

Cardiovascular Risk Factors In Obese Children: A Systematic Review

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Abstract

Introduction: Childhood obesity is a multifactorial problem, with causes that include inadequate eating habits, lack of physical activity, genetic predisposition and environmental influences.

Objective: Understand and analyze the factors that contribute to increased cardiovascular risks in children suffering from obesity.

Methods: This study constitutes a systematic review, classified as exploratory and descriptive. The preparation of the research was a bibliographical search in electronic databases on methods associated with RSL (Systematic Literature Review) and the applications of SMARTER (Simple Multi-Attribute Rating Technique using Exploiting Rankings).

Results: A comprehensive systematic search of the literature yielded a total of 5125 articles referring to the incidence of obesity and overweight in adolescents, of which 29 articles were eligible to be included in this systematic review.

Conclusion: Investing in the cardiovascular health of obese children is investing in the future of a healthier and stronger population. By implementing effective preventive and intervention measures, we can help reduce the global burden of cardiovascular disease and create an environment where all children have the opportunity to achieve their full potential for health and well-being throughout their lives.

Keywords: Childhood obesity; Cardiovascular Risk Factors; Children

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I. Introduction

Since childhood, cardiovascular risk factors, such as hypertension, dyslipidemia and insulin resistance, have been increasingly detected in obese children [1]. These risk factors not only increase the likelihood of developing cardiovascular diseases in adulthood, but can also lead to significant health complications during childhood and adolescence [2,3]. Childhood obesity is a growing concern around the world, and its effects are not limited to children's immediate physical health [4,5].

Childhood obesity is a multifactorial problem, with causes that include inadequate eating habits, lack of physical activity, genetic predisposition and environmental influences. These factors contribute to the development of overweight and obesity, which in turn trigger a cascade of physiological events that increase the risk of cardiovascular diseases [6,7]. Therefore, addressing cardiovascular risk factors in obese children requires a comprehensive approach that takes into account not only individual behaviors but also social, environmental, and genetic determinants.

The presence of cardiovascular risk factors in obese children is concerning not only because of the implications for individual health, but also because of the increasing impact on healthcare systems and the costs associated with treating cardiovascular diseases [8]. This highlights the importance of addressing childhood obesity as a public health priority by implementing policies and programs that promote healthy environments and encourage active, nutritious lifestyles from childhood.

Furthermore, it is essential to recognize that the prevention and management of cardiovascular risk factors in obese children requires an interdisciplinary approach that involves health professionals, educators, parents and communities [9,10]. This includes providing education about nutrition and physical activity, promoting access to healthy foods and safe spaces for play and exercise, and offering emotional and psychosocial support to children and their families.

By addressing cardiovascular risk factors in obese children, we are investing in the present and future well-being of future generations. With effective interventions and a collaborative approach, we can help reduce the devastating impact of childhood obesity on cardiovascular health and promote a healthier future for our children.

Given the above, the objective of this review is to understand and analyze the factors that contribute to increased cardiovascular risks in children suffering from obesity. Through this objective, we seek to identify and examine specific risk factors, such as high blood pressure, dyslipidemia, insulin resistance and other metabolic disorders, which may arise in overweight children.

II. Methods

This study constitutes a systematic review, classified as exploratory and descriptive. The preparation of the research was a bibliographical search in electronic databases on methods associated with RSL (Systematic Literature Review) and the applications of SMARTER (*Simple Multi-Attribute Rating Technique using Exploiting Rankings*). The work carried out is of a qualitative and quantitative nature. Qualitative data analysis was carried out intuitively and inductively during the survey of the theoretical framework. It is also quantitative through the use of the multi-criteria method. In addition, there is also a numerical experimental study in order to simulate an article selection situation based on the observed criteria.

The bibliographical research was carried out in the following databases: *Web of Science; Science Direct; Wiley; SpringerLink; Taylor and Francis; PubMed and EBSCO*. In addition, searches were carried out using bibliographical references of studies that relevantly addressed the topic on the *Google Scholar search platform*.

