SYSTEMIC LEVELS OF BIOCHEMICAL COMPONENTS AND INFLAMMATORY MARKERS IN PATIENTS WITH SEVERE OBESITY: A LITERATURE REVIEW

Sofia Fonseca Mattos Chaul[1]
Ana Vitória Resende Brito[2]
Ananda Camille Silva Oliveira[3]
Ester Monte Galvão[4]
Luísa Campos Castro[5]
Luís Vicente Franco de Oliveira[2]

SUMMARY

Introduction: Obesity is currently one of the most serious public health problems. Its prevalence has been sharply increasing in recent decades, even in developing countries, which has turned it into a global epidemic. Severe obesity is a complex condition that manifests through significant alterations in the systemic levels of these inflammatory markers and biochemical components, often leading to the indication of bariatric surgery. Objective: to verify the systemic levels of biochemical components and inflammatory markers in different studies with the population with severe obesity. Methodology: Five original articles were extracted from the PubMed, Google Scholar, and Scielo databases, published between 2018 and 2024. The descriptors in Health Sciences (DeCS) used for the search were: "severe obesity," "bariatric surgery," and "biochemical markers," with the boolean operator "AND." The inclusion criteria were publications in any language, original studies, and open access. Results: In obese individuals, there is an observed increase in glucose levels, blood lipids, and inflammatory markers such as CRP and IL-6, as well as an increase in oxidative stress, which can contribute to metabolic and cardiovascular comorbidities, necessitating therapeutic interventions to modulate these markers. Conclusion: The analyzed studies demonstrated that obesity significantly impacts various biochemical markers, exacerbating both glycemic and lipid conditions and promoting a chronic inflammatory state.

Keywords: Severe obesity; Bariatric surgery; Biochemical markers.

1,2,3,4,5 E-mail contato: sofiafmc@gmail.com - Evangelical University of Goiás – UniEVANGÉLICA
2 E-mail contato: luis.oliveira@unievangelica.edu.br - Evangelical University of Goiás – UniEVANGÉLICA

Introduction

Obesity is currently one of the most serious public health problems. Its prevalence has been sharply increasing in recent decades, even in developing countries, which has turned it into a global epidemic (JAACKS et al., 2019). In this sense, adipose tissue, previously seen only as an energy reserve, is now recognized as an endocrine organ that secretes adipokines with various inflammatory functions (ELAGIZI, et al., 2018). These adipokines include interleukins (IL-1, IL-6, IL-8, IL-12), tumor necrosis factor alpha (TNF-α), leptin, and resistin, which are involved in inflammatory and metabolic processes (FRÜHBECK, 2004). In obesity, the increase in adipose tissue promotes the excessive production of these adipokines, resulting in low-grade chronic inflammation that is associated with various comorbidities (RODRIGUEZ-AYALA, et al., 2020).

Severe obesity is a complex condition that manifests through significant alterations in the systemic levels of these inflammatory markers and biochemical components, often leading to the indication of bariatric surgery. Therefore, the study aimed to verify the systemic levels of biochemical components and inflammatory markers in different studies with the population suffering from severe obesity.

Methodology

This study is characterized as a literature review. The search for articles was conducted in the PubMed, Google Scholar, and Scielo databases, as well as a manual search in the references of included studies. The established search criteria were studies published between 2018 and 2024, using the Health Sciences descriptors (DeCS): "severe obesity," "bariatric surgery," and "biochemical markers," with the boolean operator "AND." The inclusion criteria were clinical trials, published in any language and freely accessible, that addressed the topic; and the exclusion criteria were incomplete studies and those with missing data.

Results

Five original articles were selected that demonstrated a comprehensive understanding of the interactions between inflammatory markers, biochemical components, and severe obesity, providing a solid foundation for the development of effective therapeutic strategies for the management of obesity and its comorbidities.

