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ORIGINAL ARTICLE

Influence of glycemic index and glycemic load of the diet on the risk of overweight and adiposity in childhood

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KEYWORDS
Glycemic index;
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Abstract
Objective: To investigate the association between the glycemic index and the glycemic load of the diet with the risk of overweight and high adiposity in children with 5 years of age.
Methods: Cross-sectional study nested in a cohort of 232 children born and living in Diamantina (MG, Brazil). Parents and/or guardians provided the food intake data, using a semiquantitative food frequency questionnaire, past history and socioeconomic conditions. Anthropometric and fatness data were collected from the children. The dietary glycemic index and the glycemic load were calculated from the food intake. The glycemic index and glycemic load effect on overweight and adiposity in children was assessed by the Poisson regression ($p<0.05$).
Results: The prevalence of overweight by body mass index was 17.3%, and high adiposity was observed in 3.4% and 6.9% by triceps skinfold and subscapular skinfold, respectively. No difference was reported between the mean body mass index, triceps skinfold and subscapular skinfold according to the glycemic index and glycemic load tertiles; however, the overweight group presented a higher carbohydrate intake ($p=0.04$). No association was found between glycemic index and glycemic load with overweight and adiposity among the children assessed.
Conclusions: The glycemic index and glycemic load of the diet were not identified as risk factors for overweight and adiposity in this cross-sectional study.

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PALAVRAS-CHAVE
Índice glicêmico;
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Adiposidade;
Carboidrato

Influência do índice glicêmico e carga glicêmica da dieta sobre o risco de sobrepeso e adiposidade na infância

Resumo
Objetivo: Investigar a associação entre o índice glicêmico e a carga glicêmica da dieta sobre o risco de sobrepeso e adiposidade em crianças de cinco anos de idade.
Métodos: Estudo transversal aninhado a uma coorte de 232 crianças nascidas e residentes em Diamantina (MG, Brasil). Os pais e/ou responsáveis forneceram os dados de consumo alimentar, utilizando um questionário semi-quantitativo de frequência alimentar, histórico do paciente e condições socioeconômicas. Os dados antropométricos e gordura corporal foram coletados das crianças. O índice glicêmico da dieta e a carga glicêmica foram calculados a partir da ingestão de alimentos. O efeito do índice glicêmico e da carga glicêmica no sobrepeso e adiposidade das crianças foi avaliado através da regressão de Poisson (p<0,05).
Resultados: A prevalência de sobrepeso pelo índice de massa corporal foi de 17,3%, e adiposidade elevada foi observada em 3,4% e 6,9% através da prega cutânea do tríceps e prega cutânea subescapular, respectivamente. Não houve diferença entre a média de índice de massa corporal, prega cutânea do tríceps e prega cutânea subescapular de acordo com os tercis de índice glicêmico e carga glicêmica; no entanto, o grupo com sobrepeso apresentou maior ingestão de carboidratos (p=0,04). Não foi encontrada associação entre índice glicêmico e carga glicêmica com sobrepeso e adiposidade entre as crianças avaliadas.
Conclusões: O índice glicêmico e carga glicêmica da dieta não foram identificados como fatores de risco para sobrepeso e adiposidade nesse estudo transversal.

Introduction

The Brazilian population, particularly children, has experienced a nutritional transition characterized by a decrease in malnutrition and a corresponding increase in the prevalence of overweight and obesity.[1,2] Corresponding to this process, a drop in the consumption of cereals, beans and tubers was observed with a subsequent increased intake of processed foods, like sandwiches, cookies, snacks and sweets.[2]

This change in the consumption pattern predisposes the intake of a high-refined carbohydrate diet, characterized by a high Glycemic Index (GI) and a high Glycemic Load (GL). The GI is defined as the incremental area under the glycemic response curve post consumption of 25 or 50g of the carbohydrates available in a food. This parameter is expressed as a percentage relative to the glycemic response of a reference food (glucose or white bread) which, thus, reflects the quality of the carbohydrate.[3] The GL is the product of the GI of the food and its available carbohydrate content; therefore, it represents both the quality and quantity of carbohydrate and its ability to raise the blood glucose.[4]

High GI and GL diets are quickly digested, absorbed and transformed into glucose. These processes accelerate insulin and glucose fluctuations, resulting in the early return of hunger, causing excessive caloric consumption. However, low GI and GL diets provide a slow and gradual insulin and glucose release in the bloodstream, thereby promoting increased fat oxidation, reducing lipogenesis and, consequently, increasing satiety and resulting in reduced food intake.[5]

Regarding these factors, some researchers have studied the association between the glycemic index and glycemic load and the risk of overweight in children.[6–11] Nielsen et al.[10] and Murakami et al.[11] reported that high glycemic load and index diets increase the risk of overweight among children and adolescents; however, it has not been confirmed by other authors.[6–9]

Considering the effect of the glycemic index and glycemic load on hunger and high-energy intake, this study proposed to investigate the association between these parameters and the risk of overweight/obesity and high adiposity in children.

Method

This cross-sectional study was nested in a cohort of live births between September 2004 and July 2005 in Diamantina, Brazil. The objective was to monitor growth and development in the first year of life.[12] Details regarding the cohort selection and cross-sectional study have been described earlier elsewhere.[13]

The present study involved 5 year-old (±5 months) children of both genders from the cohort mentioned above.[12] Data collection was done between July 2009 and July 2010. Each preschooler was visited in the respective home. Interviews and data collection commenced only after the parents signed the consent form permitting their child to participate in the study. The researchers were trained prior in data collection to avoid measurement errors. Four nutritionists collected the data. As a cross-sectional study nested in a cohort, the sample power was calculated pos-hoc using the parameter risk overweight/obese in relation to 3rd tertile for glycemic load adjusted for energy obtained by Poisson regression, which was 1.20. Using the statistical software ''G*Power'', 85% power was obtained.

This study was approved by the Ethics Committee of the Federal University of the Valleys of Jequitinhonha