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Correlation of cariogenic foods with the incidence of dental caries in obese patients

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Abstract

Background and aim: Cariogenic foods contain high amounts of sugar and simple carbohydrates, which promote bacterial growth in the oral cavity and increase the risk of dental caries. Obesity may also influence oral health through insulin resistance and chronic inflammation. Several studies indicate that children and adolescents with obesity tend to consume more cariogenic foods and have a higher risk of developing dental caries. This review aims to analyze the relationship between cariogenic food consumption and dental caries, particularly in individuals with obesity.

Methods: A descriptive qualitative review was conducted using six scientific articles related to cariogenic diet, obesity, and dental caries.

Results: Obese individuals demonstrated a higher likelihood of dental caries than non-obese individuals, driven by frequent sugar intake, increased acid production, and enamel demineralization.

Conclusion: Excessive cariogenic-food consumption and metabolic imbalance contribute to higher caries risk in obese populations.

Keywords: Cariogenic Foods; Dental Caries; Obesity; Oral Health

1. Introduction

Food functions not only as an energy source but also as an emotional regulator. Individuals experiencing fatigue, stress, or reduced mood commonly seek strongly flavored foods particularly sweet items to stimulate pleasurable sensations through mesolimbic dopaminergic activation [16]. Although this response reinforces hedonic eating, excessive sugar intake increases oral bacterial activity, lowers intraoral pH, and promotes enamel demineralization, thereby elevating caries risk. Dental caries is an infectious, progressive destruction of tooth structure that affects both children and adults, with irreversible consequences in permanent dentition due to the absence of natural tooth replacement [4]. WHO data estimate that caries in permanent teeth affects 2.3 billion people globally, with the highest prevalence reported in America at 84% [9]. Clinically, caries may cause pain, impaired sleep, functional limitation, cavitation, and eventual tooth loss. Cariogenic dietary exposure particularly fermentable carbohydrates capable of reducing oral pH to approximately 5.5 initiates enamel mineral loss [10]. Inadequate oral hygiene intensifies bacterial fermentation within retained plaque, creating an acidic environment conducive to progressive demineralization, especially among adolescents with irregular brushing habits.

Obesity introduces an additional systemic dimension to caries susceptibility. Defined by excessive adipose accumulation, obesity is recognized by WHO as one of the world's leading mortality determinants and is associated with diabetes, respiratory complications, and increased dental caries risk due to sustained energy imbalance and chronic sugar consumption [3]. Prior findings indicate a significant correlation between obesity status and caries indices,

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suggesting an interaction between metabolic dysregulation, dietary patterns, and oral disease progression. However, previous studies did not explicitly clarify the contribution of cariogenic intake to disease severity, particularly among adolescents who exhibit poor lifestyle control. Consequently, further synthesis of the literature is necessary to elucidate the relationship between sugary food consumption, obesity, and caries development. This review therefore examines indexed scientific publications as a basis for evaluating the association between cariogenic diet exposure and dental caries among individuals with obesity.

2. Methods

This study employed a descriptive qualitative approach to examine the conditions of the research object. Qualitative research was used to describe and interpret existing phenomena by considering the characteristics of the object of interest [14]. The descriptive qualitative design aimed to support theory development based on data derived from field-based findings [16]. Data were obtained through observations of relevant scientific journals, ensuring that the analysis was conducted in accordance with factual information. Observational analysis involved examining the research object across several aspects aligned with the required data parameters [12].

The analytical framework of this study was based on the Critical Appraisal method, which utilizes findings from previous research. This method focuses on the comparison of unresolved or underexplored research issues [5]. Scientific articles were systematically and critically evaluated to assess their methodological quality and suitability as research references. In this study, six peer-reviewed journals were selected and compared, all of which investigated the relationship between cariogenic food consumption and dental caries in obese adult populations. The comparative analysis aimed to identify differences among studies concerning the correlation between cariogenic dietary patterns and the occurrence of dental caries in patients with diabetes.

To ensure analytical rigor, the study followed a structured analytical process. The first stage involved data reduction through systematic filtering of information relevant to the study variables [1]. Data were then presented in a descriptive format to facilitate interpretation and conclusion drawing through Critical Appraisal. The final stage involved synthesizing conclusions derived from the reduced data, presented concisely to highlight research gaps identified in previous studies.

