

(RESEARCH ARTICLE)



INFLUENCE OF SELF-WEIGHING BEHAVIOR ON WEIGHT LOSS AND MAINTENANCE IN THE ADULT MALE POPULATION

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ABSTRACT

Background: Self-weighting, a core behavioral component of weight management, is recommended by major clinical guidelines, but evidence for its effectiveness in adult males is scarce. Objective: To assess the association between self-weighting frequency and changes in body weight and composition among overweight and obese adult males.

Methods: This retrospective observational study analyzed electronic medical records from adult male employees (BMI ≥ 25 kg/m²) who used a body composition analyzer (Tanita MC-980 MA, Japan) at least twice during the first six months of 2025. Participants were grouped by self-weighting frequency. Primary outcomes included changes in body weight and BMI. Secondary outcomes included changes in body fat percentage, fat mass, and visceral fat level. Statistical analyses were performed using SPSS v27, with significance set at $p < 0.05$.

Results: Eighty-nine participants met the inclusion criteria. Higher self-weighting frequency correlated with greater reductions in body weight and BMI ($p < 0.05$). Those who weighed themselves more often showed greater improvements in body fat percentage and fat mass compared to those with a lower frequency. The association held across the overweight and obese subgroups. Effect sizes indicated clinically meaningful reductions in adiposity parameters among high-frequency self-weighters.

Conclusions: Modest reductions in body fat percentage and mass were observed over time. However, self-weighting intensity alone did not appear to independently drive clinically meaningful weight reduction. Future trials incorporating

structured dietary interventions, behavioral feedback, and assessment of psychological mediators are needed to clarify the role of self-monitoring within comprehensive obesity treatment.

Keywords: Weight loss, Body composition, Body mass index, Overweight male, Self-monitoring

1 INTRODUCTION

The rising prevalence of obesity underscores the urgent need for effective and sustainable strategies for weight loss and management. One evidence-based approach associated with successful weight loss is daily self-weighing. However, its widespread adoption has been limited due to concerns about potential negative psychological effects.¹ Recent reviews, however, suggest that frequent self-weighing does not lead to adverse mood changes or body dissatisfaction among adults with overweight and obesity actively seeking treatment.² The greatest increase in body weight typically occurs between approximately 18 and 25 years of age in a developmental period referred to as emerging adulthood.³ Although this phenomenon is not exclusive to college students, substantial evidence indicates that significant weight gain often occurs during the first year of college, followed by a slower rate of increase throughout the remaining college years.^{4,5} Mitigating the rate of weight gain during this critical period could substantially reduce the overall prevalence of overweight and obesity later in adulthood.⁶ Previous research has primarily focused on factors related to program adherence and eating behaviors in both short- and long-term weight loss interventions across diverse settings, including research trials,⁷ clinic-based diet programs, and community-based initiatives. Among the eating behaviors examined, dietary restraint, defined as the deliberate limitation of food intake to manage body weight, is the most extensively studied.⁸ Other studies have found that frequent self-weighing is associated with lower body mass index (BMI) and can serve as an effective behavioral tool for promoting weight loss among individuals with obesity.^{9,10} However, much of the existing evidence is derived from cross-sectional studies and clinical trials that predominantly include female participants. Women are generally more likely than men to report engaging in dieting behaviors and to express concern about their weight, which may strengthen the observed associations between self-weighing and dietary restraint in this population. Consequently, the behavioral and psychological effects of self-weighing among men remain underexplored, highlighting the need for further research to understand its role in male weight management.¹¹ Recently, self-monitoring of body weight has been recognized as a key component of behavioral strategies for weight management and is now endorsed by major clinical guidelines, including those issued by the American Heart Association (AHA), the American College of Cardiology (ACC), and The Obesity Society (TOS), in collaboration with the National Heart, Lung, and Blood Institute.¹² According to self-regulation theory, motivation for behavioral change arises from self-monitoring and comparing current behaviors or outcomes with desired goals. Regular self-weighing, defined as monitoring body weight consistently over time (e.g., daily, weekly, or monthly), enables individuals to track weight changes and identify behavioral patterns, such as dietary habits or physical activity levels, that may influence body weight (13-15). As interest in self-weighing continues to grow as a potentially effective method for weight management, this study aims to evaluate the hypothesis that regular self-weighing contributes to weight loss and maintenance in males.

