Prevalence of Elevated Blood Pressure Among Overweight and Obese Elementary School-Aged Children

Evie M. Mullenburg-Trevino, Ph.D., Meg Myers Morgan, M.P.A., Chan M. Hellman, Ph.D., John Studebaker, M.D., and Mark Fox, M.D., Ph.D.

University of Oklahoma-Tulsa, Center of Applied Research for Non-profit Organizations

ABSTRACT

The epidemic of obesity in the United States is well-documented. The prevalence of overweight among US children and adolescents has tripled over the last 30 years. Hypertension is a well-known risk factor for cardiovascular disease, and elevated blood pressure (BP) during childhood has been shown to be an independent risk factor for hypertension in adulthood. Hypertension in children is commonly associated with increased weight. However, the prevalence of overweight children with elevated BP in public schools has not been characterized in previous research. The purpose of the present study was to examine the prevalence of elevated blood pressure among students in the normal, overweight, and obese body mass index (BMI) categories. In the present study, BMI and blood pressure data were collected from 1,974 students attending 8 elementary schools in Northeast Oklahoma. In order to assess the extent to which students with elevated blood pressure (BP) had healthy, overweight, or obese BMIs, chi-square analyses were computed. Results were statistically significant for systolic blood pressure. However, findings were not statistically significant for diastolic blood pressure. For systolic blood pressure, of the students with a healthy BMI, 75% had a normal BP, 13.1% fell in the range of pre-hypertensive BP, and 11.9% fell in the range of Stage 1 hypertension. Of all students in the overweight BMI category, 67.2% had a normal BP, 14.5% fell in the range of pre-hypertensive BP, and 18.3% fell in the range of Stage 1 hypertension. Finally, of the students in the obese range, 57.4% had a normal BP, 15.3% fell in the range of pre-hypertensive BP, and 27.3% fell in the range of Stage 1 hypertension. For diastolic blood pressure, of those with a healthy BMI, 68.8% had a normal BP, 13.8% fell in the range of pre-hypertensive BP, and 17.4% fell in the range of Stage 1 hypertension. Of all students in the overweight BMI category, 67.2% had a normal BP, 14.5% fell in the range of pre-hypertensive BP, and 18.3% fell in the range of Stage 1 hypertension. Finally, of the students in the obese range, 57.4% had a normal BP, 15.3% fell in the range of pre-hypertensive BP, and 27.3% fell in the range of Stage 1 hypertension.

METHOD

Date was collected by Tulsa City County Health Department (TCCHD) as part of the evaluation of their “It’s All About Kids” health and nutrition program. Funding was received from TCCHD for the evaluation of this program. The protocol for this study was approved by the university’s human subject review board.

TCCHD collected BMI and BP scores from 1,974 students during fall 2009. Participating students were enrolled in grades first through fifth. Each time BMI and BP scores were collected, participants’ code, date of birth, gender, weight, height, systolic BP, and diastolic BP were recorded. BMI raw scores were transformed into percentiles using the CDC’s BMI percentile formula. BMI categories and the corresponding percentile are presented in Table 1 (Center for Disease Control and Prevention, 2007).

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Percentile Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Weight</td>
<td>≥ 85th percentile</td>
</tr>
<tr>
<td>Overweight</td>
<td>85th percentile to &lt; 95th percentile</td>
</tr>
<tr>
<td>Obese</td>
<td>≥ 95th percentile</td>
</tr>
</tbody>
</table>

BP scores were characterized as normal, prehypertension, Stage 1: hypertension, or Stage 2: hypertension based on percentiles defined by the United States Department of Health and Human Services (2007).

RESULTS

In order to assess the extent to which students with elevated blood pressure (BP) had healthy, overweight, or obese BMIs, chi-square analyses were computed. Results were statistically significant for systolic blood pressure. However, findings were not statistically significant for diastolic blood pressure. For systolic blood pressure, of the students with a healthy BMI, 75% had a normal BP, 13.1% fell in the range of pre-hypertensive BP, and 11.9% fell in the range of Stage 1 hypertension. Of all students in the overweight BMI category, 67.2% had a normal BP, 14.5% fell in the range of pre-hypertensive BP, and 18.3% fell in the range of Stage 1 hypertension. Finally, of the students in the obese range, 57.4% had a normal BP, 15.3% fell in the range of pre-hypertensive BP, and 27.3% fell in the range of Stage 1 hypertension.

For diastolic blood pressure, of those with a healthy BMI, 68.8% had a normal BP, 13.8% fell in the range of pre-hypertensive BP, and 17.4% fell in the range of Stage 1 hypertension. In regard to those in the overweight category, 71.6% had a normal BP, 12.3% had pre-hypertensive BP, and 16.1% had Stage 1 hypertension. Of the obese students, 69.2% had a normal BP, 14.3% had pre-hypertension, and 16.4% were in the range of Stage 1 hypertension.

These findings indicate that elevated systolic BP is more likely to exist among students with overweight and obese BMI scores than students with normal BMI scores. Further research is needed to understand these findings.

INTRODUCTION

Obesity has become a major concern of health practitioners in the United States. The epidemic of obesity in the US is well-documented (Centers for Disease Control and Prevention; Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). The prevalence of overweight among US children and adolescents has tripled over the last 30 years (Ogden, Flegal, Carroll, & Johnson, 2002). In addition, hypertension is a well-known risk factor for cardiovascular disease and morbidity, and elevated blood pressure (BP) during childhood has been shown to be an independent risk factor for hypertension in adulthood. Hypertension in children is commonly associated with increased weight. However, the prevalence of overweight children with elevated BP in public schools has not been characterized in previous research. The purpose of the present study was to examine the prevalence of elevated blood pressure among students in the normal, overweight, and obese body mass index (BMI) categories.