


Long-Term Effect of a Nonrandomized Psychosocial Mindfulness-Based Intervention in Hispanic/Latina Breast Cancer Survivors

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Abstract

Background: There is a paucity of research on the long-term impact of stress-reduction in Hispanic/Latina breast cancer (BC) survivors, a growing minority. In this article, we assess the long-term efficacy of an 8-week training program in mindfulness-based stress reduction (MBSR) on quality of life (QoL) in Hispanic BC survivors. **Methods:** Hispanic BC survivors, within the first 5 years of diagnosis, stages I to III BC, were recruited. Participants were enrolled in bilingual, 8-week intensive group training in MBSR and were asked to practice at home, daily. They were also provided with audio recordings and a book on mindfulness practices. Patient-reported outcomes for QoL and distress were evaluated at baseline, and every 3 months, for 24 months. **Results:** Thirty-three self-identified Hispanic women with BC completed the MBSR program and were followed at 24 months. Statistically significant reduction was noted for the Generalized Anxiety Disorder measure (mean change -2.39 , $P=0.04$); and Patient Health Questionnaire (mean change -2.27 , $P=0.04$), at 24 months, compared with baseline. Improvement was noted in the Short-Form 36 Health-related QoL Mental Component Summary with an increase of 4.07 (95% confidence interval = 0.48-7.66, $P=0.03$). However, there was no significant change in the Physical Component Summary. **Conclusions:** Hispanic BC survivors who participated in an 8-week MBSR-based survivorship program reported persistent benefits with reduced anxiety, depression, and improved mental health QoL over 24 months of follow-up. Stress reduction programs are beneficial and can be implemented as part of a comprehensive survivorship care in BC patients.

Keywords

survivors, breast cancer, outcome, mindfulness, program, Hispanic

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Background

Breast cancer (BC) is the most commonly diagnosed, invasive cancer among Hispanic/Latina women.¹ Despite having lower incidence rates of BC than non-Hispanic whites, Hispanics tend to present with more advanced stages at time of diagnosis, experience more delay of appropriate treatment,² and possibly exhibit lower survival rates attributed to lower socioeconomic status and inferior adherence to follow-up care.³ However, due to recent efforts in early detection and treatment of BC, there has been a decrease in late diagnosis and an increase in corresponding BC survival rates among Hispanics.⁴

Improving the transition to optimal life after cancer is an important challenge for oncologists and health care

providers; it is especially important in Hispanic BC survivors. Hispanics are the largest and the fastest-growing minority in the United States⁵ and are reported to exhibit increased disparities in survivorship care compared with other BC survivor ethnic populations.⁶ Several reports have suggested that Hispanic BC survivors tend to have a

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poorer quality of life (QoL; both physically and mentally),⁶ higher levels of stress, anxiety, and depression,^{7,8} as well as more posttreatment fatigue compared with their non-Hispanic counterparts.⁹ These challenges increase the psychological burden of cancer on these survivors and significantly limit their psychosocial well-being, and functional abilities, which may have negative implications on their families and communities. Hispanic culture may play a role in shaping the cancer experience independent of socioeconomic status of these patients. This includes culturally determined perceptions of disease, participation in preventive health care, and the ability to assimilate diagnosis into cultural norms and engage in treatment decisions.¹⁰ Studies on BC survivors have revealed that Hispanic women experience unique concerns about stigma or negative attitudes their family members may have toward their disease.¹¹ In certain situations, *familism*—the belief that exalts the needs of the family over the needs of the individual—may be adaptive in the context of cancer when it facilitates social support for patients.¹² However, in the context of BC survivors, it was found to also manifest in a pattern of *marianismo*, or female submissiveness, where patients did not want to burden their spouses with their diagnosis and consequently experienced isolation in their journeys through cancer.¹¹ Some women reported the sense of abandonment by their partners, which was attributed to culturally specific *machismo* (male dominance).¹³ Qualitative studies on this population suggest that cultural factors are neither fully protective nor deleterious, but they do highlight that Hispanic women are a uniquely vulnerable population in their experience of this disease.

