Original Article

Assessment of Dental Nutrition Knowledge among Dental Students in Chennai

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Abstract

Introduction: Dentists need to have adequate knowledge regarding diet and nutrition and its effects on oral health. Students should be trained to implement the dental nutrition knowledge, so they provide holistic care for their patients. Yet, not many studies were found to have been conducted among dental students for the assessment of their knowledge regarding diet and nutrition. **Aim:** The aim of the study is to assess the knowledge of nutrition among undergraduate dental students and also the association between the knowledge of nutrition based on the year of study. **Materials and Methods:** A questionnaire consisting 15 questions related to knowledge and attitude toward dental nutrition was distributed to 175 dental undergraduate dental students via online social platform. Data were collected and analyzed using SPSS software. Responses were analyzed using Chi-square test based on three groups (3rd-year students, final-year students, and interns). **Results:** About 49.7% of students were aware that Vitamin C, Vitamin B12, and iron deficiency anemia manifest as oral symptoms, and majority of these respondents were interns ($P > 0.005$). More number of the participants studying in the 3rd- and final-year students (74.2% and 70.4%, respectively) agreed that bulimia and anorexia affect nutritional status and oral health of an individual ($P > 0.01$). About 20.5% of interns felt that nutrition was not given enough importance during dental education. **Conclusion:** For most responses, there was no significant difference in the dental nutrition knowledge between the 3rd-year students, final-year students, and interns. However, there is a need to reinforce the education of nutritional counseling to bring about prevention of oral diseases.

Keywords: Dental students, diet counseling, knowledge, nutrition

Introduction

The quality of diet plays a vital role in health of people of all ages. A balanced nutritious diet is essential for a healthy living.[1] By definition, "nutrition is the study of nutrients in the food, how the body uses them and the relationship between diet, health, and disease."[2] It is often said "the mouth is a mirror of the body" as nutrition and oral health share a synergistic and multi-directional relationship.[1]

Today, like never before, people are concerned with optimizing their health by acquiring nutritional information and applying it to their daily lives.[3] Nutritional factors are implicated in several systemic disease and conditions including obesity, hypertension, dyslipidemia, Type 2 diabetes, cardiovascular disease, osteoporosis, gastrointestinal disorders, and most cancers.[4] The association between oral health conditions, dietary practices, nutritional status, and general health status is complex with many interrelating factors.[5] Compromised oral health can alter food choices and negatively impact food intake, leading to suboptimal nutritional status, which can lead to chronic systemic diseases.[5]

Optimal nutrition is required for bringing about optimal calcification, development, and growth in the primary and permanent dentition.[6] Oral tissues are one of the most sensitive indicators of nutritional state of the body. Nutritional deficiencies are associated with change in the integrity of the oral structures/tissues, and these changes are frequently the first clinical signs of deficiency.[6] Inadequate nutrition have implications on the progression of oral diseases, including

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dental caries, periodontal diseases, disease of oral mucosa, and infectious diseases.[5]

The emphasis on regular dental checkups puts the dentist in a unique position among members of healthcare professionals.[7] In contrast with other health professionals whose practices mainly involve ill persons, the dentist typically sees healthy patients on a regular, periodic basis.[6] The situation provides many opportunities for health screening and nutrition education.[7]

Consistent nutritional health messages are required to be made available to the public.[1] Dentists need to have adequate knowledge regarding diet and nutrition and its effects on oral health. Dental students should be trained early on in their dental education, so they become skilled at implementing the dental nutrition knowledge and providing holistic care for their patients.

Professionals from various fields have stressed the importance of diet and nutrition on general health. A study done by Chalmuri *et al*. in a dental institution in India reported poor knowledge of nutrition among undergraduate students.[8] Another study done in a dental institution in Kerala reported that postgraduate students had far better knowledge on specific nutrients than undergraduate students.[2] To the best of our knowledge, only one study has explored the differences in the level of dental nutrition knowledge among dental students based on their year of study.[9] Therefore, the aim of this study is to assess the knowledge of nutrition among the undergraduate dental students. In addition, the association between the knowledge of nutrition based on the year of study of the dental students was conducted.

Materials and Methods

Ethical approval

Ethical approval for this study was obtained from the Institutional Scientific Review Board.

Questionnaire

The questionnaire was adapted from a previous study[10] and pretested on a sample of 20 subjects to test the validity and reliability of the questionnaire. The responses of these participants were excluded from the main study. The final and validated version was developed. It consisted of 15 questions of which 3 were concerning the sociodemographic characteristics and 12 questions regarding the (1) knowledge of and (2) attitude related to the dental nutrition.

