Section: Miscellaneous

Original Research Article

EFFECTS OF TIRZEPATIDE ON SKELETAL MUSCLE MASS AND BODY COMPOSITION IN ADULTS: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Tirzepatide, a dual glucose-dependent insulinotropic polypeptide and glucagon-like peptide-1 receptor agonist, has demonstrated robust weight-reducing and glycaemic benefits in adults with obesity and type 2 diabetes mellitus. However, concerns remain regarding the potential loss of skeletal muscle mass accompanying pharmacologically induced weight reduction. This study aimed to evaluate the effects of tirzepatide on skeletal muscle mass and overall body composition in adults treated in a real-world clinical setting.

Materials and Methods: This prospective observational study included 72 adults with obesity, with or without type 2 diabetes mellitus, who were newly initiated on tirzepatide and followed for 12 months. Tirzepatide was administered once weekly with standard dose escalation based on tolerability. Anthropometric measurements, metabolic parameters, and body composition were assessed at baseline, 6 months, and 12 months. Skeletal muscle mass, fat mass, fat-free mass, and skeletal muscle index were measured using multi-frequency bioelectrical impedance analysis. Changes over time were analyzed using repeated-measures analysis of variance, and correlations between skeletal muscle loss and clinical variables were assessed using Spearman's correlation.

Results: Participants had a mean age of 49.6 ± 9.8 years and a mean baseline body mass index of 33.8 ± 3.9 kg/m². Over 12 months, mean body weight decreased significantly by 16.6 ± 4.9 kg ($p < 0.001$), accompanied by marked reductions in body mass index and waist circumference. Fat mass loss accounted for 79.5% of total weight loss, while fat-free mass loss contributed 20.5%. Mean skeletal muscle mass declined modestly by 1.5 ± 0.9 kg, representing only 9.0% of total weight loss, with a small but significant reduction in skeletal muscle index ($p = 0.041$). Greater weight loss was moderately correlated with skeletal muscle loss ($r = 0.42$, $p < 0.001$), while final tirzepatide dose was not significantly associated with muscle loss.

Conclusion: Tirzepatide therapy resulted in substantial, fat-dominant weight loss with relatively limited skeletal muscle loss over 12 months. The modest decline in skeletal muscle mass suggests a favorable body composition profile, supporting tirzepatide as a metabolically balanced therapeutic option for adults with obesity and type 2 diabetes mellitus. Adjunct lifestyle strategies may further enhance skeletal muscle preservation during treatment.

Keywords: Tirzepatide; Skeletal muscle mass; Body composition; Obesity; Type 2 diabetes mellitus; Sarcopenia.

INTRODUCTION

The global rise in obesity and type 2 diabetes mellitus (T2DM) has intensified interest in pharmacological agents that promote meaningful weight loss while preserving metabolically active tissues such as skeletal muscle.[1] Skeletal muscle constitutes approximately 40% of total body mass in healthy adults and plays a pivotal role in glucose disposal, insulin sensitivity, basal metabolic rate, and physical

function.[2] Loss of skeletal muscle mass, particularly in the context of weight reduction, is associated with adverse outcomes including sarcopenia, frailty, impaired glycaemic control, and increased cardiometabolic risk.[3] Consequently, contemporary obesity and diabetes management emphasizes not only total weight loss but also the quality of weight loss, specifically the proportion of fat mass versus lean mass reduction.[4]

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) have emerged as effective agents for glycaemic control and weight reduction. Clinical trials of GLP-1 RAs have demonstrated average weight loss ranging from 5–15% of baseline body weight, primarily through appetite suppression and delayed gastric emptying.[5] However, several studies have reported that 20–40% of total weight loss induced by caloric restriction or pharmacotherapy may be attributable to lean body mass loss, raising concerns about long-term metabolic and functional consequences.[6] These concerns are particularly relevant in older adults and individuals with pre-existing low muscle reserves.[6]

Tirzepatide is a novel dual glucose-dependent insulinotropic polypeptide (GIP) and GLP-1 receptor agonist that has shown superior efficacy in weight reduction and glycaemic control compared with selective GLP-1 Ras.[7] Large phase III trials have reported mean weight loss of approximately 15–22% over 72 weeks in adults with obesity or T2DM, exceeding that observed with currently available incretin-based therapies.[7] While these findings underscore tirzepatide’s potent anti-obesity effects, they also prompt critical evaluation of its impact on body composition, particularly skeletal muscle mass.[7]