This study introduced a survivorship program that examines the effect of mindfulness on the QoL of Latina BC survivors when a psychosocial approach, which addresses the psychological, emotional, spiritual, and functional aspects of the patient journey, is implemented. We sought to evaluate the long-term benefit of implementing a language appropriate, Mindfulness-Based Stress Reduction (MBSR) program, primarily targeting Hispanic BC survivors. The MBSR program was developed by Kabat-Zinn in 1979 at the University of Massachusetts Medical Center.¹⁴ It combines meditation focused on insight with hatha yoga into an 8-week program, which includes a 7.5-hour meditation retreat¹⁵; it is a stress-reducing intervention that improves psychological and physical stress through the use of meditative practices.^{16,17} The MBSR program has numerous clinical applications, including chronic pain,¹⁸ HIV,¹⁹ depression,²⁰ and has previously been reported as useful in BC survivors.²¹⁻²⁴

This study program was implemented in an academic medical center, in the large American-Mexican Border city of El Paso, TX, with a Hispanic-majority patient population.

Methods

Patients and Design

After approval by the TTUHSC-EP (Texas Tech University Health Sciences Center El Paso) Institutional Review Board, we recruited consecutive individuals who had received diagnosis within the previous 5 years, with stages I to III BC, completed active therapy (surgery, chemotherapy, and/or radiation therapy), and who had consented to participate in this 8-week program. The program was conducted in collaboration with a bilingual oncologist, nursing staff, and a clinical psychologist who led the MBSR group sessions.²⁴ Participants were evaluated at baseline, and every 3 months thereafter, for the 24-month study period. At each interval, the patients were asked to complete 4, brief, self-administered questionnaires: the Generalized Anxiety Questionnaire-7 (GAD7),^{25,26} the Patient Health Questionnaire-9 (PHQ9),^{25,27} and the Short Form (SF-36) Quality of Life (QoL)—Physical Component Summary (PCS), and Mental Component Summary (MCS).²⁸⁻³⁰ All questionnaires and the consent form were translated into Spanish by a certified translator.

The GAD7 questionnaire measures severity of generalized patient anxiety; each of its 7 questions allows for an indication of a score between 0 and 3 (at 1-point intervals), and is interpreted on an inverse scale, with lower scores being more clinically favorable (eg, 0 indicates no anxiety symptoms; 3 indicates anxiety symptoms every day). Possible overall scores may range from 0 to 21.

The PHQ9 questionnaire measures the presence and associated severity of depression; each of its 9 questions allows for indication of a score between 0 and 3 (and 1-point intervals), and is interpreted on an inverse scale, with lower scores being more clinically favorable (eg, 0 indicates no depression symptoms; 3 indicates depression symptoms every day). Possible overall scores may range from 0 to 27.

The SF-36 questionnaire includes 8, separate sections that collectively represent overall mental, emotional, and physical health status. Two of these sections were utilized in this report, which include the MCS and PCS. Each section is scaled between 0 and 100, with a predetermined general population mean of 50. The scores for each section are interpreted on an ascending scale, with lower scores indicating higher disability and higher scores indicating lower disability.

Recruitment occurred from the BC clinic at Texas Tech Medical Center, a large tertiary program in El Paso, Texas. Patients were encouraged to attend all appointments and reminded of their upcoming appointments per standard of care. Eligible individuals were asked to attend an 8-week course that instructed participants on the techniques of mindfulness practices. Only those who had completed the 8-week course, within the first 12 months of enrollment in

the program, were included in this analysis. The MBSR course, itself, was modeled after a previously validated, 8-week course, which teaches participants elements of meditation, patience, trust, nonstriving, acceptance, paying attention, body scanning, and other practices.³¹ The MBSR course was integrated into the BC survivorship program at the Texas Tech Medical Center. The MBSR sessions were delivered in Spanish, by a bilingual psychologist (RP), for the majority of participants, and in English, separately, for individuals who preferred sessions in English. The MBSR group course consisted of a weekly, 2-hour class for 8 separate sessions. Every group session was designed to include no more than 10 participants at any time, in an effort to allow ample one-on-one time between each participant and the psychologist leading the session. The course was provided 3 times per year, in English and Spanish. It included the following components:

