

Metabolic Syndrome in Children and Adolescents

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Cardiovascular diseases and metabolic syndrome in underdeveloped countries

Cardiovascular diseases represent the first cause of death in developed countries, but their importance in underdeveloped ones and in those with a transitional economy has increased¹. As responsible, a set of risk factors, identified as metabolic syndrome, represented by arterial hypertension, overweight/obesity, elevated levels of triglycerides, reduced levels of HDL-cholesterol, and intolerance to glucose/type 2 diabetes are rapidly evolving²⁻⁴. The way such association leads to coronary arteriosclerosis, which accounts for the great majority of the deaths in affected individuals, has not yet been clearly understood. However, one of the important factors is the presence of insulin resistance/hyperinsulinemia, is frequently identified in a cluster in affected individuals. The latter seems to play an important role in the pathophysiology through the activation of the sympathetic nervous system and sodium retention, in addition to stimulation of cell growth. Obesity/hyperinsulinemia seem to be the driving forces related to multiple risk factors and the development of cardiovascular diseases^{3,4}.

The root of the problem is a high risk factor profile and metabolic syndrome in children and adolescents

The presence of cardiovascular risk factors in the adult population is a common fact in clinical practice. However, over the last 20 years, this same association has been demonstrated in the young population and is also related to a parental history of the syndrome⁵⁻⁸. In children and adolescents, the initial alterations in each of such factors may occur in varied associations, which, even being small, ultimately determine an unfavorable cardiovascular profile for those young individuals. Bogalusa carried out a study with 4,522 individuals, whose ages ranged from 5 to 38 years, selected between 1988 and 1996, to assess the components of the metabolic syndrome (fat index; serum insulin, glucose, trigly-

ceride and HDL-C levels; and BP). The author suggested two independent models to explain the cause of the syndrome. One of the models included fat index and insulin, lipid, and glucose levels, and the other included only insulin levels and blood pressure. The two models explained 54.6% of the total variance in the sample, suggesting a link between the metabolic alteration and the hemodynamic factor, whose common substrate was hyperinsulinemia/insulin resistance⁹. Those same clinical alterations could cause the early atherosclerotic lesions at autopsy observed in those populations⁹⁻¹¹.

In Brazil, the Study of Rio de Janeiro, initiated in 1983, was designed to determine the blood pressure curve in 7,015 young individuals aged from 6 to 15 years, stratified by sex and socioeconomic level, and evolved to the search of the aggregation of other cardiovascular risk factors, not only in that population, but also in their relatives. The major results of that study showed a very direct relation between blood pressure and body weight¹², aggregation of blood pressure and body mass between the members of a same family¹³, anthropometrics indices, blood pressure and left ventricular mass in adolescents¹⁴, aggregation of blood pressure and metabolic risk factors in adolescents and their relatives¹⁵ and hyperglycemia, hyperinsulinemia, overweight, and elevated blood pressure in young adults¹⁶.

However, of all risk factors of the metabolic syndrome, the presence of overweight/obesity emerges as the most important, especially in the United States, where its prevalence increased 2 to 4 times, particularly among the African Americans and Latin Americans¹⁷. But this same phenomenon has also been observed in countries with a transitional economy, such as Brazil, as shown in the research carried out by the Brazilian Institute of Geography and Statistics¹⁸, which has confirmed an effective evolution in the anthropometrics-nutritional profile of the entire Brazilian population, including children and adolescents, in the time period between 1974-1975 and 2002-2003 (Figures 1 and 2). In such period, a significant decrease was observed in the prevalence of under nutrition, more marked in the male sex, while a continuous and intense increase was observed in overweight and obesity in both sexes, although greater among women. The findings in children and adolescents should be emphasized: in the same regions and in the same period, the prevalence of undernourished children and adolescents decreased by approximately 50%, while that of overweight/obesity doubled^{19,20}.

The dietary pattern has also been assessed in that same study, showing that, regardless of their socioeconomic level, Brazilians have a wrong dietary pattern as follows: an excessive amount of sugar, an insufficient amount of fruits and vegetables, and an excessive amount of fat in general, and specially of saturated fat, particularly among the higher-income families living in the most developed regions of the country (South, Southeast, and West Central)¹⁸.

