

Relation of Body Mass and Dental Caries Indices in Children: A Review Study

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ABSTRACT

Background: Body weight and dental caries are shared risk factors in diet. They are worldwide public health diseases that affect kids and continue throughout their lives. A number of studies have discussed an association between body weight and dental caries. This will give the outline for a review to discuss a question about the possible relationship between body weight and caries in children.

Methods: This study summarized the process that carries out a review that will synthesize preceding studies of childhood body weight problems and suffering from tooth caries, which could help to categorize and report the quality of existing evidence.

This study reviews the existing literature on the relationship between obesity and childhood dental caries to provide recommendations for healthcare providers.

Keywords: Children, Dental caries, Body weight and body mass index

بحث مراجعة حول علاقة مؤشرات كتلة الجسم وسوس الاسنان عند الاطفال

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الخلاصة

الخلفية: يشترك وزن الجسم وتسوس الأسنان في عامل الخطر المتعلق بالنظام الغذائي. وهما من الأمراض العامة المنتشرة عالمياً التي تصيب الأطفال وتستمر طوال حياتهم. تم مناقشة العلاقة بين وزن الجسم وتسوس الأسنان في العديد من الأبحاث. ستوفر هذا المقالة الخطوط العريضة لمراجعة تناقش سؤالاً حول العلاقة المحتملة بين وزن الجسم وتسوس الأسنان لدى الأطفال .

الطرق: لخصت هذه الدراسة عملية إجراء مراجعة ستجمع الدراسات السابقة حول مشاكل وزن الجسم في الطفولة والمعاناة من تسوس الأسنان، مما قد يساعد في تصنيف جودة الأدلة الموجودة والإبلاغ عنها .
الهدف من هذه الدراسة كان مراجعة الأدبيات الحالية حول العلاقة بين السمنة وتسوس الأسنان في مرحلة الطفولة، بهدف تقديم توصيات لمقدمي الرعاية الصحية.

الكلمات المفتاحية: كتلة الجسم ، تسوس الاسنان ، الاطفال.

INTRODUCTION

Body mass index (BMI) is a measure of obesity calculated based on weight relative to height. It serves as a reliable indicator of health risks associated with obesity.¹ Around the world, the number of children with excess weight has

increased in recent years. The World Health Organization (WHO) has identified obesity as a 'global epidemic' and a significant issue for countries everywhere. Childhood overweight has quickly become an escalating public health problem.^{2,3}

Dental caries is a oral disease affecting individuals of all ages. It still to be a health problem despite better management of the teeth decay process and modern advanced methods of treatment. This multifactorial disease involves multiple risk factors like food intake, water fluoridation, tooth brushing, socioeconomic level, and history of caries experience. Recently, the modulation of modifiable factors, including diet, has gotten great attention in the control of caries. Investigations on the relationship between BMI and dental caries in the child population have shown contradictory results.

Studies presented that obese individuals had more risk of deciduous teeth caries than those of normal weight, this is more significant in developed countries, but not in countries with low and/or middle incomes.⁴

Conversely, some studies in China suggest that overweight and obese children may have fewer primary dental caries.

A large cross-sectional study of children aged 7–9 years found that the prevalence of primary tooth decay decreased with age, with a caries rate of 30.7%. Furthermore, the study observed an inverse relationship between BMI and dental caries, meaning obese children were more likely to be free from primary tooth decay compared to those with a normal weight.⁵

Benzian *et al.*, in 1951 tested a children sample from the Philippines, aged 11 and 13 years, and also stated that there was a significant inverse correlation between BMI and caries.⁶

A cross-sectional study carried out in Saudi Arabia for children 6 to 8 years old proposed an inverse linear relation between obesity and tooth decay.⁷

In a study carried out in China that involved 744 children 8 years old, a weak negative association between weight status and dental caries was confirmed.⁸

Consistent with these findings, studies confirmed that obese children had a higher likelihood of being caries-free. However, contrasting results were reported by Willerhausen *et al.*, who observed a significant positive correlation between weight and dental caries in deciduous teeth among 1,290 schoolchildren aged 6–11 years.⁹

In accordance with that, Marshall *et al.* stated that obese subjects have the greatest proportion of dental caries in a sample of 413 children.¹⁰

The preventive methods for obesity and dental caries in early childhood are very important to be recognized and provided. During the discussion of a patient's body weight, healthcare practitioners have been shown to promote the impaired desire for weight reduction which causes avoidance of preventive treatment.

