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The Influence of Body Mass Index on the Prevalence and Severity of Hot Flashes in Women

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ABSTRACT

Background & Objective: Hot flashes are the most common and difficult symptom of menopause. Nearly 75% of females have hot flashes, which are abrupt and increase in body temperature. Obesity has newly been recognized as a possible predictor of Vasomotor Symptoms (VMS), such as hot flashes and nocturnal sweating. This study was conducted with aim to investigate the association between BMI and the incidence and severity of hot flashes in women at numerous phases of the menopausal change.

Materials & Methods: This cross-sectional analytic study was conducted on 165 participants from private clinics. Measured height and weight, and BMI was intended using the standard formula (kg/m²). Hot flashes were characterized as mild (heat only), moderate (heat with sweating), or severe (heat with sweating and disturbance of daily activity). Contributors were classified into premenopausal (≤45 years), perimenopausal (46-50 years with regular or irregular cycles), and postmenopausal groups (≥51 years with no menstruation for 12 months or more). Data were analyzed using SPSS software (version 26) and statistical tests. P<0.05 was considered statistically significant.

Results: There was a strong link between hot flashes and age, menopausal status, and BM. Women with obesity (BMI>30) were more likely to report hot flashes (59.4%) compared to those of normal weight. Postmenopausal women also reported a higher frequency and intensity of hot flashe. Conversely, educational attainment and smoking status exhibited no significant correlations.

Conclusion: The most important factors for prediction of hot flashes were high BMI and menopause. Socio-demographic factors had a small effect. These results underscore the significance of weight management strategies in enhancing menopausal health.

Keywords: Hot flashes, Menopause, Body mass index

1. Introduction

Obesity is a chronic, progressive, and relapsing disease affecting women more than men (1). The WHO says that being overweight or obese can affect health, quality of life, and life expectancy (2). Women are more likely to be overweight or obese during the transition to menopause. It is still up for debate whether this rise in obesity is due to menopause, age, genetics, or environment (3). Oestrogen (E2) and Follicle-Stimulating Hormone (FSH) during menopause affect energy balance and may change the amount and type of fat in the body, which could lead to faster weight gain after menopause (4).

Menopause is the total cessation of menstruation for 12 months or longer following the last menstrual cycle. It is indicated by the absence of ovarian follicular function and a decline in oestrogen secretion by the ovary. The most common sign of menopause is hot flashes. About 75% of women experienced abrupt, transient, recurrent elevations in body temperature (5).

In recent years, obesity has been regarded as a predictor for hot flashes (sudden sensations of heat in the upper body, most intense in the face, neck and chest). Studies indicated that obese females tend to have more symptoms of hot flashes than slim females. Previous studies showed that mid-life obesity is associated with more symptomatic menopausal transition, including greater reporting of Vasomotor Symptoms (VMS), including hot flashes and sweating (6). The North American Menopause Society (NAMS) reported that obese women had worse hot flashes because of the "thermoregulatory theory," which says that BMI is linked to vasomotor symptoms because body fat tissue keeps heat in. This insulation makes it harder for heat to spread, which makes hot flashes worse for overweight women (7). Thus, the present study was conducted with aim to examine the correlation between Body Mass Index (BMI) and the occurrence, frequency, and intensity of hot flashes in women

undergoing various phases of the menopausal transition.

2. Materials and Methods

This cross-sectional study was conducted from February 1, 2024, to February 1, 2025, at Al-Basrah Maternity and Children's Hospital in Basrah, Iraq. A total of 165 women who referred to the outpatient clinics were included in the study. Recruitment utilised a consecutive sampling method, incorporating every eligible woman attending the clinic during the study period who consented to participate.

The study included women aged 46-69 years with intact uterus and ovaries who were either in the perimenopausal or postmenopausal stage. Women were excluded if they had a history of malignancy, undergoing hormone therapy, or used herbal or natural remedies, in order to reduce confounding factors. Other possible confounders, including medications and pre-existing chronic disorders were also taken into account at the screening stage.

Participants were evaluated by a structured questionnaire, which collected socio-demographic data and menopausal history, and hot flushes degree analysed by mild (heat only), moderate (heat with sweating) or severe (heat with sweats interfering with daily activities). For each subject, body mass index (BMI; kg/m²) was calculated by weighing and measuring with the usual formula. After obtaining written informed consent, the participants completed a structured questionnaire comprising questions concerning their age, educational level, smoking habit, stage of menopause and frequency and intensity of heat flashes. There were three degrees of hot flashes (light or consisting only of heat, moderate using both heat and perspiration and severe (heat accompanied by sweating that rendered it difficult to perform daily activities).

The data were collected for three groups of women: postmenopausal (≥51 years with no menstruation for at least 12 months), perimenopausal (46-50 years with irregular periods), and premenopausal (≤45 years). The data were analyzed using SPSS software (version 26). The chi-square, t-tests, and Fisher's exact tests were used to find statistical relationships, and the Shapiro-Wilk and Kolmogorov-Smirnov tests to determine the normality of data. $P<0.05$ was considered statistically significant.