Emerging evidence suggests that incretin-based therapies may differentially influence fat and lean compartments through complex mechanisms involving insulin sensitivity, nutrient partitioning, inflammation, and energy expenditure.[8] GIP receptor activation has been hypothesized to exert anabolic or muscle-sparing effects by enhancing insulin-mediated amino acid uptake and reducing proteolysis, whereas GLP-1–mediated weight loss may predispose to lean mass reduction in the absence of adequate protein intake or resistance exercise.[8,9] However, data on the net effect of dual GIP/GLP-1 agonism on skeletal muscle mass remain limited and inconsistent, with some analyses indicating proportional lean mass loss and others suggesting relative preservation of muscle compared with fat mass.[9]

Understanding the effects of tirzepatide on skeletal muscle mass is clinically significant, as preservation of muscle is essential for maintaining functional capacity, metabolic health, and long-term sustainability of weight loss.[10] This is particularly relevant in populations at higher risk of sarcopenia, including older adults, individuals with long-standing diabetes, and those with obesity-related physical inactivity.[11] Moreover, evaluation of skeletal muscle outcomes may inform adjunctive strategies, such as nutritional optimization and resistance training, to mitigate potential adverse effects of pharmacologically induced weight loss.[11]

Against this background, the present study aimed to evaluate the effects of tirzepatide on skeletal muscle mass in adults, contributing to the growing body of evidence on body composition changes associated with advanced incretin-based therapies and addressing an important gap in current metabolic research.

MATERIALS AND METHODS

Study Design and Setting: This prospective observational study was conducted to evaluate the effects of tirzepatide on skeletal muscle mass in adults undergoing treatment for obesity and/or type 2 diabetes mellitus. The study was carried out in the department of General Medicine at a tertiary care teaching hospital in North India, over a total duration of 12 months between December 2024 to December 2025, which included participant recruitment, follow-up, and outcome assessment. The study protocol was approved by the Institutional Ethics Committee, and all procedures were performed in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrolment.

Study Population and Sample Size: A total of 72 adult participants were enrolled in the study based on an a priori sample size estimation designed to detect a clinically meaningful change in skeletal muscle mass following tirzepatide therapy. Assuming a moderate effect size for within-subject change in skeletal muscle mass, with a type I error of 5% and statistical power of 80%, a minimum sample size of 52–64 participants was required. To account for an anticipated attrition rate of approximately 15–20% due to treatment discontinuation or loss to follow-up, the final target sample size was set at 72 participants. Adults aged 18–65 years who were newly initiated on tirzepatide as part of routine clinical management for obesity (body mass index ≥30 kg/m² or ≥27 kg/m² with obesity-related comorbidities) or type 2 diabetes mellitus were eligible for inclusion. Participants were required to be tirzepatide-naïve at baseline. Exclusion criteria included pregnancy or lactation, known neuromuscular disorders, chronic kidney disease stage 4 or higher, chronic liver disease, active malignancy, recent acute illness or hospitalization, and use of medications known to significantly influence muscle mass, such as systemic corticosteroids or anabolic agents. Individuals engaged in structured resistance training programs initiated within three months prior to enrolment were also excluded to minimize confounding effects on skeletal muscle mass.

Intervention and Treatment Protocol: Tirzepatide was administered as a once-weekly subcutaneous injection in accordance with standard clinical

practice. Treatment was initiated at a dose of 2.5 mg weekly, followed by dose escalation at four-week intervals to 5 mg, 10 mg, and up to a maximum of 15 mg based on patient tolerability and clinical response. Dose adjustments were made at the discretion of the treating physician. All participants received standard lifestyle and dietary counselling as part of routine care; however, no structured exercise regimen or targeted protein supplementation was prescribed as part of the study protocol. Adherence to tirzepatide therapy was assessed during follow-up visits through patient self-report and prescription refill verification.

Study Duration and Follow-up: Participants were followed for a total duration of 12 months from initiation of tirzepatide therapy. Assessments were conducted at baseline, at 6 months (24 weeks), and at 12 months (48 weeks). This duration was selected to capture both early and sustained changes in skeletal muscle mass, accounting for the initial dose-escalation phase and subsequent maintenance phase of tirzepatide therapy.

