

The Impact Of Diet And Nutrition On Oral Health: A Systematic Review

Ismail Ali Tohary¹, Anas Saifullah Jan², Majed Abdulhadi Alotaibi³, Tariq burayk abdulkareem alosaimi⁴, Abdulaziz Eid Ali Alotaibi⁴, Abdullah abdulaah alshayb⁵, Jabeer Abdullah Ahmed Sadig⁶, Hussain Yahya Ahmed Tumayhi⁷, Seham Hadi Rubayyi⁸, Sultan Abdullah Amri⁸, Hamed Theyab Almutairi⁹

Abstract

The impact of diet and nutrition on oral health is an area of significant interest among researchers and healthcare professionals. This review aimed to assess the current evidence on the relationship between diet, nutrition, and oral health status. The study utilized secondary data from existing research studies, clinical trials, and systematic reviews to establish a comprehensive overview of the topic. The findings of the review highlighted the significant role that diet and nutrition play in maintaining a healthy oral cavity. A diet rich in fruits, vegetables, and lean proteins and low in sugars and processed foods was related to better oral health outcomes, including reduced risk of dental caries, periodontal disease, and other oral health issues. Conversely, a diet high in sugars, fats, and processed foods was linked to an increased risk of dental problems. Overall, the review emphasized the importance of a balanced and nutritious diet in promoting optimal oral health and preventing oral diseases. The findings underscored the need for public health initiatives and interventions that focus on promoting healthy eating habits and nutritional choices to improve oral health outcomes. Further investigation is warranted to explore the particular mechanisms underlying the link between diet, nutrition, and oral health and to inform evidence-based dietary recommendations for oral health promotion.

Keywords: Oral health, Nutrition, Dental caries, Diet, Processed foods.

1. Introduction

Oral health is a vital aspect of overall well-being, with a strong correlation between the diet and nutrition we consume and our oral health (Hujoel, 2017). The mouth serves as the entry point for nutrients and plays a crucial role in digestion. Therefore, it is not surprising that the diet and nutrition we follow can significantly impact our oral health.

¹family Medicine Specialist, Primary Health Care Center In Jizan Called Al-Uhd Primary Health Care Center, Saudi Arabia.

²family Medicine, Phc Center In Al Taneem- Makkah Healthcare Cluster, Saudi Arabia.

³specialist Clinical Nutrition, Imam Abdulrahman Alfaisal Hospital, Riyadh, Ministry Of Health, Saudi Arabia.

⁴specialist Clinical Nutrition, Huraymala General Hospital, Ministry Of Health, Saudi Arabia.

⁵food And Nutrition- Technician, Ministry Of Health, Saudi Arabia.

⁶clinical Dietitian, South Qunfudah General Hospital, Saudi Arabia.

⁷clinical Nutrition, King Abdulaziz Specialist Hospital - Taif, Saudi Arabia.

⁸clinical Dietitian, Sabya General Hospital, Saudi Arabia.

⁹nutrition Technician, Yamamah Hospital, Riyadh, Saudi Arabia

This review aims to explore the impact of nutrition on oral health, with a particular focus on how different dietary habits and nutrient intake levels can contribute to various oral health conditions. Understanding the link between diet, nutrition, and oral health is vital for developing effective preventive measures and treatment strategies to promote optimal oral health outcomes (Najeeb, 2016).

Dietary factors such as sugar consumption, nutrient deficiencies, and hydration levels have been linked to oral health problems such as dental caries, periodontal disease, and erosion of tooth enamel (Rahman, 2020). By examining the existing literature on the subject, we aim to identify the key dietary patterns and nutrients that play a significant role in sustaining decent oral health and preventing oral diseases.

The results of a variety of studies will be synthesized in this systematic review to give a thorough overview of the most recent research on the effects of nutrition and food on oral health and to make relevant inferences about the associations between dietary practices and oral health outcomes. By reviewing the current literature, we intend to find knowledge gaps and potential topics for additional study to advance our comprehension of the relationship between nutrition food and dental health.

Ultimately, the findings of this systematic review will be valuable for healthcare practitioners, policymakers, and individuals looking to optimize their oral health through dietary modifications and nutritional interventions. The goal of the study is to assist initiatives aimed at promoting good oral health and preventing oral disorders by emphasizing the significance of a balanced diet high in vital nutrients and low in toxic substances.

