Stress and Response to Treatment: Insights From a Pilot Study Using a 4-week Contemplative Self-Healing Meditation Intervention for Posttraumatic Stress in Breast Cancer

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Abstract
Along with symptoms of anxiety and depression, many breast cancer survivors experience symptoms of posttraumatic stress disorder (PTSD) that may worsen in the setting of other stressful life events. The aim of this pilot study was to evaluate whether a 4-week version of our Contemplative Self-Healing program would have different effects in reducing PTSD symptoms between breast cancer survivors with or without chronic stress at baseline. PTSD symptoms were measured using the Impact of Events scale (IES). A linear mixed model analysis was used to evaluate within patients changes in IES score. Results showed that breast cancer patients who were experiencing chronic stress reported greater improvement in IES score than those without chronic stress. Our preliminary findings shed light on the need to evaluate life stressors in breast cancer patients. Evaluating chronic stress may be essential in predicting which cancer patients may benefit most from a psychological intervention.

Keywords
breast cancer, meditation, stress

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cognitive behavioral exercises, aims to teach women skills (eg, meditation, breathing) and positive coping to manage stress in the setting of a life-threatening illness. In breast cancer patients, this Contemplative Self-Healing program was effective in reducing avoidance and intrusive symptoms and improved quality of life as measured by the Functional Assessment of Cancer Therapy General scale (FACT-G). The aim of this pilot study was to evaluate whether a 4-week version of our Contemplative Self-healing program would have different effects in reducing PTSD symptoms between breast cancer survivors with or without chronic stress at baseline. Our hypothesis was that women reporting chronic stress at baseline would show greater improvement in intrusive thoughts and symptoms of avoidance than women without stress.

Methods

Screening and Eligibility

Participants were recruited from the Weill Cornell Breast Center’s monthly and annual events and from community-based sites. Women with a stage I-III breast cancer who had completed initial treatment were eligible to participate. Patients who were male, had stage IV (metastatic) breast cancer, or were not fluent in English were excluded. The study was approved by the Cornell Medical College Institutional Review Board and written informed consent was obtained.

Clinical and Psychosocial Evaluation

Data were entered directly by participants into a web-based, secure, HIPAA (Health Insurance Portability and Accountability Act) compliant data management system (ClinVestigator). ClinVestigator is an open-source data collection, reporting, and analysis web-based tool for clinical and translational research.

Baseline Evaluation

The baseline assessment included sociodemographic information such as age, race, marital status, and work status. Clinical information concerning cancer stage, axillary node status, estrogen/progesterone receptor status, and specific course of surgery, chemotherapy, and radiation were also collected from clinical records. The Charlson Comorbidity Index was used to evaluate the presence of comorbid disease. Symptoms of PTSD were assessed using the Impact of Events scale (IES). The IES evaluates 2 domains: intrusive thoughts and avoidance and assesses 14 of 17 DSM-IV symptoms for PTSD. Higher scores indicate greater distress.

Life events and chronic stress were evaluated by asking participants if they were currently experiencing psychological distress due to illness-related problems (cancer, treatment, and other illnesses); family problems (conflicts with partner, parents, and children); financial problems; and job issues. Participants who reported any of the above stressful situations were asked to rate their distress on a 10-point rating scale with 0 corresponding to not at all distressing and 10 corresponding to very distressing. Since all stressed participants rated their distress as greater than 5, the stress groups’ membership was established based on reporting or not health, family, job and financial issues.

Follow-up

At 4 weeks, we repeated the psychosocial assessment, evaluating both PTSD symptoms using the IES and reevaluated life events and chronic stress, as described above.

Intervention

The Contemplative Self-Healing program was originally developed as a 20-week program. The first part consists of 8 weekly 90-minute group sessions focus on teaching meditation skills. During these sessions, participants were guided through exercises emphasizing awareness of breath, healing imagery, and deep breathing to help them better control their responses and practice self-change. The second part of the course was a 12-session cognitive-affective-behavioral learning program. Participants were exposed to new ideas and tools to better understand and cope with their reactions to the challenges of living with illness. As more than 40% of participants attended only from 1 to 9 sessions because of work issues, distance or other problems, the program has been condensed into a 4-week program aimed at improving attention and awareness while building essential skills to deal with stress. In the new condensed program, each 90-minute session encompasses 15 minutes of initial guided meditation, 15 minutes of structured questions and answers focusing on participant’s experience with the meditation during prior week, 30 minutes of structured lecture focusing on specific principles and practice of meditation-based behavioral changes, and 30 minutes of in-depth guided meditation practice. In week 1, participants had an initial experience of posture and breathing techniques. In addition, they were introduced to the role of the stress response in undermining the processes and structures of healing and learning. In week 2, participants experienced guided mindfulness focused on consciousness and its contents and explored the link between deconditioning stress and learning self-regulation. In week 3, participants were thought mature empathy meditation and healing insight meditation. In addition, they were introduced to the neurobiology of social stress and its roots in evolution and childhood as well as the framework for reversing post-traumatic social-emotional response styles. In week 4, they were exposed to guided imagery-based social-emotional meditation and breath-work and discussed the role of positive social emotions and response styles in promoting positive interactions and optimal development. Participants also were encouraged and prepared to practice the techniques within and between meditation sessions as homework.

