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Research Article

Knowledge and Association of Nutrition and Diet Counselling Associated with Periodontal Diseases – A Questionnaire Based Survey

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Abstract:

Introduction: Dentists need to have an adequate knowledge regarding diet and nutrition and its direct and indirect effects on oral health. There is a synergistic and multidirectional relationship in between nutrition and oral health. The nutrients have an impact on both general health and on oral health. Dentists and clinician considered diet and nutrition as an important tool in the prevention of dental diseases such as dental caries and periodontitis. Therefore, a questionnaire-based survey was conducted with an aim to assess the knowledge of nutrition and diet counselling associated with periodontal diseases.

Material & Methods: A questionnaire survey was conducted on 220 dental students by administering the self-administered pre validated questionnaire. The questionnaire consists of 12 closed ended questions, which assess the awareness of dietary recommendations, knowledge of food sources and diet-disease relationship. Data was collected through google online form.

Results: The response rate of participants was 98.5%. 92.7% dental students were aware about the disease gingivitis or periodontitis and their symptoms such as bleeding gums, pus discharge or loose teeth. Vitamin C, Vitamin B12 and antioxidant vitamins are most often chosen as factors associated with maintaining periodontal health. 30.3% dental students do not have a knowledge regarding the genetic makeup of the disease. 92.7% dental students believed that diet counselling at the early stages of life can help in the prevention of gingivitis/periodontitis.

Conclusion: Well-designed clinical trials of diet and nutrition intervention are needed to establish the potential role of nutrition in the prevention and treatment of periodontal disease. This survey has also highlighted that majority of dental students have the knowledge of diet counselling and nutrition and needs a greater number of longitudinal and cross-sectional studies which may help to define the casual relationship potential intervention strategies and future recommendations.

Keywords: Nutrition, gingival bleeding, periodontitis, diet counselling, antioxidant vitamins

Introduction:

Periodontal disease is one of the most common multifactorial diseases affecting both soft and hard tissue of the oral cavity seen in adults and older individual worldwide. Periodontal disease has deleterious effect on periodontal attachment apparatus resulting in periodontal inflammation, periodontal pocket, tooth mobility and eventually tooth loss. Periodontitis is directly or indirectly related to various systemic diseases such as cardiovascular disease, COPD, diabetes or stress. [1] Periodontitis shares many risk factors that can be confounded or modified by those risk factors

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associated with systemic diseases. [2] Prevention of periodontal disease at the population level requires better understanding of modifiable risk factors for periodontal disease. The impact of diet as a modifiable risk factor for periodontitis is biologically feasible through modulation of systemic inflammation.[3] Although, the literature associated with diet and nutrition in periodontal disease is relatively very scant. Nutrients are substances that the body needs for growth and metabolism. Nutrients can be separated into two categories, macronutrients or micronutrients. Micronutrients include essential vitamins and minerals; macronutrients include proteins and carbohydrates. The human body processes over 45 different nutrients from dietary intake necessary for growth, maintenance, and repair at cellular levels. Nutritional deficiencies have been found to be associated with tooth loss and can be indicated by various signs and symptoms in the oral cavity. Gingivitis has been linked with deficiencies in vitamin A, vitamin C, Calcium, and Zinc. Low levels of vitamin C have also shown to increase the likelihood of spontaneous gingival bleeding and an overall decrease in immune response that increases the risk of infection.

According to Carullo (2002) periodontal disease has been associated with deficiency of vitamin A, vitamin C, Magnesium, Calcium, and Zinc; the incidence of dental caries has been linked with insufficient amount of vitamin A and B-complex vitamins. Decreased bone density, osteoporosis, and bone and jaw deformities have been associated with insufficient amounts of B-complex vitamins, vitamin D, Calcium, Zinc, and Copper. Nutritional factors can also lead to dental erosion, the loss of hard dental tissue caused by acidic products.[4]

The Academy of Nutrition and Dietetics and American Dietetic Association, position paper argues that nutrition is a fundamental, key fact of overall oral health.[5] Scientific evidence supports the interrelationship between diet, nutrition with oral cavity in both health and disease. Dental plaque (biofilm) is composed of microorganisms; biofilm is the primary etiologic factor in periodontal disease, an inflammatory disease that can lead to the loss of periodontal ligaments and alveolar bone. Nutrition has direct or indirect on composition and structure of plaque biofilm.[6] The direct effect of nutrition on plaque biofilm is through direct supply of specific nutrients such as sucrose which may acts as a substrate for energy and provide carbon or nitrogen for the growth of bacteria where as the indirect effect of nutrition on plaque biofilm is production of metabolic byproducts from one organism which may acts as a nutrient for other organisms. Proteins are the constituents of organic matrix and maintain the integrity of fibres of periodontal ligament. The deprivation of protein may result in dystrophic changes in the periodontal ligament, decreased cementum formation, osteoporosis, and resorption of the alveolar bone. Also, there is marked degeneration of periodontal support when it is combined with soft diet.[7]

Adequate nutrition is a relevant component of periodontal health and helps to regulate periodontal inflammation. Periodontal disease can be associated with changes in immunological and haematological markers modulated by dietary factors. Both dental decay and periodontal disease can interfere with the integrity of the teeth and contribute to their loss, which in turn can have a detrimental effect or alter dietary habits.