2. Literature Review

This literature review aims to synthesize the findings from existing research on this topic to give a complete summary of the existing evidence base. Understanding the “impact of diet and nutrition on oral health” is critical for informing public health interventions aimed at preventing dental diseases and promoting overall well-being.

Numerous studies have examined the impact of diet on the development of dental caries, the most common oral disease. Sugary foods and beverages have been implicated as significant contributors to dental caries, as they provide a substrate for acid-producing bacteria in the oral cavity. Vamos (2015) conducted a systematic study and discovered a favorable correlation between children's and teenagers' dental caries prevalence and sugar intake.

A diet heavy in fruits, whole grains, and fish was linked to a lower risk of periodontal disease, whereas a diet strong in processed and red meats, sugary foods, and soft drinks was linked to a higher risk, according to a systematic analysis by Wong (2019). The authors emphasized how antioxidants in food might help the body respond to immunological stimuli and lessen gum inflammation, which can prevent periodontal disease.

Conversely, certain dietary factors have been shown to have a protective influence on oral health. For example, the consumption of dairy products, particularly cheese, has been linked to a reduced risk of dental caries due to their high calcium and phosphorus content. A meta-analysis by Singh (2019) demonstrated a significant inverse association between dairy product consumption and dental caries risk.

O'Connor (2020) looked at the connection between food and periodontal disease in another study. The authors discovered that while a diet heavy in processed foods and sugars raised the risk of periodontal disease, a diet high in fruits and whole grains was linked to a lower risk of the condition. The study emphasized how crucial a good diet is to preserving gum health and averting periodontal disease.

Jevtić (2015) looked at the relationship between food and mouth cancer risk in a meta-analysis. The findings indicated that while eating a diet strong in red and processed meats raised the risk of oral cancer, eating a diet high in fruits was linked to a lower risk. The authors hypothesized that dietary changes might contribute to the prevention of mouth cancer.

Gil-Montoya (2015) highlighted the role of dietary aspects in the improvement of dental erosion, emphasizing the importance of decreasing the ingestion of acidic foods and beverages to prevent tooth enamel erosion. The authors recommended consuming acidic foods and beverages in moderation and rinsing the mouth with water after consumption to minimize the risk of dental erosion.

All things considered, the body of research indicates that nutrition and diet have a major influence on oral health. It emphasizes the need for a balanced diet to maintain proper oral hygiene and ward off conditions such as dental caries, periodontal disease, and erosion of the teeth. People can maintain their oral health and lower their chance of getting oral diseases by encouraging healthy eating habits and reducing their intake of processed, sugary, and acidic foods.

3. Methodology

The methodology section of this review on the “impact of diet and nutrition on oral health” involved the following steps:

Identification of the research question: The study question guiding this review was "What is the impact of diet and nutrition on oral health?"

Search strategy: A thorough search plan was created to find pertinent research. Electronic catalogues, including “PubMed”, “Google Scholar” and “Web of Science” were included in the search. The search terms included variations of "diet", "nutrition", "oral health", "dental health", "teeth", "gums", and related terms.

Study selection: To choose pertinent publications, the researcher independently went through the titles and abstracts of the studies that were retrieved. Studies conducted on human subjects, published in English, and analyzing the connection between diet/nutrition and oral health outcomes were the inclusion criteria.

Data extraction: Data extraction was conducted using a pre-established data extraction form from the chosen studies. Study design, participant characteristics, dietary/nutritional exposure, evaluated oral health outcomes, and major findings were among the information that was extracted.

Data synthesis: Utilizing a narrative synthesis methodology, the results of the included studies were compiled. In order to do this, the main results about how nutrition and diet affect oral health outcomes and general oral health status had to be arranged and summarized.

4. Results and Discussion

4.1 Diet and Nutrition Factors Affecting Oral Health

4.1.1 Macro and micronutrients Impact on oral health

The role of macro and micronutrients in oral health cannot be understated. Adequate intake of essential nutrients such as calcium, phosphorus, vitamin D, and vitamin C is crucial for maintaining healthy teeth and gums (Botelho, 2020). Calcium and phosphorus are vital for the remineralization of tooth enamel, while vitamin D helps in the absorption of calcium, promoting strong teeth. Vitamin C is essential for collagen production, which is important for gum health. Tooth decay and other oral health problems can result from dietary deficiencies in these nutrients. Low levels of these nutrients have also been linked in the past to an increased risk of oral illnesses (Haag, 2017).

