

Menopausal symptoms and sympathetic activity in post-menopausal females

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Introduction

- Women are at an increased risk of hypertension (HTN) and cardiovascular disease (CVD) after menopause³.
- Those who experience vasomotor symptoms (VMS; hot flashes and night sweats) have been shown to have a substantially greater risk for HTN and CVD compared with those who do not experience VMS^{1,2}.
- Other common symptoms of menopause include psychosocial, physical and sexual symptoms such as exhaustion, depression, anxiety, and sexual dysfunction, but it is currently unknown whether experiencing menopause symptoms in general influences the risk for HTN and CVD.

Purpose & Hypothesis

Purpose: To determine if menopausal symptoms influence blood pressure (BP) regulation (sympathetic activity and BP reactivity to stress) in postmenopausal females.

Hypothesis: We hypothesize that females who experience menopausal symptoms will have a greater sympathetic and BP reactivity to a cold pressor test (CPT) compared with females who do not experience these symptoms, indicating a higher risk for HTN and CVD than asymptomatic individuals.

Methods

Six postmenopausal females (age 61±2yr) attended two study visits.

Visit 1:

- Written informed consent
- Completion of the Menopause-specific Quality of Life questionnaire (MENQOL)
 - MENQOL: asked participants to rate how bothered they felt in four areas of symptoms: vasovagal (i.e., VMS), psychosocial, physical, and sexual
 - Absence of a symptom corresponds with a score of 1 point, whereas a present symptom is rated according to how bothersome it is and is scored from 2-8 points
 - Participants were classified as NSYMP (non-symptomatic) or SYMP (symptomatic) based on their total MENQOL scores

Methods

Visit 2:

- Participants were asked to fast overnight and abstain from caffeine, exercise and alcohol for 12 hrs.
- During a five-min rest and a two-min CPT of the hand, continuous noninvasive BP, heart rate via three-lead electrocardiography (ADInstruments, Colorado Springs, CO), and muscle sympathetic nerve activity (MSNA) via microneurography were measured

Results

Table 1: Demographic characteristics of participants.

	NSYMP (n=3)	SYMP (n=3)	Total (n=6)
Age (years)	62 ± 2	64 ± 3	63 ± 2
Menopause age (years)	53 ± 6	52 ± 2	52 ± 4
BMI (kg/m ²)	21 ± 4	27 ± 5	24 ± 5
MENQOL Vasovagal Score	1.2 ± 0.4	1.5 ± 0.4	1.3 ± 0.4
MENQOL Physical Score	1.2 ± 0.1	2.0 ± 0.6	1.6 ± 0.6
MENQOL Total Score	1.3 ± 0.1	2.1 ± 0.3	1.7 ± 0.5

Data are presented as mean ± standard deviation.
BMI: body mass index; NSYMP: non-symptomatic; SYMP: symptomatic.

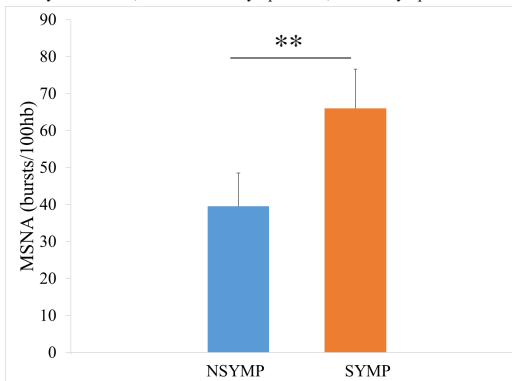


Figure 1: Baseline MSNA in NSYMP and SYMP participants. Data are presented as mean ± standard deviation. SYMP: 66±11, NSYMP: 40±9 bursts/100hb, 95% [CI: 17, 62], p = 0.03. NSYMP: non-symptomatic; SYMP: symptomatic; MSNA: muscle sympathetic nerve activity.

Results

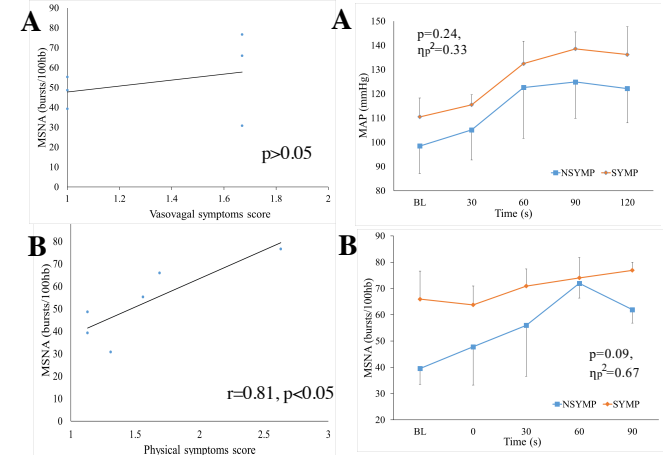


Figure 2: Relationships between baseline MSNA burst incidence (bursts/100hb) and MENQOL vasovagal symptoms score (A) and physical symptoms score (B). Physical symptoms, but not vasovagal symptoms, were significantly correlated with MSNA. MSNA: muscle sympathetic nerve activity; MENQOL: Menopause-Specific Quality of Life Questionnaire; hb: heartbeats.

Figure 3: MAP (A) and MSNA burst incidence (B) reactivity to CPT. Data are presented as mean ± standard deviation. MAP increased similarly in both groups, whereas there was a trend for a main effect of group on MSNA reactivity. MAP: mean arterial pressure; MSNA: muscle sympathetic nerve activity; BL: baseline; NSYMP: non-symptomatic; SYMP: symptomatic.

Conclusions

- Postmenopausal females who had higher physical menopause symptoms had elevated baseline sympathetic activity as compared to postmenopausal females who reported fewer physical symptoms.
- Physical menopause symptoms, but not vasovagal symptoms, significantly correlated with baseline MSNA burst incidence.
- The SYMP group tended to have a greater MSNA during the CPT than did the NSYMP participants (p=0.09).
- To explore the relationships between menopause symptoms and sympathetic reactivity, future research in women who have more severe menopause symptoms than the small sample in the present study, is warranted.

Literature Cited

1. Avis NE, Crawford SL, Green R. Vasomotor Symptoms Across the Menopause Transition: Differences Among Women. *Obstet Gynecol Clin North Am.* 2018;45:629–640.
2. Bechthold A, Kalantarios SN, Nisha KK, Chatzilykakiou A, Calis KA, Mdrigiamakis A, Papanikolaou O, Kaporis A, Katsouras C, Georgioulis, Chrousos GP, Michailis LK. Endothelial function, but not carotid intima-media thickness, is affected early in menopause and is associated with severity of hot flashes. *J Clin Endocrinol Metab.* 2010;95:1199–1206.
3. Jackson, Elizabeth A et al. "Hot Flash Frequency and Blood Pressure: Data from the Study of Women's Health Across the Nation." *Journal of women's health* (2002) vol. 25,12 (2016): 1204-1209. doi:10.1089/jwh.2015.5670.

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