.

The mean score of knowledge for oral health was 47.7 ± 25.2. Of the 498 participants, 347 (69.7%) scored between 0 and 60 (limited knowledge), 105 (21.1%) scored >60 and ≤80 (reasonable knowledge), and 46 (9.2%) scored >80 (knowledgeable) (table 1). Dental students had the highest score for oral health knowledge (mean 78.6 ± 22.2), followed by medical students (mean 50.9 ± 22.4), pharmacy students (mean 44.1 ± 21.7) and allied health sciences students (mean 41.5 ± 24.5). A one-way ANOVA showed a significant difference between the 4 faculties regarding oral health knowledge (p = 0.0001; table 2).

Of the 498 students, 235 (47.3%) were within the normal BMI range (i.e. 18.50–24.99), while 184 (37.0%) were pre-obese, with a BMI between 25 and 29.99, and 67 (13.5%) were in the obese range, with a BMI ≥30. However, 11 (2.2%) students were underweight, with a BMI ≤18.50. The classification was based on WHO BMI (table 3). The mean BMI for all 4 faculties was 25.7 ± 4.4. The BMI results were as follows: medical students, 25.4 ± 3.8; dentistry students, 26.5 ± 4.0; pharmacy students, 25 ± 4.3, and allied health sciences students, 25.9 ± 4.9. The differences in BMI between the 4 faculties were not statistically significant (one-way ANOVA, p = 0.313). Pearson's correlation analysis showed that there was no correlation between oral health knowledge and diabetes regardless of the range of BMI (r = 0.047, p = 0.295)

For lifestyle, the following results were obtained. Two hundred fifteen students (43.2%) had no form of exercise, 109 (21.9%) exercised once a week, 105 (21%) exercised more than 3 times a week, and 69 (13.9%) exercised twice a week. The consumption of vegetables and fruits was as follows: more than 3 times a week, n = 274 (55%); twice a week, n = 118 (23%); once a week, n = 80 (16%), and none, n = 26 (6%). The frequency of physician visits was: twice or more per year, n = 122 (24.5%); once a year, n = 111 (22%), only when in pain, n = 99 (20%), and no visits, n = 163 (33%). The frequency of dental visits was: twice or more per year, n = 102 (20.5%); once per year, n = 76 (15.5%), only when in pain, n = 261 (41%), and no visits,

n = 114 (23%). Regarding tooth brushing, subjects responded as follows: three times or more daily, n = 93 (18.7%); twice daily, n = 268 (53.8%); once a day, n = 110 (22.1%), and no tooth brushing, n = 27 (5.4%). In terms of flossing, the responses were: 3 or more times weekly, n = 36 (7.3%); twice a week, n = 86 (17.5%); once a day, n = 84 (17.1%), and no flossing at all, n = 204 (41.5%). The most commonly consumed (daily) sugary snacks were chocolate (n = 250; 51.7%) and brownies and cakes (n = 205; 41.3%). The consumption rates for potato chips, ice cream, and candies were similar, with 190 students (38.3%) consuming these food items daily. The

Table 1. Oral health knowledge responses

Knowledge groups	n	%
Limited knowledge	347	69.7
Reasonable knowledge	105	21.1
Knowledgeable	46	9.2
Total	498	100

Table 2. Oral health knowledge scores for the 4 faculties

Faculty	n	Mean ± SD	95% CI for the mean
Medicine	167	50.9 ± 22.4	47.5–54.3
Dentistry	37	78.6 ± 22.2	71.2–86.0
Pharmacy	63	44.1 ± 21.7	38.6–49.6
Allied Health Sciences	231	41.5 ± 24.5	38.3–44.6
Total	498	47.7 ± 25.2	45.5–49.9

One-way ANOVA, level of significance p = 0.000, F statistic = 28.5.

Table 3. BMI groups

Group	n	%
Underweight (<18.50)	11	2.2
Normal range (18.50–24.99)	235	47.3
Pre-obese (25.00–29.99)	184	37.0
Obese (≥30.00)	67	13.5
Total	497	99.8
Missing	1	0.2

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consumption of soft drinks was the lowest, i.e. 236 (49.4%) students did not consume any soft drinks.