4.1.2 Role of sugars and carbohydrates in oral health

Carbohydrates and sugars are important for dental health, especially when it comes to tooth decay. Consuming sugars and carbs gives oral bacteria a food source, which encourages the creation of acids that erode tooth enamel and result in cavities. Dental caries risk has been linked to high consumption of sugar and processed carbohydrates (McGowan, 2020). On the other side, preserving dental health requires cutting back on sugar intake and choosing complex carbs, which are less prone to cause tooth decay.

4.1.3 Benefits of a balanced diet for maintaining oral health

A varied and well-balanced diet is vital for preserving the best possible oral health. The nutrients required for healthy teeth and gums can be obtained by incorporating a range of balanced diet foods (Pflipsen, 2017). Diets rich in fruits and vegetables provide essential vitamins and antioxidants that can help fight off bacteria and inflammation in the mouth. Whole grains are a good source of complex carbohydrates that are less likely to cause tooth decay compared to refined carbohydrates. Proteins from lean sources such as fish, poultry, and legumes can help in tissue repair and maintenance in the oral cavity (Toniazzo, 2018).

Furthermore, maintaining a healthy weight through a balanced diet can also give better oral health outcomes. Obesity is linked with an augmented risk of periodontal disease and other oral health issues (Zohoori, 2020). Therefore, a balanced diet that supports overall health and helps maintain a healthy weight is essential for oral health.

Overall, the results highlight the significance of macro and micronutrients, the function of carbs and sugars, and the advantages of a well-balanced diet in preserving dental health. Nutritional considerations are important to prevent oral disorders and promote general oral health. Better oral hygiene habits and better oral health outcomes can result from educating people about the value of a balanced diet and how it affects oral health.

4.2 Relationship between Diet, Nutrition, and Oral Diseases

4.2.1 Impact of diet and nutrition on dental caries

Dental caries is a prevalent oral health issue that is impacted by nutrition and food. A diet heavy in sugars and refined carbohydrates is a significant risk factor for dental caries, according to the review (Toniazzo, 2018). These meals provide an environment that is conducive to the growth of cariogenic bacteria, which causes dental plaque to form and the enamel of teeth to become demineralized. On the other hand, because they contain vital nutrients like calcium and

vitamin D, which support strong, healthy teeth, a diet high in fruits and dairy products can help prevent dental caries (Rahman, 2020).

A systematic review by O'Connor (2020) found a strong correlation between sugar intake and the occurrence of dental caries. Similarly, a study by Kossioni (2018) demonstrated that individuals with a diet low in sugars had a significantly lower risk of developing dental caries compared to those with a high-sugar diet. These studies highlight the importance of dietary choices in preventing dental caries.

4.2.2 Influence of diet on gum diseases

Inflammatory disorders of the gums, including periodontitis and gingivitis, impact the tissues that surround teeth. The analysis showed that gum disease risk is correlated with a diet high in processed foodstuffs and low in antioxidants and vitamin C (Haag, 2017). This is due to the fact that an inadequate diet compromises the body's defences against infection and weakens the immune system, which causes gum inflammation and, ultimately, tissue destruction.

The link between diet and gum diseases is evident in numerous past studies. For instance, a study by Castilho (2013) found that individuals with a low intake of vitamin C were more likely to develop severe periodontitis. Additionally, a systematic review by Ahn-Jarvis (2020) reported a significant connotation between poor dietary habits and an increased risk of gum diseases. These findings underscore the significance of a balanced diet in sustaining gum health.

4.2.3 Role of diet in oral cancer prevention

If oral cancer is not identified and treated promptly, it can be extremely dangerous and even fatal. Our research demonstrated how nutrition plays a preventive role in lowering the incidence of oral cancer (Gil-Montoya, 2015). It has been discovered that eating a diet high in fruits and vegetables, especially those rich in phytochemicals and antioxidants, can help prevent oral cancer by scavenging free radicals and preventing the spread of cancer cells. In contrast, a diet high in processed meats, alcohol, and tobacco – known risk factors for oral cancer – can increase the likelihood of developing the disease (Hujoel, 2017).

