

## **PREVALENCE OF METABOLIC SYNDROME IN STUDENTS OF A MUNICIPALITY OF PARANA – BRAZIL**

Walcir Lima<sup>1</sup>, Silvia Silva-Lima<sup>1</sup>, Carlos Molena-Fernandes<sup>2</sup>  
and Juan Pedro Fuentes<sup>3</sup>

1. Physical Education Department, State University of Maringá, Paraná, Brazil.
2. Nursing Department, State University of Maringá, Paraná, Brazil.
3. Physical Activity and Sport Sciences Faculty, Extremadura University, Cáceres, Spain.

Correspondence: d-u-la@hotmail.com

---

### INTRODUCTION

The metabolic syndrome (MS) is a complex disorder, characterized by a clustering of risk factors (Mendes, Theodoro, Rodrigues & Olinto, 2012). These are the main causes of morbidity and death in developed and developing countries (Alberti, Zimmet & Shaw, 2005) including among children and youth, becoming one of the biggest challenges of the health sector by burdening yet more these public systems (Scholze et al., 2010). It is noteworthy that research related to MS is still needed to better explain this phenomenon.

Whereas most studies with this purpose is developed in big cities, the studies in small municipalities becomes relevant, as their results will know how the profile of adolescents residing in these centers.

This study was to estimate the prevalence of MS and identify the main risk factors in adolescents 12-19 years of age in the municipality from Paranavai, Paraná, Brazil.

### METHOD

A descriptive cross-sectional study conducted with 250 adolescents, the majority (62.8%) were female. Data were collected regarding gender, age, ethnicity, weight, height, waist circumference, glucose, triglycerides, total cholesterol (TC), high density lipoprotein (HDL-c) and systolic blood pressure (SBP) and diastolic (DBP).

Four public and two private schools were selected. And one class per school year. Classes the night period were excluded from the study because most of the students beyond the age criteria for the study; as well as pregnant women, the presence of known diabetes and medications that alter blood pressure, glucose or lipid metabolism.

---

## RESULTS

The prevalence of MS found in adolescents in the city from Paranavai, Paraná was 3.6%, being more frequent in females (4.5%) than in males (2.1%) and among those with obesity (25%) or overweight (5.7%). None of the subjects of underweight was diagnosed with MS. Components of metabolic syndrome were more frequent, high blood pressure (18%), abdominal obesity (17.2%) and low HDL (16.8%).

The difference in prevalence of MS among older and younger adolescents was small, but it was significant when considering the nutritional status, there being among individuals with low weight, but present in those with obesity (25%), overweight (5.7%) and normal (1.1%). Almost 40% of adolescents had at least one risk factor for MS, with greater frequency among youths in public schools (39.9%), male (43%) and black (60%).

When evaluated aggregation of risk factors for MS according to the nutritional status, it is observed that none of the subjects of underweight was diagnosed with MS, however 85.7% of the adolescents with low birth weight had at least one risk factor to the SM.

The most frequent risk factors were changed to Blood Pressure (18%), increased waist circumference (17.2), HDL-C below 40 mg / dL (16.8%), hypertriglyceridemia (13.6%). Hyperglycemia was found in only 6% of adolescents.

## DISCUSSION

The overall rate of MS in this study was 3.6% higher in adolescents being overweight (5.7%) and obese (25%). It is noteworthy that in this study the high rate of abnormal blood pressure (18%), abdominal obesity (17.2%), low HDL (16.8%) and high triglycerides (13.6%) was observed and glucose (6%). The prevalence rate of abnormal blood pressure (18%) corroborates the results of the Stabelini Neto et al. (2008) conducted with 249 adolescents, which identified changes in BP in 19.3% of adolescent male and 22.5% female.