Study population and data collection

Google Form was utilized to collect the data using a link that was circulated via various social platforms such as WhatsApp, Facebook, and Instagram. The questionnaire was collected from December 1, 2020 to January 15, 2021. Participants had to be studying in the clinical years of dental school to be included in the survey. Participation in the survey was taken as implied consent. A total of 175 undergraduate dental students participated in the survey.

Statistical analysis

Responses were coded and entered into an SPSS database. Data were entered in Microsoft Excel spreadsheet and analyzed using SPSS software (version 21, IBM Corporation, Texas, USA). Descriptive statistics were conducted. Bivariate analysis (Chi-square test) was used to assess the association between the responses of the study participants and the year of their study.

Results

Table 1 shows the distribution of study subjects. Of the total number of 175 study participants, 31 (17.7%) were 3rd-year students, 71 (40.6%) were final-year students, and 73 (41.7%) were interns. Mean age of the participants in the study was 21.77 ± 1.06 years with 46 males.

Table 2 shows the aggregate responses to the questions and association between responses and year of study of the participants. Majority (>70%) of the students across all years of study said that sucrose was the most cariogenic sugar ($P < 0.57$). Only 67.7% of 3rd-year students responded with xylitol when asked which sugar substitute reduced the chance of dental caries. Majority (>75%) of the final years and interns chose the correct option (xylitol) when compared to 3rd years; however, this difference was not statistically significant ($P < 0.60$).

80.6% of 3rd years, 69.0% of final years, and 74% of interns chose nuts as the most anticariogenic food as opposed to cheese ($P < 0.75$). Less than 14% of participants across all years of study chose cheese as the most anticariogenic food. More than 85% of all study participants knew rightly that firm and fibrous foods prevents dental caries and strengthens periodontium ($P < 0.80$).

Most of the interns chose the correct response to the question related to the oral manifestation of vitamin deficiency. About 76.7% of interns said that both Vitamin B12 and C deficiency manifest as oral symptoms. This response rate was higher compared to 3rd years (16.1%) and final years (36.6%). This difference was statistically significant ($P < 0.01$). Participants were asked to choose the genetic disease in which dental caries was practically absent. Less than 27% of the total study population gave the correct response of hereditary fructose intolerance, of which majority were 3rd-year students ($P < 0.56$).

Table 1: Distribution of study subjects

Variable	Categories	*n* (%)
Age (years)	19-20	88 (50.3)
	21-22	33 (18.9)
	≥23	54 (30.9)
Gender	Male	46 (26.3)
	Female	129 (73.7)
Year of study	3rd year	31 (17.7)
	4th year	71 (40.6)
	Intern	73 (41.7)

Table 2: Aggregate responses to the questions and association between responses and year of study of the participants