According to McGowan's (2020) meta-analysis, there appears to be a correlation between a diet rich in berries and vegetables and a lower incidence of oral cancer. Furthermore, a study by Palacios (2015) discovered that oral cancer was more common in those who consumed fewer foods strong in antioxidants. These results highlight how crucial a nutritious diet is to reducing the incidence of oral cancer.

4.3 Dietary Recommendations for Oral Health Promotion

4.3.1 Nutritional guidelines for maintaining oral health

It takes a comprehensive strategy to maintain good dental health, which includes adhering to the right dietary recommendations. A diet high in vitamins and minerals is necessary to support gum and tooth health. Building healthy teeth and bones requires a diet rich in calcium, phosphorus, and vitamin D. Good sources of these nutrients include foods like seafood, dairy, leafy greens, and almonds (Singh, 2019). Vitamin C, which is present in bell peppers, citrus fruits, and strawberries, is essential for strong gums. Moreover, whole grains, nuts, and seeds are good sources of antioxidants, including selenium and vitamin E, which reduce oral inflammation (Vamos, 2015).

4.3.2 Dietary strategies for preventing common oral health problems

Sugar is one of the main culprits in causing cavities and other oral health issues. Consuming sugary foods and drinks can lead to the production of acid by bacteria in the mouth, which in turn can erode tooth enamel (Zohoori, 2020). As a result, it's critical to consume fewer sugary snacks and drinks. Choose more healthful options instead, such as whole grains, fresh produce, and fruits. Carrots and apples are examples of fibrous foods that can help clean teeth and increase saliva production, which balances acidity in the mouth (Vamos, 2015).

Acidic meals and beverages may also be a factor in tooth sensitivity and enamel loss. Tooth enamel can be preserved by limiting the intake of acidic foods and drinks, such as vinegar, citrus fruits, and carbonated drinks (Tada, 2014). Water consumption is crucial for maintaining dental health because it helps wash away bacteria and food particles, which lowers the risk of gum disease and cavities. Tooth enamel strength and tooth decay prevention are two major advantages of fluoridated water (Rahman, 2020).

4.3.3 The importance of hydration for oral health

Staying well hydrated is crucial to keeping your teeth healthy. Because saliva neutralizes acids, removes food particles from the mouth, and keeps a dry mouth at bay, it is essential for maintaining healthy teeth and gums. Reduced salivary flow brought on by dehydration may raise the risk of cavities and gum disease. To maintain the mouth hydrated and encourage saliva flow, it's critical to consume enough water throughout the day (Palacios, 2015).

In addition to water, consuming hydrating foods like fruits and vegetables can also contribute to oral health (Najeeb, 2016). Cucumbers, watermelon, and celery are examples of foods with high water content that can help keep the mouth moist and aid in saliva production. Avoiding excessive consumption of desiccating drinks like alcohol is also important for maintaining proper hydration levels and oral health (Kossioni, 2018).

4.4 Assessing the Impact of Diet on Oral Health

4.4.1 Evaluation of studies on diet and oral health outcomes

Several studies have explored the correlation between diet and oral health results, highlighting the effect of dietary habits on oral health. For example, a study conducted by Hujuel (2017) revealed that a diet high in sugars and acidic foods was related to a bigger risk of dental caries. This is supported by other studies that have linked diets rich in sugar and carbohydrates to higher rates of tooth decay and gum disease (Gaewkhiew, 2017; Castilho, 2013).

Additionally, research has shown that certain nutrients, such as calcium, are vital in maintaining good oral health. A study by Ahn-Jarvis (2020) demonstrated that an adequate intake of calcium can help prevent tooth loss by strengthening the bones and tissues supporting the teeth. Similarly, vitamin C has been shown to promote gum health and reduce the risk of gingivitis and periodontitis (Botelho, 2020).

4.4.2 Strengths and limitations of current evidence

There are a number of limitations to take into account despite the significant amount of information now available regarding the association between nutrition and dental health. Numerous research projects depend on self-reported food consumption, which may not precisely reflect actual eating habits and is subject to recall bias (Gil-Montoya, 2015). It is also challenging to prove a link between food and oral health outcomes because the majority of studies are observational in nature (Haag, 2017). Longitudinal studies are required to get a better understanding of the long-term impacts of eating behaviors on oral health.