3. Results

As the results of Table 1 showed, the age and menopause were significantly associated with the incidence of hot flashes. Females feeling hot flashes were mainly older than 50 years: 95 women (62.5%) in this group were above 51 years, compared with only 4 women (30.8%) in the no-hot-flash group (P=0.01). Menopausal state was also significant: 93 postmenopausal women (61.2%) reported hot flashes compared to only 3 (23.1%) among those without symptoms (P=0.016). BMI showed a clear association as well: 79 women (59.4%) with BMI>30 kg/m^2 experienced hot flashes, versus only 2 women (16.7%) without symptoms (P=0.009). Education level and smoking did not appear to influence hot flashes, suggesting that physiological factors (age, menopause, BMI) play a greater role than lifestyle variables.

Table 2 showed no significant link between smoking and BMI (P=0.6). Nearly all women, regardless of BMI, were non-smokers (e.g., 95 obese women (96%) were non-smokers). Menopausal status also did not significantly differ across BMI groups (P=0.8), although obesity was more frequent among postmenopausal women (61.6%) than premenopausal women (38.4%). This suggests that weight gain may be related more to hormonal and age-related changes than to smoking behavior.

Hot flash frequency showed the strongest associations with BMI and menopausal state. Among obese women, 50(63.3%) reported daily hot flashes and 28(70%) reported episodes every 12 hours, significantly higher than in normal-weight women (P=0.01). Menopausal status was also significant: 46 postmenopausal women (58.2%) had daily hot flashes, compared with 33 premenopausal women (41.8%) (P=0.006). Interestingly, age alone did not show a statistically significant trend (P=0.6), though women aged 50-54 tended to report more frequent symptoms. Severity, as measured by the Menopause Rating Scale (MRS), was also notable: 49 women (62%) with moderate symptoms and 9(11.4%) with severe scores experienced daily hot flashes (P<0.0001).

Table 1. The Relationship Between Participants' Characteristics and Hot Flashes

DATA	Hot flashes	No hot flashes	P-value
Age:			
45	5(3.3%)	3(23.1%)	
46-50	52(34.2%)	6(46.2%)	0.01
>51	95(62.5%)	4(30.8%)	
Education:			
Primary or less	51(33.6%)	6(46.2%)	
Secondary	61(40.1%)	5(38.5%)	0.621
Graduated	40(26.3%)	2(15.4%)	
Smoking:			
Yes	147(96.7%)	13(100%)	1.00
No	5(3.3%)	0(0%)	
Menopausal status:			
Premenopause	12(7.9%)	2(15.4%)	
Perimenopause	47(30.9%)	8(61.5%)	0.016
Postmenopause	93(61.2%)	3(23.1%)	
BMI			
<18.5	0(0%)	0(0%)	
18.5-25	13(9.8%)	2(16.7%)	
26-30	41(30.8%)	8(66.7%)	0.009
>30	79(59.4%)	2(16.7%)	

Table 2. Association Between Smoking, Menopausal Status and BMI Categories

	BMI				
Smoking	**Normal**	**Overweight**	**Obesity**	**Total**	**P-value**
Negative	15(100.0%)	50(98.0%)	95(96.0%)	160(97.0%)	
Positive	0(0.0%)	1(2.0%)	4(4.0%)	5(3.0%)	0.6
Menopausal State	**Normal**	**Overweight**	**Obesity**	**Total**	**P-value**
Premenopausal	7(46.7%)	21(41.2%)	38(38.4%)	66(40.0%)	
Post menopause	8(53.3%)	30(58.8%)	61(61.6%)	99(60.0%)	0.8
Total	15(100.0%)	51(100.0%)	99(100.0%)	165(100%)	

Table 3. Association Between Hot Flash Frequency and Age, BMI, and Menopausal State

Hot Flushes Frequency						
Age (Years)	**None**	**Weekly**	**Daily**	**Every 12 hours**	**Every 6 hours**	**P-value**
<50	6(46.2%)	7(38.9%)	23(29.1%)	11(27.5%)	3(20.0%)	
50–54	6(46.2%)	6(33.3%)	29(36.7%)	13(32.5%)	7(46.7%)	0.6
55-59	1(7.7%)	2(11.1%)	21(26.6%)	10(25.0%)	4(26.7%)	
≥60	0(0.0%)	3(16.7%)	6(7.6%)	6(15.0%)	1(6.7%)	
BMI	**None**	**Weekly**	**Daily**	**Every 12 hours**	**Every 6 hours**	**P-value**
Normal	2(15.4%)	2(11.1%)	8(10.1%)	2(5.0%)	1(6.7%)	
Overweight	8(61.5%)	10(55.6%)	21(26.6%)	10(25.0%)	2(13.3%)	0.01
Obesity	3(23.1%)	6(33.3%)	50(63.3%)	28(70.0%)	12(80.0%)	
Menopausal	**None**	**Weekly**	**Daily**	**Every 12 hours**	**Every 6 hours**	**P-value**
Premenopausal	10(76.9%)	9(50.0%)	33(41.8%)	12(30.0%)	2(13.3%)	0.006
Post menopause	3(23.1%)	9(50.0%)	46(58.2%)	28(70.0%)	13(86.7%)	
Menopause Rating Scale	**None**	**Weekly**	**Daily**	**Every 12 hours**	**Every 6 hours**	**P-value**
None	13(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	
Mild	0(0.0%)	15(83.3%)	21(26.6%)	4(10.0%)	1(6.7%)	0.0001
Moderate	0(0.0%)	3(16.7%)	49(62.0%)	34(85.0%)	13(86.7%)	
Severe	0(0.0%)	0(0.0%)	9(11.4%)	2(5.0%)	1(6.7%)	
Total	13(100.0%)	18(100.0%)	79(100.0%)	40(100.0%)	15(100.0%)	

