

## DUAL GIP/GLP-1 AGONISM AND LEAN MASS PRESERVATION: AN INTEGRATIVE REVIEW OF TIRZEPATIDE AND A PROPOSED AMAZONIAN DIETARY MODEL

### AGONISMO DUPLO GIP/GLP-1 E MANUTENÇÃO DA MASSA MAGRA: REVISÃO INTEGRATIVA A RESPEITO DA TIRZEPATIDA E SUGESTÃO DE UM MODELO ALIMENTAR AMAZÔNICO

### AGONISMO DUAL GIP/GLP-1 E MANUTENÇÃO DA MASSA MAGRA: REVISÃO INTEGRATIVA A RESPEITO DA TIRZEPATIDA E SUGESTÃO DE UM MODELO ALIMENTAR AMAZÔNICO



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#### ABSTRACT

Tirzepatide, a dual GIP and GLP-1 receptor agonist, represents a significant therapeutic advance in the management of obesity and type 2 diabetes mellitus, promoting substantial weight reduction with a predominant impact on visceral fat. However, evidence indicates concomitant loss of lean body mass during treatment, which may compromise basal metabolic rate and the long-term sustainability of clinical outcomes. This study aims to analyze the effects of tirzepatide on body composition, with emphasis on lean mass preservation, and to propose an Amazonian Dietary Model adapted to regional specificities. This is an integrative literature review, including randomized clinical trials and systematic reviews published between 2021 and 2026. Findings indicate that the quality of weight loss depends on adequate protein intake and structured nutritional intervention. The proposed model operationalizes protein targets consistent with scientific recommendations, incorporating regional food sources and contributing to functional and metabolic preservation during pharmacological therapy.

**Keywords:** Body Composition. Lean Mass. Obesity. Tirzepatide. Nutritional Intervention.

#### RESUMO

A tirzepatida, agonista duplo dos receptores GIP e GLP-1, representa avanço terapêutico no manejo da obesidade e do diabetes mellitus tipo 2, promovendo redução ponderal significativa com impacto predominante sobre a gordura visceral. Entretanto, evidências

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indicam perda concomitante de massa livre de gordura durante o tratamento, o que pode comprometer o metabolismo basal e a sustentabilidade dos resultados clínicos. Este estudo tem como objetivo analisar os efeitos da tirzepatida sobre a composição corporal, com ênfase na preservação da massa magra, e propor um Modelo Alimentar Amazônico adaptado às especificidades regionais. Trata-se de revisão integrativa da literatura, com análise de ensaios clínicos e revisões sistemáticas publicados entre 2021 e 2026. Os achados demonstram que a qualidade da perda ponderal depende de ingestão proteica adequada e intervenção nutricional estruturada. O modelo proposto operacionaliza metas proteicas compatíveis com recomendações científicas, utilizando fontes alimentares regionais, contribuindo para preservação funcional e metabólica durante a terapia farmacológica.

**Palavras-chave:** Composição Corporal. Massa Magra. Modelo Alimentar Amazônico. Obesidade. Tirzepatida.

## RESUMEN

La tirzepatida, agonista dual de los receptores GIP y GLP-1, representa un avance terapéutico relevante en el manejo de la obesidad y la diabetes mellitus tipo 2, promoviendo una reducción ponderal significativa con impacto predominante sobre la grasa visceral. Sin embargo, la evidencia indica una pérdida concomitante de masa libre de grasa durante el tratamiento, lo que puede comprometer el metabolismo basal y la sostenibilidad de los resultados clínicos a largo plazo. Este estudio tiene como objetivo analizar los efectos de la tirzepatida sobre la composición corporal, con énfasis en la preservación de la masa magra, y proponer un Modelo Alimentario Amazónico adaptado a las especificidades regionales. Se trata de una revisión integradora de la literatura, que incluye ensayos clínicos aleatorizados y revisiones sistemáticas publicadas entre 2021 y 2026. Los hallazgos indican que la calidad de la pérdida ponderal depende de una ingesta proteica adecuada y de una intervención nutricional estructurada. El modelo propuesto operacionaliza metas proteicas compatibles con las recomendaciones científicas, incorporando fuentes alimentarias regionales y contribuyendo a la preservación funcional y metabólica durante la terapia farmacológica.

