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The relationship between dental caries and obesity among primary school children aged 5 to 14 years

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Abstract

Background: Previous study revealed that the link between dental caries and obesity has been controversial. The purpose of this research is to investigate the association between dental caries and obesity among primary school children in Wannan area, China.

Methods: A cross-sectional study was designed to collect the routine health screening data for primary school children aged 5-14 years in Wannan area, China. Overweight and obesity status were determined using the International Obesity Task Force standard (IOTF) BMI cut-off points. Caries status was recorded based on WHO recommendations.

Results: Our results revealed that the overall caries prevalence of the subjects was 44.9%. Maximum number of caries affected children belonged to underweight and normal group, followed by overweight, and the least number was obesity. These differences were statistically significant (chi-square test, \( P < 0.001 \)). Children with obesity were 1.908 times (OR = 1.908; CI95% = 1.750, 2.079) more likely to have caries than children with underweight or health weight. Overweight children were 1.547 times (OR = 1.547; CI95% = 1.479, 1.618) more likely to have caries than children with underweight or health weight. After adjusted the gender and age, a statistically significant association was also observed between body mass index categories and caries.

Conclusions: Obesity may have a significant effect on caries prevalence of primary school children in Wannan area, China. The importance of obesity should not only be emphasized with respect to general diseases but also with regard to carious lesions.

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Key words: Dental caries. Primary school children. Obesity. Overweight. China.

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Resumen

Antecedentes: Un estudio previo reveló que la asociación entre la caries dental y la obesidad es controvertida. El propósito de esta investigación fue investigar la asociación entre la caries dental y la obesidad en niños de escuela primaria en el área de Wannan, China.

Métodos: Se diseñó un estudio transversal para recoger los datos del chequeo rutinario de salud de los niños de escolarización primaria con edades de 5-14 en el área de Wannan, China. Se determinó el estado de sobrepeso y obesidad utilizando los puntos de corte estándar del IMC del Grupo de Trabajo Internacional en Obesidad (GTIO). El estado de las caries se registró de acuerdo con las recomendaciones de la OMS.

Resultados: Nuestros resultados revelaron que la prevalencia global de caries en los sujetos fue del 44,9%. El máximo número de niños afectados por las caries estaba en los grupos normal y con peso bajo, seguido por el grupo con sobrepeso y por último en el grupo de obesidad. Estas diferencias fueron estadísticamente significativas (test Chi-cuadrado, \( P < 0.001 \)). Los niños con sobrepeso tenían una probabilidad 1,547 veces superior (OR = 1,547; IC al 95% = 1,479, 1,618) de tener caries dental que los niños con un peso bajo o normal. Tras ajustar por sexo y edad, también se observó una asociación estadísticamente significativa entre el índice de masa corporal y la caries.

Conclusions: La obesidad puede tener un efecto significativo sobre la prevalencia de caries en niños en escolarización primaria en el área de Wannan, China. No sólo se debería poner el énfasis de la importancia de la obesidad en relación con las enfermedades generales sino también en relación con las lesiones cariales.

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Introduction

Dental caries and obesity constitute important health problems worldwide and have been associated with a great number of negative health outcomes. Dental caries is a chronic disease which can affect us at any age. If untreated, it can lead to pain and discomfort and finally loss of teeth. Dental caries has a multifactor etiology. The risk of dental caries can be evaluated by analyzing and integrating several causative factors such as fluoride, microbial plaque, diet, bacterial and salivary activity, and social and lifestyle related behavioral factors.

In recent decades, the prevalence of obesity risen steeply worldwide. Obesity is associated with breast cancer, asthma, diabetes mellitus, hypertension, coronary artery disease, and dental caries. Previous study showed that the prevalence of obesity in Chinese children and adolescents was considered to be still relatively low. However, research recently found that rapid increasing of both obesity and overweight, in both urban and rural areas would arouse special attention.

However, there have been little studies documented in literature in this part of China assessing the prevalence of dental caries in relation to obesity. Thus, cross-sectional study was designed to assess the prevalence of dental caries in relation to obesity in 5-14 year-old school children in Wannan area, China.

Methods

Subjects and Methods

Participants

A population-based cross-sectional study was conducted among primary school children for routine health screening from 2009 to 2013. A total of 67,956 subjects (36,664 male and 31,292 female) aged 5-14 years were recruited in this study. All subjects agreed to provide their personal information regarding the purpose and the procedures of our study. This study was approved by local ethics committee.

