

Abstract

Childhood obesity and hypertension (HTN) are predictive of adulthood obesity, HTN, and cardiovascular disease (CVD). This cross-sectional study examined BMI as an independent risk factor for HTN among essentially all 167 low-income 5th grade students attending five different elementary schools. Results indicate that 31% of students were either overweight or obese. This rate is the same as the state average, but slightly above the county average. Systolic blood pressure (SBP) was analyzed as a function of BMI group (underweight, normal, overweight and obese) using one-way ANOVA with trend tests. A significant linear trend was found in SBP across BMI groups ($p = 0.005$) such that there was an increase in systolic blood pressure across all categories of increasing BMI accounting for 63.2% of the between-groups variance in SBP. These findings support early health risk screenings and prevention programs.

Introduction

- Obesity is a serious health concern for adolescents.
- Obese and overweight children are more likely to develop risk factors associated with cardiovascular disease.
- Overweight Children tend to become overweight adults.
- Adolescent hypertension is often asymptomatic and overlooked in health screenings
- High BP is detectable and rising in incidence among children and adolescents.
- Previous research has shown that 24% of students in rural northern CA were either overweight or obese (Marty et al., 2006).



Purpose

Anthropometric data (height, weight, blood pressure) was collected in order to examine relationships between body mass index (underweight, normal, overweight, and obese) and cardiovascular disease risk (systolic blood pressure screening).

Hypothesis

There will be a significant linear trend between systolic blood pressure (mmHg) and body mass index (BMI).

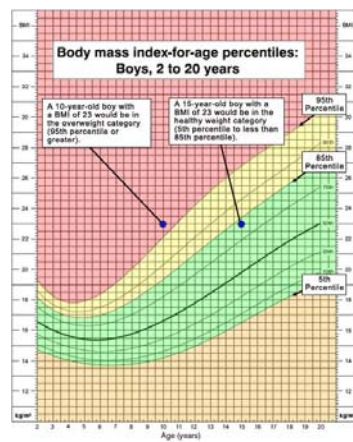
Methods

Participants

167 5th grade students from Chico Elementary Schools.

Anthropometry: Participants height and weight were measure using a Seca stadiometer with shoes and clothing on (need ref). Body Mass Index (BMI) was calculated using weight in pounds *703 divided by height in inches squared. For children 2-20 years the Centers for Disease Control and Prevention have published gender specific BMI-for-age charts.

Resting Blood Pressure: Blood pressure was measured in accordance with standard procedures and recommendations from the Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents (NIH). Calculations were made using the CDC stature-for-age charts. Data was gathered using the Omron® automatic blood-pressure monitor.



Results

- 14.37% of students were 85th-94.9th%tile BMI-for-age (overweight) and 17.37% were ≥95th%tile BMI-for-age (obese)
- These results show a higher prevalence of obesity (24% vs 31%) than previous research on students in rural northern CA (Marty et al., 2006)
- This finding is consistent with state (31%) average, but is higher than the county (24%) and national (20%) averages.

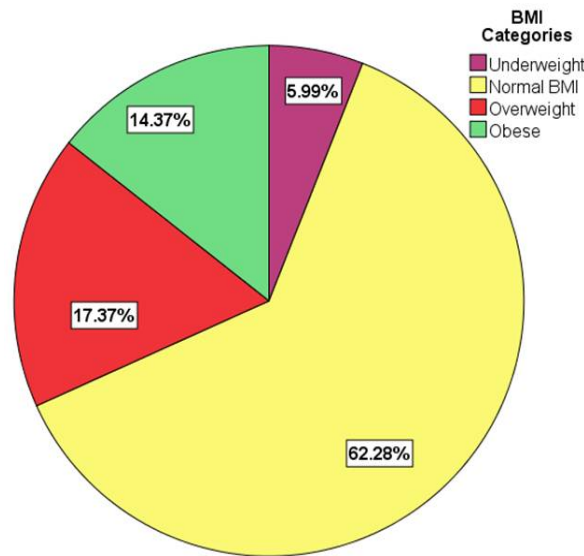


Figure 2. Trends in systolic blood pressure and BMI categories

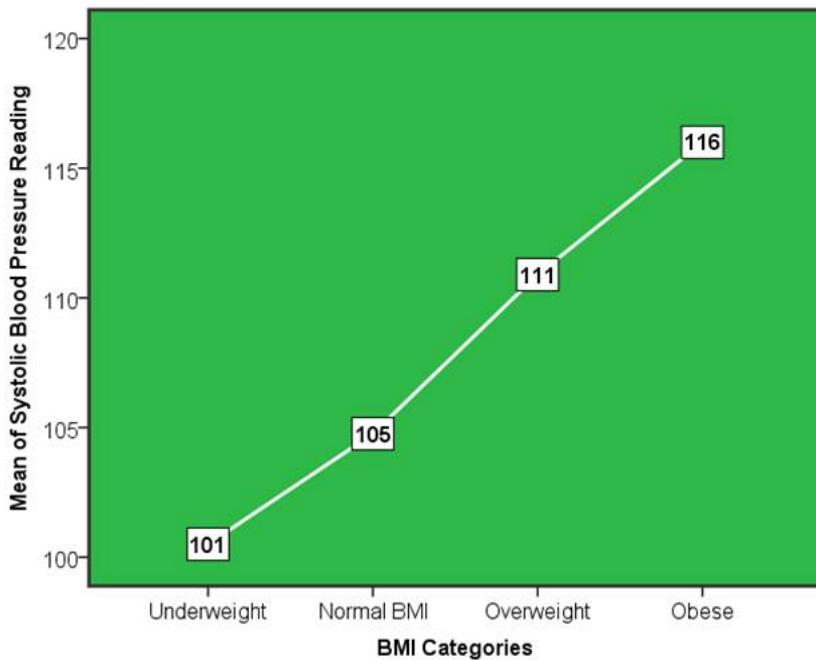


Figure 1. BMI categories of Low-income 5th Grade Students

- A single systolic blood pressure reading (*mmHg*) was analyzed as a function of BMI group (*underweight, normal BMI, overweight, obese*) using a one-way ANOVA. There were significant differences in blood pressure across BMI groups, ($p < .001$), which were explored using trend tests.
- A significant linear trend ($p = 0.005$), was found. This trend accounted for 63.2% of the between-groups variance; this can be seen in Figure 2.

Discussion

- The results of this health screening show an overall increase of 15 mmHG in systolic blood pressure across all categories of increasing BMI.
- With a single blood pressure reading, 22% had systolic and/or diastolic values indicative of pre-hypertension/hypertension (> 90th percentile) using standardized criteria for age, gender, and height.

Limitations

- Single BP reading
- Small sample size resulting in low statistical power for specific group comparisons (i.e. ethnicity).

Conclusions

- Given these results, there is clearly a need for early cardiovascular disease risk screenings and prevention programs in adolescents.

References

K. Marty et al. (2006). Overweight, Diet, Physical Activity, and Hypertension in Low-Income School-Aged Children. *Californian Journal of Health Promotion* 2006, Volume 4, Issue 2, 47-58.