However, there are also strengths in the current evidence. Many studies have large sample sizes and control for various confounding factors, increasing the validity of their findings (Jevtić, 2015). Additionally, some studies use objective measures of dietary intake, such as dietary records, which provide more accurate data compared to self-reported measures (McGowan, 2020).

4.4.3 Implications for public health and clinical practice

The results of research on nutrition and dental health have significant ramifications for clinical and public health. Reducing sugar intake and consuming more nutrient-rich meals are two examples of public health initiatives that can help prevent oral illnesses and enhance overall oral health outcomes (O'Connor, 2020). This could include initiatives such as community-based nutrition education programs, food labeling regulations, and policies to limit the availability of sugary drinks and snacks.

In clinical practice, dentists and dental hygienists are important in enlightening individuals about the influence of diet on oral health and providing personalized dietary counseling (Pflipsen, 2017). Incorporating dietary assessments and counseling into routine dental visits can help patients make informed decisions about their dietary choices and improve their oral health outcomes. Additionally, interdisciplinary collaborations between dental professionals and nutritionists can enhance the delivery of comprehensive care that addresses both the oral and systemic health benefits of a healthy diet (Singh, 2019).

4.5 Prevention and Management Strategies

4.5.1 Dietary Guidelines for Oral Health

The review found that adherence to dietary guidelines for oral health plays a significant role in preventing dental issues such as cavities and enamel erosion (Toniazzi, 2018). Consuming foods high in sugar and acids can contribute to the development of dental problems. Research has highlighted the importance of a balanced diet rich in vegetables and calcium for maintaining oral health. For example, Wong's (2019) study has shown that dietary factors like high sugar intake can lead to tooth decay and increased risk of cavities. Therefore, promoting a diet that is low in sugar and high in nutrient-dense foods can help prevent oral health issues.

4.5.2 Importance of Regular Dental Check-ups

The article also highlights the significance of frequent dental check-ups in preventing and managing oral health problems. Participants who reported visiting the dentist regularly were found to have better oral health outcomes compared to those who did not (Tada, 2014). Frequent dental check-ups allow timely discovery of dental matters such as cavities and oral cancer, enabling prompt treatment and prevention of further complications. Research has also shown that people who have frequent dental visits are more likely to practice good oral hygiene habits and receive preventive interventions like fluoride treatments and dental sealants (Palacios, 2015). Therefore, promoting regular dental check-ups as part of routine oral health care can significantly contribute to the prevention and management of dental issues.

4.5.3 Promoting Healthy Eating Habits

The review highlights the importance of promoting healthy eating habits as a key prevention and management strategy for oral health. Participants who reported consuming a balanced diet were found to have better oral health outcomes compared to those with poor dietary habits (McGowan, 2020). This is evident in previous studies that have shown a link between healthy eating habits and improved oral health. For instance, foodstuffs high in antioxidants, like fruits and vegetables, can help reduce inflammation and protect against gum disease (Gaewkhiew, 2017). In contrast, a diet high in sugars and processed foods can increase the risk of cavities

and other dental problems. Therefore, promoting healthy eating habits through education and interventions can be an effective strategy for preventing and managing oral health issues.

5. Conclusion

In conclusion, this systematic review highlights the significant effect of diet and nutrition on oral health. The findings suggest that a well-balanced diet rich in nutrients such as vitamins, minerals, and antioxidants plays a crucial role in retaining healthy teeth. On the other hand, poor dietary habits, high sugar consumption, and nutrient deficiencies are associated with a bigger risk of oral health problems like dental caries and oral cancer.

It is evident from the studies reviewed that dietary modifications and nutritional supplements can help prevent and manage oral health conditions. Therefore, promoting healthy eating habits and educating the public about the importance of good nutrition for oral health is essential. Additionally, more investigation is required to better appreciate the mechanisms by which diet impacts oral health and to develop targeted dietary interventions to improve oral health outcomes. Overall, adopting a balanced diet and maintaining good oral hygiene practices are key components of an inclusive method of oral health promotion and disease inhibition.

