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Perceived Control and Hot Flashes in Treatment-seeking Breast Cancer Survivors and Menopausal Women

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Abstract

Background—Lower perceived control over hot flashes has been linked to fewer coping strategies, more catastrophizing, and greater hot flash severity and distress in midlife women; yet, this important concept has not yet been studied in breast cancer survivors.

Objective—To explore perceived control over hot flashes and hot flashes in breast cancer survivors compared to midlife women without cancer.

Methods—99 survivors and 138 midlife women completed questionnaires and a prospective, electronic hot flash diary. All data were collected at a baseline assessment prior to randomization in a behavioral intervention study.

Results—Both groups had moderate perceived control over hot flashes. Control was not significantly related to hot flash frequency, but was significantly related to hot flash severity, bother, and interference in both groups. A significantly stronger association between control and hot flash interference was found for survivors than for mid-life women. Survivors using hot flash treatments perceived less control than survivors not using hot flash treatments, whereas the opposite was true in midlife women.

Conclusions—Findings extend our knowledge of perceived control over hot flashes in both survivors and midlife women.

Implications for Practice—Findings emphasize the importance of continued menopausal symptom assessment and management, support the importance of continuing nursing care even for survivors who are already using hot flash treatment, and suggest that nursing interventions aimed at improving perceived control over hot flashes may be more helpful for survivors than for midlife women.

Introduction

Hot flashes are frequent, severe, bothersome events that interfere with daily life for millions of breast cancer survivors and midlife menopausal women without breast cancer.[1–4] Hot flashes are also known as hot flushes, night sweats, and vasomotor symptoms: we use the phrase hot flashes throughout. Hot flashes can be associated with mood and sleep disturbances.[5–10] Although hormone therapy is an effective treatment, it is

contraindicated for breast cancer survivors[11, 12] and no longer acceptable to many women without cancer because of shifts in the risk-benefit ratio uncovered by the Women's Health Initiative study.[13–19] Although there are many non-hormonal pharmacological and non-pharmacological treatment options that appear to be promising in providing at least a small degree of relief, many of these therapies have limited efficacy data for guiding clinical practice. [20, 21]

Breast cancer treatment increases a woman's risk for hot flashes. Although the exact etiology of hot flashes is not fully understood,[22] hot flashes are precipitated by estrogen withdrawal that occurs naturally during normal aging or artificially through surgical or chemical alteration of ovarian function.[1] Women can experience hot flashes as part of the normal aging process or if oophorectomy occurs.[1] In addition, breast cancer survivors can experience hot flashes due to chemotherapy or estrogen-ablating therapies, such as selective estrogen receptor modulators (e.g., tamoxifen) or aromatase inhibitors (e.g., letrozole), which are taken for 5 years following diagnosis in women with estrogen receptor-positive breast cancer. In a survey of 476 breast cancer survivors, those who had transitioned through menopause during cancer treatment reported significantly worse hot flash severity than those who had not.[23] Finally, abrupt discontinuation of hormone therapy after breast cancer diagnosis can exacerbate hot flashes.[24]

Breast cancer survivors report more frequent, severe, and bothersome hot flashes in comparison to matched menopausal women without cancer. When groups were matched on age and not menopausal status, self-reported hot flashes in breast cancer survivors (n=69) were significantly more prevalent, frequent, severe, bothersome, and of longer duration.[2] These results held among a subset of 35 survivors and 22 menopausal women who were matched as being naturally postmenopausal. Similarly, in a case-control study, breast cancer survivors were over 5 times more likely to experience hot flashes and other menopausal symptoms than age-matched women without cancer.[3]