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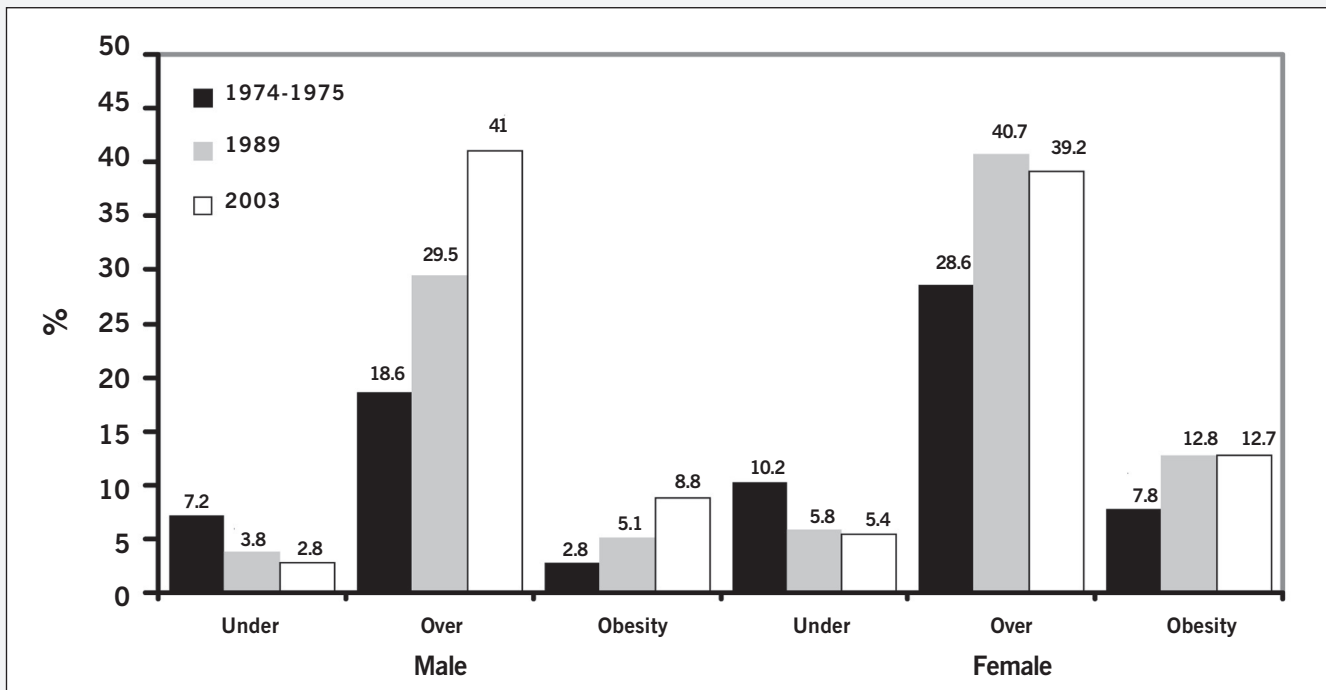


Fig. 1 - Trends in the relative burden of under, over nutrition and obesity in Brazil - Adults over the age of 20 years: 1974-1975; 1989; 2003.

