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Effect of Ginger Supplementation on Waist Circumference and Body Composition in Overweight and Obese Adults in Jazan, Saudi Arabia: A Quasi-Experimental Trial

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Abstract
Overweight and obesity are major public health challenges associated with increased cardiometabolic risk. This quasi-experimental trial investigated the short-term effects of ginger supplementation on waist circumference, body weight, and body composition among overweight and obese adults living in Jazan, Saudi Arabia. Fifty participants received 3 g/day powdered ginger in capsule form for 4 weeks while maintaining their usual diet and physical activity. Anthropometric and body composition parameters were assessed at baseline and after the intervention. Waist circumference decreased significantly after supplementation ($p = 0.024$), whereas body weight, body mass index, body fat percentage, fat mass, lean mass, and basal metabolic rate did not change significantly (all $p > 0.05$). These findings suggest that short-term ginger supplementation may preferentially influence central adiposity rather than overall body weight. Longer controlled trials are needed to confirm these findings and clarify their clinical relevance.

Keywords: supplementation; central adiposity; metabolic health; anthropometry; phytotherapy.

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1. Introduction

Obesity has emerged as one of the most pressing global health challenges of the twenty-first century and is associated with substantial cardiometabolic morbidity and mortality (World Health Organization, 2024; Ward et al., 2019). In Saudi Arabia, the burden of overweight and obesity remains high, underscoring the need for safe and acceptable interventions that can be integrated into routine care (Al-Omar et al., 2024). Lifestyle modification through dietary control and physical activity remains the cornerstone of obesity management; however, there is increasing interest in functional foods, herbs, and phytochemical-based adjuncts that may support weight management and metabolic health (Das et al., 2025; Payab et al., 2020; Ofoezie et al., 2025). Ginger (Zingiber officinale) is among the most widely studied medicinal plants in this context because of its bioactive compounds and proposed anti-inflammatory and metabolic effects (Dissanayake, 2020; Ballester et al., 2022).

Recent human trials and evidence syntheses suggest that ginger supplementation may improve selected obesity-related outcomes, particularly central adiposity indices, although findings for body weight and BMI remain inconsistent across studies (Rafieipour et al., 2024; Rjabi et al., 2025; Maharlouei et al., 2019). This inconsistency may reflect differences in dose, intervention duration, participant characteristics, and concomitant lifestyle measures (Ebrahimzadeh Attari et al., 2018; Park et al., 2020).

Accordingly, the present quasi-experimental trial was conducted to investigate the short-term effect of ginger supplementation on waist circumference, body weight, and body composition among overweight and obese adults living in Jazan, Saudi Arabia, with particular attention to whether a 4-week intervention might influence central adiposity.

2. Methods

Study design. This quasi-experimental trial was conducted in Jazan, Saudi Arabia. The study examined the effect of 4 weeks of ginger supplementation on anthropometric and body composition outcomes in a single-group pre–post treatment.

Participants. Fifty overweight and obese male and female adults aged 18–50 years were enrolled. Eligibility was based on a body mass index (BMI) of 30 kg/m² or higher. The sample size was estimated with reference to a previous intervention study on ginger supplementation in obesity-related outcomes (Ebrahimzadeh Attari et al., 2015).50 participants were recruited through a social media announcement distributed across Jazan city.

Inclusion and exclusion criteria. Adults aged 18–50 years with overweight or obesity who agreed to participate were eligible. Exclusion criteria included age younger than 18 years or older than 50 years, BMI greater than 40 kg/m², clinically diagnosed diabetes mellitus, cardiovascular disease, hypo- or hyperthyroidism, gallstones, severe depression, pregnancy, breastfeeding, current weight-reduction dieting, medications that could influence body weight, high physical activity levels, smoking, use of nutritional supplements, and hypersensitivity to ginger.

Intervention. The active supplement was powdered ginger in capsule form (Natures Aid, Ginger Root, 500 mg, 90 capsules), purchased from Alnahdi Pharmacy in Jazan, Saudi Arabia. Each participant received one container and was instructed to take two capsules after each of the three main meals daily, equivalent to 3 g/day of ginger, for 4 weeks. Participants were also instructed to maintain their usual dietary habits and physical activity levels throughout the intervention period.

