

« **CHILDHOOD OBESITY AND CONSEQUENCES:  
NO MORE TIME LEFT!** »

Editorial

**Childhood obesity: Preventing today's children from becoming tomorrow's patients**

Childhood obesity has become a major medical issue in children and likely represents the most important preventable cause of future disease in adulthood. Obesity during childhood - even if body weight becomes normalized during adulthood - is an important prognostic indicator of future coronary artery disease. We have now reached a point where obese children are diagnosed with type II diabetes, a disease formerly found only in the elderly.

The articles by Lytle, Rai, and Mitsnefes provide timely views on the medical importance, causes, treatment, and prevention of childhood obesity, as well as the disease conditions associated with it. Manu Rai refers to the controversially discussed "metabolic syndrome": in the late 1980s, Gerald M. Reaven, M.D. noticed certain diseases frequently coincide in patients with coronary artery disease which he termed "(metabolic) syndrome X". These diseases included high blood pressure, abnormal blood lipid levels, high blood sugar, and - obesity! What he overlooked, though, was that obesity is rather the cause of all the aforementioned conditions, rather than an independent disease entity of a "metabolic syndrome": indeed, successful treatment/prevention of obesity improves or even cures most of these disease conditions, in children as well as in adults.

While it is unlikely that a diet in fruits or vegetables on its own has "antihypertensive effects" as discussed by Mark Mitsnefes, regular physical exercise in combination with a diet rich in vegetables and fruit (and a reduced fat and carbohydrate content) has been shown to successfully treat obesity (and subsequently, hypertension) and also to maintain body weight, once it has been normalized.

The public health measures required to prevent childhood obesity as discussed by Leslie Lytle will be important for governments in countries around the world in order to prevent today's children from becoming tomorrow's patients.

**Matthias Barton, M.D.**  
University of Zurich, Switzerland



- E. Bere • University of Agder • Faculty of Health and Sport • Norway
- E. Birlouez • Epistème • Paris • France
- I. Birlouez • INAPG • Paris • France
- MJ. Carlin Amiot • INSERM • Faculté de médecine de la Timone • Marseille • France
- B. Carleton-Tohill • Center for Disease Control and Prevention • Atlanta • USA
- V. Coxam • INRA Clermont Ferrand • France
- N. Darmon • Faculté de Médecine de la Timone • France
- ML. Frelut • Hôpital Saint-Vincent-de-Paul • Paris • France
- T. Gibault • Hôpital Henri Mondor • Hôpital Bichat • Paris • France
- D. Giugliano • University of Naples 2 • Italy
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- S. Jebb • MRC Human Nutrition Research • Cambridge • UK
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- J. Pomerleau • European Centre on Health of Societies in Transition • UK
- E. Rock • INRA Clermont Ferrand • France
- M. Schulze • German Institute of Human Nutrition Potsdam Rehbruecke, Nuthetal • Germany
- J. Wardle • Cancer Research UK • Health Behaviour Unit • London • UK



**IFAVA** Contacts info

**HEAD OFFICE**  
**International Fruit And Vegetable Alliance**  
c/o Canadian Produce Marketing Association  
162 Cleopatra  
Ottawa, Canada, K2G 5X2

**IFAVA CO-CHAIR**  
Paula Dudley - New Zealand  
paula@5aday.co.nz

**IFAVA CO-CHAIR**  
Sue Lewis - Canada  
slewis@cpma.ca

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# Dealing with the childhood obesity epidemic: a public health approach

— Leslie A. Lytle —

Department of Health Behavior, University of North Carolina, Chapel Hill, NC, USA

Childhood obesity is one of the most pressing public health and medical problems in the United States (US). In the US, prevalence rates of childhood overweight and obesity have tripled in the past 30 years and the health implications and related medical costs of the disease are already obvious. For the first time ever, weight-related type 2 diabetes is being diagnosed in youth.

The following offers an overview of current trends and initiatives from the medical and public health communities to find appropriate and effective treatments, as well as ways to prevent obesity.