Data Analysis

Baseline differences between women with versus without stress were evaluated by Fisher’s exact test and Student’s t test as appropriate. A linear mixed model analysis was used to evaluate within-patient changes from baseline to 4 weeks in IES scores between women with versus without stress. Age and time since diagnosis were also included in the models as covariates.

Results

Overall, a total of 106 breast cancer survivors participated in the program. Sixty-four women (60.4%) signed informed consent and agreed to participate in the study. Of these, 50 completed the baseline questionnaires and were included in this analysis. Nineteen participants (38%) were lost to
follow-up (Figure 1). There were no sociodemographic or clinical baseline differences between patients who completed the study compared to those who were lost to follow-up (Table 1). Specifically, there were no differences in age ($t = 0.13, P = .901$), race ($\chi^2 = 1.23, P = .348$), marital status ($\chi^2 = 1.45, P = .362$), work status ($\chi^2 = 0.03, P > .999$), and education ($\chi^2 = 1.81, P = .360$) (Table 1). In addition, there were no differences in comorbidity ($\chi^2 = 0.39, P = .551$), time since cancer diagnosis ($t = 0.43, P = .672$), chemotherapy ($\chi^2 = 2.23, P = .771$), and radiotherapy ($\chi^2 = 6.88, P = .543$) (Table 1).

**Baseline Sociodemographic and Clinical Characteristics**

Overall, the mean age of the sample was 60 years (range 31-88 years). About 90% of participants were Caucasian, and only 2% did not complete college. Sixty percent were married and about 82% were either employed or retired. The average time since the initial breast cancer diagnosis was 8 years. A total of 34% of cancer patients had at least another medical comorbidity. Half were treated with chemotherapy and 61% with radiotherapy.

At baseline, about 39% ($n = 22$) of participants reported at least 1 stressful event. Forty-four percent reported to be stressed because of cancer or other illness, 56% reported conflicts in the family, 26% job related issues, and 41% financial problems. Stressed women did not significantly differ from nonstressed participants in any sociodemographic and clinical variables. We only found a trend ($t = 1.93; P = .06$) showing that stressed women reported less time since diagnosis (6 ± 7 years) compared with nonstressed participants (10 ± 8 years).

**Baseline Differences in IES Scores According to Stress Status**

Baseline differences in IES scores between participants with and without stress according to nature of stressor are detailed in Table 2. Women with health, family, and/or job stress reported higher scores in IES total score, as well as the intrusive thoughts and avoidance subscale scores.

**Changes in Posttraumatic Stress–Like Symptoms**

**Baseline to 4 Weeks**

Women with family stress reported a significantly greater reduction in total IES score compared with those without family stress ($P = .013$) (Table 3). Specifically, their intrusive thoughts score decreased from 16 to 12 ($P = .031$) while their avoidance score lowered from 19 to 15 ($P = .046$) (Table 3). Similar results emerged for participants with job stress, where stressed women achieved a 10-point decrease in total IES score, while women without job stress remained stable ($P = .034$) (Table 3). Participants with money and health stress both reported slight decreases in IES score, which were not significantly different from nonstressed women (Table 3).

