Content available at: https://www.ipinnovative.com/open-access-journals

International Dental Journal of Student's Research

Journal homepage: https://www.idjsronline.com/

Review Article

Diet, nutrition and oral health

Harpuneet Kaur[1,*]

[1] *National Dental College & Hospital, Dera Bassi, Punjab, India*

ARTICLE INFO

Article history:
Received 25-02-2023
Accepted 23-03-2023
Available online 29-04-2023

Keywords:
Diet
Nutrition
Oral Health
Dental caries
Periodontal disease

ABSTRACT

Eating habits describe the types and quantities of food that an individual or a group of individuals regularly consumes, as well as how often they drink. Healthy dietary practises have an impact on dental health. The future embryo's development, including the growth of the maxilla, the formation of the skull and face, and dental organogenesis, is impacted by a lack of vitamins and minerals during the preconception period. Understanding how nutrition and eating habits affect both children's and adults' caries rates is necessary to improve oral health. Lack of vitamin A, C, E, and folate all has a detrimental effect on periodontal health. Throughout the early phases of embryonic development, folate is crucial. Oral cancer is most common in people who smoke, chew tobacco, or consume alcohol. Changing one's nutrition can have a significant impact on one's health throughout one's life, both positively and negatively. Food consumption must be improved in order to minimise the incidence of oral and pharyngeal cancer. The primary sources of vitamins and fibre are fruits, vegetables, and grains, thus a daily meal should have an appropriate quantity of each. By giving folate during the first trimester of pregnancy and in the months leading up to conception, the likelihood of nervous system abnormalities is reduced. Chewing gum and other xylitol-containing products have significantly decreased dental cavities, and they provide tempting alternatives for people who are most at risk. The aim of this study is to review the evidence suggesting link between diet, nutrition, and oral health and to provide dietary advice for the prevention of oral diseases.

1. Introduction

Eating habits specify the kinds and amounts of food that a person or a group of people consumes on a regular basis, as well as how frequently they drink. A good dental health status is impacted by healthy eating habits.[1] More specifically, diet can have positive or negative impacts on oral health (and particularly the dentition and periodontium) depending on the physical and chemical characteristics of the foods we consume as well as how those meals are ingested (e.g., frequency, delivery).[2,3] The link between nutrition and oral health is complex. An individual's functional capacity to eat and their nutritional condition are affected by oral infectious diseases, as well as by acute, chronic, and systemic diseases having oral symptoms. The growth and health of the oral cavity as well as the development of oral disorders can both be impacted by diet and nutrition.[4]

Diet and nutrition have a regional impact on the oral cavity. All bodily tissues, including those in the mouth, are reliant on nutrients. When teeth are developing, nutrition plays a role, and malnutrition can make periodontal and other oral infectious illnesses worse.[5,6] The way that diet affects the body's overall health, the condition of oral tissues, the quantity and quality of saliva, and the body's general health is also significant. Additionally, the sort of food consumed, how it tastes, and ultimately its nutritional value are all influenced by dental health. Oral

* *Corresponding author*.
E-mail address: drkaur071993@gmail.com (H. Kaur).

https://doi.org/10.18231/j.idjsr.2023.002

disorders are frequently concealed and inconspicuous, or they are accepted as an inevitable result of ageing and life, despite the fact that they represent a risk factor for vitamin deficiency. For practically all nations around the world, the high incidence of oral illnesses poses a seriously underappreciated public health concern.[6–8] This study's objectives are to review the data pointing to a connection between diet, nutrition, and oral health and to offer dietary advice for the prevention of dental diseases.

2. Poor Nutrition and Diet Affecting the Development and Maturation of Teeth

The nutritional condition has an impact on teeth that are in the preeruptive stage. Vitamin D and A deficiency as well as protein-energy malnutrition have been linked to salivary gland atrophy and hypoplasia, two diseases that increase a person's vulnerability to tooth decay. A deficiency in vitamin A is linked to some hypoplasia and pits on the surface of the enamel, but a deficiency in vitamin D is linked to more dispersed hypoplastic forms. The structural damage serves as evidence of the period during which there was a lack of nutrients.[9,10]

Lack of vitamins and minerals during the preconception period affects the future embryo's development, including the growth of the maxilla, the development of the skull and face, and dental organogenesis.[11,12] Lingual papillae atrophy, connective degeneration, altered dentinogenesis, altered cementogenesis, altered maxilla development, malocclusion, and linear enamel hypoplasia can all be caused by a lack of proteins.[10,13,14]