Assessment of Skeletal Muscle Mass and Body Composition: Skeletal muscle mass and body composition were assessed using a validated multi-frequency bioelectrical impedance analysis device at baseline and during follow-up visits at 6 and 12 months. Measurements were performed under standardized conditions, with participants instructed to fast for at least 8 hours, avoid vigorous physical activity for 24 hours prior to assessment, and empty their bladder before measurement. Parameters recorded included total skeletal muscle mass, appendicular skeletal muscle mass, fat mass, fat-free mass, and skeletal muscle index, calculated as appendicular skeletal muscle mass divided by height squared. All measurements were conducted by trained personnel using the same instrument throughout the study to ensure consistency.

Clinical and Biochemical Assessments: Baseline demographic and clinical data, including age, sex, duration of diabetes, and comorbid conditions, were recorded at enrolment. Anthropometric measurements such as body weight, height, body mass index, and waist circumference were obtained at each visit using standardized methods. Venous blood samples were collected at baseline, 6 months, and 12 months to measure fasting plasma glucose, glycated hemoglobin, serum insulin, and lipid profile. These parameters were used to explore associations between metabolic changes and alterations in skeletal muscle mass during the study period.

Outcome Measures: The primary outcome of the study was the change in total skeletal muscle mass from baseline to 12 months following initiation of tirzepatide therapy. Secondary outcomes included changes in appendicular skeletal muscle mass, skeletal muscle index, fat mass, fat-free mass, and total body weight. Additional analyses assessed the proportion of weight loss attributable to lean mass versus fat mass and examined the relationship between tirzepatide dose escalation and changes in muscle-related parameters.

Statistical Analysis: Data were analyzed using standard statistical software. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, depending on distribution, while categorical variables were presented as frequencies and percentages. Changes in skeletal muscle mass and other continuous variables over time were analyzed using paired t-tests or repeated-measures analysis of variance, as appropriate. Correlations were assessed using Spearman's rank correlation coefficient (ρ) due to the non-normal distribution of change variables and ordinal nature of dose categories. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: Participant confidentiality was maintained throughout the study. Participants were free to withdraw at any time without affecting their standard medical care. Adverse events related to tirzepatide therapy were monitored, documented, and managed according to institutional clinical protocols.

RESULTS

A total of 72 adults were included in the analysis. The mean age of participants was 49.6 ± 9.8 years, with a male predominance (58.3%). The cohort had a high burden of adiposity, with a mean body weight of 92.4 ± 12.6 kg and mean BMI of 33.8 ± 3.9 kg/m². Central obesity was evident, as reflected by a mean waist circumference of 108.6 ± 9.4 cm. Type 2 diabetes mellitus was present in 70.8% of participants, with a mean disease duration of 6.2 ± 3.8 years, and was accompanied by suboptimal glycaemic control (mean HbA1c 8.4 ± 1.2%). Hypertension and dyslipidaemia were observed in 52.8% and 47.2% of participants, respectively, highlighting a metabolically high-risk Indian cohort [Table 1].

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants (n = 72).

Variable	Frequency (%)/mean ± SD
Age (years)	49.6 ± 9.8
Gender	
Male	42 (58.3%)
Female	30 (41.7%)
Body weight (kg)	92.4 ± 12.6
Body mass index (kg/m²)	33.8 ± 3.9
Waist circumference (cm)	108.6 ± 9.4
Type 2 diabetes mellitus	51 (70.8%)
Duration of diabetes (years)	6.2 ± 3.8

Hypertension	38 (52.8%)
Dyslipidaemia	34 (47.2%)
HbA1c (%)	8.4 ± 1.2
Fasting plasma glucose (mg/dL)	162.5 ± 38.6

BMI: body mass index; HbA1c: glycated hemoglobin.

Tirzepatide therapy resulted in a significant and progressive reduction in body weight, BMI, and waist circumference over the 12-month follow-up period. Mean body weight decreased from 92.4 ± 12.6 kg at baseline to 82.9 ± 11.8 kg at 6 months and further to 75.8 ± 11.2 kg at 12 months ($p < 0.001$). Correspondingly, BMI declined significantly from 33.8 ± 3.9 kg/m² to 27.8 ± 3.4 kg/m² at 12 months ($p < 0.001$). Waist circumference showed a marked reduction of over 16 cm by the end of follow-up ($p < 0.001$). Among participants with type 2 diabetes, HbA1c levels improved significantly from 8.4 ± 1.2% at baseline to 6.6 ± 0.8% at 12 months ($p < 0.001$) [Table 2].