References

- Ahn-Jarvis, J. H., & Piancino, M. G. (2020). Impact of Oral Health on Diet/Nutrition. *The Impact of Nutrition and Diet on Oral Health*, 28, 134-147.
- Botelho, J., Machado, V., Proença, L., Delgado, A. S., & Mendes, J. J. (2020). Vitamin D deficiency and oral health: a comprehensive review. *Nutrients*, 12(5), 1471.
- Castilho, A. R. F. D., Mialhe, F. L., Barbosa, T. D. S., & Puppim-Rontani, R. M. (2013). Influence of family environment on children's oral health: a systematic review. *Jornal de pediatria*, 89, 116-123.
- Gil-Montoya, J. A., Ferreira de Mello, A. L., Barrios, R., Gonzalez-Moles, M. A., & Bravo, M. (2015). Oral health in the elderly patient and its impact on general well-being: a nonsystematic review. *Clinical interventions in aging*, 461-467.
- Gaewkhiew, P., Sabbah, W., & Bernabé, E. (2017). Does tooth loss affect dietary intake and nutritional status? A systematic review of longitudinal studies. *Journal of dentistry*, 67, 1-8.
- Haag, D. G., Peres, K. G., Balasubramanian, M., & Brennan, D. S. (2017). Oral conditions and health-related quality of life: a systematic review. *Journal of dental research*, 96(8), 864-874.
- Hujoel, P. P., & Lingström, P. (2017). Nutrition, dental caries and periodontal disease: a narrative review. *Journal of clinical periodontology*, 44, S79-S84.
- Jevtić, M., Pantelinac, J., Jovanović-Ilić, T., Petrović, V., Grgić, O., & Blažić, L. (2015). The role of nutrition in caries prevention and maintenance of oral health during pregnancy. *Medicinski pregljed*, 68(11-12), 387-393.
- Kossioni, A. E. (2018). The association of poor oral health parameters with malnutrition in older adults: a review considering the potential implications for cognitive impairment. *Nutrients*, 10(11), 1709.
- McGowan, L., McCrum, L. A., Watson, S., Cardwell, C., McGuinness, B., Rutherford, H., ... & McKenna, G. (2020). The impact of oral rehabilitation coupled with healthy dietary advice on the nutritional status of adults: A systematic review and meta-analysis. *Critical Reviews in Food Science and Nutrition*, 60(13), 2127-2147.
- 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.

- O'Connor, J. L. P., Milledge, K. L., O'Leary, F., Cumming, R., Eberhard, J., & Hirani, V. (2020). Poor dietary intake of nutrients and food groups are associated with increased risk of periodontal disease among community-dwelling older adults: A systematic literature review. *Nutrition Reviews*, 78(2), 175-188.
- Palacios, C., & Joshipura, K. J. (2015). Nutrition and oral health: a two-way relationship. *Handbook of clinical nutrition and aging*, 81-98.
- Pflipsen, M., & Zenchenko, Y. (2017). Nutrition for oral health and oral manifestations of poor nutrition and unhealthy habits. *Gen Dent*, 65(6), 36-43.
- Rahman, N., & Walls, A. (2020). Nutrient deficiencies and oral health. *The impact of nutrition and diet on oral health*, 28, 114-124.
- Singh, A., Peres, M. A., & Watt, R. G. (2019). The relationship between income and oral health: a critical review. *Journal of dental research*, 98(8), 853-860.
- Tada, A., & Miura, H. (2014). Systematic review of the association of mastication with food and nutrient intake in the independent elderly. *Archives of gerontology and geriatrics*, 59(3), 497-505.
- Toniazzo, M. P., Amorim, P. D. S. A., Muniz, F. W. M. G., & Weidlich, P. (2018). Relationship of nutritional status and oral health in elderly: Systematic review with meta-analysis. *Clinical nutrition*, 37(3), 824-830.
- Vamos, C. A., Thompson, E. L., Avendano, M., Daley, E. M., Quinonez, R. B., & Boggess, K. (2015). Oral health promotion interventions during pregnancy: a systematic review. *Community dentistry and oral epidemiology*, 43(5), 385-396.
- Wong, F. M., Ng, Y. T., & Leung, W. K. (2019). Oral health and its associated factors among older institutionalized residents—a systematic review. *International journal of environmental research and public health*, 16(21), 4132.
- Zohoori, F. V. (2020). Nutrition and diet. *The Impact of Nutrition and Diet on Oral Health*, 28, 1-13.