



## EDITORIAL COMMENT

# Obesity and hypertension in children: A worldwide problem



## Obesidade e hipertensão arterial nas crianças: um problema à escala mundial

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Childhood obesity is an important and concerning public health problem. Its prevalence is increasing worldwide, as are obesity-related diseases, at ever younger ages, in both developed and developing countries.<sup>1–3</sup>

According to the World Health Organization, worldwide obesity rates have nearly tripled since 1975. In 2016, more than 39% of adults aged 18 years and over were overweight and 13% were obese. The prevalence of overweight and obesity among children and adolescents aged 5 to 19 rose dramatically from 4% in 1975 to over 18% in 2016.<sup>4</sup> Portugal presents one of the highest prevalences of pediatric obesity and overweight in Europe.<sup>2</sup> Overweight and obesity are linked to higher mortality worldwide than underweight.<sup>1</sup>

Obesity-related diseases, usually considered adult diseases, are more frequently affecting children and adolescents. Obesity-related comorbidities affect the cardiovascular, endocrine, pulmonary and gastrointestinal systems, as well as having psychosocial effects.<sup>2,3</sup> Hypertension, classically an adult problem, used to be a rare condition in children, in whom it was mostly secondary to renal, endocrine or cardiovascular disorders, such as coarctation

of the aorta. However, primary hypertension is becoming more prevalent in childhood.<sup>3</sup>

Various studies have shown that weight gain is associated with increased blood pressure (BP) and hypertension and that the prevalence of hypertension is much higher in obese than in non-obese children.<sup>1,5</sup>

Obesity in children is defined as a body mass index (BMI) at or above the 95th percentile for age and gender.<sup>5,6</sup> BMI is a strong predictor of BP in children and adolescents, and predicts overweight and obesity in adulthood.<sup>2</sup>

Normal BP in children is defined as systolic and diastolic BP below the 90th percentile for age and height, while hypertension in children is defined as mean systolic and diastolic BP above the 95th percentile for age and height. BP should be measured on at least three separate occasions.<sup>5,6</sup>

The prevalence of metabolic syndrome has increased in recent years, along with obesity in the young. It is associated with increased risk of cardiovascular morbidity and mortality.<sup>1</sup> Hypertension is the first cardiovascular problem to appear in the obese child and is being diagnosed at earlier ages. Understanding of some of the complex physiological mechanisms involved in obesity-related hypertension is important, since it can have therapeutic implications.<sup>1</sup>

Neural activity to the kidney and skeletal muscle is increased in obesity in both hypertensive and normotensive children, but may be influenced by environmental

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and genetic factors. Activation of the renin-angiotensin system may contribute to hypertension, increasing renal sodium retention and mineralocorticoid activity. Regulation of vascular resistance by the endothelium also has an important role; endothelium-derived nitric oxide induces vascular relaxation and is depressed in obese children. Adipose tissue produces several endocrine substances which have been implicated in BP. Leptin, an amino acid peptide, promotes weight loss by reducing appetite and increasing energy expenditure through activation of the sympathetic nervous system by central mediation on the hypothalamus and local peripheral action, but there appears to be leptin resistance in obesity. Obesity is also associated with resistance to insulin-stimulated glucose uptake and hyperinsulinemia; weight loss increases insulin sensitivity.<sup>1</sup>

Due to the risk of systemic complications, obese children with BP above the 90th percentile for height and gender should be treated. This treatment should begin with diet and exercise, since the fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended.<sup>4</sup>

Behavior modification programs and parental involvement may lead to significant weight loss in obese children. If obesity is sustained it can have an important effect on adult risk for hypertension and coronary heart disease.<sup>2,7</sup> Actions to promote health in the school environment are a useful tool to change patterns of health and disease in the young population. Pharmacological interventions may have little effect in reducing BMI and body weight in obese children and adolescents.<sup>4,8</sup>

BMI in adolescence is a powerful predictor of adult obesity and risk for hypertension. The waist-hip ratio correlates strongly with resting and ambulatory BP, and is therefore among the tools used to infer which children are at risk for obesity and/or hypertension.<sup>1,2,7</sup>

The importance of anthropometric and BP measurements at age three years and older by the child's general practitioner (and before this age, in special cases) is recognized. BMI and waist-hip ratio can help to predict the evolution of the child's growth and weight gain, in order to detect and prevent obesity and its comorbidities.<sup>1,3</sup> Methods that take into account variations in adiposity over time and over the BMI spectrum may be considered superior approaches.<sup>2</sup> Further research is needed to explore the best methods to summarize the dynamic of adiposity over time.<sup>2</sup>

Parents should be aware that there are important periods in their child's development that can induce a predisposition to obesity, beginning with prenatal development and continuing with non-breast feeding during the first six months of life and inappropriate nutritional diversification during the first years of the child's life and during adolescence.<sup>2,3</sup> There should be an awareness that obesity and the resulting problems are preventable.<sup>4</sup>

There have been considerable changes in eating patterns in recent years, including reduced frequency of eating breakfast and increased intake of energy-dense food and beverages, as well as increases in physical inactivity due to sedentary forms of playing, working and transportation.<sup>2,7</sup>

There is worldwide concern about this childhood health problem. In order to halt and reverse this trend, many groups have been formed to develop and implement guidelines

designed in order to minimize the short- and long-term effects on young people's health. Strategies should be implemented involving parents, schools, the media and the food industry, in order to increase their awareness of the short- and long-term health problems that an obese child may suffer, and to minimize the resulting morbidities.<sup>3,8</sup>

As stated above, there is a strong association between adiposity, overweight and obesity, and hypertension. The article by Vieira et al. published in this issue of the *Journal*<sup>9</sup> examines this problem in small children (aged 4-7 years) and emphasizes the importance of assessing anthropometric parameters (BMI and waist-height ratio) and their relationship with BP. Sociodemographic and lifestyle parameters were also assessed, as well as nutritional and exercise habits. The authors found an association between high BMI and waist-height ratio and increased BP. They propose that these parameters should be used for the early identification of overweight or obese children and to prevent the associated comorbidities.<sup>9</sup>

Community-based social intervention programs should be established, in order to change habits and mentalities.

More research and clinical trials are needed to continue to improve the treatment of childhood obesity-related comorbidities and to develop evidence-based guidelines.<sup>5,10</sup>

## Conflicts of interest

The author has no conflicts of interest to declare.

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