- Teaching various mindfulness meditation techniques (eg, body scans, awareness of breathing, sitting/walking meditations)
- Practicing the mindfulness techniques in class
- Encouraging the practice of learned techniques, at home, through audio recordings of mindfulness meditation exercises and daily diary writing
- Providing a book on mindfulness³¹

Statistical Analysis

Data were summarized using descriptive and univariate measures, including mean and standard deviation (SD) for quantitative data, as well as frequency and proportion for categorical data. The distribution of patient characteristics was also captured, including age at diagnosis, year of diagnosis, chemotherapy received, type of surgery, presence of comorbidities, and obesity. These characteristics were reported descriptively, as well as utilized to understand their respective effect on any trends noted in outcomes—any statistical comparison in outcomes, between patient subgroups, was evaluated with *t* tests or Fisher's exact tests, as appropriate.

Outcomes were evaluated as the change in scores between baseline data captured and at a 12- or 24-month follow-up, via the following measures: GAD7, HQ, MCS of SF-36, and PCS of SF-36. A descriptive comparison was also made via percent improvement in each outcome, measured from baseline to either 12- or 24-month follow-up. Although the primary aim of the study was to evaluate the effect of the MBSR program on each outcome at 24 months compared with the respective baseline, the longitudinal effect of MBSR intervention on each outcome over the follow-up (baseline, at 12 months, and at 24 months) using a repeated measures mixed model (PROC MIXED in SAS) was also examined given the longitudinal study design.

Among those who completed the full 24-month study duration, trends in each outcome measure, over the follow-up period, was assessed using a repeated measures analysis of variance. In addition, the difference in each measure of SF-36 QoL from baseline to 12 months and 24 months were determined using paired *t* tests. Significance was reported as *P* value with $\alpha < 0.05$; all tabulated *P* values exhibiting significance are indicated with an asterisk (*). Statistical analyses were conducted using SAS 9.3.

Results

A total of 94 BC survivors were initially recruited into the study. Of this cohort, 91% were Hispanic. Thirty-three survivors completed the full, 24-month program, 97% of whom were Hispanic. Of the 94 original survivors enrolled, 60 completed 12 months of follow-up and 33 completed 24 months of follow-up after receiving MBSR; 1 patient was lost to follow-up due to disease progression. Participants who did not complete the 24-month follow-up visits predominately stated that social commitments prevented them from returning for evaluation. There were no differences in baseline characteristics between participants who completed the 24-month program versus those who did not, as noted in Table 1. Mean age was 55 years (SD = 8.5 years). Of the cohort enrolled, 27% of participants were younger than 50 years, and the majority of patients presented with a diagnosis of early stage BC at stage I (36%) or stage II (39%). Approximately three quarters of the patients received chemotherapy and endocrine (hormonal) therapy; half of the patients received lumpectomy and the other half received mastectomy. More than 65% had estrogen receptor positive/progesterone receptor positive disease, and 15% had HER2/neu positive disease. Over half of the patients presented with comorbidities, including diabetes and hyperlipidemia, and 52% had known family history of cancer.

Figure 1 shows the changes in outcome measures over the 24-month duration of the study. A linear trend toward significant improvement was observed for GAD7 and PHQ9 measures, evaluated using repeated measures analysis of variance. At baseline, the PCS representing the mean for the SF-36 QoL Physical Health was 45.75, and the MCS for Mental Health was 43.7, both abnormal (below 50.0 the population norm). Mean score for GAD7 was 7.3 and for PHQ9 7.62, both abnormal (>5) and elevated. At 12 months, PCS was slightly improved at 46.02, so was MCS at 46.1, but GAD7 was significantly improved at 4.92; and PHQ9 at 5, also improved. At 24 months, results showed the following: GAD7 was 4.88 and PHQ9 was 4.52, both of which were significantly better compared with baseline; MCS also improved at 47.02 while PCS was 45.65 (no significant change compared with baseline). Figure 1 supports the persistent trend in improvement over the period of follow-up in all measures except for the PCS measure.

Table 1. Characteristics of Patients Included in the MBSR Program.