**Palabras clave:** Composición Corporal. Masa Magra. Modelo Alimentario Amazónico. Obesidad. Tirzepatida.

## 1 INTRODUCTION

Obesity and type 2 diabetes mellitus are common chronic metabolic disorders worldwide, resulting from a complex interplay between insulin resistance, hormonal dysfunction, low-grade systemic inflammation, and changes in energy homeostasis. These conditions are directly linked to increased cardiovascular morbidity and mortality, decreased quality of life, and a significant socioeconomic impact on health systems.

The limitation of conventional strategies that are based only on caloric restriction and physical exercise has intensified the search for pharmacological methods that can act simultaneously on several metabolic pathways related to the regulation of body weight and glucose metabolism.

In this scenario, therapies based on the incretin system have established themselves as one of the main novelties in the treatment of obesity and type 2 diabetes. Tirzepatide stands out for its unique mechanism of action, functioning as a double agonist of GIP (glucose-dependent insulinotropic polypeptide) and GLP-1 (glucagon-like peptide-1) receptors. This integrated approach enhances the classic incretin effects by combining stimulation with glucose-dependent insulin secretion, glucagon suppression, delayed gastric emptying, and central satiety modulation. Wardeh (2024) explains that dual GIP/GLP-1 agonism favors metabolic synergy, leading to a considerable improvement in glycemic control and a greater weight reduction than that observed with GLP-1 agonists alone.

Evidence from randomized controlled trials shows that tirzepatide causes a significant reduction in body weight, usually greater than 15% of initial weight in higher-dose protocols, with a predominant effect on visceral fat. Central adiposity, especially visceral fat, is considered a determining factor in cardiometabolic risk, being linked to insulin resistance, atherogenic dyslipidemia, and pro-inflammatory condition. Cariou (2024) demonstrated that treatment with tirzepatide favors the redistribution of adipose tissue in people with type 2 diabetes, significantly reducing visceral fat. This reinforces that the clinical benefits go beyond simply reducing total weight.

However, the increasing efficacy of drugs in controlling body weight has shifted the focus of scientific discussion to qualitative analysis of weight loss. Body composition has become a crucial factor in the evaluation of therapeutic efficacy, especially considering the possibility of simultaneous reduction of fat-free mass. Research using dual-energy X-ray absorptiometry (DXA) indicates that a portion of the weight loss associated with the use of tirzepatide is a result of reduced lean body mass. Look (2025), in the SURMOUNT-1 substudy, observed that, although adiposity loss is predominant, there is a proportional reduction in the components of fat-free mass, indicating significant clinical implications.

Lean mass is essential for maintaining resting energy expenditure, glycemic homeostasis, and musculoskeletal functionality. Considerable reductions in this compartment can affect the basal metabolic rate, facilitate weight regain, and increase the risk of frailty, especially in people with lower protein reserves. Rochira (2024), in a systematic review of randomized controlled trials, emphasizes that the proportion of tirzepatide-related fat-free mass loss should be taken into account when interpreting therapeutic outcomes, especially in long-term strategies.

Simultaneously, decreased appetite and reduced spontaneous energy intake, commonly observed during the use of incretin agonists, can lead to inadequate protein intake and a deficiency of micronutrients essential for muscle preservation. Brown (2025) points out that there are still significant gaps in the combination of GLP-1-based pharmacotherapy with structured nutritional guidelines, especially with regard to the preservation of lean mass as a priority clinical outcome. Thus, it is clear that the effectiveness of medications must be evaluated in conjunction with nutritional interventions that can reduce unintentional muscle loss.

This discussion gains an extra layer of complexity in the Amazonian context. The region offers a unique dietary diversity, with an abundance of local protein sources of high biological value, such as fish from the Amazon, as well as foods rich in bioactive compounds with antioxidant and anti-inflammatory properties. However, difficulties related to access to structured nutritional monitoring and the adaptation of international protocols to the local sociocultural reality highlight the need for strategies adapted to the region. There is a lack of proposals that integrate clinical evidence on tirzepatide with organized and culturally contextualized dietary models for the Brazilian Amazon.

In this context, the following guiding questions arise: what are the main impacts of tirzepatide on body composition, as reported in the recent literature? What is the extent of treatment-related reduction in fat-free mass? What nutritional guidelines have been suggested for maintaining muscle tissue during Incretin therapy? And how can these recommendations be implemented in a dietary model adjusted to the particularities of the Amazon?