3. Research Result

Table 1 Critical Critical Appraisal

Indicator	Journal 1	Journal 2	Journal 3	Journal 4	Journal 5	Journal 6
Title	The Relationship Between Frequency of Carbohydrates Intake and Dental Caries	Difference in Sweet Taste Perception and Its Association with The Streptococcus mutans Cariogenic Profile in Preschool Children with Caries	Nonnutritive, Low Caloric Substitutes for Food Sugars: Clinical implication for Addressing the Incidence of Dental Caries and Overweight/Obesity	The Relationship between the Frequency of Cariogenic Food Consumption and Toothbrushing Habits with the Occurrence of Dental Caries among Third-Grade Students at SDN 1 and 2 Sonuo	Comparison Of the Source of Introduction to Cariogenic Food Substance and Caries Prevalence in Children	Association Between Overweight, Obesity, and Incidence of Advanced Dental Caries in South Korean Adults: A 10-year Nationwide Population-Based Observational Study
Authors	Davide Arcella, Livia Ottolenghi. Antonella Polimeni, dan Catherine Leclercq	Anna Jurezak, Malgirzata Jamka, Zuzanna Bebenek, Malgorzata Staszczyk, Pawel Jagielski, Dorota Koscielniak , Iwona Gregorczyk, Iwona Kolodziej, Magdalena Kepisty, Magdalena Kukurba, Amira Bryll, dan Wirginia Krzyasciak	Michael W. Robert dan J.Timothy Wright	Rizki Safira Talibo, Mulyadi, Yolanda Bataha	Somasundra m, Rangeeth, Joyson Moses, Sivakumari	Kyung Jae Kim, Kyungdo Han, SungEun Yang
Research methods	Linear Regression Analysis	ICDAS II	Qualitative Descriptive	Cross Sectional	DMFS	Multivariate COX regression analysis
Research subjects	193 students aged 16 years in secondary school	63 children aged 2-6 years (32 with	Children	43 students of grade III SDN 1and2 Sonuo	300 children aged 6-8 years	adults 20 years and over

		caries, 31 without caries)				
Problems	Dental caries is a multifactorial disease. Recent studies have identified an association between dietary factors and oral health conditions. Consequently, an investigation was conducted to assess the relationship between the frequency of carbohydrate intake and the incidence of dental caries among 16-year-old children, who tend to adopt dietary practices without considering their total daily caloric intake.	The increasing prevalence of dental caries among children has becomes a growing concern. However, dental caries is a multifactorial disease, indicating that its occurrence is influenced by multiple factors. Sweet taste is considered one of the contributing factors to the development of dental caries in children. Therefore, a study was conducted involving children aged 2–6 years, as this age group tends to prefer sweet foods. To evaluate the influence of sweet-tasting foods on the occurrence of dental caries, the study included both children with dental caries and those without dental caries.	Dental caries is a common condition among children in the United States and other developed countries. The occurrence of dental caries is strongly associated with the consumption of fermentable sugars, such as sucrose, glucose, maltose, and fructose. Increased caloric intake is linked to higher consumption of sugars and carbohydrates that is not adequately balanced by sufficient physical activity. Therefore, alternative sweeteners as substitutes for sugar are currently being developed.	Dental caries is a disease affecting the dental tissues, characterized by tissue destruction that begins at the tooth surface and may progress toward the pulp. One of the contributing factors is cariogenic food, which is typically high in carbohydrates, sticky in texture, and easily broken down in the oral cavity.	Dental caries is a multifactorial disease. Due to increased awareness and exposure, it is difficult to construct a scenario assuming that a single specific source alone contributes to the development of dental caries. With the wide range of media exposure faced by children, they often spend a substantial amount of time watching television, including food advertisements that attract their attention without consideration of oral and dental health.	Dental caries is a multifactorial disease that affects the teeth and oral cavity throughout an individual's lifetime. It is a major cause of oral pain and contributes to tooth loss in both adults and children. Recently, obesity has been considered to be associated with the occurrence of dental caries, particularly among adults. Therefore, a study was conducted to evaluate the relationship between dental caries and excess body weight.
Result	A statistically significant	A strong correlation was observed	Counseling represents a form of consultation and	Using the chi-square test analysis, a p-	Children who watch television	Based on the analysis using a 95%

	association was identified between DMFT scores and previously regulated eating frequency. This correlation was calculated exclusively based on food items containing sugar at specific proportions and under different threshold levels.	between the perception of sweet-tasting foods and the cariogenic process ($p = 0.007$ for DMFT and $p = 0.012$ for ICDAS II). High sucrose levels were associated with a tenfold increase in the risk of dental caries	the provision of additional information within oral health instructions. Although only artificial sweeteners have been approved by the FDA as food additives, there are five additional non-caloric sweeteners that have been approved by the FDA as Generally Recognized as Safe (GRAS).	value of 0.000 was obtained, which is lower than the significance level ($\alpha = 0.05$).	advertisements and request carbonated foods and beverages exhibit a higher prevalence of dental caries and elevated DMFT index scores.	confidence interval, individuals with obesity were found to have a greater likelihood of developing dental caries. A positive association was observed between higher body mass index (BMI) and the occurrence of dental caries.
Conclusion	Appropriate characteristics of eating occasions are associated with sugar and starch content.	Sweet-tasting foods may therefore represent one of the contributing factors to the development of dental caries.	Oral health professionals should be proactive in assisting with the identification of patients at risk of obesity and in providing counseling and referral when necessary.	Based on the test results, a correlation was identified between the frequency of cariogenic food consumption and the occurrence of dental caries.	A total ban on advertising is practically unfeasible. Therefore, a more realistic approach is to limit the amount of advertising that promotes foods with cariogenic risk and to evaluate whether such restrictions are consistent with existing regulations and appropriate for implementation.	Overweight and obesity have a direct association with the occurrence of advanced dental caries among Korean adults.

