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REVIEW ARTICLE

# Tirzepatide in the management of diabetes mellitus and obesity

*Tirzepatida en el control de la diabetes mellitus y la obesidad*

*Tirzepatida no controle do diabetes mellitus e da obesidade*

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**Abstract**

Diabetes Mellitus is a chronic disease characterized by dysfunctions in glucose metabolism, resulting from a deficiency in insulin secretion or resistance to its action, leading to persistent hyperglycemia. Obesity is defined as an excessive accumulation of adipose tissue and diagnosed by a Body Mass Index ≥30 kg/m². Innovative therapies have been studied for the simultaneous management of hyperglycemia and obesity, with tirzepatide being a prominent example. The objective of this research was to analyze the available scientific evidence on the efficacy, safety, and applicability of tirzepatide in the control of Diabetes Mellitus and obesity. This study used a literature review methodology, conducted in databases such as PubMed, SCIELO, and Google Scholar (2020-2025). Innovative therapies are being investigated for the concomitant management of hyperglycemia and obesity; Evidence suggests that effective management requires a multimodal approach, integrating pharmacological treatment, lifestyle modifications, and educational support, to reduce complications and improve patients' quality of life.

**Descriptors:** Diabesity; Diabetes Mellitus; Weight Loss; Combination Therapy; Tirzepatide.

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**Resumén**

La diabetes mellitus es una enfermedad crónica caracterizada por disfunciones en el metabolismo de la glucosa, resultantes de una deficiencia en la secreción de insulina o resistencia a su acción, lo que conduce a hiperglucemia persistente. La obesidad se define como una acumulación excesiva de tejido adiposo y se diagnostica por un índice de masa corporal ≥30 kg/m². Se han estudiado terapias innovadoras para el manejo simultáneo de la hiperglucemia y la obesidad, siendo la tirrizepatida un ejemplo destacado. El objetivo de esta investigación fue analizar la evidencia científica disponible sobre la eficacia, seguridad y aplicabilidad de la tirrizepatida en el control de la diabetes mellitus y la obesidad. Este estudio utilizó una metodología de revisión bibliográfica, realizada en bases de datos como PubMed, SCIELO y Google Scholar (2020-2025). Se están investigando terapias innovadoras para el manejo concomitante de la hiperglucemia y la obesidad; la evidencia sugiere que un manejo efectivo requiere un enfoque multimodal, que integre tratamiento farmacológico, modificaciones del estilo de vida y apoyo educativo, con el objetivo de reducir las complicaciones y mejorar la calidad de vida de los pacientes.

**Descriptores:** Diabesidad; Diabetes Mellitus; Reducción de Peso; Terapia Combinada; Tirzepatida.

**Resumo**

O Diabetes Mellitus é uma enfermidade crônica caracterizada por disfunções no metabolismo da glicose, decorrentes de deficiência na secreção de insulina ou resistência à sua ação, resultando em hiperglicemia persistente, considera-se que a obesidade é definida como acúmulo excessivo de tecido adiposo e diagnosticada por Índice de Massa Corporal ≥30 kg/m², terapias inovadoras têm sido estudadas para o manejo simultâneo da hiperglicemia e da obesidade, destacando-se a tirzepatida. O objetivo desta pesquisa foi analisar as evidências científicas disponíveis sobre a eficácia, segurança e aplicabilidade da tirzepatida no controle do Diabetes Mellitus e da obesidade. Este estudo utilizou como metodologia a revisão bibliográfica, realizada em bases como PubMed, SciELO e *Google Scholar* (2020-2025). Terapias inovadoras vêm sendo investigadas para o manejo concomitante da hiperglicemia e da obesidade; as evidências apontam que a condução eficaz requer uma abordagem multimodal, integrando tratamento farmacológico, modificações no estilo de vida e suporte educacional, com o objetivo de reduzir complicações e promover melhoria na qualidade de vida dos pacientes.

**Descritores:** Diabesidade; Diabetes Mellitus; Redução de Peso; Terapia Combinada; Tirzepatida.

## Introduction

Diabetes Mellitus is characterized by an alteration in glucose metabolism, which is the body's main source of energy. This alteration occurs when insulin production is deficient in the pancreas or resistance to the action of this hormone in cells. Insulin is responsible for allowing glucose to enter cells, enabling its use as energy. When this mechanism fails, glucose remains in the bloodstream, resulting in chronic hyperglycemia. Over time, this condition causes damage to blood vessels and vital organs, such as the kidneys, eyes, nerves, and heart. The main factors that explain the origin of diabetes include genetic predisposition, related to family inheritance; an inadequate lifestyle, marked by sedentary behavior and an unbalanced diet; obesity, especially in type 2 diabetes, due to increased insulin resistance; and autoimmune diseases, present in type 1 diabetes, which destroy pancreatic beta cells. In short, diabetes is not simply "excess sugar," but constitutes a complex metabolic disorder that requires continuous control to prevent serious complications[1].