## Family-based behavioral treatment programs seem to be the most effective childhood obesity treatment programs

A recent Cochrane review on treating obesity in children examined the efficacy of community, school, and clinic-based treatment programs (including lifestyle, drug, and surgical treatment)<sup>1</sup>.

The majority of the lifestyle interventions focused on behaviorally oriented treatment programs while other lifestyle approaches focused on activity, reduction of sedentary behavior, or on dietary changes. Behavioral treatment programs most typically target eating and activity change in the obese child by working with parents to restructure the foods available in the home. These programs positively impact how families cue and reinforce eating and activity behaviors, and provide counseling to both parents and the obese youth. For youth under the age of 12, these family-targeted programs decreased Body Mass Index (BMI) more than standard care at 6-month follow-up, but treatment differences were not evident at a 12-month follow-up. For adolescents, these programs were found to be more effective than standard care at both 6-month and 12-month follow-up. Some medications (orlistat, sibutramine) combined with a lifestyle intervention showed significant weight loss in adolescents but also adverse outcomes like abdominal pain, gallstones, and high blood pressure.

The studies show a good effect of family-based behavioral treatment programs but they are some limitations: generally the studies include a small number of participants and there are few published studies that evaluate treatment efficacy in non-white children.

## Changing foods available in schools to prevent childhood obesity

The vast majority of youth spend at least six hours, five days a week, in school. Therefore schools, and other agencies in the community that work with youth, have an important role in helping to prevent childhood obesity. Health education research

has shown that knowledge alone does not result in behavior change. Behavior choices occur in the context of what youth see as options in their environment and in what they see modeled by other people in their environment. Interventions should focus on changing elements of the physical and social environments, such as changing foods available in schools or increasing physical activity options and rewarding and incentivizing healthful choices.

## Public health initiatives to prevent childhood obesity

In the United States there are many initiatives from the federal government as well as non-profit institutions to help develop solutions to reduce childhood obesity. At the federal level, the Centers for Disease Control and Prevention as well as Michelle Obama's "Let's Move!" campaign offer recommendations for individuals, communities and local and state organizations to reduce the risk of childhood obesity. The American Academy of Pediatrics and the Robert Wood Johnson Foundation are examples of non-profit organizations that are working hard to find strategies for preventing childhood obesity.

## Public Health challenges for the future

The time will tell us if these public health initiatives impact prevalence rates of childhood obesity. Flegal et al.<sup>2</sup> report that the most recent NHANES data showed no statistically significant change in the prevalence of obesity from 1999 to 2008 for adult women. For men, prevalence rates appear to have leveled off since 2003.

The Pediatric Nutrition Surveillance System shows no increase in obesity rates in children and in students between 2005 and 2007. These are good signs but approximately 2.7 million children, ages 2-19 were at or above the 99th percentile for BMI in 2004 and nearly half a million had a BMI that met or exceeded 40 kg/m<sup>2</sup>. In particular, among those youth living in families below the poverty threshold, the rates of severe obesity tripled in the last decades. The challenge for the future is to develop more powerful treatments for these severely obese youth<sup>3</sup>.

While public health and clinical interventions appear to be in high gear to prevent and treat childhood obesity, it would be naive to believe that childhood obesity will be eradicated like other epidemics of the past. We are no more likely to find a "cure" for obesity than we are to find a "cure" for cancer. Both diseases are highly complex and have biological, behavioral, psychological, social, and environmental etiologic factors that are not easily fixed. Those of us in public health need to do what we can to allow all of our children to achieve the highest degree of health and wellness possible.