Eating disorders, bulimia and anorexia can affect the oral cavity. Oral manifestations occur from bulimia due to acid contents from the gastrointestinal tract, which primarily leads to tooth erosion; whereas, anorexia causes xerostomia and nutrient deficiency.[8] There is a plausible and bidirectional association between nutrition, systemic disease, and oral health. Research evidence showed that dental professionals with paucity of understanding and skills which are required to educate their patients regarding the importance of nutrition and its role in oral health.[9] Similarly, studies have revealed that registered dieticians demonstrate insufficient understanding of oral health.[10] In addition, Hein, Schonwetter, & Iacopino (2011) found limited knowledge among non-dental health experts, such as dieticians and other allied health professionals, regarding the interrelationship between oral health and overall health.[11] Therefore, in the light of above facts the present survey was conducted with an aim an objective is to assess the knowledge and association of nutrition and diet counselling associated with periodontal disease.

Material and methodology:

The cross-sectional questionnaire-based study was conducted in february 2024 , to assess and obtain information about the knowledge and association of nutrition and diet counselling associated with periodontal diseases among dental students. Prior to start of survey, a protocol and purpose of the present study was discussed with the participants and included those participants who were willing to participate as volunteer in the survey. A sample size of 200 dental students were selected for the study. Those participants who were willing to participate and filled the entire questionnaire were included in the study.

Questionnaire Design:

The open-ended questionnaire was divided into two main sections. The survey questionnaire was designed based on the literature data available. The primary intent of this questionnaire was to explore the knowledge and association of nutrition and diet counselling associated with periodontal diseases among dental students. The first section of questionnaire captured the knowledge regarding nutrition and diet counselling associated with periodontal diseases of the participants. The second section of questions included association of nutrition and diet counselling with periodontal diseases. The questionnaire was entered in google forms for conducting the online survey and the google form was created through google form. The participate filled the questionnaire response and for each question and the data was calculated and analysed using statistical package for social sciences (spss) software for window version 23. The descriptive statistics have been generated in terms of percentage.

Results:

Out of 223 participants, a total of 220 participants completed the Questionnaire Proforma and positively participated in the study. The response rate of participants was 98.5%. Only 3 participants did not complete the questionnaire proforma and they were

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excluded from the study.

Knowledge about Nutrition Associated with Periodontal Health and Disease among Dental Students:

Table 1- shows the Knowledge about Nutrition Associated with Periodontal Health and disease among Dental Students. 92.7% dental students were aware about the disease gingivitis or periodontitis and their symptoms such as bleeding gums, pus discharge or loose teeth. Vitamin C, Vitamin B12 and antioxidant vitamins are most often chosen as factors associated with maintaining periodontal health. 90.4% dental students believed that deficiencies of vitamin may cause destruction to periodontium and results in bleeding gums. 80.9% dental students responded positively that high blood sugar level can increase the risk of infection in the oral cavity. When asked about the primary etiological factors for gingivitis and periodontitis, 89% dental students have a knowledge that dental plaque, calculus, and food impaction are the primary etiological factors which causes gingivitis and periodontitis. 64% dental students believed that during conditioned enlargement such as pregnancy may results in increased bleeding gums and gingival enlargement. 28.1% dental students do not have any knowledge about the conditioned enlargement. when asked about the genetic predisposition with periodontitis only 54.3% dental students responded positively responded and 30.3% dental students do not have a knowledge regarding the genetic makeup of the disease. Although 84% dental students were believed that smoking can be a risk factor for causing periodontitis.