Given differences in the causes and experiences of hot flashes, breast cancer survivors may perceive their ability to control hot flashes differently than midlife women without cancer. Perceived control over hot flashes is defined as a woman's perception of her ability to self-manage or cope with hot flashes. This may involve self-managing hot flashes through pharmacologics (e.g., hormone therapy, selective serotonin reuptake inhibitors) or non-pharmacological strategies (e.g., natural fabrics, dressing in layers, cooling fans, lowering room temperature). In midlife women, lower perceived control over hot flashes has been related to use of fewer coping strategies,[25] greater catastrophizing about hot flashes,[26] greater hot flash frequency,[27] and greater hot flash severity and distress.[25, 27, 28] In one study of 43 midlife women, perceived control over hot flashes accounted for 28% of the variance in hot flash distress.[27] We could find no published reports evaluating perceived control over hot flashes in breast cancer survivors or comparing perceived control over hot flashes between midlife women and breast cancer survivors (or other groups at high risk for hot flashes).

Thus, the purpose of this report was to address these identified gaps in the literature and explore perceived control over hot flashes and hot flashes in breast cancer survivors and midlife women without cancer. Specific aims were to (1) explore group differences in perceived control, (2) explore group differences in the relationship between perceived control over hot flashes and hot flashes (frequency, severity, bother, and daily interference), and (3) explore group status (survivor vs. midlife woman) as a possible moderators of the relationship between perceived control and demographic/clinical variables.

Conceptual Model and Hypotheses

According to relational statements found in the literature cited above, perceived control over hot flashes was expected to be negatively related to hot flash frequency, severity, and distress (i.e., lower control related to greater hot flash frequency, severity, and distress). Our study aims were designed to generate new data to further build a conceptual model of perceived control over hot flashes. We anticipated that breast cancer survivors would perceive less control, relationships between perceived control and hot flashes might vary by group, and group status might moderate the relationships of demographic and clinical variables to perceived control. Potential demographic and clinical variables that were analyzed fell into four broad categories: (1) demographics (race, marital status, employment status, income, age, years of education), (2) general health status (smoking history, current use of selective estrogen receptor modulators or aromatase inhibitors, body mass index, number of concurrent medications, number of comorbid conditions, mood disturbance), (3) menopause-related variables (menopausal status, months since last menses), and (4) hot flash-related variables (current use of hot flash treatments, number of hot flash treatments tried in the past, hot flash frequency, hot flash severity, hot flash bother, and hot flash interference).

Methods

Study Design

Data for this analysis came from baseline measures in a three-group randomized clinical trial comparing two different breathing programs to a usual care wait-list control for hot flashes and other menopausal symptoms. Baseline data collection occurred between May 2009 and February 2011. Follow-up data collection for the clinical trial was ongoing at the time of the baseline data analysis. Survivors and women without cancer were recruited from the breast cancer and high risk clinics at a Midwestern National Cancer Institute-designated cancer center and from the community using mass mailings of brochures and flyers, website and newsletter advertisements, and word of mouth. Women who met inclusion criteria and provided informed consent and approval to use health information completed a baseline assessment and then were stratified and randomized to study arms in a 2:2:1 ratio. Only baseline data prior to randomization are reported here. The study was approved by the university institutional review board and cancer center scientific review committee.

Sample Criteria

Inclusion criteria for both groups were: adult females, reporting 2 or more hot flashes per 24-hour day of moderate or greater severity (4 using 0 to 10 point numeric rating scale) at initial screening, desirous of hot flash treatments, self-reported peri- or post-menopausal status, in good general physical and mental health, no self-reported breathing difficulties, living within the local metropolitan area, and English literate. All survivors had to be at least 4 weeks post-completion of surgery, radiation, and/or chemotherapy for non-metastatic breast cancer and without a history of other cancers. The menopausal non-cancer group had to have no history of breast or other cancers (exception: basal cell skin carcinoma allowed). Women taking hot flash treatments were not excluded because one aim in the clinical trial was to determine if the breathing programs had any additive effect above and beyond currently used treatments. However, women taking such treatments had to agree to remain on them for the duration of the study and had to meet the hot flash frequency and severity inclusion criteria.