The main issue of this study is the need to combine the pharmacological progress represented by GIP/GLP-1 dual agonism with well-defined nutritional strategies that ensure functional and metabolic preservation. Wardeh (2024) highlights that understanding the metabolic effects of tirzepatide in a systemic way is essential to optimize its clinical benefits, emphasizing that additional interventions are crucial for the quality of weight loss.

Therefore, the main objective of this study is to evaluate the effects of tirzepatide on

body composition, focusing on the preservation of lean mass. As specific objectives, it is intended to: synthesize evidence on the proportion of fat-free mass loss in clinical trials and systematic reviews; discuss nutritional strategies for protein adequacy during treatment; and to propose initial guidelines for an Amazonian Food Model that is in line with current scientific evidence and regional particularities.

## 2 THEORETICAL FRAMEWORK

Incretin-based drug therapies have been establishing themselves as one of the most promising approaches in the treatment of obesity and type 2 diabetes, especially considering the global growth of these conditions and their metabolic consequences. In this context, tirzepatide stands out, an innovative drug that acts as a double agonist of GIP and GLP-1 receptors, generating synergistic effects in blood glucose control, weight loss, and modulation of body composition. Wardeh (2024) argues that this dual mechanism intensifies the metabolic response by activating, at the same time, pathways linked to satiety, energy consumption, and hormonal regulation. This makes tirzepatide one of the most important compounds in current pharmacotherapy.

In addition to significant weight reduction, recent studies have shown a growing concern about the quality of this loss, especially in relation to the effect on lean mass and body fat distribution. Clinical research and exploratory analyses suggest that tirzepatide interventions may cause relevant changes in adiposity pattern, mainly resulting in adipose tissue reduction, although muscle preservation needs to be monitored. Cariou (2024) highlights that the redistribution of body fat in people with type 2 diabetes treated with tirzepatide shows not only an overall reduction in fat, but also changes in visceral fat, an important factor for reducing cardiometabolic risk.

In this scenario, body composition analysis has been shown to be fundamental to understand the clinical effects of tirzepatide, especially in long-term treatment programs. Evidence from substudies with dual-energy X-ray absorptiometry (DXA) indicates that drug-related weight loss involves reductions in fat mass and fat-free mass, requiring specific nutritional strategies to minimize muscle loss. Look (2025) shows that in the SURMOUNT-1 trial substudy, there was a significant reduction in total adiposity, although this was accompanied by a decrease in lean mass components, highlighting the need for concomitant dietary interventions.

Thus, it is essential to combine pharmacotherapy with specific nutritional strategies, especially with regard to protein supply and the maintenance of energy metabolism. The literature indicates that the use of incretin agonists can lead to reduced appetite and caloric

intake, which can affect adequate protein intake. This increases the risk of functional loss and sarcopenia, especially in vulnerable groups. Rochira (2024), when analyzing randomized controlled trials, points out that tirzepatide offers significant benefits in weight loss. However, the composition of this loss should be evaluated carefully, especially in people with low muscle reserve.

In the Amazonian context, these discussions gain even more importance, as regional factors, such as specific dietary patterns, socioeconomic difficulties, and characteristics in accessing specialized nutritional monitoring, can affect clinical outcomes. Therefore, although tirzepatide is an effective pharmacological treatment, it requires nutritional protocols adapted to the local reality, focusing on strategies to preserve lean mass, adjust protein intake, and continuously monitor body composition.

One of the main current clinical challenges is to maintain lean mass during incretin drug-induced weight loss. Although tirzepatide has been shown to be more effective in weight loss compared to other therapies, the simultaneous reduction of muscle tissue can affect functionality, basal metabolic rate, and the maintenance of long-term results. Ramos (2025) highlights that the reduction in skeletal muscle mass, identified in some studies, requires special attention, especially in adults at higher risk of frailty. It is essential to combine nutritional interventions and multidisciplinary follow-up with pharmacological treatment.

In this context, nutritional strategies focused on increasing protein intake are often recommended to reduce the loss of fat-free mass. Decreased appetite and reduced overall energy intake, commonly seen in GLP-1 agonist users, can result in an inadequate intake of proteins, micronutrients, and compounds essential for muscle maintenance. Johnson (2025) argues that, when dealing with incretin agonists, it is essential to carefully consider the use of nutritional supplements, particularly those intended for the maintenance of lean mass, such as proteins of high biological value and essential amino acids.