Families' education about healthy food habits and avoidance of harmful eating behaviors, with encouraging movement, and sedentary activity limitations like screen time are all examples of anticipatory counseling. Many aspects of our culture, especially the family, impact children's lifestyle choices. As a result, rather than addressing obesity and dental caries as an individual problem, it is critical to approach the issue through the lens of the family unit.¹¹

Aim of Study

Dental cavities and obesity are common risk factors. Findings on the association between dental caries and obesity have varied globally. This study aimed to review existing literature on the relationship between body weight and dental caries in children, with the goal of offering guidance to healthcare providers who utilize a risk factor-based approach.

DISCUSSION

Obesity and dental caries are common diseases. Elements like lifestyle, Diet, and socioeconomic status, in addition to environmental factors, are several predisposing factors to both of them. Frequent and high sugar consumption, also intake of carbohydrates have been evidenced to be the major shared reason for both obesity and caries of teeth in children. Many scientists and researchers have theorized that increased weight might be a marker for dental caries in children.^{12,13}

This review seeks to evaluate and emphasize the relationship between body mass index (BMI) and dental caries by analyzing published research. Upon reviewing the existing literature, it became clear that the included studies show no consistent agreement, primarily because of differing influencing factors.

All reviewed studies measured BMI following standardized WHO protocols. Dental caries were identified through clinical visual inspections of the affected teeth. The D E F T index was applied to assess caries in deciduous teeth, whereas the D M F T index was used for permanent teeth.¹⁴ Studies conducted by several authors observe that increased consumption of caries-causing food especially in these young age individuals, leads to significant risk to both overweight and caries of their primary and permanent teeth. Parental guidance and supervision will also decide the dietary habits and oral health care practices to control caries prevalence. While both parental and maternal commands on the rate of sugar ingestion can lower caries incidence, lack of control can give more risk of dental caries and, consequently, obesity.¹⁵

The previously conducted studies did not take into consideration other variables including dietary patterns, socioeconomic factors, oral hygiene, and the use of fluoridated substances which could have a major role in the regulation of obesity/caries correlation. These are all prospective impact modifiers that could account for the weak or unfavorable correlation between dental caries and BMI.¹⁴

Publication bias should also be taken into consideration when reviewing these preceding studies, since it is difficult to publish negative results by some authors coming up with varying outcomes.¹⁶

Based on the above, diet and carbohydrate intake alone cannot adequately explain the complex relationship between childhood dental caries and BMI.¹⁷

Other factors may be partially responsible for the contradictory results that have been published throughout time. The relationship may not be strongly defined because dental caries is a condition that tends to increase with age across all populations, irrespective of gender or social status, whereas BMI fluctuates over time.¹⁸

Previous statistical research by Hayden C et al. demonstrated a stronger correlation between obesity and dental caries in children from developed nations versus those from newly industrialized countries, as well as when compared to normal-weight children. The study also identified economic differences between nations, shaped by socioeconomic status, parental employment, and educational attainment, as important contributing factors.¹⁹

The percentage of underweight and overweight children in low, middle, and high-income countries is greatly variable which is consistent with our review. Therefore, family characteristics, socioeconomic condition, and educational environment should be taken into account when future research examines the association between dental caries index and BMI.²⁰

A cross-sectional study was conducted on a randomly selected sample of schoolchildren aged 7–10 years in Mosul City. Participants were classified into four weight categories: normal weight, overweight, obese, and underweight, based on BMI-age percentiles. The analysis revealed significant differences in dental caries prevalence across these groups. Deciduous teeth exhibited an 80.33% caries rate, compared to 50.33% in permanent teeth. Overweight and obese children had the highest incidence of caries, followed by normal-weight children, while underweight children showed the lowest prevalence.²¹

This was in agreement with Kubala E *et al*, at which Obesity is linked to a higher risk of gum disease and tooth decay. Saliva contains a number of molecular components that may contribute to this interaction. Increased salivation brought on by obesity can reduce the mouth's pH and raise the risk of tooth decay.²²

Salivary citrate, an organic acid, also inhibits the growth of germs, preventing tooth decay. Because obesity reduces citrine levels, rotting cavities may become more common.²³

Obesity can also linked to the synthesis of phosphoric acids in saliva excretion, which may raise the risk of tooth erosion and cavitation due to the increased production of these potent acids.²⁴

Additionally, obesity can lower salivary protein levels, which may raise the risk of teeth cavitation. Additionally, it has been demonstrated that inflammation has a role in dental decay, and obesity increases gingival inflammation, which may further boost the risk of this condition.²⁵

In accordance with all contradictory results of previous studies, long-term researches are needed for a better understanding of the relation between weight and tooth decay index.

CONCLUSION

Childhood obesity and dental caries are not issues that can be treated by dealing with a single factor. Environmental, social, and biological factors, such as the availability of food alternatives, eating behaviors, and reduction of foods containing sugars and carbohydrates are very important for controlling both diseases. Updated and delineated researches are recommended in the future to offer valuable clues regarding this relationship.

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