Table 2: Changes in Anthropometric and Metabolic Parameters Over 12 Months of Tirzepatide Therapy (n = 72).

Parameter	Baseline	6 months	12 months	p value*
	mean ± SD			
Body weight (kg)	92.4 ± 12.6	82.9 ± 11.8	75.8 ± 11.2	<0.001
BMI (kg/m²)	33.8 ± 3.9	30.3 ± 3.6	27.8 ± 3.4	<0.001
Waist circumference (cm)	108.6 ± 9.4	99.2 ± 8.7	92.4 ± 8.3	<0.001
HbA1c (%)†	8.4 ± 1.2	7.1 ± 0.9	6.6 ± 0.8	<0.001

BMI: body mass index; HbA1c: glycated hemoglobin.

Analysis of body composition revealed that weight reduction with tirzepatide was predominantly driven by fat mass loss, with a comparatively smaller decline in lean compartments. Mean fat mass decreased significantly from 36.8 ± 8.4 kg at baseline to 23.6 ± 6.9 kg at 12 months ($p < 0.001$). Fat-free mass also declined modestly over time, from 55.6 ± 7.3 kg to 52.2 ± 6.9 kg ($p < 0.001$). Total skeletal muscle mass showed a statistically significant but numerically modest reduction from 28.4 ± 4.2 kg at baseline to 26.9 ± 4.0 kg at 12 months ($p = 0.003$). A similar pattern was observed for appendicular skeletal muscle mass, which declined from 21.6 ± 3.4 kg to 20.4 ± 3.2 kg over the study period ($p = 0.004$) [Table 3].

Table 3: Changes in Body Composition Parameters Assessed by Bioelectrical Impedance Analysis (n = 72).

Parameter	Baseline	6 months	12 months	p value*
	mean ± SD			
Fat mass (kg)	36.8 ± 8.4	29.4 ± 7.6	23.6 ± 6.9	<0.001
Fat-free mass (kg)	55.6 ± 7.3	53.5 ± 7.1	52.2 ± 6.9	<0.001
Total skeletal muscle mass (kg)	28.4 ± 4.2	27.6 ± 4.1	26.9 ± 4.0	0.003
Appendicular skeletal muscle mass (kg)	21.6 ± 3.4	21.0 ± 3.3	20.4 ± 3.2	0.004

*Repeated-measures ANOVA; Body composition assessed using multi-frequency bioelectrical impedance analysis.

At 12 months, the mean total weight loss was 16.6 ± 4.9 kg. Fat mass reduction accounted for the majority of this loss, with a mean decrease of 13.2 ± 4.2 kg, representing approximately 79.5% of total weight reduction. Fat-free mass loss contributed 20.5% of total weight loss (3.4 ± 1.6 kg). Importantly, the absolute loss of skeletal muscle mass was limited to 1.5 ± 0.9 kg, corresponding to only 9.0% of total weight loss, indicating preferential fat loss with relative preservation of skeletal muscle [Table 4].

Table 4: Relative Contribution of Fat Mass and Lean Mass to Total Weight Loss at 12 Months.

Parameter	Mean ± SD	Percentage Contribution
Total weight loss (kg)	16.6 ± 4.9	100%
Fat mass loss (kg)	13.2 ± 4.2	79.50%
Fat-free mass loss (kg)	3.4 ± 1.6	20.50%
Skeletal muscle loss (kg)	1.5 ± 0.9	9.00%

Percentages calculated relative to total weight loss at 12 months.

The skeletal muscle index (SMI) demonstrated a small but statistically significant decline during tirzepatide therapy. Mean SMI decreased from 8.12 ± 0.96 kg/m² at baseline to 7.98 ± 0.94 kg/m² at 6 months and further to 7.85 ± 0.92 kg/m² at 12 months ($p = 0.041$). Despite this reduction, the magnitude of change remained modest and did not reach thresholds suggestive of clinically significant sarcopenia in the majority of participants [Table 5].

Table 5: Changes in Skeletal Muscle Index (SMI) Over Study Period (n = 72).