Enamel hypoplasia, tooth formation, and epithelial tissue development are all hampered by vitamin A deficiency. Hypomineralization, delayed eruption, the absence of lamina dura, and aberrant alveolar bone patterns are all symptoms of vitamin D and calcium inadequacy. Vitamin C insufficiency can cause collagen production problems, bleeding gums, dentin deformities, and delayed wound healing. A deficiency of vitamin B is linked to angular cheilosis and periodontal disorders.[15–17]

3. Dental Caries

Dental caries is a multi factorial disease that involves interactions between socioeconomic (income, primary prevention organisation), behavioural (quality and quantity of nutrition, dental hygiene, behavioural patterns or lifestyles linked to society and culture), genetic (co-existing somatic disorders, proteins related to the antimicrobial activity (beta-defensin one and lysozyme-like protein), pH control (carbonic anhydrase VI), and bacterial colonizability factors.[18–21]

The most potentially modifiable risk factors for dental caries, nutritional and behavioural risk factors, must be the focus of primary prevention. The most important risk factor for dental caries is dietary sugar intake.[21,22] The sugars and other fermentable carbohydrates are digested by salivary amylase and then serve as the substrate for oral bacteria, which reduces plaque and salivary pH. Tooth demineralization is the subsequent outcome, which starts.[21,23]

Improving dental health requires an understanding of how nutrition and eating habits affect both children's and adults' caries rates. An illness with multiple causes is dental caries. Food carbohydrates provide the perfect environment for cariogenic bacteria to grow and produce acids that demineralize enamel. Dental cavities and the quantity and frequency of free sugar consumption are strongly correlated. The risk of dental disease is increased by refined diets and ferment able carbohydrates. On the other hand, it has been demonstrated that fresh fruits and starchy staple foods are linked to reduced levels of caries activity.[17,24]

Food's ability to cause cancer is strongly correlated with how sticky it is.[17,24] The risk of caries rises if the type of sugar has a strong propensity to attach to teeth surfaces.[17,25] Foods with poor stickiness, such as sugary beverages, have a cariogenic potential that should not be undervalued because they considerably raise the risk of dental caries. Many research assess the relationship between sugar intake (both quantity and frequency) and dental caries. For instance, one study discovered that toddlers aged 3 who consumed sugar four to five times per day were six times more likely to have a high caries rate than children who consumed sugar the least frequently.[17,24]

4. Periodontal Diseases

Function of vitamins has been extensively explored in relation to periodontal disorders. Vitamin A, C, E, and folate deficiency all have a negative impact on periodontal health. More investigation into the impact of dietary antioxidants and free radicals in relation to periodontal disease is anticipated, as is the significance of folate in the prevention of gingivitis. As vitamin A is crucial to maintaining the epithelium, gingiva is likely to be affected by a vitamin A deficiency. In 1962, Shaw evaluated the evidence from animal research on the association between vitamin A deficiency and periodontal disease and found that gingivitis, gingival hypoplasia, proliferation of crevicular epithelium and resorption of alveolar bone were all associated with deficiency of vitamin A[26,27] In older persons, periodontal disease was independently linked to low serum folate levels. According to the findings, serum folate levels, which are crucial markers of periodontal disease in older persons, may offer a crucial therapeutic target for treatment to advance dental health.[28]

5. Cleft Lip and Palate

Folate is essential throughout the early stages of embryonic development; in fact, a deficiency in this vitamin has been linked to "defects of the neural tube," which are developmental flaws that affect the neural tube. For this reason, B9 is given to women who are trying to get pregnant and during the first few months of their pregnancy in the United States with the help of the health authorities.[2,10,29]

6. Oral Cancer

Very grave implications stem from the link between nutrition and mouth cancer. Three hundred thousand new instances of oral cancer are diagnosed worldwide each year. Those who smoke, chew tobacco, and drink alcohol are most likely to develop oral cancer. Smoking can change how nutrients, such antioxidants, are distributed, which generates a protective effect on the cells. The study on the prevalence of mouth cancer has highlighted the potential for diet and nutrition to play a significant role in the aetiology of oral carcinogenesis. Antioxidant qualities can be found in vitamins A, E, C, and beta-carotene. They block the activation of pro-carcinogens, neutralise metabolic products, stop chromosomal abnormalities, and maybe stop the development of potentially cancerous tumours.[27,30]

