Letter

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Trends and Risk Factors of Metabolic Syndrome among Korean Adolescents, 2007 to 2018 (*Diabetes Metab J* 2021;45:880-9)

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Metabolic syndrome was originally considered an intermediate stage that began with abdominal obesity and insulin resistance and ultimately led to type 2 diabetes mellitus and cardiovascular disease. Risk for metabolic syndrome is largely determined from birth, and heredity and intrauterine nutritional status are strongly related [1]. In recent years, metabolic syndrome in adults has been steadily increasing, and is linked to the occurrence of type 2 diabetes mellitus in young adults. Several epidemiological studies showed that obesity is steadily increasing and type 2 diabetes mellitus is frequently diagnosed in childhood and adolescence [2,3].

In this article, entitled "Trends and risk factors of metabolic syndrome among Korean adolescents, 2007 to 2018" [4], the rate of metabolic syndrome among adolescents aged 12 to 18 years did not change significantly from 1.7% in 2007 to 2.2% in 2018. However, during that period, the components of metabolic syndrome showed statistically significant changes (abdominal obesity, 8.1% to 11.2%; hyperglycemia, 5.3% to 10.4%; hypo-high density lipoprotein-cholesterolemia, 22.4% to 14.8%).

In a meta-analysis including 85 studies, the prevalence of metabolic syndrome in children and adolescents was 3.3% (0% to 19.2%), but was 11.9% in overweight and 29.2% in obese children [5]. Choi et al. [6] analyzed metabolic syndrome among adolescents aged 13 to 18 years based on 2014 to 2019 data from the Korea National Health and Nutrition Examination Survey (KNHANES) and reported a prevalence rate of 8.8% in boys and 5.1% in girls, significantly higher than in this study. These differences in prevalence may be due to differences in the definition of metabolic syndrome. While this study used International Diabetes Federation (IDF) diagnostic criteria, previous studies used the diagnostic criteria proposed by Choi et al. [6] and Cook et al. [7]. An in-depth discussion is needed on which diagnostic criteria to use when estimating metabolic syndrome in Korean adolescents. When interpreting the results of this study, it is difficult to explain why abdominal obesity increased in adolescents, but metabolic syndrome did not. Metabolic syndrome may not be an appropriate measure for evaluating the metabolic abnormalities caused by abdominal obesity and insulin resistance in childhood and adolescence.

Above all, the observed increase in hyperglycemia is a major concern. In the 2007 to 2009 survey, fasting blood glucose was 88.6 mg/dL, but in the 2016 to 2018 survey it rose to 91.0 mg/dL, and when hyperglycemia was defined as fasting blood glucose above 100 mg/dL, the prevalence of hyperglycemia nearly doubled from 5.3% to 10.4%. Compared to the increase in abdominal obesity (1.4-fold), this large increase in hyperglycemia is difficult to explain. Blood glucose was tested after a >9-hour overnight fast, but because adolescents in Korea are likely to study and consume snacks at night, it is possible that fasting was not adequate. When hyperglycemia is defined as glycated hemoglobin of 5.7% or more, the prevalence of hyperglycemia according to glycated hemoglobin can be a good reference.

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In this study, over time, physical activity such as regular walking decreased, and fat intake increased in adolescents. Thus, the increase in abdominal obesity in adolescents appeared to be due to lack of regular walking and an increase in total calorie intake. In addition, regular walking and strength training are associated with a decrease in triglyceride levels.

However, current smokers had lower glucose levels. As the authors mentioned, the association of smoking status and glucose levels is controversial. In my opinion, it is difficult to rule out the possibility of misclassification because smoking status was self-reported. In addition, the authors compared the mean value of components of metabolic syndrome according to lifestyle factors such as smoking in Table 3. However, unlike adults, obesity in children and adolescents is evaluated using body mass index and waist circumference percentiles by race, sex, and age. Therefore, it may be more reasonable to compare the proportion of each metabolic abnormalities rather than the average value of metabolic syndrome components according to lifestyle.

Also, in adult studies, emerging relationships of alcohol consumption and socioeconomic status with obesity, metabolic syndrome, and type 2 diabetes mellitus have been detected. Thus, it is unclear whether metabolic syndrome increases with increased alcohol consumption or whether it increases more with low socioeconomic status in childhood and adolescence [6,8].

During the coronavirus disease 2019 (COVID-19) pandemic, there have been many concerns regarding the quality of nutrition as consumption of convenience foods and take-out food has increased. Physical activity is rapidly decreasing because students cannot go to school and cannot easily leave the house to play. Therefore, further research is needed to investigate whether obesity and metabolic syndrome in children and adolescents have increased further since 2020.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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