Item	Responses	3rd year, *n* (%)	4th year, *n* (%)	Intern, *n* (%)	Total, *n* (%)	χ^2	*P*
1. Which among the following is the most cariogenic sugar?	Lactose	5 (16.1)	16 (22.5)	11 (15.1)	32 (18.3)	2.901	0.57
	Sucrose	26 (83.9)	52 (73.2)	59 (80.8)	137 (78.3)		
	Maltose	0	3 (4.2)	3 (4.1)	6 (3.4)		
2. Which of the following sugar substitute reduces chances of dental caries the most?	Xylitol	21 (67.7)	57 (80.3)	57 (78.1)	135 (77.1)	2.705	0.60
	Aspartame	5 (16.1)	5 (7.0)	8 (11.0)	18 (10.3)		
	Saccharine	5 (16.1)	9 (12.7)	8 (11.0)	22 (12.6)		
3. Which of the following food is anticariogenic?	Milk	2 (6.5)	9 (12.7)	9 (12.3)	20 (11.4)	1.883	0.75
	Cheese	4 (12.9)	13 (8.3)	10 (13.7)	27 (15.4)		
	Nuts	25 (80.6)	49 (69.0)	54 (74.0)	128 (73.1		
4. Which of the following form of food help in preventing the dental caries and strengthens periodontium?	Firm and fibrous food	27 (87.1)	64 (90.1)	66 (90.4)	157 (89.7)	1.650	0.80
	Liquid food	3 (9.7)	6 (8.5)	4 (5.5)	13 (7.4)		
	Hard and sticky food	1 (3.2)	1 (1.4)	3 (4.1)	5 (2.9)		
5. Which among of the following deficiencies manifest as oral symptoms?	Vitamin C and B12 deficiency	24 (77.4)	37 (52.1)	14 (19.2)	75 (42.9)	42.327	0.00
	Iron deficiency	2 (6.5)	8 (11.3)	3 (4.1)	13 (7.4)		
	Both	5 (16.1)	26 (36.6)	56 (76.7)	87 (49.7)		
6. With which of the following genetic error would an individual have practically no decay?	Hereditary Glucose intolerance	15 (48.4)	34 (47.9)	33 (45.2)	82 (46.9)	2.960	0.56
	Hereditary lactose intolerance	5 (16.1)	20 (28.2)	22 (30.1)	47 (26.9)		
	Hereditary fructose intolerance	11 (35.5)	17 (23.9)	18 (24.7)	46 (26.3)		
7. Which of the following psychological disorders affect nutritional and oral health of an individual?	Bulimia and anorexia	23 (74.2)	50 (70.4)	37 (50.7)	110 (62.9)	12.914	0.012
	Schizophrenia	2 (6.5)	8 (11.3)	22 (30.1)	32 (18.3)		
	Bipolar and anxiety disorders	6 (19.4)	13 (18.3)	14 (19.2)	33 (18.9)		
8. Which of the following elements present in trace amount in food is strongly cariostatic?	Fluoride	25 (80.6)	58 (81.7)	63 (86.3)	146 (83.4)	0.886	0.92
	Calcium	5 (16.1)	10 (14.1)	8 (11.0)	23 (13.1)		
	Iodine	1 (3.2)	3 (4.2)	2 (2.7)	6 (3.4)		
9. Do you counsel patients with high caries risk?	Always	20 (64.5)	52 (73.2)	53 (72.6)	125 (71.4)	0.889	0.64
	Sometimes	11 (35.5)	19 (26.8)	20 (27.4)	50 (28.6)		
10. Do you think diet counseling can help prevent dental caries?	Yes	17 (54.8)	53 (74.6)	42 (57.5)	112 (64.0)	7.064	0.13
	No	0	0	1 (1.4)	1 (0.6)		
	May be	14 (45.2)	18 (25.4)	13 (41.1)	62 (35.4)		
11. Do you feel nutritional counseling is important for the dental patients?	Yes	26 (83.9)	60 (84.5)	65 (89.0)	151 (86.3)	3.802	0.43
	No	1 (3.2)	0	2 (2.7)	3 (1.7)		
	May be	4 (12.9)	11 (15.5)	6 (8.2)	21 (12.0)		
12. Do you feel nutrition as a subject is given enough importance during dental education?	Yes	27 (87.1)	60 (84.5)	43 (58.9)	130 (74.3)	19.371	0.001
	No	0	3 (4.2)	15 (20.5)	18 (10.3)		
	May be	4 (12.9)	8 (11.3)	15 (20.5)	27 (15.4)		

About 74.2% of 3rd-year and 70.4% of final-year students agreed that bulimia and anorexia could affect the nutritional status and oral health of an individual, while only 50.7% of interns agreed to the same. The difference in the response to this question was statistically significant ($P < 0.012$). More than 80% of the study participants across all the years agreed that trace amounts of fluoride in food is strongly cariostatic.

Seventy percent of all participants said that they always counseled patients with high caries risk; however, 28.6% accepted that they never counsel the patients. Most of the participants, most of whom were 3rd years, and least were final years agreed that diet counseling can help in caries prevention, although 0.6% felt that diet counseling play no role in the prevention of caries ($P = 0.13$). About 86.3% of the participants felt that nutritional counseling is important for dental patients, 12% were unsure on the subject, and 1.7% felt that nutritional counseling was not important for dental patients.

When asked if they felt nutrition as a subject was given enough importance during dental education, only 58.7% interns in comparison to more than 80% third and final years felt that subject is given enough importance during their undergraduate education. A highly significant statistical difference was observed with $P = 0.001$.

Discussion

Poor nutrition affects the entire immune system degrading the immunity of individuals making them susceptible to a number of systemic and oral diseases.[2] The main aim of teaching medical and dental students about nutrition should be health promotion, disease prevention, and comprehensive care, rather than just disease management. Basic knowledge and skills

regarding nutrition counseling should be inculcated during the days of training in dental schools. Thus, this study reports on the nutritional knowledge among undergraduate dental students in a dental institution in India. The findings of this study can help structure the training of dental students in nutrition.