QUESTIONNAIRE	RESPONSES	N	%
1) Do you have awareness about diseases affecting the gums known as gingivitis (or)periodontitis	a) Yes	204	92.7%
	b) No	13	5.9%
	c) Don't know	3	1.3%
2) Are you aware about the symptoms ofgingivitis, such as bleeding gums, loose teethand pus discharge?	a) Yes	209	95%
	b) No	9	4%
	c) Don't know	2	0.9%
3) Are you aware that deficiencies of Vitamin B12and Vitamin C in the diet can lead to periodontal damage and bleeding gums?	a) Yes	199	90.4%
	b) No	14	6.3%
	c) Don't know	7	3.1%
4) Did you know that high blood sugar level canincrease the risk of infection in the oral cavity?	a) Yes	178	80.9%
	b) No	28	12.7%
	c) Don't know	14	6.3%
5) Initiating factors responsible for gingivitis andperiodontitis?	a) Dental plaque	13	5.9%
	b) Dental calculus	4	1.8%
	c) Food impaction	6	2.7%
	d) All of theabove	196	89%
6) Do you know that there is an increased tendency for bleeding gums and enlargementof gums during pregnancy?	a) Yes	141	64%
	b) No	14	6.3%
	c) Don't know	62	28.1%
7) Do you think periodontitis have genetic predisposition?	a) Yes	119	54.3%
	b) No	34	15.4%
	c) Don't know	66	30.3%
8) Are you aware that smoking can causegingivitis/periodontitis?	a) Yes	185	84%
	b) No	15	6.8%
	c) Don't know	20	9%

Table 1: Knowledge Regarding Nutrition and Diet Counselling Associated with Periodontal Diseases.

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Association of Nutrition and Diet Counselling Associated with Periodontal Health and Disease among Dental Students

Table 2- shows the Association of Nutrition and Diet Counselling Associated with Periodontal Health and Disease among Dental Students. In relation to periodontal health 77.2% dental students believed that high fiber diet has a self-cleansing effect resulting in less plaque accumulation and strengthen the periodontium. 92.7% dental students believed that diet counselling at the early stages of life can help in the prevention of gingivitis/periodontitis. in relation to prevention of periodontal disease, 79% dental students responded positively that tooth brushing is advisable after the consumption of food which reduces the plaque accumulation in the oral cavity. Majority of dental students (94.5%) believed that nutrition and diet counselling is an important subject to be covered during their educational curriculum.

QUESTIONNAIRE	RESPONSES	N	%
1) Are you aware that high fiber diet have self cleansing effect, causes low plaque accumulationand strengthens periodontium?	a) Yes	170	77.2%
	b) No	33	15%
	c) Don't know	15	6.8%
2) Diet counselling can help in prevention of gingivitis/ periodontitis, if done at early stage.	a) Yes	204	92.7%
	b) No	4	1.8%
	c) Don't know	11	5%
3) If nutrition/diet counselling is important for dental students during their educational course (BDS/MDS)	a) Yes	208	94.5%
	b) No	7	3.1%
	c) Don't know	5	2.2%
4) Tooth brushing/rinsing is advisable every timeafter food/drink consumption to reduce the chances of plaque accumulation.	a) Yes	174	79%
	b) No	33	15%
	c) Don't know	13	5.9%

Table 2: Association of nutrition and diet counselling with periodontal diseases

Discussion:

The relationship between nutrition, infectious disease, and the immune system is synergistic. Infection may promote malnutrition, malnutrition elicits dysfunction in the immune system, and impaired immunity intensifies infection. Deficiency of nutrition may affect the microflora of dental plaque, salivary secretion, and the pH levels of the oral cavity. It also impacts systemic diseases, obesity, and inflammatory markers all of which have been shown to be associated with periodontal disease. Adequate and appropriate nutrient intake is needed for growth, development, and maintenance of the oral tissues and for the prevention of dental caries, gingivitis, and periodontitis. Research in the literature suggested that nutrition have a role in the onset and progression of periodontal disease. It may affect the entire immune system of the host which make more susceptible to number of systemic diseases and oral diseases. Recently the prime importance of oral health has received the recognition as research to be more established in the direction of oral and systemic health. The oral cavity can be the gateway for assessment by dental professionals to determine nutritional deficiencies. Therefore, it is significant for dental professionals to understand these impacts for an excellent care to their patients.

Many nutritional deficiencies can first be seen in the oral cavity. For example, deficiency of vitamin c may result in bleeding gums, delayed wound healing and Defective collagen formation whereas deficiency of vitamin B12 may result in halitosis, hemorrhagic gingivitis, detachment of periodontal ligament fibres and bone loss. The serum level of vitamin C and dietary intake of vitamin c have shown a weak but statistically significant relationship to periodontal disease.[12,13] Also. an inverse association has been found between calcium intake and dairy products and prevalence of periodontitis.[14] The increased level of magnesium to calcium ratio has been linked with less attachment loss.[15] And the supplementation of vitamin B complex led to significantly improved clinical attachment level. A very scant data is available in the literature with nutritional advice by general dentists and association with periodontal diseases. This survey was conducted among dental students to assess the knowledge and association of nutrition and diet counselling associated with periodontal diseases.