**BASED ON:** LA Lytle (2012). Dealing with the childhood obesity epidemic: a public health approach. *Abdom Imaging*. March 7

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# Management of blood pressure in children

— Mark M. Mitsnefes —

Division of Nephrology and Hypertension, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA

Elevated Blood Pressure (BP) has been recognized as an important health issue in the pediatric population over the past three decades. The majority of data indicate that average BP levels and prevalence of hypertension have risen substantially among children and adolescents. This tendency is evident not only in the United States but also in Asia, Europe and Latin America. Obesity and other lifestyle factors such as physical inactivity and high calorie, high salt intake and fast food are thought to be responsible. **Hypertension in children is viewed now as a significant risk factor for the development of cardiovascular disease in adulthood.**

## Risk factors of hypertension in children

The most comprehensive analysis of potential anthropometric, prenatal, environmental, and familial risk factors for high BP was performed recently by Simonetti et al.<sup>1</sup> as part of a screening project in 4.236 preschool children in Germany.

### • Correlation between BP and BMI

Obese children displayed significantly higher BP than lean children.

### • Prenatal risk factors

- Children born pre-term or with low birth weight showed significantly higher systolic BP than children born at term or children with birth weight above 2,500g.

- Children exposed to maternal smoking during pregnancy displayed significantly higher systolic BP than unexposed children, and children of mothers with pregnancy-related hypertension showed significantly higher systolic and diastolic BP.

### • Parental and environmental risk factors

Children of hypertensive parents showed higher BP than children of normotensive parents. Similarly, BP was higher in children of obese parents than in children of nonobese parents. A lower parental educational level was significantly associated with higher systolic BP of the offspring. Children exposed to parental smoking at home had higher systolic and diastolic BP than unexposed children. The amount of maternal cigarette consumption correlated linearly with systolic BP.

## How to lower blood pressure without use of blood pressure medications?

### • By eating fruits more than twice per day

Damasceno et al.<sup>2</sup> examined the associations of BP with fruits, vegetables, and fruit juice consumption among a random sample of 794 adolescents from 12 private schools in northeast Brazil. Regular consumption of fruits (more than twice per day) was associated with lower systolic and diastolic BP, whereas

consumption of vegetables was associated with a significant decrease in systolic BP only.

The relationships between childhood lifestyle risk factors and adulthood Pulse Wave Velocity (PWV) have been evaluated in 1.622 individuals of the Cardiovascular Risk in Young Finns Study followed up for 27 years since baseline<sup>3</sup>. Decreased vegetable consumption was an independent predictor of high PWV in adulthood when adjusted for lifestyle or traditional risk. The number of lifestyle risk factors (the lowest quintile for vegetable consumption, fruit consumption, physical activity and smoking) in childhood was directly associated with PWV in adulthood. These findings suggest that lifetime lifestyle risk factors, with low consumption of fruits and vegetables in particular, are related to arterial stiffness in young adulthood.

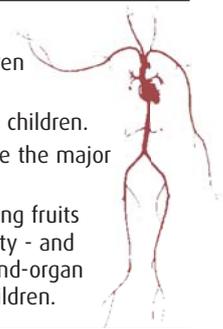
### • By practicing physical activity at a moderate intensity level in everyday life

The Greek adolescents study analyzed data from 496 students aged 12–17 years who submitted information on the frequency and duration of physical activity and the amount of time spent in sedentary activities<sup>4</sup>. As expected, heart rates were significantly lower as the level of activity rose. However, intense physical activity was associated with higher systolic BP and pulse pressure, with positive correlations. The authors concluded that physical activity should be practiced at a moderate intensity level in everyday life.

Maggio et al.<sup>5</sup> performed a follow-up study of 20 young adolescents who participated in the randomized controlled trial of the effect of physical activity on cardiovascular risk factors. The authors showed that even two years after stopping the trial, the reduction in BP was maintained. In addition, arterial intima – media thickness, Body Mass Index (BMI) z-score, and body fat remained stable two years after stopping the physical activity program. These results were more prominent in the patients that decreased their BMI during the exercise program.

## KEY POINTS

- ▶ Primary hypertension can develop in children of preschool age.
- ▶ Hypertension is frequently unrecognized in children.
- ▶ Obesity epidemic and physical inactivity are the major causes of elevated BP.
- ▶ Combination of lifestyle modification – eating fruits and vegetables and practice physical activity - and pharmacological treatment can decrease end-organ damage associated with elevated BP in children.