Important to emphasize that higher rates of PA changed were observed in a study of obese adolescents, demonstrating that obesity has a major influence in determining blood pressure (Alvarez, Vieira, Sichieri & Veiga, 2008) in this study, both the PA and abdominal obesity were those who indicated higher levels of incidence. Weiss et al. (2004) draw attention to the fact that the fasting plasma glucose (FPG) alter late in the course of MS in children and adolescents, as this is something rarely seen at this stage, even when there is excess weight. This was observed in this study, since hyperglycemia was the least prevalent

risk factor among adolescents. However, it is noteworthy the fact that she was present in 28% of adolescents with low birth weight.

In the present study, we found the occurrence of 50.8% for one or two components of MS. In a study conducted in the United States with schoolchildren of the same age group in the present study, found lower results (42%) to one or two components of MS, and 8.6% for three or more components (Johnson, Kroon, Greenway, Bouchard, Ryan & Katzmarzyk, 2009). When evaluating the relationship between risk factors for metabolic syndrome and nutritional status, it is observed that none of the subjects of underweight was diagnosed with MS. However, 75% of them had at least one risk factor. In addition, just over 50% of overweight adolescents had at least one risk factor.

Noteworthy in this study the presence of MS only students in the public school system, which can be explained by changes in lifestyle of the lower social classes. The results show that a portion of the adolescents surveyed already has MS and a significant portion of them have at least one risk factor for it. The results deserve attention, because they indicate the urgency of adopting preventive measures to prevent teenagers living in small centers also develop, in addition to the metabolic syndrome, other related diseases.

#### ACKNOWLEDGEMENTS

Coordination of Improvement of Higher Education Personnel - CAPES for the scholarship and the Araucaria Foundation for funding the Project, Brazil.

#### REFERENCES

- Alberti, K. G. M., Zimmet, P., & Shaw, J. (2005). The metabolic síndrome - a new worldwide definition. *The Lancet*, 366(9491), 1059-1062.
- Alvarez, M. M., Vieira, A. C. R., Sichieri, R., & Veiga, G. V. D. (2008). Association between central body anthropometric measures and metabolic syndrome components in a probabilistic sample of adolescents from public schools. *Arquivos Brasileiros de Endocrinologia & Metabologia*, 52(4), 649-657.
- Johnson, W. D., Kroon, J. J., Greenway, F. L., Bouchard, C., Ryan, D., & Katzmarzyk, P. T. (2009). Prevalence of risk factors for metabolic syndrome in adolescents: National Health and Nutrition Examination Survey (NHANES), 2001-2006. *Archives of pediatrics & adolescent medicine*, 163(4), 371-377.
- Mendes, K. G., Theodoro, H., Rodrigues, A. D., & Olinto, M. T. A. (2012). Prevalência de síndrome metabólica e seus componentes na transição menopáusica: uma revisão sistemática Prevalence of metabolic syndrome and its components in the menopausal transition. *Cad. saúde pública*, 28(8), 1423-1437.

- Scholze, J., Alegria, E., Ferri, C., Langham, S., Stevens, W., Jeffries, D., & Uhl-Hochgraeber, K. (2010). Epidemiological and economic burden of metabolic syndrome and its consequences in patients with hypertension in Germany, Spain and Italy; a prevalence-based model. *BMC Public Health, 10*(1), 529.
- Neto, A. S., Mascarenhas, L. P., de Vasconcelos, Í. Q., Bozza, R., Ulbrich, A. Z., & de Campos, W. (2008). Hipertensão arterial na adolescência: associação com a aptidão cardiorrespiratória, o IMC ea circunferência da cintura. *Rev Bras Hipertens vol, 15*(2), 59-64.
- Weiss, R., Dziura, J., Burgert, T. S., Tamborlane, W. V., Taksali, S. E., Yeckel, C. W., Allen, K., Lopes, M., Savaye, M., Morrison, J., Sherwin, R. S. & Caprio, S. (2004). Obesity and the metabolic syndrome in children and adolescents. *New England Journal of Medicine, 350*(23), 2362-2374.