The majority of dental students believed that nutrition plays a role in periodontal health. Most of the studies that have been conducted on nutrition and diet are observational studies which may assess a relationship between certain aspects of diet and periodontal disease, including an inverse association with intake of vitamin C, calcium, and wholegrains.[13,14,15,16] However, there is a well-established link between consumption of a healthier diet and prevention of many chronic diseases associated with periodontitis. However, there is a very scant data in terms of dietary interventional randomised controlled clinical trials which may demonstrate whether nutrition has a therapeutic and preventive effect in the management of gingival and periodontal disease. More clinical trials are needed to clarify and strengthen the evidence of nutritional diet and periodontal disease.

In the present survey, most of the dental students (80.9%)

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responded positively that high blood sugar level can increase the risk of infection in the oral cavity. There is a direct casual relationship between diabetes and periodontitis in which the advanced glycosylation end products may triggers the inflammatory response to phenotypic cells such as fibroblast, endothelial cells and macrophages. Endothelial cells may become hyperpermeable and hyper expressive for adhesion molecules and increased cellular permeability. The increased accumulation of AGEs and their interaction with RAGE in diabetic gingiva resulting in hyper production of proinflammatory cytokines, vascular dysfunction, and loss of effective tissue integrity and barrier function.[17,18] Smoking and oral hygiene are undoubtedly major risk factors for periodontal disease with a strong evidence base. There is a decrease in pro- inflammatory cytokines and chemokines and various regulators of NK cells and T-cells resulting in immunosuppressant effect on the host immune response which may enhance the susceptibility of periodontitis. In the present survey, dental students (84%) strongly believed that smoking may cause gingivitis and periodontitis.

In the present survey majority of dental students (89%) agreed that dental plaque and calculus are the initiating factor for gingivitis and periodontitis. plaque and calculus both are the initiating primary etiological factors which plays a more direct role in periodontal inflammation and destruction. There is a positive correlation of plaque and calculus and prevalence of gingivitis and periodontitis. Plaque is the primary initiating factor for gingival inflammation resulting in pocket formation and provides a habitat niche for bacterial accumulation along with increased flow of gingival fluid may provide the minerals that convert plaque in the sub-gingival calculus.

Cross-sectional data in the literature evidenced that a “high-quality” diet is considered as an oral health-promoting factor only when there is a control of weight and an adequate exercise. In the present survey 77.2% dental students agreed that high finer diet have self- cleansing effect causes low plaque accumulation and strengthens the periodontium. A pro- inflammatory diet and poor consumption of micronutrient have been linked to an increased risk of periodontal disease. Similarly, adherence to an anti-inflammatory dietary pattern especially “high micronutrient and fibre” has shown a linked with lower risk of periodontal destruction and tooth loss.[8,9] Twin studies have shown that genetic factor may affect the clinical measure of gingivitis, probing depth, attachment loss and interproximal bone height. In the present survey only one half of dental students (54%) agreed that periodontitis have genetic predisposition. However, 30% dental students did have any knowledge regarding the genetic factors associated with periodontitis. genes associated with periodontal disease are associated with immunological alteration in neutrophil abnormality, Monocytic hyper- responsiveness to LPS and Alterations in the monocytes/macrophage. Genetic studies in the literature showed that gene polymorphisms are associated with stable inter-individual differences in IL-1 and TNF production. Interleukin-4 (IL-4) is a potent down-regulator of macrophage function. A higher occurrence of IL-4 gene polymorphism has been demonstrated in a group of Aggressive periodontitis patients than controls.[21]

The findings of the survey highlighted that majority of dental students are knowledgeable in the subject of nutrition and diet counselling. Although, 94.5% dental students felt that nutrition and diet counselling as a subject in their educational course or curriculum (BDS/MDS) is important with more emphasis on the prevention of oral diseases. The subject of dental nutrition must be taught on the basis of clinical implications, systematic and methodical training or in the form of a continuing education programs. The present survey has certain limitations such as the number of dental students included in this survey was very less. Also, dental practitioners and specialized dentists should be included with more emphasis on the clinical implication of dental diseases and their association with dietary factors for designing the questionnaire to assess the knowledge, and attitude of diet and nutrition. Longitudinal studies should be conducted to evaluate the effectiveness of nutrition counselling in terms of prevention of oral diseases.