Anthropometric measurements

Height was measured to the nearest 0.1 cm with a standard stadiometer following study protocols, and weight in kilograms was measured in light clothing to the nearest 0.1 kg on an electronic scales. All anthropometric data were collected by trained staff and supervised by the school nurse. BMI was computed using the following standard equation: BMI = Weight in kg/height squared in meter.

Definitions

Overweight and obesity were defined using the International Obesity Task Force standard (IOTF) body mass index cut-off points established for children. These cut-off points are based on health related adult definitions of overweight (≥25 kg/m²) and obesity (≥30 kg/m²) but are adjusted to specific age and sex categories for children. Caries status was recorded based on WHO recommendations. A single trained and calibrated examiner performed comprehensive clinical examination with the assistance of one recorder. Children were made to sit on the chair and examination was conducted under bright daylight.

Ethical consideration

All respondents agreed to take part in this study. According to local and international guidelines on ethics considerations in research involving human participants, this study was approved by local ethics committee.

Statistical analysis

Excel software was performed to describe the characteristics of study population. The difference in caries prevalence of children according to year, age, grade and body mass index categories was tested using chi-square test. Relationships between year, grade, body mass index categories and dependent variable dental caries were assessed using multivariate logistic regression. Adjusted odds ratios (OR) and their 95% confidence intervals (CI) were calculated. In evaluating the association, we adjusted for the following confounders: gender and age. A line graph was drawn for caries prevalence of boys and girls among children by age and year. A value of \( P < 0.05 \) was considered statistically significant.

Results

A total of 67,956 subjects (36,664 male and 31,292 female) aged 5-14 years were recruited in this study. The characteristics of study population are shown in table I. Caries prevalence of children according to year, age, grade and body mass index categories are shown in table II. The overall caries prevalence of the subjects was 44.9%, caries prevalence of boys and girls are showed in figure 1 and figure 2. Maximum number of caries affected children belonged to underweight and normal group, followed by overweight, and the least number was obesity. These differences were statistically significant (chi-square test, \( P < 0.001 \)).
Table III provide unadjusted and adjusted ORs of dental caries by year, grade and body mass index categories. Subjects recruited in 2009, 2010 and 2011 had less likely to have caries than subjects conducted in 2012, the OR (95%CI) was 0.44, 0.871 and 0.996, respectively. Children from low grade have more likely have caries than children from high grade. Overweight children were 1.547 times (OR = 1.547; CI95% = 1.479, 1.618) more likely have caries than children with underweight or health weight. After adjusted the gender and age, a statistically significant association also observed between year, grade, body mass index categories and caries.

Discussion

The main objective of the present study was to determine the prevalence of dental caries in relation to obesity of 5-14 year-old school children of Wannan area, China. Our study found high caries prevalence (44.9%), a statistically significant association was observed between obesity and caries. Similar results were obtained in a systematic review and meta-analysis conducted by Hayedn et al.23 showed that, overall, there was a significant relationship between childhood obesity and dental caries. However, this relationship between dental decay and BMI was not significant for the study by Pinto et al24. Kopycka-Kedzierawski et al. 25 even found an inverse association between BMI and caries experience: overweight children were less likely to have caries experience than normal weight children aged 6-11 years. The possible explanation was that both obesity and dental caries are multifactorial in aetiology and various genetic and environmental factors have an impact on them. Another possible reason was that high sugar intake is risk factor common to both obesity and dental caries26. The role of high sugar intake in the prevalence of obesity and dental caries should be further researched.

Recent evidence suggests that the nutrition transition is accelerating and the outcome of this trend is a rapid increase in obesity and chronic diseases27. Lifestyle transition and socio-economic improvement have contri-
The relationship between dental caries and obesity among primary school children aged 5 to 14 years

Table II

The prevalence of caries for children according to year, age, grade and body mass index categories

<table>
<thead>
<tr>
<th>Variable</th>
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<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
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<td>68.3</td>
<td>789</td>
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*p for linear-by-linear association.

Fig. 1.—The prevalence of caries for children by year.
tributed enormously to the escalating problem in developing countries. Especially, lifestyle and food variety may have an influence on obesity. Thus, the eating pattern among overweight or obese children may be a common risk factor in overweight children and dental caries. Lack of oral health education and less physical training to primary school children may also be linked to high obesity and dental caries prevalence.

Conclusions

Obesity may have a significant effect on caries prevalence of primary school children in Wannan area, China. The importance of obesity should not only be emphasized with respect to general diseases but also with regard to carious lesions.

Acknowledgments

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The relationship between dental caries and obesity among primary school children aged 5 to 14 years

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