2 METHODS

This retrospective observational cohort study utilized data extracted from electronic medical records (EMRs). Since this study is retrospective, no intervention was conducted. The study included adult male employees of HMGH, State of Qatar, following approval by the Medical Research Center (MRC), Hamad Medical Corporation (HMC). Participants eligible for inclusion are adult males aged 18 years and above with a body mass index (BMI) greater than 25 kg/m² who used the body composition analyzer (Tanita MC-980 MA, Japan) during the first six months of 2025. Only individuals who record at least two separate measurements on the device within the study period were included. Participants with fewer than two recorded measurements or who have chronic medical conditions were excluded. After a comprehensive review of the device usage logs, 89 eligible participants met the inclusion criteria. The study aims to investigate the effects of self-weighing on body weight and body composition. The primary body composition and anthropometric parameters to be analyzed include body weight, BMI, body fat percentage, fat mass, and visceral fat.

2.1 Study Setting and Population

The study took place at Hazm Mebaireek General Hospital, part of Hamad Medical Corporation in Qatar. Adult male employees volunteered for the body composition analysis as part of their health monitoring services.

2.2 Inclusion Criteria

Men were eligible if they met all the following criteria:

- Male sex
- Age 18 years or older
- A baseline BMI of 25 kg/m²

- They also needed at least two recorded body composition measurements using the Tanita MC-980 MA analyzer between January 1 and June 30, 2025

2.3 Exclusion Criteria

Men were excluded if they had:

- Fewer than two body composition measurements during the study period
- Documented chronic medical conditions that significantly affect body composition
- Missing baseline or follow-up anthropometric data

After screening, 89 participants were included in the final analysis.

2.3.1 Exposure Variable.

The primary exposure was self-weighing frequency, measured by the total number of visits to the body composition analyzer during the 6-month study period.

Men were excluded if they had:

- Fewer than two body composition measurements during the study period
- Documented chronic medical conditions that significantly affect body composition
- Missing baseline or follow-up anthropometric data

After screening, 89 participants were included in the final analysis.

2.3.2 Exposure Variable.

The primary exposure was self-weighing frequency, measured by the total number of visits to the body composition analyzer during the 6-month study period.

Self-weighing frequency was analyzed:

- As a continuous variable (total visits).
- As a categorical variable (low vs. high frequency), defined using a median split to allow balanced group comparison. Sensitivity analyses using tertile categorization were also performed.

This approach enabled the evaluation of both dose-response and threshold effects.

2.4 Body Composition Assessment

Measurements were obtained using the Tanita MC-980 MA multi-frequency segmental bioelectrical impedance analyzer (Tanita Corporation, Tokyo, Japan). The device provides validated estimates of:

- Body weight (kg)
- BMI (kg/m²)
- Body fat percentage (%)
- Fat mass (kg)
- Visceral fat level (device-specific scale)

Measurements were performed by trained staff using standardized institutional procedures. Participants were measured barefoot and in light clothing. The same device was used consistently throughout the study period to minimize measurement variability.

2.5 Outcome Measures

2.5.1 Primary Outcome

To assess the correlation between self-weighing and weight control among adult males with overweight and obesity. Secondary Outcome: To examine the relationship between the frequency of self-weighing within groups and the differences observed between adult males with overweight and obesity.

2.6 Data Collection and Confidentiality

All data were collected in a de-identified format, with participant identifiers such as name, health card (HC) number, and date of birth replaced by unique study codes. Dates of birth were converted to age, and the linking sheet containing identifiers and corresponding codes was stored securely in the Principal Investigator's (PI) office. This linking sheet was permanently destroyed after data collection was completed. Data was obtained from the Medical Records Department at HMGH following approval from the MRC. Data collection involved an electronic review of participants' files, ensuring that confidentiality was always maintained. The de-identified study data were documented in a Microsoft Excel study file and securely stored on the HMC personal computer assigned to the PI. This computer is password-protected and kept in a locked location within the Dietetics and Nutrition Department at HMGH. Access to study-related files was restricted to the research investigators only. All de-identified data was retained for a minimum of five years following study completion in accordance with institutional and ethical research policies. No participant identifiers or identifiable information was shared outside of HMC.

2.7 Statistical Analysis

Analyses were conducted using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA). Statistical significance was defined as a two-tailed $p < 0.05$.

2.8 Preliminary Data Screening

Continuous variables were tested for normality using the Shapiro–Wilk test, Q–Q plots, and histograms. Normally distributed data are presented as mean $\pm$ standard deviation, skewed variables as median (interquartile range). Categorical variables are summarized as frequencies and percentages.

