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Review Article

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Importance of Early Diagnosis of Metabolic Syndrome in Children: A Brief Review

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Abstract

Metabolic syndrome is a multifactorial condition characterized by the presence of interrelated risk factors such as abdominal obesity, hypertension, dyslipidemia, and insulin resistance. Its prevalence has increased significantly in pediatric populations due to the rising incidence of childhood obesity. Early diagnosis of this condition is crucial to preventing future cardiovascular and metabolic complications. This article discusses the importance of early diagnosis of metabolic syndrome in children, highlighting the main risk factors, diagnostic methods, intervention strategies, and public health implications.

Keywords: Childhood Obesity; Metabolic Syndrome; Cardiovascular Diseases; Genetic Factors.

Introduction

Metabolic syndrome (MS) is defined as a set of interrelated metabolic alterations that increase the risk of cardiovascular diseases, type 2 diabetes mellitus (T2DM), and other chronic complications. In children, metabolic syndrome has increasingly become a growing public health concern due to the prevalence of childhood obesity, influenced by genetic, environmental, and behavioral factors. Recent studies indicate that risk factors for MS, such as abdominal obesity, dyslipidemia, hypertension, and insulin resistance, often begin in childhood and intensify throughout life. Early detection of these factors provides a crucial opportunity for interventions that minimize future complications.

However, diagnosing MS in pediatric populations remains a significant challenge due to the lack of universally accepted diagnostic criteria. Nutritional changes observed in recent decades, characterized by increased consumption of ultra-processed foods and reduced physical activity, play a crucial role in the genesis of MS. These habits, combined with social and economic determinants, amplify the risk of childhood obesity and its metabolic complications. Furthermore, genetic and epigenetic factors also contribute to susceptibility to the condition. Early diagnosis of MS in children is a highly relevant topic, as it enables targeted interventions that can alter the disease course and significantly improve the quality of life of affected individuals.

Objectives

This article aims to investigate the importance of early diagnosis of metabolic syndrome in children and its implications for public health, as well as to identify the main risk factors associated with MS in children.

Materials and Methods

A bibliographic review was conducted, analyzing articles published in the PUBMED, ScienceDirect, and Scielo databases to support this study.

Discussion

Early diagnosis of metabolic syndrome in children presents both a challenge and an opportunity. Studies show that the prevalence of MS in pediatric populations varies widely depending on the diagnostic criteria used, highlighting the need for standardized criteria that consider age, racial, and cultural factors. Abdominal obesity is considered an early marker of metabolic risk. Waist circumference, along with body mass index and waist-to-hip ratio, are important tools for initial screening. Additionally, biochemical tests such as fasting glucose, lipid profile, and glycated hemoglobin are essential for confirming the diagnosis. Early interventions are crucial to preventing the progression of MS and its complications. Lifestyle changes, including a balanced diet and increased physical activity, are the primary therapeutic strategies. However, adherence to these recommendations is often hindered by social and cultural barriers.

Beyond clinical approaches, preventing MS requires the implementation of effective public policies. Initiatives such as school-based nutritional education programs, regulations on the advertising of ultra-processed foods, and the creation of spaces for physical activities are promising strategies. Another critical challenge is the involvement of families in the intervention process. Family guidance plays a crucial role in promoting healthy habits, particularly in young children. Additionally, support from healthcare professionals such as nutritionists and physical educators can optimize intervention outcomes.

Conclusion

Metabolic syndrome in children represents a significant public health challenge due to its association with severe chronic conditions and difficulties in early diagnosis. This study reinforces the importance of preventive measures and early identification as key strategies to mitigate the impacts of this condition in pediatric populations. Early diagnosis of MS in children enables interventions that can prevent or reverse the syndrome's negative effects, promoting better quality of life and reducing the risk of complications in adulthood.

Evidence-based interventions, including changes in eating habits and physical activity levels, are essential in this context. The role of families, educators, and healthcare professionals is crucial for implementing effective prevention strategies. Additionally, public policies aimed at regulating environmental factors and promoting healthy habits have the potential to significantly impact the prevalence of MS in children. Finally, it is essential that future research seeks to standardize diagnostic criteria for MS in pediatric populations, promoting greater uniformity in studies and enabling global comparisons. Investing in longitudinal studies that explore the effects of early interventions will also be essential in guiding clinical practices and health policies.

References

1. ALBERTI, K. G.; ZIMMET, P.; SHAW, J. The metabolic syndrome—a new worldwide definition. Lancet, 2005.
2. CRUZ, M. L.; GORAN, M. I. The metabolic syndrome in children and adolescents. Curr Diab Rep, 2004.
3. DE FERRANTI, S. D.; GAUVREAU, K.; LUDWIG, D. S.; et al. Prevalence of the metabolic syndrome in American adolescents: findings from the Third National Health and Nutrition Examination Survey. Circulation, 2004.
4. FORD, E. S.; LI, C. Defining the metabolic syndrome in children and adolescents: will the real definition please stand up? J Pediatr Endocrinol Metab*, 2008.
5. FREEDMAN, D. S.; MEI, Z.; SRINIVASAN, S. R.; et al. Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa Heart Study. J Pediatr, 2007.
6. FRIEND, A.; CRAIG, L.; TURNER, S. The prevalence of metabolic syndrome in children: a systematic review of the literature. Metab Syndr Relat Disord, 2013.
7. KASSI, E.; PERVANIDOU, P.; KALTSAS, G.; et al. Metabolic syndrome: definitions and controversies. BMC Med, 2011.
8. KELISHADI, R. Childhood overweight, obesity, and the metabolic syndrome in developing countries. Epidemiol Rev, 2007.
9. LEE, A. M.; GURKA, M. J.; DEBOER, M. D. Trends in metabolic syndrome severity and lifestyle factors among adolescents. Pediatrics, 2016.
10. MORRISON, J. A.; FRIEDMAN, L. A.; GRAY-MCGUIRE, C. Metabolic syndrome in childhood predicts adult metabolic syndrome and type 2 diabetes mellitus 25 to 30 years later. J Pediatr, 2007.
11. REINEHR, T. Metabolic syndrome in children and adolescents: a critical approach considering the interaction between pubertal stage and insulin resistance. Horm Res, 2013.
12. SKINNER, A. C.; PERRIN, E. M.; STEINER, M. J. Cardiometabolic risks in children with metabolic syndrome. J Clin Endocrinol Metab, 2015.
13. TAILOR, A. M.; PEETERS, P. H.; NORAT, T.; et al. An update on the prevalence of the metabolic syndrome in children and adolescents. Int J Pediatr Obes, 2010.
14. WEISS, R.; BREMER, A. A.; LUSTIG, R. H. What is metabolic syndrome, and why are children getting it? Ann N Y Acad Sci, 2013.
15. ZIMMET, P.; ALBERTI, K. G.; KAUFMAN, F.; et al. The metabolic syndrome in children and adolescents – an IDF consensus report. Pediatr Diabetes, 2007.