Procedures

Interested women were screened in person in clinic or contacted the research office to be screened over the telephone by trained staff. Eligible women were mailed a packet containing a cover letter, study brochure, two copies of the consent and health information authorization, and a pre-paid envelope. Women were instructed to review the materials and sign and return one copy of the consent and authorization by mail if interested in participating. Women who did not return materials were contacted by telephone by trained study staff to address questions and further assess interest in the study.

Once the signed consent and authorization were returned to the research office, trained data collectors contacted women by email or phone to arrange a baseline assessment session. Sessions typically lasted 30–45 minutes and were conducted in a private room at the university or in the woman's home. Trained data collectors measured height and weight, ensured that questionnaires were appropriately completed by participants, and reviewed verbal and written instructions regarding use of an electronic hot flash diary. All measures are described below:

Measures

Demographic and health information was collected on an investigator-designed form. Participants answered a series of questions regarding age, race, ethnicity, marital status, employment status, socio-economic status, education, prior breast training, smoking status, menopausal status, medication use including current hot flash treatments, and number and type of comorbid conditions. Race and ethnicity were assessed using National Institutes of Health criteria. Socio-economic status was worded in terms of ease in paying for basics.[29] Questions on smoking were from the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System Survey.[30] Three questions were used to classify women as never, former, or current smokers who had or had not made a quit attempt in the past year. Questions on menopausal status were based on definitions from the Stages of Reproductive Aging criteria as adapted for survey use.[31, 32]

Height and weight were measured by a trained data collector, recorded on a form, and used to calculate body mass index. Height was measured using a portable stadiometer (Harpender Pocket Stadiometer, Crosswell, UK) capable of measuring up to 7 feet of height with accuracy to within 1 cm. Weight was measured using a portable scale (UC-321S, A&D Weighing, Milpitas, CA) that allowed for up to 300 pounds and + 0.1 pound of accuracy.

Breast cancer disease and treatment information was verified by review of medical records by trained personnel. Collected information included date of diagnosis, stage of disease, and dates and types of treatments including surgery, chemotherapy, radiation, selective estrogen receptor modulators, and aromatase inhibitors.

Subjective hot flash frequency, severity, and bother were assessed using an electronic diary contained within the Biolog ESR (enhanced subject reporting) sternal skin conductance monitor (UFI, Morro Bay, CA). This allowed for event-based, real-time, real-world, prospective, subjective monitoring of hot flashes. Women were instructed to press both buttons to signal the start of the hot flash, press the left button to rate severity, and press the right button to rate bother. The letters "HF" appeared on the screen to indicate the subjective recording had been saved. Pressing severity and bother buttons allowed women to rate severity and bother using 0 to 10-point numeric rating scales (*0 not at all to 10 extremely*). [33, 34] Hot flash frequency was averaged over the amount of time women kept the diary and the number of hot flashes per 24-hours was used in the analysis. This allowed hot flash frequency to be standardized according to a common time frame across participants even though the amount of time they maintained the diary varied. Hot flash bother and distress

were averaged across all hot flashes recorded. Sternal skin conductance monitoring for objective measurement of hot flash frequency using the Biolog was not performed due to discontinuation of commercial production of the required electrodes during the course of the study.

Hot flash interference was measured using the 10-item Hot Flash Related Daily Interference Scale. This scale measures a woman's perceptions of the degree to which hot flashes interfere with nine daily life activities; the tenth item measures interference with overall quality of life.[35]. Participants rate the degree to which hot flashes have interfered with each item during the previous week (*0 do not interfere* to *10 completely interfere*). Recent structural equation modeling suggests this is a uni-dimensional scale best represented by an overall mean score (sum of items/10).[36] Cronbach's alphas in this study were 0.95 for survivors and 0.93 for menopausal women.

The Perceived Control over Hot Flashes Index is a 15-item scale measuring how much control women feel they have over menopausal hot flashes.[25–27] Participants rated each item from 1 *strongly disagree* to 4 *strongly agree*. Responses were totaled to create a summed score with higher scores denoting more control. Cronbach's alphas in this study were 0.70 for survivors and 0.65 for menopausal women.