In addition, there is a significant gap in the development of specific clinical guidelines that systematically unite pharmacotherapy and nutrition in the treatment of obesity. Brown (2025) argues that many current protocols focus on total weight loss as the main outcome, leaving aside qualitative aspects, such as muscle preservation and the metabolic effects of prolonged low-calorie diets. Thus, it is advisable that nutritional monitoring be organized from the beginning of tirzepatide therapy, establishing clear goals for protein intake and encouraging the practice of resistance physical activity.

The importance of these recommendations becomes even clearer when considering energy metabolism and the systemic effects linked to rapid weight loss. The reduction in lean mass is linked to a decrease in energy expenditure at rest, which can contribute to weight

regain after stopping treatment or in cases of lower adherence. Spreckley (2025) emphasizes that combined interventions, which include protein adjustment and strength exercises, are essential to maintain muscle tissue and achieve better clinical outcomes in incretin agonist therapies.

Another important point concerns the evaluation through advanced imaging techniques and specific substudies that measure body changes beyond total weight. Additional analyses from the SURPASS program provide evidence that tirzepatide causes significant changes in body composition, affecting visceral fat and fat-free mass. Sattar (2025) indicates that the results found in substudies with magnetic resonance imaging highlight the importance of personalized nutritional strategies, as the body's response may differ according to age, previous metabolic condition, and baseline nutritional status.

In the Amazonian context, these considerations gain relevance, since the region's food variety, characterized by foods with bioactive compounds and specific protein sources, can offer a strategic opportunity for culturally adapted nutritional interventions. Therefore, the use of tirzepatide in the Brazilian Amazon should be supported by guidelines that take into account not only the metabolic risks, but also the possibility of using local food resources as protein support and functional preservation.

The clinical use of tirzepatide has expanded beyond glucose control and obesity, encompassing outcomes related to significant comorbidities and conditions of high metabolic risk. Recent trials indicate that weight loss induced by GIP/GLP-1 dual agonism can directly affect conditions such as obstructive sleep apnea, often linked to central obesity and systemic inflammation. Malhotra (2024) demonstrates that treatment with tirzepatide leads to significant clinical improvement in these patients, highlighting that the modulation of body composition has implications beyond aesthetics or total weight, being a crucial factor in reducing cardiometabolic risks.

However, studies indicate that rapid weight loss, without appropriate nutritional interventions, can have negative effects on muscle health and functional status. Loss of lean mass, particularly in adults and the elderly, constitutes a significant clinical risk, as it affects strength, mobility, and energy metabolism. Ramos (2025) highlights that, despite the significant benefits of tirzepatide, muscle preservation should be considered a therapeutic priority, incorporating nutritional protocols and encouragement of resistance exercise as essential complementary measures.

In this context, the systematic review by Rochira (2024) indicates that the available randomized controlled trials confirm the efficacy of tirzepatide in reducing adiposity. However, they also underscore the need for more information on the proportion of lean mass lost during

the process. Therefore, it is advisable that body composition assessments such as DXA and imaging methods be integrated into clinical follow-up, especially in patients with low protein reserves or risk of relative malnutrition.

Another important aspect concerns the need for specific dietary guidelines when using incretin agonists, as reduced appetite can result in significant dietary deficiencies. Johnson (2025) argues that protein supplementation and personalized nutritional adjustments should be taken into account, especially when spontaneous intake is not sufficient to meet metabolic needs. Thus, clinical protocols should establish minimum protein targets, track micronutrients, and provide ongoing nutritional support.

In addition, Brown (2025) points out that there are still significant gaps in the creation of guidelines that integrate pharmacotherapy and nutrition, particularly with regard to the preservation of lean mass as a priority outcome. Thus, treatment with tirzepatide should not be seen only as an isolated drug intervention, but as a component of a multifactorial approach that includes diet, physical exercise, nutritional education and continuous monitoring. These discussions acquire a particular importance in the Amazonian context, due to regional particularities. The Brazilian Amazon has unique dietary patterns, with a high potential for local protein sources and functional foods.

However, it also faces structural difficulties with regard to access to specialized services and continuous nutritional monitoring. Therefore, when implementing tirzepatide clinically in the Amazon, it is necessary to take into account not only global scientific evidence, but also cultural and socioeconomic adaptations that ensure metabolic safety and functional preservation.

