

Physical Activity Mediates Blood Pressure in Overweight Adolescents Without Abdominal Adiposity

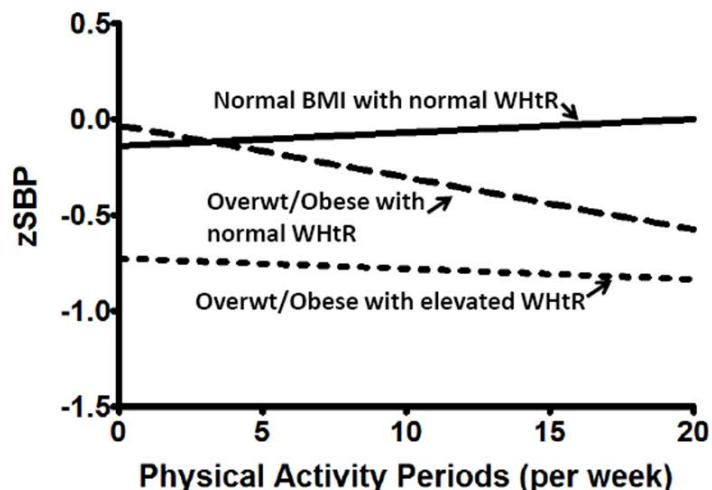
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Objective. We sought to identify lifestyle factors that may mediate the association of adolescent blood pressure (BP) and hypertension (HTN) with adiposity and, hence, suggest targets for specific interventions.

Methods. N=4,104 grade 9 students (14-15 years old, 52% males) were assessed as part of the Heart Niagara Healthy Heart Schools' Program. Measurements included BP, adiposity (body mass index [BMI] and waist circumference [WC]) and lifestyle assessment. WC to height ratio (WHtR) was classified as normal (<0.5), elevated (0.5-0.59) or abdominally obese (≥ 0.6). WC was also classified by percentile categories based on published normal values. BP was converted to age, gender and height specific percentiles and z-scores, and classified as normal (<90th %ile), pre-HTN (<95th) and HTN ($\geq 95^{\text{th}}$). Associations between BP, adiposity and lifestyle factors were assessed in linear and logistic regression models adjusted for age at enrollment and gender.

Results. Median BP z-score was -0.6 (IQR: -1.3; -0.1) for systolic (zSBP) and +0.0 (IQR: -0.4; +0.6) for diastolic (zDBP), with 2.8% of subjects classified with pre-HTN and 0.8% with HTN. Based on BMI percentiles, 15% of subjects were overweight (85th-94th%ile) and 19% obese (95th+%ile). WHtR ≥ 0.5 was noted in 2.5% of normal BMI subjects, 38% of overweight and 95% of obese subjects. Higher WHtR category was associated with higher zSBP and zDBP within BMI categories. Higher WHtR category was weakly associated with HTN category within BMI categories. Higher WC%ile category was more significantly associated with higher HTN category within BMI categories. Higher zBP was significantly associated with family history of HTN but not cardiovascular disease. Higher zBP was associated with skipping breakfast, but no other dietary characteristic. Lower zBP was associated with greater weekly physical activity and participation in organized activities, but not with sleep duration. Subjects who were overweight/obese but did not have elevated WHtR showed lower zSBP but not zDBP with increasing level of weekly physical activity (Figure).

zSBP and Physical Activity by Adiposity



Conclusions. Waist measures in addition to BMI should be included in the anthropometric assessment of risk for obesity-related HTN. Physical activity interventions might be effective in managing BP for overweight/obese adolescents who do not have abdominal adiposity.