Using these values of exercise, frequency of physician and dental visits, and frequency of brushing, flossing and eating vegetables, the mean calculated lifestyle index was 48.46 ± 16.08 (range 11.5–96.2). Based on this lifestyle index, of the 498 participants, 244 (49%) had a healthy lifestyle, while 254 (51%) had an unhealthy lifestyle. The students with an unhealthy lifestyle had limited oral health knowledge, but there was no correlation between oral health knowledge and lifestyle (Pearson's correlation coefficient test, r = 0.034, p = 0.452).

Similarly, there was no statistically significant correlation between oral health knowledge and BMI (Pearson's correlation coefficient test, r = 0.047, p = 0.295). However, there was a correlation between lifestyle and BMI (Pearson's correlation coefficient test, r = –0.113, p = 0.011).

Discussion

The findings of this study revealed that the majority of the students had limited oral health knowledge; however, dental students showed the highest scores among the 4 faculties. This could be attributed to the fact that dental students have more professional exposure to oral health sciences during the course of their study than other students. Hence the students from the Faculty of Dentistry had more knowledge of the relationship between oral health and diabetes. This finding confirmed the results of previous studies [15–17]. Equally important is the finding that a staggering 69% of all HSC students had limited knowledge of the relationship between oral health and diabetes, confirming the results of a previous study by Al-Hussaini et al. [18], who reported very limited knowledge regarding the causes of oral disease and methods for its prevention.

In this study the finding that more than one third of the participants were within the pre-obese and obese categories confirmed the previous finding of a high prevalence of obesity in the general population of Kuwait, as well as among college students [18, 19]. However, in this study oral health knowledge was not correlated with obesity.

In this study, the finding that more than half of the sampled population had an unhealthy lifestyle was comparable to the results of other studies examining oral habits and lifestyle factors among college students [12, 20–22].

The majority of the students reported consuming vegetables or fruits on a regular basis; however, it was noted that more than half of the participants consumed chocolate on a daily basis and had a frequent intake of sugary snacks. This could be attributed to the availability of vending machines around campus that offer easy access to chocolates and sugary snacks, which can have negative effects on oral health.

Data on visits to the doctor or dentist showed that more than one third of the students dis not visit a physician or dentist or only visited a dentist when in pain. This finding could be attributed to multiple factors, such as a lack of time, a lack of awareness or low accessibility, which has a negative impact on lifestyle.

Engagement in oral hygiene practices showed a similar trend in which a considerable number of students did not use dental floss and a fraction did not use a toothbrush. This confirmed the finding of Al-Ansari et al. [22] that students have appropriate knowledge regarding some aspects of oral health yet limited knowledge of oral hygiene practices. Kuwait University students were generally noncompliant with optimal oral hygiene standards in terms of brushing and flossing on a daily basis [12].

Given the low assimilation of knowledge regarding oral health in relation to diabetes among these participants from the HSC, this study indicates that these students could be at risk for diabetes because of obesity coupled with unhealthy lifestyle behaviors. It is worth pointing out that, while these students could be at risk, they do not seem to be able to take preventative measures. Because these students as health care workers could be in a position to advise the public about health-related behaviors and provide professional advice to others, it is necessary for them to possess adequate levels of knowledge and understanding in order to provide such advice. Hence, it is recommended that oral health education be made a part of the curriculum in all health science faculties, as Jindwani et al. [23] have suggested.

The limitations of this study were that it was based on self-reported responses to a questionnaire, which could lead to the issue of bias due to the potential for over-/underreporting of responses. The sampled population was limited to HSC students, and hence the findings could not be generalized to the general population. Future projects are needed to expand the distribution of this questionnaire to the general population and further to countries in the region to gain a more thorough understanding of the knowledge of oral health in the region.

Conclusion

The level of knowledge regarding the relationship between oral health and diabetes in the 4 faculties of the HSC was low. Students' BMI and lifestyles indicated that they could be at a potential risk for developing type 2 diabetes. Thus, future studies should investigate this area in depth and extend the population sample to include other countries within the Persian Gulf region.

Acknowledgments

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