Body Composition, Activity, & Nutrition in Menopause

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nutrition metabolism performance body composition

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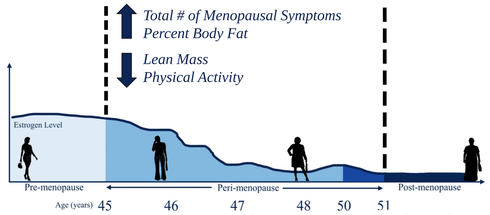
INTRODUCTION

- Women spend an average of seven years in perimenopause.[1] Up to 85% of women experience physical and psychological menopausal symptoms,[2] which are shown to significantly reduce health-related quality of life across the menopause transition (MT).[3]
- The MT is also associated with adverse body composition changes of increased percent body fat (%BF),[4] decreased lean mass (LM).[5]



- Evidence suggests lower carbohydrate to protein ratio (C:P) positively influences metabolism[6] and body composition in women.
- Despite impact of MT and associated symptoms on quality of life, there is little clarity regarding modulating factors of frequency and severity of total menopause symptoms (TMS).

PURPOSE

Characterize relationships between body composition (**%BF**, **LM**), activity (low [**LOW**], moderate [**MOD**], vigorous [**VIG**] active mins/day), nutrition (**C:P**), and **TMS** in pre- (**PRE**), peri-(**PERI**), and post-menopausal (**POST**) women.

REFERENCES

1. Woods NF, Mitchell ES. Symptoms during the perimenopause: Prevalence, severity, trajectory, and significance in women's lives. *American Journal of Medicine*. 2005;118(12 SUPPL. 2):14-24.
2. Avis NE, Crawford SL, Greendale G, et al. Duration of menopausal vasomotor symptoms over the menopause transition. *JAMA Intern Med*. 2015;175(4):531-539.
3. Whiteley J, Dibonaventura MD, Wagner JS, Alvir J, Shah S. The impact of menopausal symptoms on quality of life, productivity, and economic outcomes. *J Womens Health*. 2013;22(11):983-990.
4. Ambikairajah A, Walsh E, Tabatabaei-Jafari H, Cherbuin N. Fat mass changes during menopause: a meta-analysis. *Am J Obstet Gynecol*. 2019;221(5):393-409.e50.
5. Greendale GA, Sternfeld B, Huang MH, et al. Changes in body composition and weight during the menopause transition. *JCI Insight*. 2019;4(5).
6. Hostetter ME, Cabre HE, Gordon AN, Gould LM, Moore SR, Patterson ND, Smith-Ryan AE. Effect of carbohydrate to protein ratio on metabolic flexibility in women across the menopause transition. *Intl J Exer Sci*. 2022; 16(1): 262.

PRACTICAL APPLICATION

Targeted **exercise** and **nutrition** interventions to **alleviate body composition changes** and **reduce menopausal-related symptoms** should be **menopause stage specific**.

RESULTS

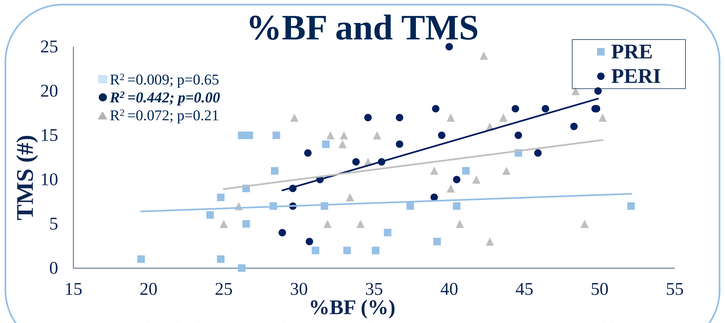


Figure 1 | Individual responses for %BF and TMS, regression lines presented by group.

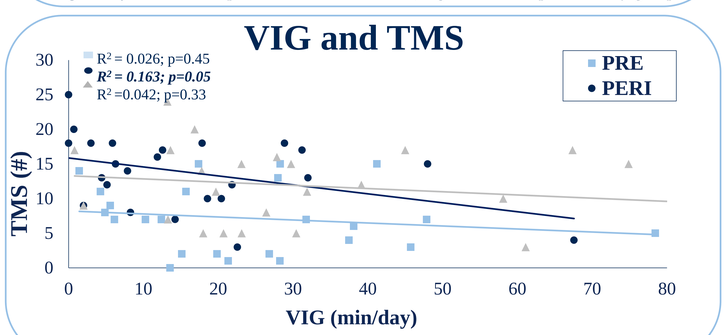


Figure 2 | Individual responses for VIG and TMS, regression lines presented by group.

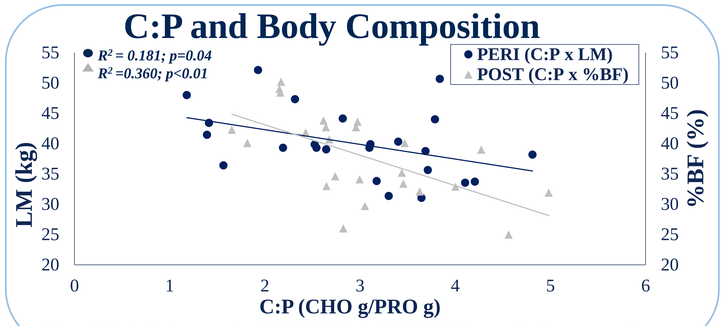


Figure 3 | Individual responses for C:P, LM (PERI), and %BF (POST), regression lines presented by group.

