

Correlation between Body Mass Index and Blood Sugar/Serum Lipid Levels in Fourth-Grade Boys in Japan

Authors : Kotomi Yamashita, Hiromi Kawasaki, Satoko Yamasaki, Susumu Fukita, Risako Sakai

Abstract : Lifestyle-related diseases develop from the long-term accumulation of health consequences from a poor lifestyle. Thus, schoolchildren, who have not accumulated long-term lifestyle habits, are believed to be at a lower risk for lifestyle-related diseases. However, schoolchildren rarely receive blood tests unless they are under treatment for a serious disease; without such data on their blood, the impacts of their young lifestyle could not be known. Blood data from physical measurements can help in the implementation of more effective health education. Therefore, we examined the correlation between body mass index (BMI) and blood sugar/serum lipid (BS/SL) levels. From 2014 to 2016, we measured the blood data of fourth-grade students living in a city in Japan. The present study reported on the results of 281 fourth-grade boys only (80.3% of total). We analyzed their BS/SL levels by comparing the blood data against the criteria of the National Center for Child Health and Development in Japan. Next, we examined the correlation between BMI and BS/SL levels. IBM SPSS Statistics for Windows, Version 25 was used for analysis. A total of 69 boys (24.6%) were within the normal range for BMI (18.5–24), whereas 193 (71.5%) and 8 boys (2.8%) had lower and higher BMI, respectively. Regarding BS levels, 280 boys were within the normal range (70–90 mg/dl); 1 boy reported a higher value. All the boys were within the normal range for glycated Hemoglobin (HbA1c) (4.6–6.2%). Regarding SL levels, 271 boys were within the normal range (125–230 mg/dl) for total cholesterol (TC), whereas 5 boys (1.8%) had lower and 5 boys (1.8%) had higher levels. A total of 243 boys (92.7%) were within the normal range (36–138mg/dL) for triglycerides (TG), whereas 19 boys (7.3%) had lower and 19 boys (7.3%) had higher levels. Regarding high-density lipoprotein cholesterol (HDL-C), 276 boys (98.2%) were within the normal range (40-mg/dl), whereas 5 boys (1.8%) reported lower values. All but one boy (280, 99.6%) were within the normal range (-170 mg/dl) for low-density lipoprotein cholesterol (LDL-C); the exception (0.4%) had a higher level. BMI and BS didn't show a correlation. BMI and HbA1c were moderately positively correlated ($r = 0.139$, $p = 0.019$). We also observed moderate positive correlations between BMI and TG ($r = 0.328$, $p < 0.01$), TC ($r = 0.239$, $p < 0.01$), LDL-C ($r = 0.324$, $p < 0.01$), respectively. BMI and HDL-C were low correlated ($r = -0.185$, $p = 0.002$). Most of the boys were within the normal range for BS/SL levels. However, some boys exceeded the normal TG range. Fourth graders with a high TG may develop a lifestyle-related disease in the future. Given its relation to TG, food habits should be improved in this group. Our findings suggested a positive correlation between BMI and BS/SL levels. Fourth-grade schoolboys with a high BMI may be at high risk for developing lifestyle-related diseases. Lifestyle improvement may be recommended to lower the BS/SL levels in this group.

Keywords : blood sugar level, lifestyle-related diseases, school students, serum lipid level

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