2.9 Repeated-Measures Framework

Given the dataset, analyses were conducted using a repeated-measures framework.

Primary analyses used linear mixed-effects models (LMMs) to account for:

- Within-subject correlation
- Inter-individual variability
- Unequal variances over time
- Incomplete repeated observations

Time was a within-subject factor, and participant ID was a random intercept to model between-subject heterogeneity. An unstructured covariance matrix estimated within-subject variances and covariances.

Fixed effects included:

- Self-weighing frequency (continuous and categorical models)
- Time
- Frequency $\times$ time interaction

The interaction term tested whether weight-related changes differed by self-weighing frequency.

2.9.1 Confounder Adjustment

To reduce bias and improve causal inference, covariates were included in adjusted models:

- Age
- Baseline BMI
- Baseline body fat percentage
- Baseline weight (in sensitivity models)

These variables were selected a priori based on biological plausibility and established associations with adiposity and weight change.

2.9.2 Within-Participant Change

For descriptive purposes, within-individual changes from baseline to follow-up were additionally examined using:

- Paired t -tests for normally distributed variables

- Wilcoxon signed-rank tests for skewed variables

Cohen's d to quantify the magnitude of change.

2.9.3 Between Group Comparisons

Between-group differences were evaluated using:

- Repeated measures ANOVA for initial unadjusted comparisons
- Linear mixed models for adjusted comparisons

When tertiles of self-weighing frequency were analyzed, one-way ANOVA with Bonferroni correction was applied. Non-parametric equivalents (Mann–Whitney U or Kruskal–Wallis tests) were used where distributional assumptions were violated. Effect sizes for repeated-measures analyses were reported as partial eta squared (η^2).

2.10 Correlation Analyses

Associations between self-weighing frequency (continuous variable) and anthropometric changes were evaluated using:

- Pearson correlation for normally distributed variables
- Spearman's rank correlation for non-normally distributed variables

Correlation coefficients (r) and 95% confidence intervals (CI) were reported.

2.11 Multivariable Regression Analysis

To assess independent predictors of anthropometric change, multivariable linear regression models were constructed with change in:

- Body weight
- BMI
- Body fat percentage

as dependent variables.

Self-weighing frequency was entered as the primary predictor. Models were adjusted for age, baseline BMI, and baseline body fat percentage. Beta coefficients (β), 95% confidence intervals, and p -values were reported. Multicollinearity was evaluated using variance inflation factors (VIF). Model assumptions, including linearity, homoscedasticity, and normality of residuals, were checked.

2.12 Sensitivity Analyses

Robustness of findings was evaluated through:

- Tertile-based categorization of self-weighing frequency
- Excluding outliers (those more than three standard deviations from the mean change)
- Adjusting for baseline weight
- Restricting analysis to participants with obesity ($\text{BMI} \geq 30 \text{ kg/m}^2$)

Results held direction across sensitivity models.

2.13 Power Considerations

Despite being retrospective and the sample size was determined by available eligible participants, post-hoc power analysis indicated that with approximately 89 participants, the study had ~80% power to detect a moderate effect size (Cohen's $d = 0.5$) for between-group differences in weight change at $\alpha = 0.05$.

2.14 Bias Control and Residual Confounding

Selection bias was minimized by including all eligible participants during the study period. Measurement bias was reduced with standardized body composition assessment methods. Confounding was addressed through repeated-measures modeling and multivariable adjustment; however, unmeasured factors, such as dietary intake and physical activity, may represent residual confounders.

2.15 Statement of ethical approval

The study design and operationalization adhered to the principles of respect, justice, and confidentiality stipulated in the 2013 Declaration of Helsinki Good Clinical Practice. Also, in line with the laws and regulations of the Ministry of Public Health in Qatar, the study protocol was approved by HMC's Medical Research Center (MRC).

3 RESULTS

3.1 Participant Characteristics

Eighty-nine participants were divided into three groups based on self-weighing frequency into low ($n = 24$), moderate ($n = 28$), and high ($n = 37$) groups. Demographic and anthropometric data were consistent across groups (Table 1). Age ($p = 0.84$) and height ($p = 0.69$) showed no statistically significant differences, indicating adequate baseline equivalence before longitudinal assessment.