Conclusion:

There is concern amongst dental students that the literature may not be strong enough to support a therapeutic role of diet and nutrition in periodontal diseases. Well-designed clinical trials of diet and nutrition intervention are needed to establish the potential role of nutrition in the prevention and treatment of periodontal disease. This survey has also highlighted that majority of dental students have the knowledge of diet counselling and nutrition and needs a greater number of longitudinal and cross-sectional studies which may help to define the casual relationship potential intervention strategies and future recommendations. Future research is also required to further elucidate the role of micronutrients in the prevention and treatment of periodontal disease

References:

1. Otomo-Corgel J, Pucher JJ, Rethman MP, Reynolds MA. State of the science: chronic periodontitis and systemic health. The journal of evidence-based dental practice. 2012;12: 20-28.
2. Albandar JM. Epidemiology and Risk Factors of Periodontal Diseases. Dental Clinics of North America. 2005;49: 517-532.
3. Chapple ILC. Potential Mechanisms Underpinning the Nutritional Modulation of Periodontal Inflammation. The Journal of the American Dental Association. 2009;140: 178-184.
4. Najeeb, S., Zafar, M. S., Khurshid, Z., Zohaib, S., & Almas, K. (2016). The role of nutrition in periodontal health: An update. Nutrients, 8(9), 530.
5. American Dietetic Association. Position of the American Dietetic Association: Oral health and nutrition. Journal of the American Dietetic Association 2007;107(8):1418 1428.
6. Baumgartner S, Imfeld T, Schicht O, et al. The impact of the stone Age diet on gingival conditions in the absence of oral hygiene. J Periodontol 2009; 80:759-768.
7. Al-Zahrani MS. Increased intake of dairy products is related to lower periodontitis prevalence. J Periodontol 2006; 77:289-294.
8. Decker, R.T. & Mobley. Position of the academy of

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nutrition and dietetics: Oral health and nutrition. Journal of the Academy of Nutrition and Dietetics 2013; 113(5): 693-701.

9. Shah, K., Hunter, M. L., Fairchild, R. M., & Morgan, M. Z. A comparison of the nutritional knowledge of dental, dietetic and nutrition students. British Dental Journal 2011; 210(1): 33-38.
10. Bhat, P., Lingaraj, S., & Aruna, C. Assessing the knowledge of dietitians regarding diet and oral health in Bengaluru city. Journal of Indian Association of Public Health Dentistry 2014; 12(2): 119.
11. Hein, C., Schonwetter, D. J., & Iacopino, A. M. Inclusion of oral systemic health in predoctoral/ undergraduate curricula of pharmacy, nursing, and medical schools around the world: A preliminary study. Journal of Dental Education 2011; 75 (9):1187-1199.
12. Amarasena N, Ogawa H, Yoshihara A, Hanada N, Miyazaki H. Serum vitamin C- periodontal relationship in community-dwelling elderly Japanese. Journal of Clinical Periodontology 2005;32(1):93-7.
13. Nishida M, Grossi SG, Dunford RG, Ho AW, Trevisan M, Genco RJ. Dietary vitamin C and the risk for periodontal disease. Journal of Periodontology 2000;71(8):1215-23.
14. Nishida M, Grossi SG, Dunford RG, Ho AW, Trevisan M, Genco RJ. Calcium and the risk for periodontal disease. Journal of Periodontology 2000;71(7):1057-66.
15. Meisel P, Schwahn C, Luedemann J, John U, Kroemer HK, Kocher T. Magnesium deficiency is associated with periodontal disease. Journal of Dental Research 2005;84(10):937-41.
16. Merchant AT, Pitiphat W, Franz M, Joshipura KJ. Whole-grain and fiber intakes and periodontitis risk in men. American Journal of Clinical Nutrition 2006;83(6):1395-400.
17. Lalla E, Lamster IB, Drury S, Fu C, Schmidt AM. Hyperglycemia, glycoxidation and receptor for advanced glycation endproducts: potential mechanisms underlying diabetic complications, including diabetes-associated periodontitis. Periodontol 2000. 2000; 23:50–62.
18. Soskolne WA, Klinger A. The relationship between periodontal diseases and diabetes: an overview. Ann Periodontol. 2001; 6:91–98.
19. Van der Velden U, Kuzmanova D, Chapple IL. Micronutritional approaches to periodontal therapy. J Clin Periodontol. 2011 Mar;38 Suppl 11:142-58.
20. Watson S, Woodside JV, Winning L, Wright DM, Srinivasan M, McKenna G. Associations between self-reported periodontal disease and nutrient intakes and nutrient-based dietary patterns in the UK Biobank. J Clin Periodontol. 2022 May;49(5):428-438.
21. Kornman KS, di Giovine FS -1998-. Genetic variations in cytokine expression: a risk factor for severity of adult periodontitis. *Ann Periodontol* 3:327–338.

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