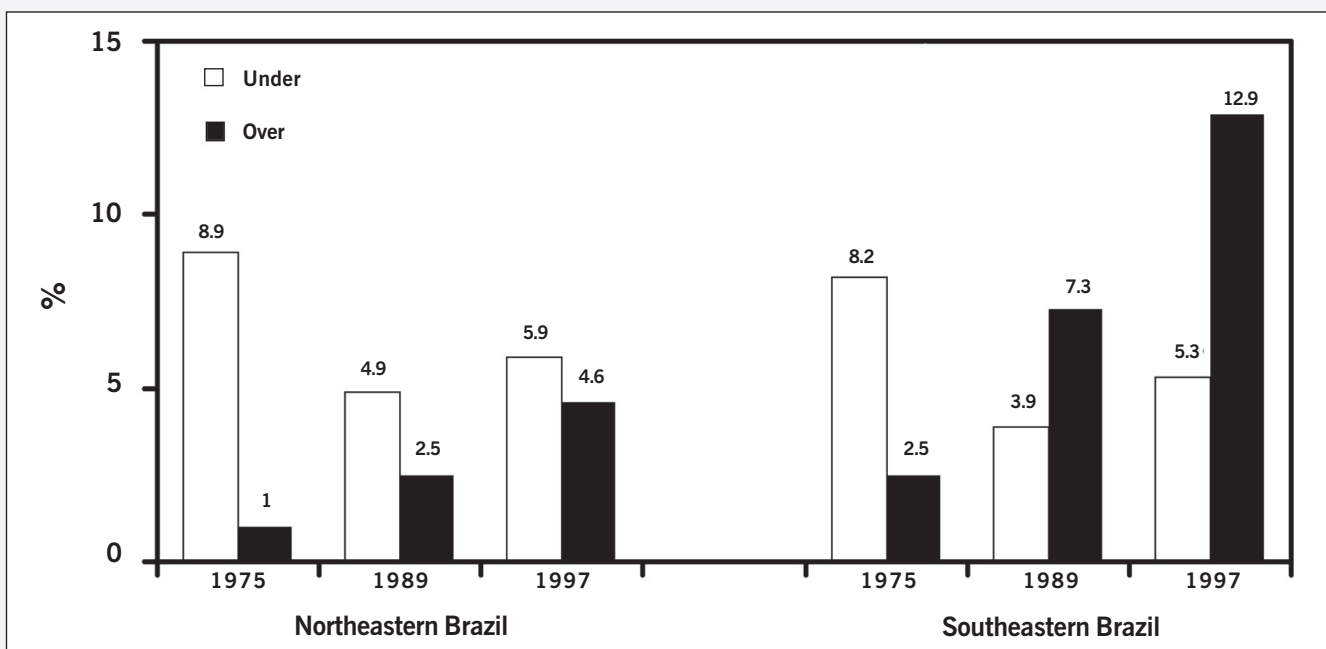


Fig. 2 - Trends in the relative burden of under and over nutrition in Brazil. Children and adolescents: 1975; 1989 and 1997.

In addition, there is a great tendency towards a sedentary lifestyle, observed in all studies assessing metabolic syndrome, which propitiates the appearance of alterations related to the glucose and lipid metabolism and an increase in blood pressure, which are well-known important risk factors for the development of cardiovascular diseases. Such findings point to a real probability of an increase in the future cardiovascular morbidity and mortality rates, which have a great socioeconomic impact not only for Brazil, but also for all countries with a transitional economy.

Nonmedicamentous measures aiming at a change in lifestyle, focusing on regular physical activity and a balanced diet, are the first action to be taken²¹. The medicamentous treatment may be

necessary and, although not desirable, it has been increasingly used in patients with elevated blood pressure, dyslipidemia, and diabetes²¹. The use of medication to treat obesity may also be considered, although the experience is still small and lacks a long-term assessment²¹.

The importance of primary prevention in children and adolescents

The adoption of primary preventive measures in young individuals has been recognized as of great importance in approaching cardiovascular diseases. The demonstration of the presence of arte-



riosclerosis in children, adolescents, and young adults, in addition to a greater knowledge about the risk factors in those age groups, points to proposals of rational and effective programs aiming at interfering with those factors as early as possible²¹.

The measures recommended for that age group focus on the adoption of healthy habits, such as avoiding the excessive ingestion of calories, salt, saturated fat, and cholesterol, and engaging in regular physical activity without smoking. Health education focusing on improving nutrition, physical activity and healthy lifestyles for school children and their parents should become a leading role for physicians^{22,23}.

The specific prevention of obesity through diet and physical activity should be the number one priority, because its success will have a positive direct repercussion on dyslipidemia, arterial hypertension, and the alterations in the metabolism of carbohydrates²¹⁻²³.

The benefits associated with physical activity in young individuals include weight loss, improvement in metabolic parameters, a reduction in blood pressure and insulin resistance, psychic well-being, predisposition to maintain physical activity in adulthood, and, consequently, a decrease in the risk of cardiovascular disease and an increase in life expectancy²¹⁻²³.

In general, youngsters have been exercising less. Television,

videogames, and computers tend to keep them indoors. The lack of safety in big cities inhibits walking and bike riding. At school, the new curricular requirements have reduced the time spent for physical activity. And, finally, the families have become increasingly sedentary.

These observations point towards the need for actions directed to changes in the family as a whole. To counteract poor lifestyles programs for children through health education have just begun in Brazil²⁴.

Governmental programs providing specific areas for practicing physical exercise, a greater supply of physical education teachers, and improved public safety are absolutely necessary. It is also a consensus that such measures will only succeed within a context encompassing joint family, school, community, and government efforts.

In accordance with that vision, the World Heart Federation has elected the slogan "Healthy Weight, Healthy Shape", an alert against obesity, as the theme for the day of the heart to be celebrated on September, 26th, an initiative in which everybody should get involved.

Only interference at young age will be able to effectively guarantee a healthy adult lifestyle, as far as the cardiovascular system is concerned, thereby favorably influencing the elevated cardiovascular morbidity and mortality rates.

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