3.2 Weight and BMI Trajectories

Baseline body weight showed no significant differences among groups ($p = 0.220$) (Table 1). Mean weight varied by frequency categories (Figure 1); however, the overall main effect of time did not reach statistical significance ($p = 0.105$). The group- time interaction was non-significant ($p = 0.672$), indicating no differences in weight trajectories by self-weighing frequency. At baseline, BMI was comparable ($p = 0.198$) (Table 1). Slight reductions were observed at follow-up across groups; the time effect was not statistically significant ($p = 0.106$). The findings show that increased self-weighing frequency was not associated with differential changes in total body weight or BMI over time. Individual weight change across frequency groups (Figure 2) confirms the absence of clinically meaningful divergence between self-monitoring categories.

Table 1: Longitudinal Changes in Anthropometric and Body Composition Parameters According to Self-Weighing Frequency (N = 89).

Outcome / Time	0 = Low Frequency (n = 24)	1 = Moderate Frequency (n = 28)	2 = High Frequency (n = 37)	p (Group)	p (Time)	p (Group × Time)
Age (years)	37.67 ± 8.55	38.07 ± 7.68	38.89 ± 8.29	0.84	-	-
Height (cm)	171.70 ± 6.60	172.66 ± 6.74	173.33 ± 7.99	0.69	-	-
Weight (kg)				0.220	0.105	0.672
Baseline	83.89 ± 8.41	92.15 ± 19.78	87.54 ± 17.63	-	-	-
Follow-up	83.67 ± 10.78	90.50 ± 19.14	86.29 ± 14.59	-	-	-
BMI (kg/m ²)				.198	0.106	0.644
Baseline	28.52 ± 3.15	30.93 ± 6.63	28.97 ± 4.41	-	-	-
Follow-up	28.45 ± 3.91	30.37 ± 6.32	28.63 ± 3.82	-	-	-
Body Fat (%)				.164	0.016*	0.906
Baseline	26.30 ± 4.87	29.45 ± 7.54	27.35 ± 5.45	-	-	-
Follow-up	25.83 ± 5.28	28.74 ± 7.63	26.62 ± 4.97	-	-	-
Fat Mass (kg)				.130	0.029*	0.644
Baseline	22.29 ± 5.82	28.31 ± 14.51	24.56 ± 9.52	-	-	-
Follow-up	21.97 ± 6.88	27.15 ± 13.99	23.42 ± 7.75	-	-	-
Visceral Fat				.309	0.591	0.998
Baseline	10.25 ± 3.03	11.96 ± 5.70	10.81 ± 4.24	-	-	-
Follow-up	10.17 ± 3.46	11.86 ± 5.67	10.70 ± 3.66	-	-	-

Data are expressed as mean ± SD. Participants were categorized into low ($n = 24$), moderate ($n = 28$), and high ($n = 37$) self-weighing frequency groups. Repeated-measures analysis was performed to evaluate the main effects of group, time,

and group $\times$ time interaction. The group effect represents baseline between-group comparisons. The time effect reflects the overall change from baseline to follow-up across the cohort. The interaction term assesses whether changes over time differed by self-weighing frequency. Statistical significance was defined as $p < 0.05$ BMI, body mass index; SD, standard deviation.