4. Discussion

Hot flashes are sudden feelings of heat in the upper body, usually in the face, neck, and chest. Menopause is the most common cause of hot flashes, but other medical conditions can also cause them. Many studies have evaluated the link between body mass index and menopausal symptoms, especially hot flashes. The hypothesis positing that elevated body mass correlates positively with hot flashes remains contentious **(8-10)**. This cross-sectional study on Iraqi women has described the relations between BMI and the menopausal transitional symptoms. Hot flashes were found to be independent of socio-demographic factors like level of education and smoking. Smoking, with factors like BMI, may predispose a woman to severe, frequent bouts of hot flashes, especially the moderate-to-severe type, as reported by a study done by Whitman et al., **(11)**, which is in disagreement with our study, as only 5 (3%) participants who had hot flashes were positively smokers, while 160 of participants were non-smokers. This may be because most women in these societies do not admit that they are smokers for social and cultural reasons. Hot flashes affect 50-80% of women during the transition to menopause and after that, with the most severe cases occurring two years before and two years after menopause **(12,13)**. In the present study, hot flashes were more common at the age of 50-54 years (37%) and at the age of 55-59 years (23%), and this is in disagreement with another study that showed hot flashes are more common at the age of 45 and older **(14)**.

The hormonal changes of menopause, in addition to loss of muscle mass and decreased activity as women age, tend to make women more likely to gain weight. BMI was found to be higher in our study in postmenopausal participants (58.8%, 58.2%, and 67.9% for overweight, obesity class 1, and obesity class 2, respectively) than premenopausal participants, although it is statistically insignificant. In disagreement with studies that showed a significant association between age and BMI, the older women had a higher body mass index compared to the younger, and BMI increased with advancing age **(15,16)**.

Hot flashes are self-reported but still a valid measure. In our study, there was a strong association between the presence of hot flashes and BMI. But 51 (30.9%), 67 (40.6%), and 28 (17%) of participants who were overweight, in obesity class 1, and in obesity class 2, respectively, reported increased frequency of hot flashes, which was still statistically insignificant and inconsistent with a study done by Lisa Gallicchio et al., **(10)**, which showed that BMI, BMI changes, and weight changes were not related to hot flashes. Thurston et al., also recorded that BMI was an invaluable indicator for hot flashes. They explained that not all the perimenopausal participants were at the same stage of menopausal transition, and adipokines, adiposity, and hot flashes varied at different menopausal states **(8)**.

In this study, 66(44%) participants were premenopausal, while 99(60%) of postmenopausal participants reported hot flashes. Also, the severity of hot flashes, assessed by the number of hot flash episodes per day or the number of days per week when women experience hot flashes, in is significantly higher in postmenopausal women **(17)**. Some results of this study differ from previous research. In contrast to various international studies that have identified smoking as a predictor of vasomotor symptoms, no such correlation was found in our research. This may indicate the low incidence of smoking among Iraqi women and potential underreporting attributable to social stigma. Likewise, age alone did not significantly influence hot flashes in our cohort, whereas other studies identified midlife age as a critical factor. This inconsistency may be credited to the more marked influence of menopausal status compared to chronological age, together with differences in lifestyle and genetic predisposition. Moreover, while confident studies recommended no definite association between BMI and hot flashes, our results confirmed a significant association, representative that population-specific factors, including body arrangement and environmental effects, may change this association.

One of the limitations of this study is consecutive sampling to gather the data from a single center, which might have limited the study's generalisability. Recollection bias may also have an impact on self-reported symptoms.

5. Conclusion

In women, incidence and frequency of hot flashes were significantly associated with higher BMI and post-menopausal status. On the other hand, smoking status and level of education were not associated with vasomotor symptoms. These findings suggest that adiposity may be an important determinant of the severity of menopausal symptoms. Thus, weight management may be a useful strategy for improving women’s health during the menopausal transition. These results require confirmation by further, larger, prospective studies.

6. Declarations

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Ethical Considerations

The local committee, which also complied with the Declaration of Helsinki, approved the study ethically 122 in (2-1-2026). Throughout the investigation, every participant's confidentiality was rigorously maintained.

Authors' Contributions

The 1st author (GJ) came up with the idea, designed the study. The 2nd author (KS) is analyzing and interpreting the data. (GJ and KS) reviewing the literature and editing the manuscript.

Conflict of Interest

The Authors declare no conflict of interest.

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