The current literature agrees that tirzepatide is an important advance in the treatment of obesity and diabetes, but its effects on body composition need to be carefully considered. Wardeh (2024) highlights that GIP/GLP-1 dual agonism enhances metabolic benefits, but emphasizes the importance of complementary nutritional interventions, especially to prevent excessive loss of muscle mass and ensure better clinical outcomes. Thus, it is clear that well-planned nutritional strategies, focused on adequate protein intake and the preservation of lean mass, are essential to enhance the therapeutic effects of tirzepatide, especially in the Amazonian context.

### 3 METHODOLOGY

This study is a qualitative integrative review of the literature, aiming to synthesize recent scientific evidence on the effects of tirzepatide, a dual agonist of GIP and GLP-1 receptors, on body composition. The focus is on the preservation of lean mass, energy

metabolism and nutritional guidelines during pharmacological treatment. Opting for an integrative review is justified by the possibility of analyzing in a broad and systematic way different study designs, which allows for the construction of a consolidated view on the subject and its clinical implications, particularly in the Amazonian context.

The review was carried out in a sequential and organized manner, according to the methodological guidelines for bibliographic research. First, the central question of the study was established: what are the main effects of tirzepatide on body composition and what nutritional approaches are suggested to reduce the loss of lean mass during treatment? Subsequently, scientific articles published in the last five years were searched, focusing on journals of high academic rigor, preferably classified in the Qualis A and B strata.

The bibliographic material was collected through the selection of thirteen studies in PDF format, covering clinical trials, substudies with DXA and magnetic resonance imaging, systematic reviews and narrative reviews. All of these studies were directly linked to GIP/GLP-1 dual agonism, tirzepatide, and associated nutritional interventions. The descriptors used included combinations such as tirzepatide, body composition, lean mass, energy metabolism, protein intake, and nutritional supplementation, also taking into account the importance for groups at metabolic risk.

The inclusion criteria included complete open-access articles, published between 2021 and 2026, aimed at adults with obesity or type 2 diabetes mellitus, and that provided results related to body composition or nutritional guidance during the use of incretin agonists. Duplicate studies, publications outside the defined period, and studies that did not directly address outcomes of interest, such as muscle preservation or dietary strategies, were removed.

After being selected, the articles were analyzed in a descriptive and comparative manner, with the objective of identifying agreements and disagreements in the results related to adiposity reduction, changes in fat-free mass, and suggested nutritional recommendations. The synthesis of the data was made through thematic categorization, organizing the results into central axes: impacts of tirzepatide on body composition, risks related to loss of lean mass, relevance of protein intake and clinical guidelines for nutritional monitoring.

A methodological limitation is identified as the small number of studies considered and the diversity of the designs analyzed, which may affect the generalization of the findings. Even so, the integrative review makes it possible to present a solid and up-to-date overview of tirzepatide and its nutritional implications. This contributes to important clinical discussions in the context of the Brazilian Amazon, where dietary and socioeconomic particularities

require adapted health care strategies. The following is a table with the authors employed in the research so far, including main author, title, and year of publication.

**Table 1**

*Authors used in the research*

Author	Title	Year
Brown	Nutritional guidance gaps during GLP-1 receptor agonist therapy: preserving lean mass and parallels with bariatric surgery	2025
Cariou	Effect of tirzepatide on body fat distribution pattern in people with type 2 diabetes	2024
Costa	Selenium bioavailability from Brazil nuts: implications for antioxidant status and thyroid function	2021
Johnson	Dietary supplement considerations during glucagon-like peptide-1 receptor agonist treatment: a narrative review	2025
Look	Body composition changes during weight reduction with tirzepatide: DXA substudy of SURMOUNT-1	2025
Malhotra	Tirzepatide for the treatment of obesity and obstructive sleep apnea	2024
Olive	Polyphenolic profile and antioxidant potential of Amazonian fruits: implications for cardiometabolic health	2023
Branches	Effects of tirzepatide on skeletal muscle mass in adults: a systematic review	2025
Rochira	The effect of tirzepatide on body composition in people with overweight and obesity: a systematic review of randomized controlled studies	2024
Sattar	SURPASS-3 MRI substudy: supplementary appendix on body composition outcomes	2025
Silva	Nutritional composition and lipid profile of Amazonian freshwater fish species	2022
Spreckley	Lean mass preservation and protein intake strategies during GLP-1 based pharmacotherapy	2025
Wardeh	Tirzepatide as a dual GIP and GLP-1 receptor agonist in diabetes and obesity: metabolic implications	2024

Source: The authors..

