

## Health behaviors and cardiovascular disease risk factors in vegetarian adolescents

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### Abstract

#### Introduction

The prevalence of childhood obesity and metabolic syndrome is increasing worldwide, resulting in increased cardiovascular disease (CVD) risk. Achievement of optimal lifestyle behaviors is recommended. Previous studies in adults have suggested that vegetarians have lower adiposity, with less evidence in children. Therefore, we sought to determine the behaviors and CVD risk factors associated with self-identification as a vegetarian in adolescents.

#### Methods

Heart Niagara, Inc., Heart Healthy Schools Program has provided school-based universal risk factor screening for all grade 9 students in a defined geographic region since 1987 as a health curriculum enrichment program. The program includes assessment of family history, lifestyle behaviors, and CVD risk factors based on questionnaires, anthropometric measurements, blood pressure and point-of-care lipid testing.

#### Results

From cross-sectional cohorts from 2009-2018,  $n=23,174$  students (50.4% males) were included. There were 21,345 non-vegetarians (92%), 1,378 flexitarians (6%, eating mostly vegetables, but sometimes meat), and 451 vegetarians (2%). There were more flexitarians and vegetarians in girls (919 flexitarians (8%) and 336 vegetarians (3%) in girls; 459 flexitarians (4%) and 115 vegetarian (1%) in boys,  $p < 0.001$ ). There was no significant differences between groups regarding BMI, waist to height ratio, and systolic blood pressure Z score, while flexitarians had slightly smaller height Z scores than non-vegetarians ( $-0.093$ , SE 0.028,  $p = 0.02$ ). There was no difference in non-HDL cholesterol levels between groups, but HDL was lower in vegetarians ( $-0.042$  mmol/L, SE 0.018). Flexitarians and vegetarians were more likely to 'skip meals' (OR 1.52, 95% CI 1.36–1.70, and OR 1.50, 95% CI 1.24–1.81, respectively). Flexitarians and vegetarians spent less time in moderate to vigorous exercise ( $-0.13$  days/week, SE 0.056, and  $-0.27$  days/week, SE 0.094, respectively). More flexitarians were smokers at examination (OR 1.81, 95% CI 1.22–2.68).

#### Conclusions

Vegetarianism is rarely reported by adolescents. It was not associated with reduced adiposity or cardiovascular risk factors, and in fact vegetarians had lower HDL and were more likely to report suboptimal dietary habits and less physical activity. These data suggest that vegetarianism may be paradoxically associated with increased CVD risk and worse lifestyle behaviors in adolescents.