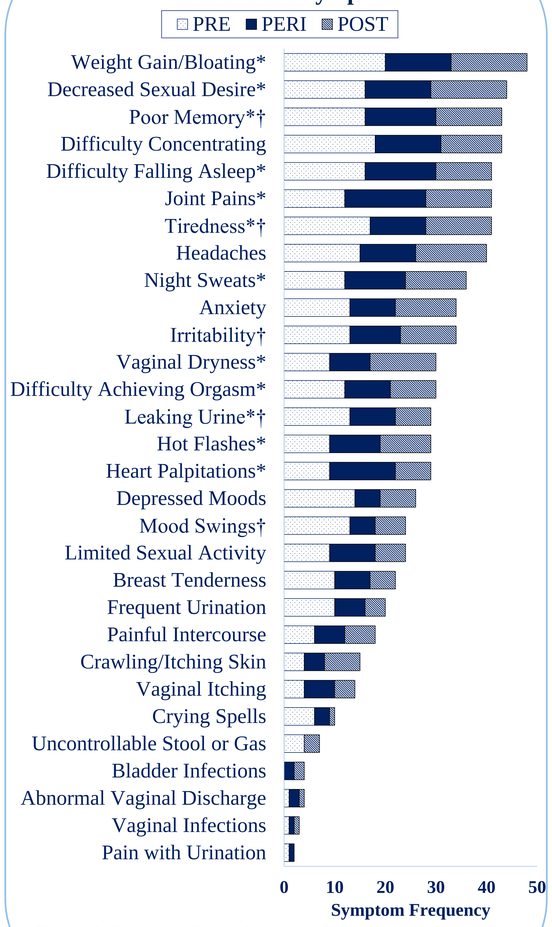


Figure 4 | Frequency Plot of Individual Symptoms by Group. *Note*: *denotes significant correlation with %BF; † denotes significant correlation with VIG.

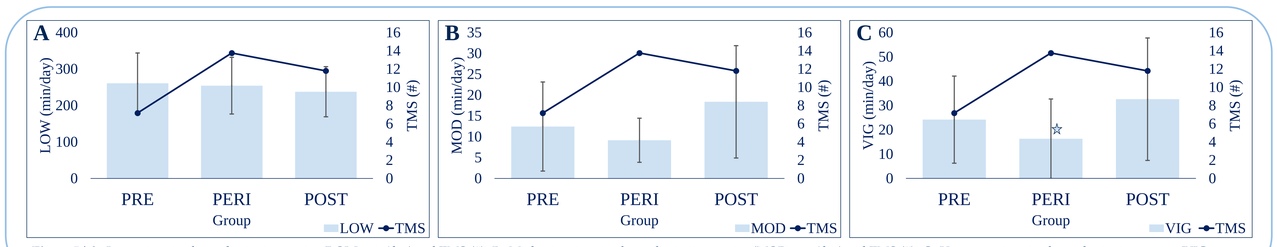


Figure 5 | A: Low-intensity physical activity minutes (LOW; min/day) and TMS (#), **B:** Moderate-intensity physical activity minutes (MOD; min/day) and TMS (#), **C:** Vigorous intensity physical activity minutes (VIG; min/day) and TMS (#), presented by group (PRE: pre-menopausal; PERI: peri-menopausal; POST: Post-menopausal). Statistically significant ($p<0.05$) associations between TMS and physical activity are indicated by ☆.

PARTICIPANTS

72 Healthy Females

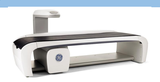
Table 1 | Participant demographics presented as mean ± standard deviation.

Group	Age (yrs)	Weight (kg)	%BF (%)
PRE (n=24)	39.8 ± 3.3	69.0 ± 14.6	31.8 ± 7.6
PERI (n=24)	50.3 ± 3.4	70.2 ± 15.1	39.0 ± 7.1
POST (n=24)	54.7 ± 3.5	68.7 ± 13.4	38.0 ± 6.9

Pre-menopausal (PRE): naturally menstruating and ≥ 35 years old; **Peri-menopausal (PERI)**: experiencing irregular periods or amenorrheic for <12 months and ≥38 years old**; Post-menopausal (POST)**: amenorrheic for ≥12 months; %BF: percent body fat.

METHODS

Body Composition (%BF, LM): Dual energy x-ray absorptiometry



Physical Activity (LOW, MOD, VIG): fitbit

Data were recorded over one whole week of continuous wear. LOW, MOD, and VIG minutes per day were averaged into a 7-day mean for each outcome.

DHQ III Diet History Questionnaire

Nutrition (C:P): Validated Diet History Questionnaire III

Menopause Symptoms (TMS): North American Menopause Society Validated Questionnaire

NAMS The North American Menopause Society

Statistical Analyses: Bivariate correlations were used to analyze strength of relationships between body composition, activity, nutrition and TMS outcomes. Stepwise linear regressions were then used to evaluate the independent effects of significant correlations.

CONCLUSION

- **TMS** was **significantly associated** with **%BF**, **predicting almost half** the variation in **TMS** for **PERI**.
- Only **VIG** demonstrated a **significant relationship** with **TMS** for **PERI**, **predicting 16%** of **TMS** variability.
- **C:P** intake appears to **influence body composition differently** across the **MT**, showing **significant relationships** with **LM** in **PERI**, and **%BF** in **POST**.
- While **physical activity** shows **weaker associations** with **TMS**, **vigorous** physical activity may **indirectly improve TMS** through **blunting unfavorable changes** in **body composition**.

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