Outcome measures. Anthropometric measurements were obtained by the same technician. Height, body weight, waist circumference, and hip circumference were measured with the participants barefoot. Waist circumference was measured at the midpoint between the lower border of the rib cage and the iliac crest. BMI was calculated as weight in kilograms divided by height in meters squared. Body composition variables, including fat percentage, fat mass (kg), lean percentage, lean mass (kg), and basal metabolic rate (BMR), were assessed using a body fat analyzer. All outcomes were measured at baseline and after 4 weeks of supplementation.

Ethical considerations. Each participant received an information sheet and provided informed consent before participation. Participants were informed of the study purpose, confidentiality procedures, and their right to withdraw at any time without penalty. Ethical approval was obtained from the Standing Committee for Scientific Research, Jazan University (HAPO-10-Z-001), Reference No. REC-44/07/538.

Statistical analysis. Data were analyzed using SPSS version 20 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were expressed as mean ± standard deviation (SD). Because the study used a single-group pre–post design, within-group comparisons were performed using paired-sample t-tests. Participant-reported symptoms were summarized as frequencies and percentages. Statistical significance was set at $p < 0.05$.

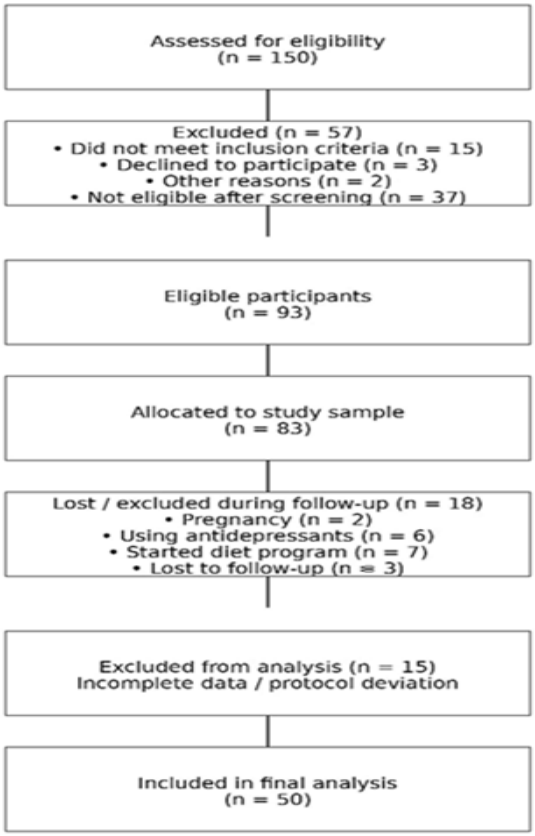


Figure 1. CONSORT flowchart summarizing participant enrollment and study progression.

3. Results

Baseline characteristics of the participants are presented in Table 1. The mean age of the participants was 31.58 ± 10.25 years. At baseline, the mean body weight was 86.54 ± 17.08 kg, the mean waist circumference was 95.01 ± 13.76 cm, and the mean BMI was 32.93 ± 5.09 kg/m².

Table 1. Baseline characteristics of the participants.

Variable	n	Mean	SD
Age	50	31.58	10.25
Body weight (kg)	50	86.54	17.08
Waist circumference (cm)	50	95.01	13.76
BMI (kg/m²)	50	32.93	5.09
Body fat (%)	50	39.51	7.81
Lean percentage (%)	50	60.40	7.43
Lean mass (kg)	50	50.94	12.76
Fat mass (kg)	50	34.20	12.24
BMR (kcal/day)	50	1564.44	401.04

Note. Values are expressed as mean ± SD. Baseline data are shown for participants who completed the study.

Changes in anthropometric and body composition outcomes after 4 weeks of supplementation are shown in Table 2. A statistically significant reduction was observed only in waist circumference (95.01 ± 13.76 cm at baseline vs. 89.03 ± 12.95 cm after intervention; mean change = −5.98 cm; $p = 0.024$). In contrast, body weight, BMI, body fat percentage, fat mass, lean percentage, lean mass, and basal metabolic rate did not change significantly (all $p > 0.05$).

Table 2. Pre–post changes in anthropometric and body composition outcomes after ginger supplementation.