The studies presented in the table show that tirzepatide has been extensively investigated in recent years, especially with regard to its effects on body composition, fat redistribution and potential impacts on lean mass. It is observed that recent literature converges on the need to integrate pharmacological treatment with specific nutritional strategies, emphasizing adequate protein intake, monitoring of energy metabolism and prevention of muscle loss during weight loss.

Thus, the selected authors provide consistent scientific support for the discussion proposed in this integrative review, contributing to the understanding of the clinical implications of GIP/GLP-1 dual agonism and to the adaptation of these recommendations to the context of the Brazilian Amazon.

#### 4 RESULTS AND DISCUSSIONS

The research analyzed indicates that tirzepatide causes a significant weight reduction, with a higher metabolic effect than GLP-1 agonists alone. The mechanism of action that uses the GIP/GLP-1 double agonism intensifies the incretinic response, which improves glycemic control, increases appetite suppression and generates synergistic hormonal effects that

potentiate the decrease in total adiposity. Wardeh (2024) states that this integrated approach justifies the magnitude of the clinical results seen in the most recent trials.

One of the main qualitative results of the treatment is the redistribution of body fat. Clinical evidence shows a considerable reduction in visceral fat, a compartment that is directly linked to cardiometabolic risk. Cariou (2024) showed that people with type 2 diabetes treated with tirzepatide exhibited an improvement in body fat distribution, with a significant impact on central adipose tissue. This highlights the importance of looking beyond absolute body weight.

However, body composition analysis indicates that weight loss also involves reducing fat-free mass. In a study using dual-energy X-ray absorptiometry (DXA), Look (2025) observed a proportional decrease in lean mass components during weight loss, even though most of the reduction is related to adipose tissue. These results highlight the importance of specific body composition monitoring.

The systematic analysis carried out by Rochira (2024) confirms that tirzepatide favors the predominant loss of body fat. However, it demonstrates that the proportion of fat-free mass lost varies according to the dose, duration of treatment and clinical profile of the participants. This variability indicates that simultaneous nutritional interventions can influence the quality of weight loss.

Maintaining skeletal muscle mass is critical for metabolic sustainability. Ramos (2025) points out that considerable reductions in muscle tissue can negatively affect basal energy expenditure and functional capacity, particularly in people with lower initial protein reserves. Thus, the analysis of the results must take into account not only the magnitude of the weight loss, but also its composition.

Spreckley (2025) emphasizes the importance of establishing clear protein goals during GLP-1 therapies, emphasizing that adequate protein intake is essential to preserve lean mass during pharmacological treatments for weight loss. Protein adequacy stands out as a fundamental component in clinical follow-up, especially considering the spontaneous reduction in energy intake observed in these treatments.

It is important not only to consume protein but also to ensure adequate micronutrient intake. Johnson (2025) points out that spontaneous decrease in food consumption, usually linked to appetite suppression caused by incretin agonists, can lead to an inadequate intake of essential nutrients. This requires personalized evaluation and, if necessary, strategic supplementation.

In clinical practice, there are still significant gaps in the integration between pharmacotherapy and nutrition. Brown (2025) states that many protocols focus on total

weight reduction as the primary outcome, without adopting strategies for muscle preservation, which can affect the metabolic quality of weight loss.

Reducing adiposity has a systemic effect that also affects associated comorbidities. Malhotra (2024) showed a significant improvement in obstructive sleep apnea in people treated with tirzepatide, indicating that central fat reduction has extensive clinical implications, beyond body aesthetics and glycemic control.

Sophisticated imaging methods highlight the relevance of a thorough analysis of body composition. Sattar (2025), in a secondary study with magnetic resonance imaging, observed significant changes in adipose compartments and fat-free mass, indicating that the body's response to treatment is multifactorial and affected by personal characteristics.

In the Amazonian context, the maintenance of lean mass during treatment with tirzepatide can be achieved through a structured eating plan, based on local protein sources of high biological value. Research indicates that Amazonian fish have an average protein density of 17 to 22 g per 100 g of edible portion, combined with a mostly unsaturated lipid profile, which helps with metabolic support during weight loss programs (Silva et al., 2022).

The literature on the preservation of lean mass during pharmacotherapy with incretin agonists emphasizes the need for a protein intake higher than the minimum recommended for adults, particularly in situations of energy restriction. Strategies that increase protein intake are considered to reduce the loss of fat-free mass during weight loss caused by medications (Spreckley, 2025).