Time point	SMI (kg/m²), mean ± SD
Baseline	8.12 ± 0.96
6 months	7.98 ± 0.94

12 months	7.85 ± 0.92
p value*	0.041

* Repeated-measures ANOVA; SMI calculated as appendicular skeletal muscle mass divided by height squared (kg/m²).

Correlation analysis demonstrated a moderate positive association between total weight loss and reduction in skeletal muscle mass ($r = 0.42$, $p < 0.001$), indicating that greater weight loss was accompanied by higher absolute muscle loss. Fat mass loss was also positively correlated with skeletal muscle loss ($r = 0.31$, $p = 0.008$). Improvement in glycaemic control, reflected by HbA1c reduction, showed a weaker but significant correlation with skeletal muscle loss ($r = 0.27$, $p = 0.02$). No statistically significant association was observed between final tirzepatide dose and skeletal muscle mass change ($r = −0.18$, $p = 0.11$) [Table 6].

Table 6: Correlation Between Change in Skeletal Muscle Mass and Key Clinical Variables at 12 Months.

Variable	Correlation coefficient (r)	p value
Total weight loss	0.42	<0.001
Fat mass loss	0.31	0.008
HbA1c reduction	0.27	0.02
Final tirzepatide dose	−0.18	0.11

Correlations assessed using Spearman's rank correlation coefficient (ρ); HbA1c: glycated hemoglobin.

DISCUSSION

This prospective observational study evaluated the effects of tirzepatide on skeletal muscle mass and body composition over 12 months in an Indian adult population with obesity and a high prevalence of type 2 diabetes mellitus. The principal findings indicate that tirzepatide induces substantial weight loss predominantly through fat mass reduction, while the accompanying loss of skeletal muscle mass is modest and constitutes a small proportion of total weight loss. These findings are clinically relevant given increasing concerns regarding sarcopenia and functional decline associated with pharmacologically induced weight reduction.[12,13]

The magnitude of weight loss observed in the present study (mean 16.6 ± 4.9 kg; approximately 18% of baseline body weight) is comparable to that reported by Gudzune et al., where tirzepatide-treated participants achieved 15–22.5% weight loss over 72 weeks.[14] Similarly, Khawaji et al. demonstrated superior weight reduction with tirzepatide compared with selective GLP-1 receptor agonists, with mean losses ranging from 8.5% to 13.1% depending on dose and population characteristics.[15] The slightly lower weight loss observed in this real-world cohort likely reflects heterogeneous dose escalation, variable adherence, and the distinct metabolic phenotype of Indian patients, who tend to exhibit greater visceral adiposity and insulin resistance at comparatively lower BMI thresholds.[16]

A major strength of the study is the detailed evaluation of body composition changes. Nearly 80% of total weight loss was attributable to fat mass reduction, while fat-free mass loss accounted for approximately 20%, and skeletal muscle loss constituted only 9% of total weight loss. These proportions compare favorably with caloric restriction and bariatric surgery studies, where lean mass losses of 25–40% of total weight reduction have been reported.[17] Post hoc DXA-based analyses by Look et al. reported that approximately 25% of tirzepatide-associated weight loss was attributable to lean mass reduction.[18] The lower proportion of skeletal muscle loss in the present study may reflect differences in ethnicity, baseline adiposity, lifestyle factors, and the use of bioelectrical impedance analysis rather than advanced imaging.

The absolute reduction in skeletal muscle mass (mean 1.5 ± 0.9 kg) and the modest decline in skeletal muscle index are consistent with prior incretin-based therapy studies. Koceva et al. and De Girolamo et al. reported lean mass reductions ranging from 1.2 to 2.8 kg over 12–18 months, generally proportional to the magnitude of weight loss achieved.[19,20] Importantly, in the present study, skeletal muscle index remained within clinically acceptable limits and did not approach thresholds used to define sarcopenia, supporting the muscle safety profile of tirzepatide.[21]

From a physiological perspective, loss of some lean mass is expected during any substantial weight reduction, as energy is mobilized from both adipose and lean tissue compartments. Greater absolute weight loss is typically associated with greater absolute lean mass loss, even when fat mass constitutes the majority of weight lost. With tirzepatide's potent appetite suppression and marked weight reduction, modest lean mass changes may therefore reflect the magnitude of weight loss rather than a direct catabolic effect on muscle tissue. To date, there is no evidence that tirzepatide exerts muscle-specific catabolic effects beyond those expected from caloric restriction alone. The proportion of lean versus fat mass loss is influenced by baseline body composition, rate of weight loss, protein intake, physical activity, and individual metabolic characteristics, with individuals having higher baseline adiposity generally losing a greater proportion of fat mass.