Obesity, defined as excessive accumulation of adipose tissue and diagnosed by a Body Mass Index ≥30 kg/m², is a significant risk factor for the development of type 2 Diabetes Mellitus, as it promotes insulin resistance. Both conditions have a multifactorial etiology, involving genetic, environmental, and behavioral aspects, and require integrated preventive and therapeutic strategies[1,2].

Diabetes mellitus and obesity are chronic conditions with high global prevalence and are frequently interrelated, as obesity is a determining risk factor for the development of type 2 diabetes. The search for effective therapeutic strategies has driven the emergence of innovative agents, among which tirzepatide stands out. Tirzepatide is a dual agonist of GLP-1 and GIP receptors. This molecule significantly improves glycemic control by stimulating insulin secretion and reducing glucagon release. Glucagon is a hormone produced by alpha cells in the pancreas and released when blood glucose levels are low, such as during fasting or hypoglycemia. It acts primarily in the liver, stimulating glycogen breakdown and glucose production, raising blood glucose levels to maintain homeostasis. It also induces satiety and reduces caloric intake, favoring weight loss. These characteristics give tirzepatide a potential positive impact on the integrated management of type 2 diabetes and obesity, with relevant implications for public health[3,4].

The new antidiabetic medications showed consistent reductions in blood glucose and glycated hemoglobin (HbA1c) throughout the follow-up period, demonstrating sustained efficacy in controlling type 2 diabetes. There was improvement in secondary parameters,

such as body weight and blood pressure, especially with agents from the GLP-1 agonist and SGLT2 inhibitor classes. Regarding safety, the incidence of hypoglycemia was low, mainly when the drugs were used without combination with insulin or sulfonylureas (a class of oral medications used in the treatment of type 2 diabetes that works by stimulating the beta cells of the pancreas to release more insulin, helping to reduce blood glucose levels). The most common adverse events were mild and transient gastrointestinal symptoms, while serious effects occurred rarely. A reduction in cardiovascular risk and preservation of renal function were also observed in certain subgroups, reinforcing additional benefits to glycemic control. Overall, the data indicated a favorable long-term efficacy and safety profile, although continuous monitoring is necessary to identify possible rare or late events[4].

Therefore, this study aims to identify the available scientific evidence on the efficacy, safety, and applicability of tirzepatide in the management of Diabetes Mellitus and obesity.

**Methodology**

This study adopted a reflective approach, conducted between November and December 2025, to synthesize scientific evidence on the efficacy, safety, and applicability of tirzepatide in the management of Diabetes Mellitus and obesity. The search strategy was structured and carried out in electronic databases recognized by the scientific community, including PubMed, SciELO, and Google Scholar, ensuring the comprehensiveness and relevance of the sources consulted. Controlled descriptors from DeCS (Descriptors in Health Sciences) were used, associated with specific keywords: "Diabesity", "Diabetes Mellitus", "Weight Reduction", "Combined Therapy", and "Tirzepatide". A temporal filter was applied to restrict the search to articles published in the last five years (2020–2025), ensuring the updating of the evidence. Original studies, integrative and scoping reviews, narrative reviews, and reflective articles were included, all available in full, in English, Portuguese, or Spanish. The exclusion criteria included editorials, letters to the editor, and works that did not meet the defined methodological parameters. The selection of articles was carried out independently, with disagreements resolved by consensus, ensuring rigor and reliability in the analysis.

**Results and Discussion**

Obesity is a multifactorial chronic condition characterized by the excessive accumulation of body fat, resulting from the interaction between genetic, metabolic, behavioral, environmental, and social factors. Variations in the growth trends of obesity in Brazilian adults between 2006 and 2021 are associated with systemic inflammation and a higher risk of chronic non-communicable diseases, such as type 2 diabetes mellitus, hypertension, cardiovascular diseases, and some types of cancer, constituting a relevant public health problem. Five studies published between 2019 and 2024 evaluated the efficacy and safety of tirzepatide in the management of type 2 diabetes mellitus. The findings showed high effectiveness in glycemic control, associated with a significant reduction in body weight, without increasing the risk of hypoglycemia. These results consolidate tirzepatide as a promising therapeutic alternative, capable of achieving challenging clinical goals and providing additional benefits related to weight loss[4-6].

A study observed that fatphobia, as a determining factor in mental illness, is associated with anxiety, depression, low self-esteem, eating disorders, and social isolation. It highlights that weight stigma is reinforced in social, media, and healthcare contexts, negatively impacting access to care and the quality of assistance. Furthermore, it states that confronting fatphobia requires humanized healthcare practices, ongoing professional education, and public policies focused on equity and respect for body diversity[7].