**Discussion**

Receiving a diagnosis of breast cancer forces women to face the inevitability of death. Similar to other potential life-threatening illness or situations, this can trigger a variety of negative emotional reactions such as fear, helplessness, anxiety, and irritability.13-15 In most cases, these symptoms represent an adaptive response to adjust to change.16 As a result, patients
may develop a stronger awareness of what is important in their life and positive spiritual and personal changes can arise. In other patients, fear of recurrence, intrusive thoughts about their illness, and anxiety can be overwhelming, making patients not able to cope effectively with their illness and the changes happening in their lives.3,15,16

We have previously demonstrated that a 20-week Contemplative Self-Healing program is effective in reducing intrusive thoughts and avoidance while improving quality of life in women with breast cancer.10 In the current study, using a shorter version of the same program, we found that women with family and/or job problems showed greater improvement in IES scores than women without stress. At baseline, with the exception of participants who presented financial problems, breast cancer survivors with no stress had an IES total score lower than 25, a cutoff that corresponds to the presence of a mild posttraumatic symptomatology.17 On the contrary, women with health, family, or job stress presented scores indicating a powerful impact of the event.14 Thus, it is not surprising that the Contemplative Self-Healing intervention was more effective in reducing PTSD symptoms in women who were currently distressed than in those who were not. Furthermore, both family and job problems often revolve around social conflicts. Aging parents, caregiving, children with school problems, marital dissatisfaction, and conflicts with colleagues or bosses, were among the most common issues. A key component of the 4-week Contemplative Self-Healing program is disarming social stress. Through guided empathic meditation,

| Table 2. Baseline Differences in Impact of Events Scale Scores Between Women With and Without Stress According to Stressors. |
|---------------------------------------------------------------|
|                                                                 |
| **No Stress (n = 28), Mean ± SD**                             |
| **Stress (n = 22), Mean ± SD**                                |
| **t or χ²** | **P** |
| Health stress Impact of events scale | 21.5 ± 14.1 | 34.0 ± 19.0 | 2.61 | .01 |
| Intrusive subscale | 10.3 ± 7.4 | 15.4 ± 10.3 | 1.98 | .05 |
| Avoidance subscale | 11.2 ± 8.5 | 16.8 ± 10.4 | 2.74 | <.01 |
| Family stress Impact of events scale | 20.3 ± 15.1 | 33.1 ± 17.6 | 2.65 | .01 |
| Intrusive subscale | 9.5 ± 8.1 | 15.3 ± 9.3 | 2.24 | .03 |
| Avoidance subscale | 10.8 ± 8.4 | 17.8 ± 10.3 | 2.55 | .01 |
| Job stress Impact of events scale | 23.4 ± 16.8 | 39.7 ± 14.9 | 2.89 | <.01 |
| Intrusive subscale | 10.6 ± 8.2 | 19.7 ± 9.4 | 3.11 | <.01 |
| Avoidance subscale | 12.7 ± 9.8 | 20.0 ± 8.7 | 2.22 | .03 |
| Financial stress Impact of events scale | 26.3 ± 19.5 | 28.5 ± 15.3 | 0.42 | .679 |
| Intrusive subscale | 12 ± 10 | 12.9 ± 9 | 0.69 | .496 |
| Avoidance subscale | 14.3 ± 11.1 | 14.6 ± 8.3 | 0.10 | .919 |

| Table 3. Estimated Marginal Means Pre-Post Intervention by Stress Status According to Stressors With Age and Time Since Diagnosis as Covariates. |
|---------------------------------------------------------------|
|                                                                 |
| **No Stress** | **Stress** |
| **Pre, Mean (SE)** | **Post, Mean (SE)** | **Pre, Mean (SE)** | **Post, Mean (SE)** | **F (df)** | **P** |
| Health stress Impact of events scale | 22 (4) | 19 (4) | 33 (4) | 32 (4) | 0.35 (1, 31) | .559 |
| Intrusive subscale | 11 (2) | 9 (2) | 15 (2) | 15 (2) | 0.70 (1, 30) | .408 |
| Avoidance subscale | 12 (2) | 10 (2) | 18 (2) | 17 (2) | 0.03 (1, 34) | .859 |
| Family stress Impact of events scale | 20 (3.2) | 22 (4) | 35 (3) | 27 (4) | 6.91 (1, 30) | .013 |
| Intrusive subscale | 10 (2) | 10 (2) | 16 (2) | 12 (2) | 5.16 (1, 29) | .031 |
| Avoidance subscale | 10 (2) | 12 (2) | 19 (2) | 15 (2) | 4.31 (1, 32) | .046 |
| Job stress Impact of events scale | 24 (3) | 24 (3) | 39 (5) | 29 (6) | 4.94 (1, 29) | .034 |
| Intrusive subscale | 11 (1) | 11 (2) | 19 (3) | 13 (3) | 10.17 (1, 29) | .003 |
| Avoidance subscale | 13 (2) | 12 (2) | 20 (3.0) | 16 (30) | 0.90 (1, 32) | .349 |
| Financial stress Impact of events scale | 26 (3) | 22 (3) | 29 (4) | 29 (4) | 0.81 (1, 31) | .375 |
| Intrusive subscale | 12 (2) | 11 (2) | 14 (2.1) | 12 (2) | 1.11 (1, 29) | .301 |
| Avoidance subscale | 14 (2) | 11 (2) | 15 (2.2) | 17 (2) | 3.43 (1, 33) | .073 |
patients learn to recognize their self-protective bias and stress-reactive social emotional style, as well as to develop compassion and mature altruism.9 This component, along with the meditation practice, was probably essential in helping breast cancer survivors to decrease the stress response and the intrusiveness of illness-related thoughts.