The search in the databases was carried out using terminologies registered in the Health Sciences Descriptors created by the Virtual Health Library developed from the *Medical Subject Headings of the US National Library of Medicine*, which allows the use of common terminology in Portuguese, English and Spanish. The present study sought to investigate the literature on cardiovascular risk factors in obese children. To this end, the descriptors “childhood obesity”; “cardiovascular risk factors”; “children”, initially in English, and in a complementary way in Spanish and Portuguese.

As a tool to support decision-making in the selection and prioritization of articles, a set of criteria were considered essential to represent the state of the art of the topic under study. This method has the following characteristics: (i) rigorous logic allows the method to be accepted as a decision support tool; (ii) simple to understand and apply with easy-to-interpret results.

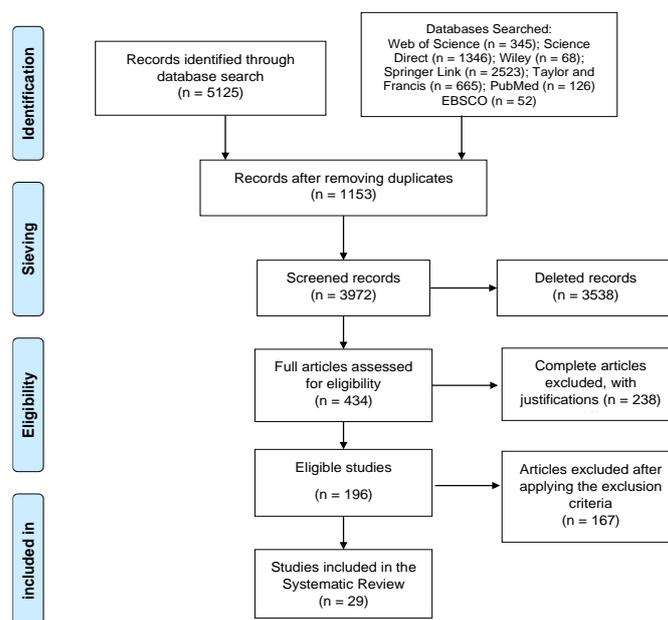
References from selected works were also searched for other documents of potential interest. Once qualified for full text in the evaluation, articles were included in the qualitative review if they met the following inclusion criteria: a) cardiovascular risk factors; b) childhood obesity. Articles were excluded if they were reports, banners or conference abstracts. There was no review of confidential health information and the study was non-interventional. Therefore, ethics committee approval was not necessary. In the end, the result obtained totaled 29 articles that covered the desired characteristics for the study.

Three independent researchers extracted data from articles that met the inclusion criteria and recorded them in a “Data Extraction Form” generated in Microsoft Excel on cardiovascular risk factors in obese children. From this form, the authors and year of publication, objective, type of study (design), study title, sample size (n) and conclusion of the studies were included, which will be demonstrated in the results through table 1.

III. Results

A comprehensive systematic search of the literature yielded a total of 5125 articles referring to the incidence of overweight and obesity in adolescents. Of these, 1153 studies were excluded due to data overlap. From this, the SMARTER method (*Simple Multi-Attribute Rating Technique using Exploiting Rankings*) was chosen and 434 articles were selected that were suitable for full-text screening, of which 196 articles were included for data extraction, of which 167 were excluded by the exclusion criteria, making 29 articles eligible and included for systematic review. In Figure 1, we describe the strategy for selecting articles on the topic in question.

Figure 1. Article search strategy



IV. Discussion

Childhood obesity is a growing public health concern, with significant implications for children's cardiovascular health, demonstrating a clear association between childhood obesity and multiple cardiovascular risk factors, including high blood pressure, dyslipidemia, insulin resistance and inflammatory markers [11,12].