The Profile of Mood States-Short Form assessed current (during the past week) mood disturbance.[37] The scale consists of 37 items from the original 65-item Profile of Mood States rated on a 5-point scale.[38, 39] A total mood disturbance score and six subscale scores were computed, with higher scores indicating higher mood disturbance. Subscales include tension/anxiety, anger/hostility, depression/dejection, confusion/bewilderment, fatigue/inertia, and vigor/activity. Cronbach's alphas in this study for total mood disturbance were 0.95 for survivors and 0.95 for menopausal women.

Other baseline measures that were administered but not relevant to this analysis were the Positive and Negative Affect Scale,[40] the 19-item Pittsburgh Sleep Quality Index,[41, 42] and the 10-item Somatosensory Amplification Scale assessing tendency to amplify or be aware of bodily sensations.[43, 44] The Positive and Negative Affect Scale was not included here because negative affect subscale scores were highly correlated with total POMS-SF scores (.69 in BCS and .79 in MW). The Pittsburgh Sleep Quality Index and Somatosensory Amplification Scale were not consistent with our purpose or aims and were excluded here.

Data Analysis

Demographic and disease and treatment information were described using frequencies and descriptive statistics. Demographic information was compared between groups using chi-square and t-tests. Aim 1 was analyzed using t-tests. Aim 2 was analyzed using correlation coefficients within each group. Aim 3 was analyzed using analysis of variance with group, potential moderator, and group*moderation interaction terms.

Results

A total of 331 breast cancer survivors were screened with 49% eligible after screening (n=161), 70% of those eligible consented (n=113), and 88% of those who consented completed a baseline assessment (n=99). A total of 402 midlife women were screened with 59% eligible after screening (n=237), 68% of those eligible consented (n=160), and 138 of those who consented completed a baseline assessment (n=138).

The breast cancer survivors were mostly stage IIB or less at first diagnosis (90%) and 8% had had a recurrence. Treatment received included 17% surgery only, 29% surgery with

radiation, 14% surgery with chemotherapy, and 39% surgery with both radiation and chemotherapy. Time post-diagnosis varied: 33% were 24 months (2 years) post-diagnosis, 33% were between 24 and 60 months (2–5 years), and 33% were > 60 months (> 5 years). Similarly, time since completion of the last treatment varied: 33% 16 months post-treatment, 33% >16 to 40 months, and 33% > 40 months.

Group differences in background characteristics are shown in Table 1. Hot flash therapies used included pharmacologics (e.g., selective serotonin reuptake inhibitors) and/or herbal or dietary supplements (e.g., black cohosh, soy). Breast cancer survivors were more likely to be White/Caucasian, be married or living with a partner, have no difficulty paying for basics, never have smoked, be using at least one therapy for hot flashes (pharmacological or herbal/dietary supplement), be using selective estrogen receptor modulators or aromatase inhibitors, be older, have lower body mass index, and have more comorbid conditions. Total mood disturbance in the BCS group was significantly lower than in the MW group.

Table 1 also shows a lack of group differences in perceived control over hot flashes, hot flash frequency, severity, bother, and daily interference. Both breast cancer survivors and menopausal women had moderate perceived control over their hot flashes. Both groups had an average of 6–7 hot flashes per day that were moderately severe and moderately bothersome with moderate hot flash related daily interference.

Relationships between perceived control and hot flash variables are shown in Table 2. Perceived control over hot flashes was not significantly related to hot flash frequency or severity in either group of participants. Perceived control was mildly related to hot flash bother in midlife women, but not in the breast cancer survivors. The relationship between perceived control and hot flash interference differed between groups with a moderate correlation seen in breast cancer survivors but mild correlation seen in midlife women. In other words, group status moderated the relationship between perceived control over hot flashes and hot flash interference ($p=.0420$).