Outcome	Baseline, mean ± SD	Post-intervention, mean ± SD	Mean change	p value
Body weight (kg)	86.54 ± 17.08	86.51 ± 17.06	−0.03	0.857
Waist circumference (cm)	95.01 ± 13.76	89.03 ± 12.95	−5.98	0.024
BMI (kg/m²)	32.93 ± 5.09	32.91 ± 5.02	−0.02	0.789
Body fat (%)	39.51 ± 7.81	39.35 ± 9.27	−0.16	0.811
Fat mass (kg)	34.20 ± 11.21	34.48 ± 12.49	+0.28	0.588
Lean percentage (%)	60.40 ± 7.43	60.28 ± 9.18	−0.12	0.874
Lean mass (kg)	50.94 ± 10.63	52.05 ± 11.65	+1.11	0.273
BMR (kcal/day)	1564.44 ± 401.32	1592.64 ± 332.94	+28.20	0.472

Note. Within-group pre–post comparisons were performed using paired-sample t-tests. Mean change was calculated as post-intervention minus baseline. Statistical significance was set at $p < 0.05$. BMI, body mass index; BMR, basal metabolic rate; SD, standard deviation.

Participant-reported gastrointestinal and appetite-related symptoms are summarized in Table 3 as frequencies and percentages. Satiety was reported by 22 participants (44%), whereas nausea was uncommon. Improvement in digestion was reported by 32 participants (64%). Heartburn was the most frequently reported gastrointestinal complaint, occurring in 20 participants (40%), while diarrhea was reported by 10 participants (20%).

Table 3. Participant-reported symptoms during the intervention period, n (%).

Symptom	Yes, n (%)	Sometimes, n (%)	No, n (%)
Satiety	22 (44)	13 (26)	15 (30)
Nausea	3 (6)	3 (6)	44 (88)
Heartburn	20 (40)	18 (36)	12 (24)
Diarrhea	10 (20)	6 (12)	34 (68)
Constipation	7 (14)	0 (0)	43 (86)
Gas	6 (12)	4 (8)	40 (80)
Improved digestion	32 (64)	5 (10)	13 (26)

Discussion

The present quasi-experimental study examined the short-term effects of ginger supplementation (3 g/day for 4 weeks) on anthropometric and body composition outcomes in overweight and obese adults living in Jazan, Saudi Arabia. The principal finding was a statistically significant reduction in waist circumference. In contrast, body weight, body mass index (BMI), body fat percentage, lean mass, and basal metabolic rate (BMR) did not change significantly. This pattern suggests that ginger supplementation may exert a more detectable effect on central adiposity than on total body weight during short intervention periods. From a clinical perspective, this observation is relevant because waist circumference is more closely linked to visceral adiposity and cardiometabolic risk than body weight alone (Rafieipour et al., 2024; Rjabi et al., 2025).

The current findings are generally consistent with recent systematic reviews and dose–response meta-analyses showing that ginger supplementation can improve some indices of central obesity, particularly waist circumference, while effects on body weight and BMI are smaller and less consistent across trials (Rafieipour et al., 2024; Rjabi et al., 2025). In the present study, the significant reduction in waist circumference, in the absence of significant changes in overall body weight or body composition, may indicate an early effect on abdominal fat distribution rather than a substantial reduction in total adiposity. Such an interpretation is reasonable because central fat depots are metabolically active and may respond earlier than total body mass to dietary bioactive compounds.

The lack of statistically significant changes in body weight and BMI should be interpreted in light of the design characteristics of the present study. First, the intervention period was only 4 weeks, which may have been insufficient to produce measurable changes in total body mass. Second, the administered dose was moderate compared with some studies that reported broader anthropometric improvements after longer

supplementation periods or different preparations of ginger (Maharlouei et al., 2019; Park et al., 2020). Third, participants were instructed to maintain their habitual diet and physical activity, and no structured caloric restriction or exercise program was introduced. This is important because prior studies suggest that the influence of ginger on weight-related outcomes may be enhanced when supplementation is combined with lifestyle modification or structured exercise (Atashak et al., 2011; Payab et al., 2020).