Globally, the incidence of childhood obesity is on the rise, particularly in urban areas. In 2019, it was estimated that 38.2 million children under the age of 5 were experiencing overweight or obesity. Among children and adolescents aged 5 to 19 years, the prevalence of overweight and obesity has witnessed an alarming increase, rising from 4% in 1975 to approximately 18% in 2016. This increase has affected both sexes similarly [13,14].

Obese children often have unfavorable lipid profiles, with elevated levels of total cholesterol, LDL and triglycerides, together with reduced levels of HDL, thus increasing the risk of early cardiovascular diseases [15,16,17]. Furthermore, an association is observed between childhood obesity and high blood pressure, suggesting a predisposition to hypertensive disorders in adulthood [18,19,20].

Eating habits and a sedentary lifestyle play a central role in childhood obesity and associated cardiovascular risk factors [21]. Obese children often consume diets rich in saturated fats, refined sugars and processed foods, while having an insufficient intake of fruits, vegetables and whole foods [22, 23]. The lack of regular physical activity also contributes to the development of obesity and cardiovascular risk factors [24].

Another important factor is the influence of the socioeconomic environment on childhood obesity and cardiovascular risk factors. Children from low-income families have a higher prevalence of obesity and a greater burden of cardiovascular risk factors [25], reflecting socioeconomic disparities in child health. This highlights the need for public policies that address the underlying causes of childhood obesity and promote equitable access to healthy foods and opportunities for physical activity.

Furthermore, it is of utmost importance to recognize that childhood obesity does not occur in isolation, but is often associated with a variety of comorbidities, such as metabolic syndrome, sleep apnea, non-alcoholic fatty liver disease and psychosocial disorders [26,27]. These conditions can further aggravate the cardiovascular risk of obese children and require a broad, multidisciplinary approach to treatment and prevention.

Intervention strategies should be aimed not only at weight loss, but also at promoting healthy eating habits, regular physical activity and changes in family lifestyle. Educating parents and caregivers about the importance of a balanced diet and physical activity from childhood is essential to prevent obesity and associated cardiovascular risk factors [28,29, 10].

School health programs and community interventions can play a significant role in promoting health-friendly environments, including school cafeterias with healthy meal options, regular physical education classes, and initiatives to increase access to safe public spaces for physical activity.

Early detection and adequate management of cardiovascular risk factors in obese children are essential to prevent cardiovascular complications in adulthood [1]. Health professionals must be aware of early signs of cardiovascular risk in this population and offer personalized interventions to reduce this risk [30].

The complexity of the relationship between childhood obesity and cardiovascular risk factors emphasizes the need for a comprehensive and multidisciplinary approach to prevent and treat these significant public health problems. Preventing childhood obesity and promoting cardiovascular health from childhood are essential to ensure a healthier population capable of facing challenges in the future.

V. Final Considerations

The analysis of cardiovascular risk factors in obese children revealed the complexity and severity of this public health problem. Childhood obesity not only increases the likelihood of developing cardiovascular risk factors, but can also accelerate the onset of cardiovascular disease later in life. Therefore, it is crucial to implement prevention and intervention strategies from an early age to mitigate these risks and promote children's cardiovascular health.

By recognizing the determinants of childhood obesity and associated cardiovascular risk factors, we can direct efforts to implement effective public policies and programs. This includes promoting healthy eating environments, encouraging regular physical activity, providing access to preventive health care, and offering psychosocial support to children and their families.

It is essential to engage a variety of stakeholders, including healthcare professionals, educators, policymakers, and the broader community, to create a comprehensive and collaborative approach to addressing childhood obesity and cardiovascular risk factors. This can help prevent not only cardiovascular complications but also other health conditions associated with childhood obesity, thereby improving children's quality of life and reducing the costs associated with treating cardiovascular disease.

Investing in the cardiovascular health of obese children is investing in the future of a healthier and stronger population. By implementing effective preventive and intervention measures, we can help reduce the global burden of cardiovascular disease and create an environment where all children have the opportunity to achieve their full potential for health and well-being throughout their lives.

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