Tirzepatide is a dual agonist of GIP and GLP-1 receptors, indicated for the treatment of obesity and overweight in adults with comorbidities such as type 2 diabetes. Its mechanism of action consists of stimulating these receptors, promoting glycemic control, and reducing appetite. The medication is administered subcutaneously, once a week, with gradual dose adjustment to minimize adverse effects. Clinical trials have demonstrated significant weight loss and metabolic improvement compared to placebo. The most common side effects are mild to moderate, including nausea, vomiting, diarrhea, and constipation, like those observed with other GLP-1 agonists. Warnings include the risk of pancreatitis, hypoglycemia when associated with insulin or secretagogues, and the need for monitoring in patients with a history of severe gastrointestinal diseases; its use is contraindicated in individuals with a history of medullary thyroid carcinoma or multiple endocrine neoplasia type 2 syndrome[8].

Recent studies confirm that tirzepatide shows significant results in the management of type 2 Diabetes Mellitus and obesity, with a significant reduction in glycated hemoglobin (HbA1c) – a test that measures the average blood glucose levels over the past two to three months, a marker for understanding glycemic control or how well blood sugar is being managed over time – and consistent improvement in glycemic control. It also promotes significant weight loss, superior to that obtained with other pharmacological options, reinforcing its role as an innovative agent in the treatment of obesity. Clinical trials published between 2021 and 2022 demonstrated promising results but highlighted the need for additional data on cardiovascular outcomes and long-term safety. The importance of integrating this pharmacological innovation into broader prevention and treatment strategies is discussed, considering the socioeconomic impact of obesity and diabetes. There are therapeutic progress and future perspectives, although limitations related to the lack of long-term studies and the accessibility of the treatment are acknowledged[9,10].

The benefits extend to improved metabolic parameters and reduced cardiovascular risk, suggesting a positive impact on patients' overall health. Evidence indicates that tirzepatide outperforms therapies such as

dulaglutide, providing greater reduction in HbA1c and body weight in up to 40 weeks of treatment, with an acceptable safety profile[9].

Sustained efficacy and improved quality of life, although long-term studies are needed to assess cost-effectiveness and maintenance of results, international guidelines, such as those of the WHO, reinforce that the use of GLP-1 agonists, including tirzepatide, should be integrated into a comprehensive approach that includes healthy eating, physical activity, and professional support, recognizing that medication alone does not resolve the complexity of obesity. In this context, inclusive public policies are paramount to ensure equitable access to therapies and combat social stigmas, such as fatphobia, thus increasing the effectiveness of interventions. In short, tirzepatide represents a promising therapeutic advance, but its maximum impact depends on multidimensional strategies that combine pharmacological innovation, health education, and the promotion of equity[9,10].

In clinical studies, most participants experienced mild to moderate adverse effects, such as nausea, consistent with the profile of other GLP-1 receptor agonists. Furthermore, data indicated that tirzepatide is associated with a significant reduction in body weight in obese individuals, with a significant average percentage of weight loss after a few weeks of treatment, reinforcing its effectiveness as an innovative therapy for metabolic control and weight reduction[10-12].

The authors address the adverse effects identified in clinical trials, emphasizing the need for continuous long-term safety monitoring, and discuss the importance of integrating this pharmacological intervention into broader treatment strategies, incorporating lifestyle approaches to optimize therapeutic outcomes[11,12].

## Final Considerations

Obesity and type 2 diabetes mellitus are two of the most prevalent and challenging chronic conditions today, contributing substantially to global morbidity and mortality; both conditions are closely associated with metabolic, cardiovascular, and psychosocial complications, imposing a significant burden on healthcare systems worldwide. The increasing prevalence of these diseases reflects changes in dietary patterns, physical activity levels, and socioeconomic factors, often exacerbated by obesogenic environments. Consequently, the effective management of these diseases requires innovative therapeutic interventions, combined with prevention and management strategies that promote health in an integrated manner. Tirzepatide represents a promising addition to the therapeutic arsenal available for the treatment of obesity and type 2 diabetes. Future trials should focus on evaluating the long-term impact and analyzing specific subgroups, with the aim of personalizing treatments. Tirzepatide stands out as an innovative therapeutic solution in the management of type 2 Diabetes Mellitus and obesity, providing a significant improvement in glycemic control and promoting weight loss. These characteristics make it a promising option to address the challenges posed by these chronic conditions with high global prevalence. However, the fight against obesity must transcend pharmacological treatment, requiring an integrated approach that includes not only the promotion of healthy lifestyles, but also the adoption of a balanced diet, regular physical exercise, and multidisciplinary follow-up. Furthermore, it is essential to combat social stigmatization, such as fatphobia; it is imperative to implement health strategies that embrace body diversity and promote equity, to improve access to care and the quality of care, ensuring that therapeutic advances are beneficial equitably and inclusively for the population.

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