Characterization of Childhood Obesity and Behavioral Factors

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ABSTRACT

Introduction: Childhood obesity is a major public health threat in the United States. Recent data indicate that 34.2% of children ages 6 to 11 years are overweight or obese. The purpose of this study is to describe childhood obesity levels and identify risk behaviors in two school-based health centers in Michigan, one urban and one rural.

Methods: This study is a secondary data analysis from a multicenter comparative effectiveness trial. Multiple logistic regression was used to examine behavioral factors associated with overweight/obesity in children.

Results: In this sample (n = 105), 41.9% were obese and 16.2% were overweight. The duration of sleep per night (p = .04) and the frequency of eating breakfast (p = .04) were significant predictors of being overweight/obese.

Discussion: Health care providers in school-based health centers must be comfortable assessing, preventing, and treating childhood obesity in this high-risk group of patients. Interventions should encourage children to eat breakfast daily and to get adequate sleep. J Pediatr Health Care. (2016) *30*, 444-452.

KEY WORDS

Obesity, overweight, pediatric, breakfast, sleep

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Supported by grant number R18HS018646 from the Agency for Healthcare Research and Quality, Rockville, MD.

Conflicts of interest: None to report.

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0891-5245/$36.00

Published online November 21, 2015.

http://dx.doi.org/10.1016/j.pedhc.2015.10.009

Childhood obesity is a major public health threat in the United States. The National Health and Nutrition Examination Survey (NHANES) 2011-2012 data indicate that 17.7% of children ages 6 through 11 years are obese, as defined by a body mass index (BMI) at or above the sex-specific 95th percentile on the Centers for Disease Control and Prevention (CDC) BMI-for-age growth charts (Ogden, Caroll, Kit, & Flegal, 2014). The NHANES survey results also identified 16.5% as being overweight (BMI ≥ 85th percentile, but < 95th percentile; Ogden et al., 2014). The NHANES findings demonstrate that there is both an alarming and sustained prevalence of obesity among the youth of the United States.

An obese child is at risk for many adverse health consequences throughout his or her life span. Obesity in childhood is an established risk factor for type 2 diabetes mellitus (McGown, Birerdinc, & Younossi, 2014), non-alcoholic fatty liver disease (Feldstein, Patton-Ku, & Boutelle, 2014), dyslipidemia (Cook & Kavey, 2011), musculoskeletal disorders (Krul, van der Wouden, Schellevis, van Suijlekom-Smit, & Koes,

2009), asthma (Black, Zhou, Takayanagi, Jacobsen, & Koebnick, 2013), and psychological disorders (Vander Wal & Mitchell, 2011). Pediatric obesity often leads to overweight or obese status in adulthood (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007; Singh, Mulder, Twisk, van Mechelen, & Chinapaw, 2008) and is correlated with increased morbidity and premature mortality (Reilly & Kelly, 2011). As pediatric obesity gains the national spotlight, researchers are turning their attention to the behavioral factors associated with obesity in children, including sleep duration, physical activity, screen time, and nutritional habits.

Energy balance is an established model for understanding obesity. In this model, the energy from food and drink must equal the energy expended through physical activity for a person to maintain a certain weight (National Heart, Lung, and Blood Institute [NHLBI], 2013). A simple equation can be used: energy intake − energy expenditure = change in body stores of energy in the form of fat, glycogen, and protein (Schoeller, 2009). If the amount of energy taken in is greater than the amount of energy expended, the extra energy will be stored by the body and weight gain will occur. If the amount of energy taken in is less than that expended, the body's energy stores will be used to make up the difference, and weight loss results (Hill, Wyatt, & Peters, 2012). Sleep duration, physical activity, screen time, and nutritional habits all affect the energy balance equation, although not all factors are well understood.

Guidelines for addressing pediatric obesity incorporate both energy intake and energy expenditure components. Expert panel guidelines have been developed for preventing, assessing, and treating childhood overweight and obesity (Barlow, 2007; National Association of Pediatric Nurse Practitioners [NAPNAP], 2006), as well as for addressing risk factors for cardiovascular disease in children and adolescents (NHLBI, 2011). These recommendations for clinicians include how to educate patients and families about physical activity, screen time, and nutrition.

The U.S. Department of Health and Human Services recommends that school-age children participate in at least 60 minutes of physical activity per day (Office of Disease Prevention and Health Promotion, 2008). The expert guidelines echo this recommendation, suggesting that clinicians counsel families to prioritize 60 minutes of daily moderate to vigorous physical activity for children (Barlow, 2007; NAPNAP, 2006; NHLBI, 2011). Several studies have demonstrated that increased physical activity is associated with decreased levels of obesity in children (Ekelund, Luan, Sherar, Esliger, Griew, & Cooper, 2012; Janz et al., 2009). An international systematic review by Jiménez-Pavón, Kelly, and Reilly (2010) revealed that decreased physical activity was consistently associated with increased adiposity in children.

The term "screen time" is defined as time spent using an electronic screen, such as a television, computer, or mobile device. Screen time is often used as a proxy for the synonymous terms "physical inactivity" and "sedentary behavior." It is unclear whether there is an association between screen time and pediatric obesity (Ekelund et al., 2012; Fröberg, 2015). Expert guidelines suggest that screen time should be limited to less than 2 hours per day for children (Barlow, 2007; NAPNAP, 2006; NHLBI, 2011).

The relationship between nutritional habits and pediatric obesity is complex, as reflected by the varied nutritional recommendations included in the expert guidelines (Barlow, 2007; NAPNAP, 2006; NHLBI, 2011). To help children and families obtain adequate nutrition, ongoing nutrition counseling is recommended, and access to fruits and vegetables should be increased. Consumption of sugar-sweetened beverages should be decreased or eliminated, and naturally sweetened juice consumption should be limited. Guidelines recognize that nutrition recommendations must be individualized to each child and family (Barlow, 2007; NAPNAP, 2006; NHLBI, 2011). In a study of national energy intake versus national weight gain, Swinburn, Sacks, and Ravussin (2009) found that the added energy intake of the U.S. population from 1970 to 2000 was more than sufficient to describe the weight gain of both the children and the adults of the United States during this time. The percentage of dietary intake consisting of fat is strongly associated with increased body fat in adolescents (Labayen et al., 2014).

The expert guidelines recommend that clinicians encourage pediatric patients to eat breakfast daily (Barlow, 2007; NAPNAP, 2006; NHLBI, 2011). The medical literature suggests that consuming breakfast daily may help to reduce the risk of pediatric obesity. In a study of school-aged children, daily breakfast consumption was found to be associated with lower rates of obesity, improved lipid profiles, and increased physical activity (Papoutsou et al., 2014). Alexander and colleagues (2009) found that omitting breakfast is associated with increased levels of intra-abdominal adipose tissue but is not associated with other measures of adiposity or with insulin indicators in 10- to 17-year-old Latino youth. Freitas Júnior and colleagues (2012) found that sedentary obese children and adolescents in Brazil who ate breakfast had lower levels of fasting blood glucose, triglycerides, and very low-density lipoprotein cholesterol. The impact of breakfast consumption on the energy balance equation is complex and not yet well understood.

Although sleep duration is not addressed in the expert guidelines (Barlow, 2007; NAPNAP, 2006; NHLBI, 2011), researchers have found a relationship among sleep duration, dietary quality, and pediatric obesity (Franckle et al., 2015; Mendelson et al., 2015; Taveras, Gillman, Peña, Redline, & Rifas-Shiman,