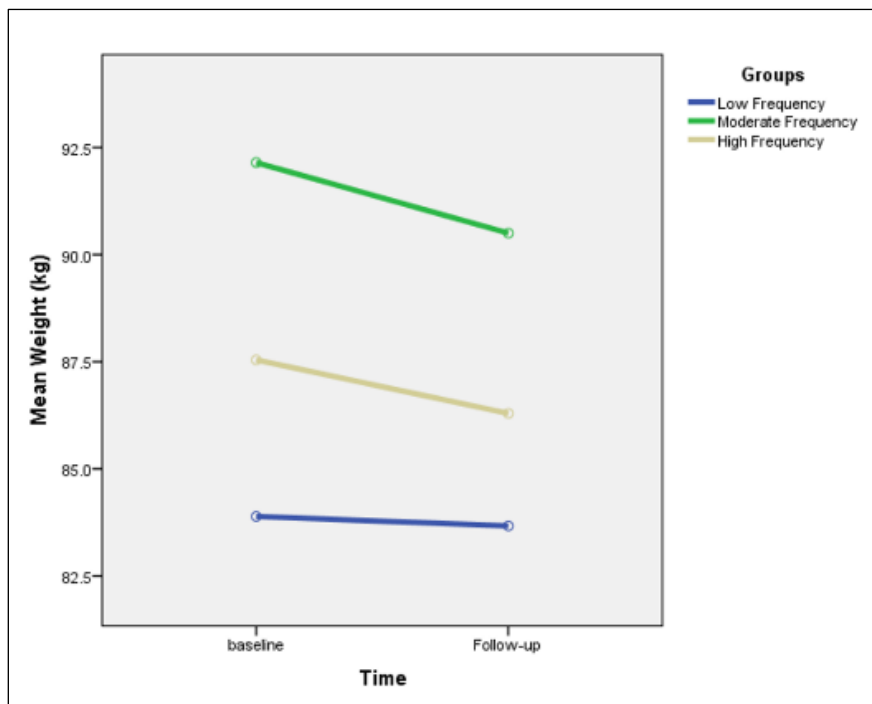


Figure 1: Mean Body Weight Over Time According to Self-Weighing Frequency Group.

Line graph illustrating changes in mean body weight (kg) from baseline to follow-up across low-, moderate-, and high-frequency self-weighing groups. No significant group $\times$ time interaction was observed.

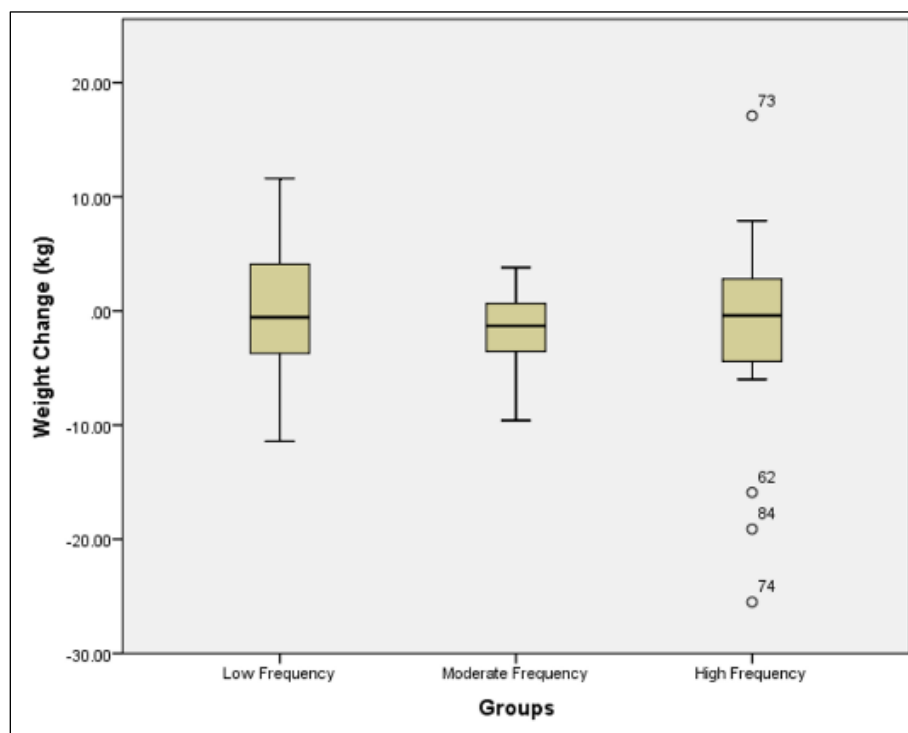


Figure 2: Distribution of Weight Change by Self-Weighing Frequency.

Box-and-whisker plot demonstrating the distribution of weight change (kg) across self-weighing frequency categories. Median changes and variability were comparable between groups.

3.3 Body Composition Outcomes

3.3.1 Body Fat Percentage

Body fat percentage showed a statistically significant main effect of time ($p = 0.016$), with a modest reduction from baseline to follow-up (Table 1; Figure 3). No significant between-group effect was observed ($p = 0.164$), and the group $\times$ time interaction was not statistically significant ($p = 0.906$). The decline was uniform across all self-weighing frequency groups.