Sucrose for years has been regarded as the "arch criminal" of dental caries.[10] It has been known as a cariogenic substrate, owing to its unique ability to support the synthesis of extracellular glucans by mutans streptococci, enhancing its accumulation in the plaque. In the present study, the majority (78.3%) of the participants reported sucrose as the most cariogenic sugar. This was similar to the results obtained by da Costa *et al*.,[9] where 82.3% of the participants reported sucrose as the most cariogenic sugar.[1] Only 64% branded sucrose as the most cariogenic sugar in the study conducted by Sivakumar *et al*.[3]

Cheese stimulates the salivary secretion and increases plaque calcium concentration. The calcium concentration of the dental plaque strongly influences the balance between demineralization and remineralization of enamel.[9] In an epidemiological study, cheese intake was higher in children who remained caries-free over a 2-year period than in those who developed caries.[11] Yet, in the present study, only 15.4% of students thought cheese as anticariogenic, while 73% believed that nuts are anticariogenic.

In a recent systematic review, Cagetti *et al*.[12] found that there is no clear scientific evidence on the role played by vitamins on oral health. However, they also stated that there is a general consensus on the effect of vitamins deficiencies or supplementation on oral health but without substantial scientific evidence.[11] On the other hand, an overview of vitamins and oral health highlighted the importance of vitamins in oral health and disease.[13]

Recent literature shows that nutrition plays a major role in maintaining the integrity of oral tissues and nutritional disorder can affect the oral mucosal surface epithelium and cause changes and facilitate the invasion of pathogenic organisms, thus triggering the onset of various disorders of oral mucosa.[14-16] Studies have implicated Vitamin D deficiency in the incidence of periodontal disease.[17-19] A review stated that Vitamin K2 and Vitamin D together result in a far greater reduction of tooth decay than does either vitamin alone despite.[20] The body of literature, only 49.7% of dental students agreed that Vitamin C and B12 and iron deficiency anemia manifest as oral symptoms.

Another important finding of this study was that 62.9% of the study participants agreed that bulimia and anorexia affect nutritional status and oral health of an individual. A review[21] reported the oral consequences of eating disorders such as erosion on the palatal surfaces of maxillary teeth and dry mouth in bulimic patients. Interestingly, erosion was also found on the buccal and labial surfaces of patients who did not vomit.[21]

Most of the students presented a positive approach toward the importance of diet and nutrition in patient care. About 71.4% said that they counseled patients with high caries risk, and 86.3% stated that nutritional counseling is important for dental patients. However, interestingly, only 64% believed that diet counseling could help prevent dental caries. This finding was in contrast to da Costa *et al*.,[9] where almost 80% of the students had a more favorable attitude toward diet counseling being an efficient tool in the prevention of dental caries. The difference to the responses to these questions could be explained by the fact that diet counseling is effective only with patient compliance.

Our study findings highlight that while the students are knowledgeable in some aspects of nutrition, there are still some facets of nutrition that are ambiguous to them. Previous study authors who surveyed the dental students in India reported similar levels of knowledge.[3,8,9,22] The majority (74.3%) of the students felt that nutrition as a subject is given enough importance during dental education. However, there is still a need for reinforcement of training in diet and nutritional counseling with emphasis on prevention of oral diseases.

The subject of dental nutrition must now be taught based on the evidence and recent research, so the clinical implications can be better understood by the dental students. Training in a systematic and methodical manner with appropriate techniques for nutritional assessment and nutritional counseling will offer the upcoming dentists an opportunity to assume more central roles in holistic and preventive healthcare than the previous generations of dentists.

Limitations

It is acknowledged that the small and convenient sample size of dental students surveyed is one of the key limitations. Therefore, this sample may not be representative of and thus cannot be generalized to all dental students. However, the results do represent the dental students of this region and provide an input regarding the level of knowledge and attitude toward dental nutrition. The questions related to the attitude of the students may have a social desirability bias. Even so, the present study offers important findings for future dental education as it has studied the knowledge of students studying in different years of study. This may be helpful in designing the curriculum in a systematic and methodical manner.

Future scope

Further research should be conducted on larger samples to ascertain generalization. Longitudinal studies should be conducted on the effectiveness of nutritional counseling in the prevention and treatment of oral diseases.

Conclusion

Based on the findings of our study, it can be concluded that the dental students have knowledge regarding only the most basic concepts of dental nutrition. There is still a need to teach the subject of dental nutrition in Indian dental colleges so as to inculcate the practice of nutritional assessment and counseling for every patient and bring about prevention of oral diseases.

We would also like to highlight that there were no significant differences in the knowledge or attitude levels attributable to the year of study in dental college.

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Conflicts of interest

There are no conflicts of interest.

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