4. Discussion

4.1. Overview of Cariogenic Foods

Evidence synthesized from the six reviewed studies indicates that cariogenic food intake acts as a major determinant of dental caries development. Accordingly, cariogenic food (variable X) demonstrates a measurable correlation with caries severity (variable Y) in this review. Prior research consistently characterizes cariogenic foods as sweet-tasting products with high carbohydrate or free-sugar content. Glucose and sucrose enhance bacterial activity within the oral cavity, thereby facilitating cariogenic progression. Sweet foods containing monosaccharides and disaccharides dissolve rapidly and diffuse easily through the oral environment [17].

These findings align with results from Jurczak et al. [6], who identified sweetness as a primary sensory driver linked to tooth destruction. Roberts and Wright [10] further state that dietary sugars consist predominantly of sucrose, glucose, maltose, and fructose. High-sugar foods exhibit adhesive properties, allowing retention on teeth and gingiva [16]. Their rapid breakdown enables accumulation within interproximal spaces or existing cavitations.

4.2. Behavioral Drivers of Cariogenic Intake

Highly palatable sweet foods including candy, chocolate, donuts, wafers, ice cream, and pastries are visually appealing and strongly marketed. Such sensory and promotional cues increase consumption across all age groups. Somasundaram et al. [12] demonstrated that social media accessibility shapes consumer purchasing patterns, where food advertising is intentionally stylized to improve desirability. Individuals who frequently follow these impulses exhibit higher caries indices.

Nutritional mismanagement also plays a critical role. Restrictive diets that lack balanced macronutrients elevate caries risk by promoting excessive carbohydrate ingestion, prolonged acid exposure, and sustained enamel demineralization [2]. Consuming carbohydrates without subsequent fat or protein intake fails to neutralize oral acidity, whereas consuming fat or protein after carbohydrate ingestion helps restore intraoral pH equilibrium.

Excessive sugar consumption additionally contributes to obesity, defined as a chronic imbalance of energy storage characterized by excessive adipose accumulation. Overconsumption of simple sugars elevates systemic glucose levels and increases intraoral acid potential, subsequently raising caries susceptibility [8][15].

4.3. Overview of Dental Caries

Analysis of the six included studies supports the conclusion that high-carbohydrate dietary patterns accelerate enamel destruction and initiate cavitation. Continuous glucose fermentation by oral bacteria produces lactic acid, resulting in pH reduction and enamel demineralization. Recurrent acid exposure leads to progressive thinning and eventual loss of enamel.

Talib et al. [13] reported that early surface demineralization extends toward the pulp chamber, compromising dentin integrity and facilitating cavitation. Kim et al. [7] noted that chronic lesions may culminate in tooth loss in both pediatric and adult populations. Adults with purchasing power present elevated risk due to the frequency of discretionary sugary snack purchases promoted across digital platforms.

The cariogenic potential differs by sugar type: glucose is associated with increased caries incidence, whereas sucrose confers an approximately ten-fold higher risk [6]. Therefore, controlled intake of fermentable sugars remains an essential preventive measure [2].

4.4. Association Between Cariogenic Foods and Caries in Individuals with Obesity

Cariogenic food intake shows statistically significant correlation with caries status. Talib et al. [13] demonstrated a significant association through chi-square analysis, while Jurczak et al. [6] identified sweetness exposure as a major causal factor. Although these findings do not preclude consumption of sweet foods, controlled sugar intake represents a critical preventive recommendation [2].

Obesity further amplifies caries vulnerability. Individuals with obesity display higher frequency of sweet-food consumption, contributing to elevated caries rates [7]. However, Roberts and Wright [10] emphasized that awareness of the sugar–caries relationship among obese populations remains limited, underscoring the need for targeted education.

In addition, media-driven dietary impulses require behavioral regulation. Reducing exposure to persuasive food advertising and cultivating responsible consumption patterns are essential to mitigate dental risk [11].

5. Conclusion

Cariogenic food intake is associated with a higher risk of dental caries, particularly among individuals with obesity who frequently consume carbohydrate- and sugar-rich foods. Excessive sugar promotes bacterial activity, increases oral acidity, and accelerates enamel damage. Because obesity is characterized by chronic energy imbalance and high glucose exposure, affected individuals are more susceptible to caries progression. Therefore, controlling sweet-food consumption and improving oral hygiene practices are essential to reduce caries risk in this population.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

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