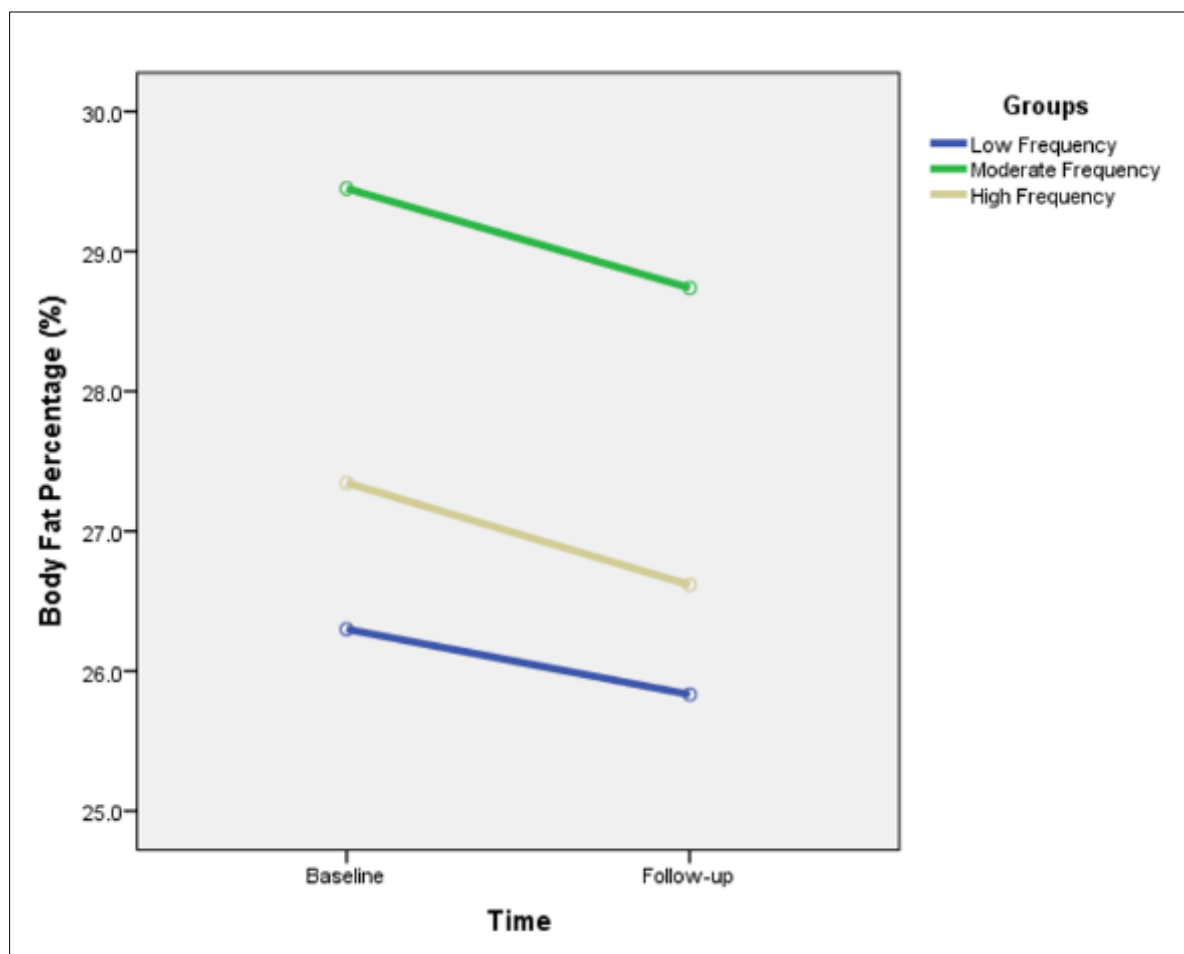


Figure 3: Changes in Body Fat Percentage Over Time by Self-Weighing Frequency Group.

Line graph depicting mean body fat percentage at baseline and follow-up across groups. A significant overall time effect was observed ($p = 0.016$), with reductions occurring similarly across all groups.

3.3.2 Fat Mass

Fat mass declined significantly over time ($p = 0.029$) (Table 1). No significant differences emerged between groups, and the main effect of group ($p = 0.130$) and the group $\times$ time interaction ($p = 0.644$) were not statistically significant. The decline was similar across low-, moderate-, and high-frequency groups.

3.3.3 Visceral Fat

No, statistically significant effects were found for visceral fat (group $p = 0.309$; time $p = 0.591$; group $\times$ time $p = 0.998$) (Table 1). Visceral adiposity remained stable, unaffected by self-weighing.