Mechanistically, tirzepatide's dual glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) receptor agonism

may favor muscle preservation through improved insulin sensitivity, enhanced amino acid uptake, suppression of proteolysis, and reductions in glucotoxicity and systemic inflammation.[22] Experimental work by Liu et al. suggests that GIP signaling may exert anabolic or muscle-sparing effects through insulin-mediated pathways, although robust human data remain limited.[23] The absence of structured resistance training in this study likely contributed to the modest muscle loss observed and underscores the importance of adjunct lifestyle strategies.

Correlation analyses further contextualized these findings. The moderate association between total weight loss and skeletal muscle loss aligns with observations by Khawaji et al. and Bergman et al., where greater weight reduction was associated with higher absolute lean mass loss without consistent evidence of adverse functional outcomes.[15,24] The weak association between HbA1c reduction and muscle loss likely reflects global metabolic improvement rather than direct muscle degradation. The lack of association between final tirzepatide dose and muscle loss suggests that skeletal muscle changes are driven primarily by caloric deficit and total weight loss rather than pharmacological dose intensity, consistent with findings reported by Gibble et al.[25]

Importantly, recent MRI-based evidence from the SURPASS-3 trial demonstrated that tirzepatide reduces intramuscular adipose tissue and improves muscle composition despite modest reductions in muscle volume.[28] Conventional bioelectrical impedance analysis cannot differentiate contractile muscle from intramuscular fat and may therefore overestimate true muscle loss. Thus, the observed reduction in skeletal muscle mass in this study may partly represent favorable muscle remodeling rather than pathological muscle wasting. Contemporary definitions of sarcopenia emphasize muscle strength and function rather than mass alone, and modest reductions in muscle mass may not translate into functional impairment when muscle quality and insulin sensitivity improve.

Clinical Implications: In the Indian context, where sarcopenic obesity is increasingly recognized due to early insulin resistance, physical inactivity, and suboptimal protein intake, preservation of skeletal muscle is critical.[26] The findings support the metabolic safety of tirzepatide but also highlight the importance of integrating resistance training and nutritional optimization. Adequate protein intake (approximately 1.2–1.6 g/kg/day), evenly distributed across meals (20–30 g per meal), combined with resistance exercise targeting major muscle groups, is essential to stimulate muscle protein synthesis and counteract the catabolic effects of energy restriction.[27]

Limitations: This study has limitations. The observational design without a comparator group limits causal inference. Body composition was assessed using bioelectrical impedance analysis rather than DXA or MRI, which may be influenced by hydration status and cannot assess muscle quality. Functional outcomes such as muscle strength were not evaluated. Dietary intake and physical activity were not quantified, and therefore their influence on lean mass changes could not be adjusted for. The single-center design and predominance of middle-aged participants may limit generalizability. Finally, longer-term follow-up is required to assess durability of skeletal muscle preservation and functional outcomes.

CONCLUSION

In conclusion, this prospective observational study demonstrates that tirzepatide induces substantial and clinically meaningful weight loss in adults with obesity and type 2 diabetes mellitus, with the majority of weight reduction attributable to fat mass loss. Although a statistically significant decline in skeletal muscle mass was observed over 12 months, the absolute magnitude of muscle loss was modest and constituted a small proportion of total weight loss, with preservation of skeletal muscle index within clinically acceptable limits. These findings suggest that tirzepatide promotes a favorable body composition profile characterized by fat-dominant weight loss with relative preservation of skeletal muscle in a real-world Indian population. Given the rising burden of obesity, diabetes, and sarcopenic obesity in South Asia, tirzepatide appears to be a metabolically balanced therapeutic option when used in routine clinical practice. Incorporation of resistance exercise and adequate dietary protein intake may further optimize skeletal muscle preservation during therapy. Future randomized and long-term studies incorporating functional outcomes and objective measures of muscle quality are warranted to fully define the role of tirzepatide in comprehensive obesity and diabetes management.

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