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# Obesity and cardiovascular risk in children and adolescents

— Dr. Manu Raj —

Consultant in Cardiovascular research, Population Health Research Institute (PHRI) and David Braley Cardiac, Vascular, and Stroke Research Institute (DBCVSRI), Hamilton, Ontario, Canada.

The world wide prevalence of childhood overweight and obesity is projected to reach 9.1% in 2020. Obesity in childhood and adolescence is associated with established risk factors for Cardiovascular Diseases (CVD) like elevated blood pressure, abnormal levels of blood lipids and blood glucose, metabolic syndrome, type II diabetes mellitus, structural and functional changes of the heart and sleep disorders. Cardiovascular health in children and adolescents worsen with an increase in Body Mass Index (BMI), a marker of obesity. The worsening of cardiovascular health with increases in BMI is dramatic above the 85th percentile of BMI, a level at which CVD risk factors start to show rapid increases with increasing levels of BMI. The spectrum of atherosclerotic CVD process begins early in childhood and evolves during later life.

## Obesity related hypertension in childhood and adolescence

The relationship of childhood obesity with Blood Pressure (BP) was examined and confirmed by many previous studies. In a large multi center European cohort of 26,000 children, more than a third had high BP (i.e., BP>95th percentile). Data from a recent study covering 25,000 school children (5–16 years) reported that 17% of overweight children and 18% of obese children had abnormally high BP compared to only 10% among non-overweight children.

## Metabolic syndrome among obese children

The metabolic syndrome is a clustering of components including higher levels of insulin, obesity, high BP and abnormal levels of blood lipids. Subjects with metabolic syndrome anytime during life have a higher risk of CVD in future. The primary cause of the syndrome appears to be obesity, which leads to excess insulin production that in turn leads to an increase in BP and altered levels of blood lipids. In a recent cross-sectional survey done on school children (12–17 years), the criteria for metabolic syndrome were met by 37% of the overweight adolescents and 12% of at-risk-for-overweight adolescents. Only 2% of the remaining normal-weight adolescents met the same diagnostic criteria.

Insulin resistance (resistance to the normal action of insulin in the body due to several reasons) is a well-known cardiovascular risk factor. This condition has a strong association with childhood obesity. In a recently published

study conducted among obese children and adolescents, the rate of insulin resistance was higher among both pre-pubertal (37% in boys and 28% in girls) and pubertal obese subjects (62% among boys and 67% among girls). Insulin resistance frequently leads to the development of type II diabetes. In a recent study among obese children, the researchers reported that 2% of obese children had type II diabetes and 20% had pre-diabetes (a forerunner of diabetes).

## Dyslipidemia and accelerated atherosclerosis among obese children

Dyslipidemia (abnormal levels of blood lipids) is strongly associated with obesity during childhood and adolescence. In a recent study done among 26,000 overweight children, concentrations of one or more of the lipids were abnormal in 32%: total cholesterol in 14%, LDL-Cholesterol in 16%, HDL-Cholesterol in 11%, and triglycerides in 14% of subjects. Autopsy studies done on children and adolescents who died of non-cardiac causes suggest that there exists an accelerated atherosclerotic process among obese children.

## Sleep disordered breathing in obese children

Sleep Disordered Breathing (SDB) and Obstructive Sleep Apnea Syndromes (OSAS) are associated with childhood obesity. In a recent study, the researchers reported that childhood obesity was associated with a 4.7-times higher likelihood of SDB. The risk of having moderate OSAS increased 12% with each unit of BMI above the mean levels for the subjects included in the study. Both SDB and OSAS are well known cardiovascular risk factors.

## Conclusion

Among the modifiable CVD risk factors currently known, obesity is the major contributor for CVD as well as the one which is most amenable to modification. The opportunity to reduce cardiovascular risk by modifying obesity levels during childhood and adolescence through focused interventions (dietary and physical activity based) should be used to the highest possible extent. Most risk factor excesses that are related to increased obesity during childhood can be reversed to a significant extent by reducing obesity levels through appropriate interventions.



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