Overall, our results point out the importance of evaluating the presence of chronic stress for the successful treatment of PTSD symptoms in patients with breast cancer. This is particularly true when stressful situations are present. Indeed, the co-occurrence of life events and other longstanding stressful situations may exceed the individual’s coping skills leading to a state of psychological overload.18 In patients with chronic or life-threatening illness stressful situations can easily aggravate the already heavy burden of the individual, increasing the likelihood of developing a state of psychological overload, which in turn may lead to a full depressive and/or anxiety disorder19 and may constitute a further danger to health.20,21 The assessment of comorbid stressful situations and psychological overload can be essential in predicting which patients can benefit the most from an intervention and can help clinicians to tailor the intervention to the patients’ needs.

**Limitations**

The main limitation of the study is the absence of a control group. Thus, we do not know whether the improvement in PTSD symptoms is due to active components of the intervention or to the regular social contact the patients shared for 4 weeks. The small sample size and the heterogeneity of the sample limit our ability to generalize the results of this pilot. Moreover, being the majority of the sample Caucasian, we could not evaluate race differences. Another limitation is the lack of assessment of depression and anxiety disorders. Because of the preliminary nature of this study and our focus on PTSD symptoms, we did not include those measures that need to be included in future studies as they may play a crucial role in influencing participants response to the intervention.

In addition, our pilot investigation did not use a well-established life stress assessment. Even though our stress tool was easy to be filled by participants, we recognized that it lacks a proper validation for reliability.

**Conclusion**

Despite several limitations, this pilot investigation sheds light into the crucial role that chronic stress may play in influencing the response of breast cancer patients to psychological interventions. Our findings showed that in breast cancer survivors with family or job problems, our 4-week Contemplative Self-Healing program yielded greater improvement in PTSD symptoms compared to non-stressed breast cancer survivors. These preliminary results may have important clinical implications. First, we showed that about 40% of breast cancer survivors are still psychologically challenged by their illness even years after completing the treatment. Since cancer treatments have been improved notably in the last years, breast cancer survivors live longer but so does their fear of recurrence. A patient-oriented care should include psychological support for those who may need to learn how to face and cope with these fears. A second result highlighted by our study is that the presence of concurrent life stressor such as problems with family members or job issues can exacerbate intrusive thoughts and avoidant behaviors related to cancer. Dealing with a chronic illness and fear of recurrence is more challenging when patients face life problems. As a result, intrusive negative thoughts may prevail, further worsening their psychological state. Third, we found that a 4-week Contemplative Self-Healing intervention was more effective in reducing PTSD symptoms in women who reported chronic stress at baseline. This result may be crucial for future studies trying to evaluate the impact of psychological interventions on well-being and distress of breast cancer patients. Often, participants are recruited based on their breast cancer diagnosis neglecting that the majority of them are resilient and cope successfully with their illness. This recruiting bias may be the reason why meta-analyses found controversial results in term of effect sizes of psychological interventions in breast cancer. Consistently with the precision medicine initiative, psychological interventions should be focusing on those survivors who are facing other life stressors and may benefit the most from psychological support.

**Author Contributions**

EO was involved with research concept and design, data analysis interpretation and providing statistical expertise. JCP was involved with research concept and design, acquisition of data, data analysis and interpretation, statistical expertise, acquisition of funding, and supervision of the study. JL was involved with research concept and design. AM was involved with research concept and design, acquisition of data, and acquisition of funding. MEC was involved with research concept and design, data analysis and interpretation, statistical expertise, acquisition of funding, and supervision of the study.

**Declaration of Conflicting Interests**

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**Ethical Approval**

The study was approved by the Cornell Medical College Institutional Review Board.

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