7. Diet and Prevention of Dental Diseases

Combining data from human intervention studies, epidemiological studies, animal studies, and experimental investigations, there is strong support for a link between the consumption of free sugars and dental caries. Consumption of fresh fruit and starchy staple foods is linked to reduced levels of dental caries, according to epidemiological studies, even though other fermentable carbs may not be entirely blameless. Fluoride lowers the risk of dental caries, although it hasn't completely eradicated it, and many nations do not receive enough fluoride exposure. A maximum of four times per day should be the daily limit for eating foods with free sugars.[31] The use of chewing gum and other xylitol-containing products has clearly reduced dental caries and offers appealing alternatives for those at high risk of developing dental caries. Dietary carbohydrates can be used safely by people who receive the recommended amount of fluoride exposure and practise routine dental hygiene, ideally during meals and two to three times per day in the form of snacks or drinks.[32]

To limit the danger, it is best to only eat highly acidogenic snacks at mealtimes. Snacks in between meals should either be nonacidogenic (like xylitol products) or hypoacidogenic (such as sorbitol and HSH products). Cheeses present a circumstance that occurs naturally and may have an anticariogenic effect on the body. The supply of between-meal snack meals that lower the incidence of dental caries with certain chemicals and sugar alternatives shows significant promise.[33]

The incidence of nervous system defects is decreased by administering folate in the months before conception and throughout the first trimester of pregnancy, and even cleft lip and palate could be averted with the preventive use of the vitamin.[10,29]

Dietary consumption must be improved in order to lower the risk of oral and pharyngeal cancer, particularly squamous cell carcinoma, the most prevalent oral cancer. This is done mostly by cutting back on calories, monounsaturated fat, and red or processed meat. The daily diet should include a suitable amount of fruits, vegetables, and grains, which are the main sources of vitamins and fibre. Oral cancer can be prevented by consuming the recommended daily amounts of micro nutrients such vitamin C, E, antioxidants, zinc, beta-carotene, and folate. Due to the creation of hetero cyclic amines, eating fried or broiled food as well as using a microwave should be avoided due to the rising risks of mouth cancer, particularly tumours of the salivary glands.[34]

8. Conclusion

Dietary sugar intake is the main risk factor for dental caries. Lack of vitamin A, C, E, and folate all have a detrimental effect on periodontal health. Throughout the early phases of embryonic development, folate is crucial. Oral cancer is most common in people who smoke, chew tobacco, or consume alcohol. The quality of food must be improved if oral and pharyngeal cancer incidence is to be reduced. Fruits, vegetables, and grains are the main sources of vitamins and fibre; therefore, a regular meal should have a suitable amount of each. The risk of nervous system abnormalities is decreased by providing folate during the first trimester of pregnancy and in the months preceding conception. Dental cavities have been greatly reduced by chewing gum and other xylitol-containing products, and they offer enticing substitutes for those who are most at risk.

9. Source of Funding

None.

10. Conflict of Interest

None.

References

1. Mestaghanmi H, Labriji A, Touguy I, Kehailou F, Idhammou S, Kobb N. Impact of Eating Habits and Lifestyle on the Oral Health Status of a Casablanca's Academic Population. *Open Access Libr J*. 2018;5(11):1–16.
2. Jensen ME. Diet and dental caries. *Dent Clin North AM*. 1999;43(4):615–33.
3. Lieffers JRL, Vanzan AGT, De Mello J, Cammer A. Nutrition Care Practices of Dietitians and Oral Health Professionals for Oral Health Conditions: A Scoping Review. *Nutrients*. 2021;13(10):3588. doi:10.3390/nu13103588.