Group status also moderated the relationship between current use of hot flash treatments and perceived control ($p=.0460$). In breast cancer survivors, those who reported using hot flash treatments reported less control over their hot flashes than those who reported not using hot flash treatments (Figure 2). In midlife women, the opposite was true. No other significant moderation effects were found.

Discussion

Taken together, these study findings help to build the theoretical understanding of perceived control over hot flashes in several ways. First, contrary to expectations, there were no group differences in perceived control over hot flashes, suggesting that this concept may generalize across different populations. Perceived control was moderate in both groups (mean scores of approximately 37 on a scale with a possible range of 0 to 60). Although cutoff scores and minimally clinically important differences have not yet been examined or published for this scale, our group means are comparable to those of Ecuadorian women ($M=37.9$, $SD=5.8$) [28] and slightly higher than for British women ($M=34.11$, $SD=6.74$) [27]. The lack of group differences in this study may have been related to the fact that both groups reported similar levels of hot flash frequency, severity, bother, and daily interference.

Second, study findings clarify existing knowledge regarding the available relational statements found in the literature. The expectation about group differences in the relationships between perceived control and hot flash variables was only partially supported. For example, in 38 midlife British women, moderate relationships were found between perceived control and hot flash frequency ($p = -.43$, $p < .001$) and between perceived

control and hot flash distress ($p = -0.53, p < .001$).[27] Although we found no relationship between perceived control and hot flash frequency, we did confirm significant relationships between perceived control and hot flash severity and bother. These relationships were found in both groups of participants. Further exploration of these relationships in larger and more diverse samples may be warranted to determine how stable our study findings are.

Third, study findings provide new evidence concerning moderating factors. We found that the relationship between perceived control and hot flash related daily interference was stronger for the breast cancer survivors than for the midlife women. This suggests that perceived control plays a more important role in how much hot flashes interfere in daily life for breast cancer survivors than for healthy women; a notion that could be tested in future qualitative or quantitative research. In addition, we found that in breast cancer survivors, the use of hot flash treatments was associated with poorer perceived control, whereas the opposite was true in midlife women. In this study of women seeking treatment for hot flashes, BCS were more likely to be already using a hot flash treatment, and yet they reported the same hot flash frequency, severity, bother, and interference as the midlife women, who were less likely to be using hot flash treatments. This suggests that BCS may have had a more problematic hot flash experience overall, with at least one hot flash treatment being required to decrease hot flashes to a level comparable to midlife women. This difference in relief from current hot flash treatments was not measured in this study but could be explored in future studies for its role in explaining moderation findings.

Study limitations include the following. First, the sample included only women in good general mental health and therefore does not represent the full spectrum of menopausal women with mood disorders. Second, the sample included only women seeking treatment for hot flashes, and scores for perceived control and for hot flashes may have been influenced by their desire for hot flash relief. Third, although we achieved good minority representation in the midlife woman group, fewer minority women with breast cancer were recruited. Thus, our findings need to be further explored in larger and more diverse populations of survivors. Fourth, Cronbach's alphas for the perceived control scale were .70 in this study, which could indicate that the scale is not internally consistent and might benefit from further evaluation through factor analysis and revision of items.

Practice Implications

Findings have several implications for practice. First, our overall findings emphasize the importance of continued menopausal symptom assessment and management for BCS and midlife women. Second, our findings support the importance of continuing nursing care even for women who are already using hot flash treatments. For BCS in particular, use of hot flash treatments may provide only partial symptom relief, thus necessitating clinical evaluation of protocols designed to allow use of multiple concurrent therapies in order to obtain greater symptom relief. Finally, findings suggest that nursing interventions targeted at improving perceived control over hot flashes may be more helpful for breast cancer survivors than for midlife women. Such interventions could be designed to teach women to self-manage hot flashes using lifestyle or behavioral interventions (such as those in the parent study).