According to the articles, each marker exerts a degree of association with obesity. In the study by Menezes et al., the relationship between leptin and adiponectin was observed, with the former having a strong genetic association with obesity, while the latter had lower levels of association but still had a genetic impact on the concentrations related to the disease. In the study by Chielle, the aim was to show the relationship of C-Reactive Protein (CRP), which proved to be a relevant inflammatory marker in metabolic syndrome and obesity. In addition to it, this same article discussed IL-1β, which is related to chronic inflammation and metabolism in metabolic syndrome. In the article by Giuliani et al., it was reported that the interleukins TNF-α and IL-6 are markers that increase in obesity and also in response to bariatric surgery. Now, regarding metabolic markers (glucose, total lipids, LDL, and triglycerides), the article by Nascimento et al. showed that all of them increase in body compositions more oriented towards obesity.

Figure 1 demonstrates these findings, considering the intensity relationship of the markers with obesity on a scale of 1-5, with 5 being the highest intensity found, taking into account only the articles found and the author's interpretation. The graph was created using Microsoft Excel, utilizing the data found in the researched articles for the purpose of conducting the integrative literature review.

Figure 1. Relationship of markers with obesity

Source: author

Furthermore, according to the researched articles, it became clear that in individuals with obesity, there is an increase in glucose levels, blood lipids, and inflammatory markers such as CRP and IL-6, as well as an increase in oxidative stress, which can contribute to metabolic and cardiovascular comorbidities, necessitating therapeutic interventions to modulate these markers.

Conclusion

The analyzed studies demonstrated that obesity significantly impacts various biochemical markers, exacerbating both glycemic and lipid conditions and promoting a chronic inflammatory state. These changes highlight the role of obesity in the deterioration of metabolic health and the predisposition to chronic diseases. On the other hand, therapeutic interventions, such as strength training and surgical procedures, prove to be effective in modulating these biomarkers. Thus, these therapeutic approaches can offer substantial improvements in the metabolic health of obese individuals, highlighting the importance of multifaceted strategies for the management and treatment of obesity.

Bibliographic References

NASCIMENTO, G. M.; at al. Prevalência dos fenótipos corporais e suas associações com biomarcadores dos perfis glicídico, lipídico e inflamatório: um estudo de base populacional. **Cadernos de Saúde Pública,** 5 ed, v.40, p. 1-13, 2024.

CAVALCANTI, T. V. O.; et al. Efeitos agudos do treinamento de força com diferentes intensidades sobre marcadores inflamatórios de mulheres com obesidade severa. **J Phys Educ**, v.33, e. 3358, 2022.

GIULIANI, N.R.; et al. Estudo prospectivo da resposta inflamatória em pacientes submetidas à abdominoplastia pós-cirurgia bariátrica. **Revista Brasileira de Cirurgia Plástica**. v.2, ed 36, p.129-133, 2021.

CHIELLE, E. O.; GENS F.; ROSSI E. R. Biomarcadores oxidativos, inflamatórios e cardiometabólicos de relevância clínica em pacientes com síndrome metabólica. **J Bras Patol Med Lab**, v.4, ed.54, p.213-219, 2018.

MENEZES, C. A.; et al. Polimorfismos genéticos e concentrações plasmáticas de leptina e adiponectina associados à obesidade em crianças e adolescentes. Rev Paul pediatr, v.40, e2021030, 2022.

RODRIGUEZ-AYALA E.; et al. Towards precision medicine: defining and characterizing adipose tissue dysfunction to identify early immunometabolic risk in symptom-free adults from the GEMM family study. **Adipocyte**, v.1, ed. 9, p.153-169, 2020.

FRÜHBECK G. The adipose tissue as a source of vasoactive factors. **Curr Med Chem Cardiovasc Hematol Agents**, v. 3, ed.2, p.197-208, 2004.

ELAGIZI A.; et al. An Overview and Update on Obesity and the Obesity Paradox in Cardiovascular Diseases. **Prog Cardiovasc Dis**, v. 2, ed. 61, p142-150, 2018.

JAACKS L. M.; et al. The obesity transition: stages of the global epidemic. **Lancet Diabetes Endocrinol**, v. 3, ed.7, p. 231-240, 2019.