While previous studies have proposed several biological mechanisms to explain the observed reduction in waist circumference, these remain hypothetical in the context of the present study, as no biochemical markers were measured

Ginger contains bioactive constituents, particularly gingerols and shogaols, that have been linked to thermogenesis, enhanced fat oxidation, modulation of adipocyte metabolism, and improvements in insulin sensitivity (Ballester et al., 2022; Ebrahimzadeh Attari et al., 2018). Experimental and clinical evidence also suggests that ginger may influence appetite regulation and satiety, which could contribute to a gradual reduction in abdominal adiposity even in the absence of marked short-term weight loss (Mansour et al., 2012; Aregawi et al., 2023). Therefore, the present findings may reflect an early metabolic effect of ginger on fat distribution rather than a direct and immediate effect on overall body mass.

In contrast to the significant change in waist circumference, no significant changes were observed in body fat percentage, fat mass, lean mass, or lean percentage. This finding is also in line with previous literature indicating that ginger supplementation alone does not consistently improve whole-body composition over short durations (Ebrahimzadeh Attari et al., 2016; Maharlouei et al., 2019). The slight numerical increase in lean mass observed in the present study should therefore be interpreted cautiously, as it may reflect normal biological variation, device-related measurement variability, or hydration-related changes rather than a true anabolic effect. More pronounced changes in body composition are more likely to occur in studies with longer follow-up, larger samples, and controlled co-interventions such as dietary restriction or resistance training.

The absence of a significant effect on BMR is likewise understandable. Although ginger has been associated with thermogenic and fat-oxidation effects, these responses are often modest and may not be sufficient to produce measurable changes in resting metabolic rate over a short intervention period (Braga Tibaes et al., 2022; Mahluji et al., 2013). The discrepancy between mechanistic expectations and clinical outcomes may be related to dosage, intervention duration, inter-individual metabolic variability, and compensatory physiological responses. Accordingly, the current results support the view that ginger may have subtle metabolic effects, but these effects may not have resulted in statistically significant changes in resting energy expenditure within 4 weeks.

The participant-reported symptom profile provides additional practical insight into tolerability. In the present study, some participants reported increased satiety and improved digestion, findings that are consistent with prior reports suggesting that ginger may enhance gastric motility and promote subjective fullness (Mansour et al., 2012; Aregawi et al., 2023). At the same time, mild gastrointestinal complaints such as heartburn and diarrhea were reported by a subset of participants. These findings should not be ignored; instead, they suggest that ginger was generally acceptable but was associated with mild gastrointestinal side effects in some individuals. This interpretation is more accurate than describing the supplement as completely free of adverse effects and is supported by previous reviews and trials documenting mixed gastrointestinal responses to ginger supplementation (Anh et al., 2020; Estes et al., 2025; Foshati et al., 2023).

From a clinical standpoint, the present findings suggest that ginger supplementation may be considered a complementary dietary strategy for targeting central obesity, particularly abdominal adiposity, which is strongly associated with metabolic and cardiovascular risk. However, the results should be interpreted cautiously because the study used a single-group quasi-experimental design without a control group. Consequently, the observed changes cannot be attributed exclusively to the intervention with the same confidence as in a randomized controlled trial. Nevertheless, the findings remain clinically informative because they provide preliminary local evidence from an understudied population in Jazan and may help guide future intervention research in Saudi Arabia.

This study has several strengths, including its focus on an important public health issue, the use of a clearly defined supplementation protocol, and the assessment of multiple anthropometric and body composition outcomes. It also adds region-specific evidence on ginger supplementation in overweight and obese adults. However, several limitations should be acknowledged. These include the absence of a control group, the relatively short intervention period, the modest sample size, the lack of dietary intake monitoring, and the absence of biochemical markers such as lipid profile, inflammatory markers, glucose homeostasis indices, leptin, or adiponectin. These limitations reduce mechanistic interpretation and limit causal inference. Future studies should therefore adopt randomized controlled designs, longer follow-up periods, tighter dietary monitoring,

and broader metabolic profiling to clarify whether the reduction in waist circumference is sustained and whether it translates into meaningful cardiometabolic benefits.

4. Conclusion

In conclusion, short-term supplementation with 3 g/day ginger was associated with a significant reduction in waist circumference in overweight and obese adults, without significant changes in body weight or other body composition variables. Ginger may therefore be considered a complementary strategy targeting central adiposity, although larger and better-controlled studies are required before firm clinical recommendations can be made.

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