Conclusions

To the best of our knowledge, this is the first published report to examine perceived control over hot flashes in breast cancer survivors and to compare perceived control between menopausal women without cancer and another group at higher risk for hot flashes. Findings fail to replicate some previously published results and extend our understanding of

perceived control over hot flashes in relationship to other hot flash variables in both breast cancer survivors and midlife women.

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Figure 1.
Group Moderates the Relationship between Hot Flash Related Daily Interference and Perceived Control over Hot Flashes

Figure 2.
Group Moderates the Relationship between Current Use of Hot Flash Treatments and Perceived Control over Hot Flashes

Table 1**Group Differences in Background Characteristics and Hot Flashes**

	Breast Cancer Survivors	Midlife Women	
Background characteristics	N (%)	N (%)	p
Ethnicity			.4927
Non-Latina	98 (99%)	135 (98%)	
Latina	1 (1%)	3 (2%)	
Race			< .0001
White/Caucasian	85 (86%)	78 (57%)	
Other	14 (14%)	60 (43%)	
Marital			.0009
Married/living with partner	74 (75%)	73 (53%)	
Single, widowed	20 (20%)	60 (43%)	
Other	5 (5%)	5 (4%)	
Employment			.8410
Full time	62 (63%)	90 (65%)	
Part time	13 (13%)	19 (14%)	
Not currently working	24 (24%)	29 (21%)	
Difficulty paying for basics			.0242
None	81 (82%)	91 (66%)	
Some	15 (15%)	37 (27%)	
A lot	3 (3%)	10 (7%)	
Smoker			.0393
Never	71 (72%)	81 (59%)	
Ever (Former, current)	28 (28%)	57 (41%)	
Menopausal status			.0877
Early peri/late peri	1 (1%)	6 (5%)	
Early post	9 (10%)	21 (16%)	
Late post	85 (89%)	102 (79%)	
Current use of hot flash treatments			.0309
No	40 (41%)	76 (55%)	
yes	58 (59%)	62 (45%)	
Use of SERM or AI			< .0001
Currently	59 (60%)	2 (1%)	
Not Currently	40 (40%)	136 (99%)	
Background characteristics	M (SD)	M (SD)	p
Age	53.10 (8.10)	52.36 (5.17)	.4215
Body mass index	28.80 (6.02)	30.17 (8.01)	.1363
Years of education	15.22 (2.48)	14.78 (2.13)	.1457
Number of concurrent medications	2.76 (2.37)	1.97 (1.64)	.0028
Number of comorbid conditions	2.11 (1.05)	1.46 (1.35)	< .0001

	Breast Cancer Survivors	Midlife Women	
Background characteristics	N (%)	N (%)	p
Number of past hot flash treatments	1.90 (1.58)	2.07 (1.71)	.4464
Months since last menses	90.93 (91.32)	75.85 (83.98)	.2106
POMS total mood disturbance	39.04 (22.48)	45.62 (24.86)	.0418
Hot flashes	M (SD)	M (SD)	p
Perceived control over hot flashes	37.59 (5.05)	37.61 (4.72)	.9741
24-hour hot flash frequency	6.94 (4.30)	6.34 (4.39)	.3026
Average hot flash severity	5.10 (1.55)	5.12 (1.65)	.9076
Average hot flash bother	4.64 (1.60)	4.64 (1.79)	.4376
Hot flash related daily interference	39.98 (24.61)	45.59 (24.08)	.0905

Table 2

Correlations between Perceived Control and Hot Flashes in Breast Cancer Survivors and Midlife Women without Cancer

	Perceived control over hot flashes	
	Breast Cancer Survivors (n=99)	Midlife Women (n=138)
24-hour hot flash frequency	-.04 ^a	-.04 ^a
Average hot flash severity	-.35 ^b	-.38 ^b
Average hot flash bother	-.37 ^b	-.37 ^b
Total hot flash-related daily interference	-.59 ^b	-.37 ^b

^aNot significant,

^bp < .001