3.4 Integrated Longitudinal Analysis

Integrated analysis showed that no statistically significant effects were limited to body fat percentage and fat mass over time. Body fat percentage and fat mass changed, but self-weighing frequency had no independent influence on these trajectories. The forest plot summarizing mean differences in anthropometric outcomes between baseline and follow-up across frequency groups (Figure 4) further illustrates the lack of statistically significant between-group effects. Overlapping confidence intervals indicate no clinically meaningful divergence in outcomes.

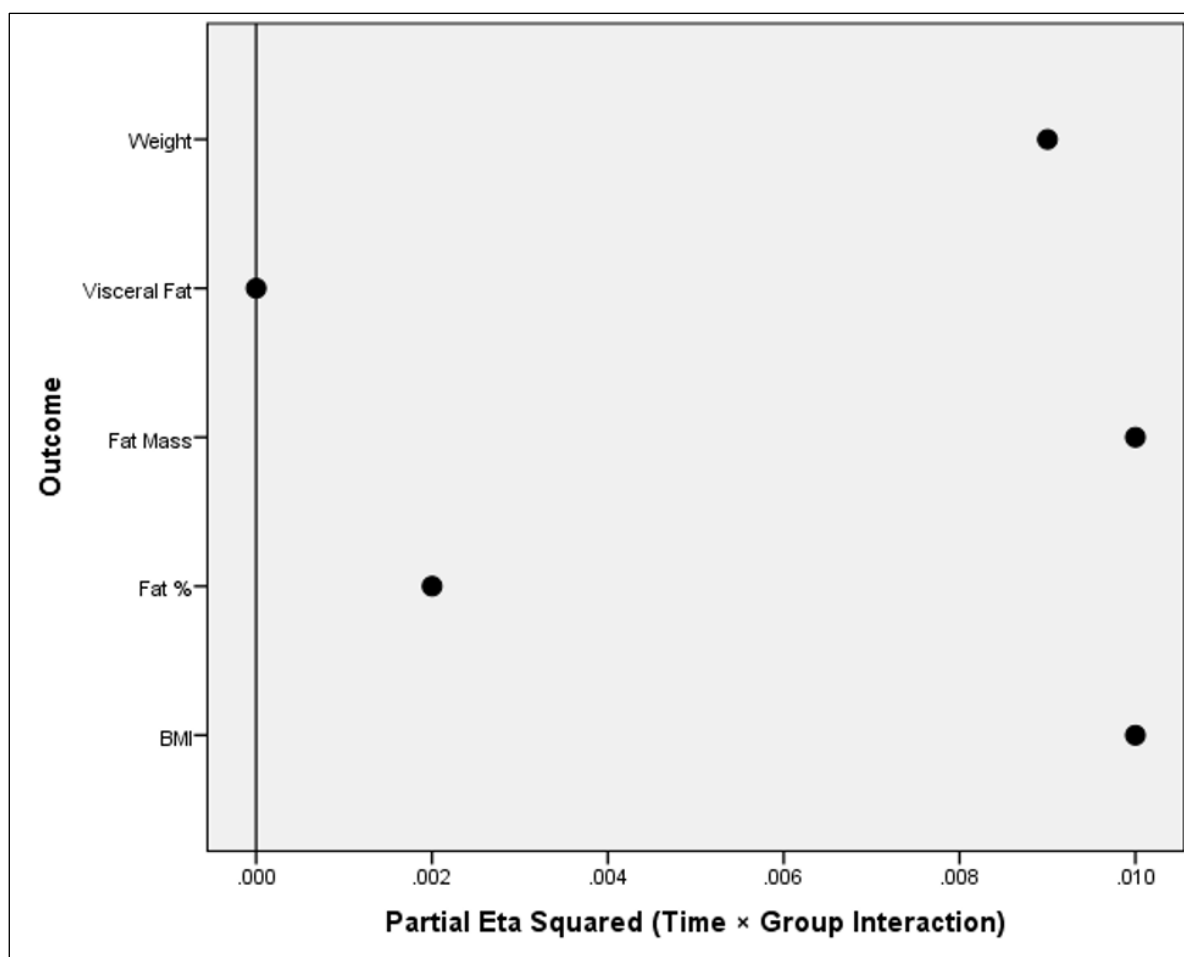


Figure 4: Forest Plot of Anthropometric Changes by Self-Weighing Frequency.