4. Decker RT, Mobley C. Academy of Nutrition and Dietetics. Position of the Academy of Nutrition and Dietetics: oral health and nutrition. *J Acad Nutr Diet*. 2013;113(5):693–701.
5. Ghosh A, Pallavi SK, Nagpal B. Nutrition and Oral Health: A Review. *Indian J Appl Res*. 2015;5(11):546–9.
6. Muyide AM, Oduneye MT. Effect of dietary pattern and nutritional status on oral health of patients attending the dental clinic in University College Hospital. *Int J Health Sci Res*. 2021;11(6):374–80.
7. FDI. The Challenge of Oral Disease - A call for global action. In: and others, editor. The Oral Health Atlas; 2015. p. 120.
8. Smadi L, Nassar O. Oral & Dental Health Knowledge and Attitude among Nursing Students. *World J Educ Res*. 2016;3(2):238–50.
9. Faggella A, Guadagni MG, Cocchi S, Tagariello T, Piana G. Dental features in patients with Turner syndrome. *Eur J Paediatric Dent*. 2006;7(4):165–8.
10. Scardina GA, Messina P. Good oral health and diet. *J Biomed Biotechnol*. 2012;2012:3272860.
11. Belcastro G, Rastelli E, Mariotti V, Consiglio C, Facchini F, Bonfiglioli B. Continuity or discontinuity of the life-style in central Italy during the Roman imperial age-early middle ages transition: diet, health, and behavior. *Am J Phys Anthropol*. 2007;132(3):381–94.
12. Dion N, Cotart JL, Rabilloud M. Correction of nutrition test errors for more accurate quantification of the link between dental health and malnutrition. *Nutrition*. 2007;23(4):301–7.
13. Singh A, Bharathi MP, Sequeira P, Acharya S, Bhat M. Oral health status and practices of 5 and 12 year old indian tribal children. *J Clin Pediatr Dent*. 2011;35(3):325–30.
14. Society CD. Good oral health starts with exercise, eating right. *CDS Rev*. 2011;104(2):34.
15. Pflipsen M, Zenchenko Y. Nutrition for oral health and oral manifestations of poor nutrition and unhealthy habits. *Gen Dent*. 2017;65(6):36–43.
16. Sheetal A, Hiremath VK, Patil AG, Sajjansetty S, Kumar SR. Malnutrition and its oral outcome - a review. *J Clin Diagn Res*. 2013;7(1):178–80.
17. Tungare S, Paranjpe AG. Diet and Nutrition to Prevent Dental Problems. StatPearls Publishing; 2022. Available from: https://pubmed.ncbi.nlm.nih.gov/30480981/.
18. Petersen PE. Socio behavioral risk factors in dental caries - international perspectives. *Commun Dent Oral Epidemiol*. 2005;33(4):274–9.
19. Frazão P. Epidemiology of dental caries: When structure and context matter. *Braz Oral Res*. 2012;26(1):108–14.
20. Eriksson L, Holgerson PL, Johansson I. Saliva and tooth biofilm bacterial microbiota in adolescents in a low caries community. *Sci Rep*. 2017;7(1):5861. doi:10.1038/s41598-017-06221-z.
21. Tudoroniu C, Popa M, Iacob SM, Pop AL, Năsui BA. Correlation of Caries Prevalence, Oral Health Behavior and Sweets Nutritional Habits among 10 to 19-Year-Old Cluj-Napoca Romanian Adolescents. *Int J Environ Res Public Health*. 2020;17(18):7558728.
22. Watt RG, Rouxel P. Dental caries, sugars, and food policy. *Arch Dis Child*. 2012;97(9):769–72.
23. Decker RT, Loveren CV. Sugars and dental caries. *AJCN*. 2003;78:881–92.
24. Moynihan P, Petersen PE. Diet, nutrition and the prevention of dental diseases. *Public Health Nutr*. 2004;7(1A):201–27.
25. Moynihan PJ. The role of diet and nutrition in the etiology and prevention of oral diseases. *Bull World Health Organ*. 2005;83(9):694–703.
26. Shaw JH. The relation of nutrition to periodontal disease. *J Dent Res*. 1962;41:264–74.
27. Ghosh A, Archana J, Nagpal P, Hegde B, Usha S. Nutrition and Oral Health: A Review. *Indian J Appl Res*. 2015;5(11):546–9.
28. Yu YH, Kuo HK, Lai YL. The association between serum folate levels and periodontal disease in older adults: data from the National Health and Nutrition Examination Survey 2001/02. *J Am Geriatr Soc*. 2007;55(1):108–13.
29. Hagoort A, Bliek J, Tabatabaei FS, Ursem N, Steegers E. Steegers-Theunissen R. Hyperhomocysteinemia and MTHFR polymorphisms in association with orofacial clefts and congenital heart defects: a meta-analysis. *Am J Med Genet*. 2007;143(9):952–60.
30. Sheetal A, Hiremath VK, Patil AG, Sajjansetty S, Kumar SR. Malnutrition and its Oral Outcome - A Review. *J Clin Diagnostic Res*. 2013;7(1):178–80.
31. Moynihan P, Petersen P. Diet, nutrition and the prevention of dental diseases. *Pub Health Nutr*. 2004;7(1):201–26.
32. Kandelman D. Sugar, alternative sweeteners and meal frequency in relation to caries prevention: New perspectives. *Brit J Nutr*. 1997;77(S1):121–8.
33. Jensen ME. Diet and dental caries. *Dent Clin North Am*. 1999;43(4):615–33.
34. Taghavi N, Yazdi I. Type of food and risk of oral cancer. *Arch Iran Med*. 2007;10(2):227–32.

Author biography

Harpuneet Kaur, Former BDS Graduate

Cite this article: Kaur H. Diet, nutrition and oral health. *International Dental Journal of Student's Research* 2023;11(1):1-4.