At the same time, Amazonian fruits rich in polyphenols and vitamin C, such as açai and camu-camu, demonstrate significant antioxidant potential in reducing oxidative stress related to obesity and chronic inflammation (Oliveira et al., 2023).

Brazil nuts are a significant natural source of selenium, and small amounts are enough to improve the status of this micronutrient and help with the body's antioxidant balance (Costa et al., 2021).

Given that the use of GLP-1 agonists often leads to appetite suppression, which can decrease total food intake, it is imperative to conduct a personalized nutritional assessment, monitoring macro- and micronutrients during treatment (Johnson, 2025).

Thus, the inclusion of minimally processed regional foods, abundant in lean proteins, fibers, and bioactive compounds, is in line with the strategies for preserving fat-free mass addressed by Ramos (2025). The Amazon Dietary Model, suggested as a technically-based nutritional strategy, combines protein adequacy and micronutritional support to improve weight loss and reduce muscle loss during incretin therapy.

In this context, the quality of weight loss is related to the preservation of lean mass,

which has a direct relationship with basal metabolism, functionality, and the maintenance of long-term results. The literature analyzed indicates that the most effective strategy is the combination of pharmacotherapy, protein adjustment, monitoring of body composition and valorization of regional foods.

In the Amazonian context, the creation of a Food Model based on local protein sources and foods with antioxidant properties emerges as a viable, culturally adapted and metabolically qualified strategy. Table II below summarizes the main positions of the authors analyzed, emphasizing the fundamental contributions of each study to understand the effects of tirzepatide on body composition, preservation of lean mass, and integration between pharmacotherapy and nutritional strategies in the Amazonian context. The position of the authors employed in this study is presented below, taking into account the year of publication and the respective fields of research.

**Table 2**

*Authors used in the research, positioning and year*

<b>Author</b>	<b>Positioning</b>	<b>Year</b>
Brown	It advocates integration between GLP-1 pharmacotherapy and strategies for preserving lean mass.	2025
Cariou	Evidence of significant reduction in visceral fat with tirzepatide.	2024
Costa	It demonstrates the bioavailability of selenium in Brazil nuts and its antioxidant relevance.	2021
Johnson	Discusses protein and micronutritional adequacy during GLP-1-based therapies.	2025
Look	Identifies proportional reduction of lean mass by DXA in SURMOUNT-1.	2025
Malhotra	It is linked to a reduction in central adiposity with an improvement in sleep apnea.	2024
Olive	It evidences the antioxidant potential of Amazonian fruits rich in polyphenols and vitamin C.	2023
Branches	It analyzes the impact of tirzepatide on skeletal muscle mass.	2025
Rochira	This study evaluates the proportion of fat-free mass loss in a systematic review.	2024
Sattar	Demonstrates changes in body composition by MRI in SURPASS-3.	2025
Silva	It describes the protein composition of Amazonian fish and its nutritional applicability.	2022
Spreckley	Protein intake of 1.2–1.6 g/kg/day during GLP-1 therapy is recommended.	2025
Wardeh	It underlies the GIP/GLP-1 dual agonism and its metabolic effects.	2024

Source: The authors.

The positions presented in Table II reinforce that, although tirzepatide has robust efficacy in modulating visceral adiposity and metabolic control, the interpretation of its clinical results should incorporate qualitative analysis of body composition. The preservation of lean mass emerges as a strategic outcome, requiring systematized nutritional interventions, with defined protein goals and continuous monitoring, especially when considering the adaptation of these recommendations to the Amazonian food reality.

## 5 CONCLUSION

Tirzepatide has established itself as an important therapeutic advance in the treatment

of obesity and type 2 diabetes mellitus, contributing to a considerable reduction in visceral adiposity and improvement of cardiometabolic parameters. However, the evidence of simultaneous loss of fat-free mass indicates that the magnitude of weight reduction should not be the only criterion for evaluating treatment success.

The preservation of lean mass is a strategic clinical variable, mainly due to its connection with basal metabolism, physical functionality, and maintenance of long-term results. In this scenario, adequate protein intake, combined with well-structured nutritional planning, is essential during incretinal pharmacotherapy.

The proposal of the Amazon Food Model is based on the combination of scientific evidence and regional particularities, allowing the practical implementation of the suggested nutritional goals. The combination of drug therapy and localized eating strategy emerges as a promising approach to promote metabolically qualified and sustainable weight loss.

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