Forest plot illustrating mean differences in anthropometric outcomes between baseline and follow-up across frequency groups, with corresponding confidence intervals. No statistically significant between-group differences were identified

4 DISCUSSION

Statistically significant reductions were observed in body fat percentage ($p = 0.016$) and fat mass ($p = 0.029$). The absence of interaction effects means improvements were independent of self-weighing frequency, suggesting that weighing intensity did not exert an additive or dose-dependent effect on weight-related outcomes. Importantly, effect sizes were small and between-group differences did not approach statistical significance, reinforcing the interpretation that self-weighing frequency alone was not a clinically meaningful determinant of change within the study period. Self-weighing is a behavioral self-regulation strategy rooted in control theory, where feedback loops facilitate behavioral correction.^{16, 17} Frequent weighing and improved weight loss maintenance.¹⁸⁻²⁰ Wing et al. found that consistent self-monitoring predicted long-term weight control in the National Weight Control Registry.¹⁸ Burke et al. reported that self-monitoring correlated with greater weight reduction in behavioral interventions.¹⁹ Meta-analyses show inconsistent effect magnitude and highlight that self-weighing is most effective when embedded within multicomponent behavioral programs.^{21, 22} Our findings support a more nuanced interpretation. Modest improvements in body composition occurred uniformly across frequency categories. This suggests that general participation in a weight management context, not intensity, drives observed time effects. The lack of a dose-response gradient undermines assumptions that increasing monitoring frequency alone enhances weight reduction, particularly without structured feedback, dietary counseling, or behavioral reinforcement.^{21, 23} Reductions in body fat percentage and fat mass reveal limitations of BMI as a sole metric of metabolic improvement, as weight and BMI remain unchanged despite the change. This aligns with growing recognition that body composition metrics provide superior clinical outcomes.²⁴ Franz et al. found that modest fat mass reductions can occur without significant weight shifts, especially in early intervention phases.²⁵ Visceral fat remains unchanged, indicating that central adiposity may require more intense interventions than behavioral self-monitoring.²⁶ Psychological response variability may explain the absence of differential effects. Some individuals thrive on feedback, while others may experience weight-related stress or demotivation, potentially attenuating adherence.^{27, 28} Experimental work shows that self-weighing boosts outcomes when paired with goal setting and accountability frameworks.²⁹ Without such structures, frequency alone may lack mechanistic potency. From a

clinical standpoint, escalating self-weighing frequency without integrating dietary structure, energy prescription, or physical activity guidance is unlikely to yield substantial anthropometric benefit. This interpretation aligns with large obesity intervention trials emphasizing dietary composition, protein adequacy, and caloric control as primary drivers of fat reduction.^{25,30} The present study contributes to a growing body of evidence indicating that self-monitoring is a supportive adjunct rather than a primary therapeutic lever. This study boasts several methodological strengths. Objective measures of anthropometry and body composition eliminate self-report bias. Stratification by self-weighing frequency categories analysis, while modeling distinguished time effects and interaction effects. Body fat percentage and visceral fat provide a more comprehensive metabolic assessment than BMI alone, addressing a recognized limitation in obesity research.¹⁹ Retrospective design cripples causal inference and precludes control of behavioral covariates, dietary intake, protein consumption, physical activity, and psychological engagement. Self-weighing frequency may proxy for intrinsic motivation, introducing confounding and reverse causality. The sample size may be too small to detect small interaction effects, and the follow-up period may not have been long enough to capture long-term weight trajectories. Without psychological outcome measures, mediating or moderating effects can't be assessed. The cohort design limits generalizability to similar behavioral contexts.

5 CONCLUSION

Modest reductions in body fat percentage and mass were observed over time. These findings suggest that self-weighing intensity alone does not independently drive clinically meaningful weight reduction. Future trials structured dietary interventions, behavioral feedback mechanisms, and psychological mediators are warranted to clarify the mechanistic role of self-monitoring within comprehensive obesity treatment paradigms.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of ethical approval

The study protocol was reviewed and approved by the Medical Research Center (MRC) of Hamad Medical Corporation (HMC), Qatar. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and local regulatory requirements (Approval No.: MRC-01-25-1338).

Statement of informed consent

This study was conducted using retrospective data extracted from electronic medical records. Therefore, informed consent from participants was waived in accordance with institutional ethical guidelines. All data were fully de-identified before analysis, and no personal identifiers were accessible to the research team. The study adhered to strict confidentiality and ethical standards in accordance with institutional policies.

Data Sharing Statement

The datasets generated and/or analyzed during the current study are not publicly available due to institutional privacy regulations but are available from the corresponding author on reasonable request.

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