Characteristics	Entire Cohort (N = 94)	12 Months (N = 60)	24 Months (N = 33)	P ^a
Age (years), mean (SD)	54.4 (8.71)	54.95 (8.4)	54.58 (8.5)	0.71
Years since cancer diagnosis, mean (SD)	2.98 (2.19)	2.92 (2.34)	2.58 (2.05)	0.21
Body mass index (kg/m ²), mean (SD)	31.22 (5.68)	31.59 (5.86)	32.37 (6.48)	0.26
	n (%)	n (%)	n (%)	P
Age (categorized) years				1.00
Age <50	29 (30.85)	17 (28.33)	9 (27.27)	
Age ≥50	65 (69.15)	43 (71.67)	24 (72.73)	
Comorbidities				0.90
None	47 (50.0)	29 (48.33)	17 (51.52)	
DM	2 (2.13)	3 (5.0)	1 (3.03)	
Lipids	10 (10.64)	7 (11.67)	4 (12.12)	
Others	35 (37.23)	21 (35)	11 (33.33)	
Stage				0.89
I	36 (38.3)	22 (36.67)	12 (36.36)	
II	40 (42.55)	25 (41.67)	13 (39.39)	
III	18 (19.15)	13 (21.67)	8 (24.24)	
ER +/PR+				0.25
Negative	25 (26.6)	16 (26.67)	11 (33.33)	
Positive	69 (73.4)	44 (73.33)	22 (66.67)	
HER2/neu				0.74
Negative	75 (79.79)	50 (83.33)	28 (84.85)	
Positive	19 (20.21)	10 (16.67)	5 (15.15)	
Endocrine therapy				0.06
None	27 (28.72)	18 (30)	13 (39.39)	
Tamoxifen	21 (22.34)	13 (21.67)	8 (24.24)	
AI	29 (30.85)	18 (30)	10 (30.3)	
Tamoxifen and AI sequentially	16 (17.02)	10 (16.67)	2 (6.06)	
Surgery type				1.00
Lumpectomy	48 (51.06)	32 (53.33)	18 (54.55)	
Mastectomy	46 (48.94)	28 (46.67)	15 (45.45)	

Abbreviations: MBSR, mindfulness-based stress reduction; SD, standard deviation; N, number; DM, diabetes mellitus ER, estrogen receptor; PR, progesterone receptor; HER, human epidermal growth factor receptor; AI, aromatase inhibitor.

^aP value for comparison between participants who completed the program and those who did not.

Table 2 provides the effect of the MBSR program intervention on considered outcomes. Marked improvements were obtained for GAD7 (mean change = -2.39, $P = 0.04$) and PHQ9 scores (mean change = -2.27, $P = 0.04$) at 24 months compared with baseline. The absolute change was more than 2 units between the 24-month follow-up interval and baseline, for all of MCS, GAD7, and PHQ9. Based on percent improvement shown in Table 2, for each outcome, the improvement in PHQ9 measures at 24 months was 15.2%, indicating persistence of benefit, as noted by similar improvement observed at 12 months (15.9%). Overall improvement in outcomes and sustainable effects post-MBSR interventions were obtained for all measures, except for PCS, although improvement was slightly lower at 24 months compared with 12 months, as follows: MCS 10% versus 14%; GAD7 11% versus 16%; PHQ9 15% versus

16%; and PCS 2% versus 1%. Although an improvement in MCS of SF-36 was obtained at 24 months compared with baseline, the difference did not reach statistical significance (mean change = 2.57, $P = 0.17$). No improvement was noted for PCS outcome at 24-month follow-up compared with baseline (mean change = -0.34, $P = 0.80$). Of interest, no change in average body mass index measure (mean change = 0.83, $P = 0.15$) was noted at 24 months compared with baseline and remained in the obesity range (>30), reflecting the patient population included.

Table 3 displays the longitudinal effect of MBSR intervention on different outcomes at the 12-month and 24-month follow-up intervals. Significant improvements, in all outcome measures except for PCS, were noticed at 24 months compared with baseline. At 24 months, the mean change in MCS was 4.07 (95% CI = 0.48 to 7.66,

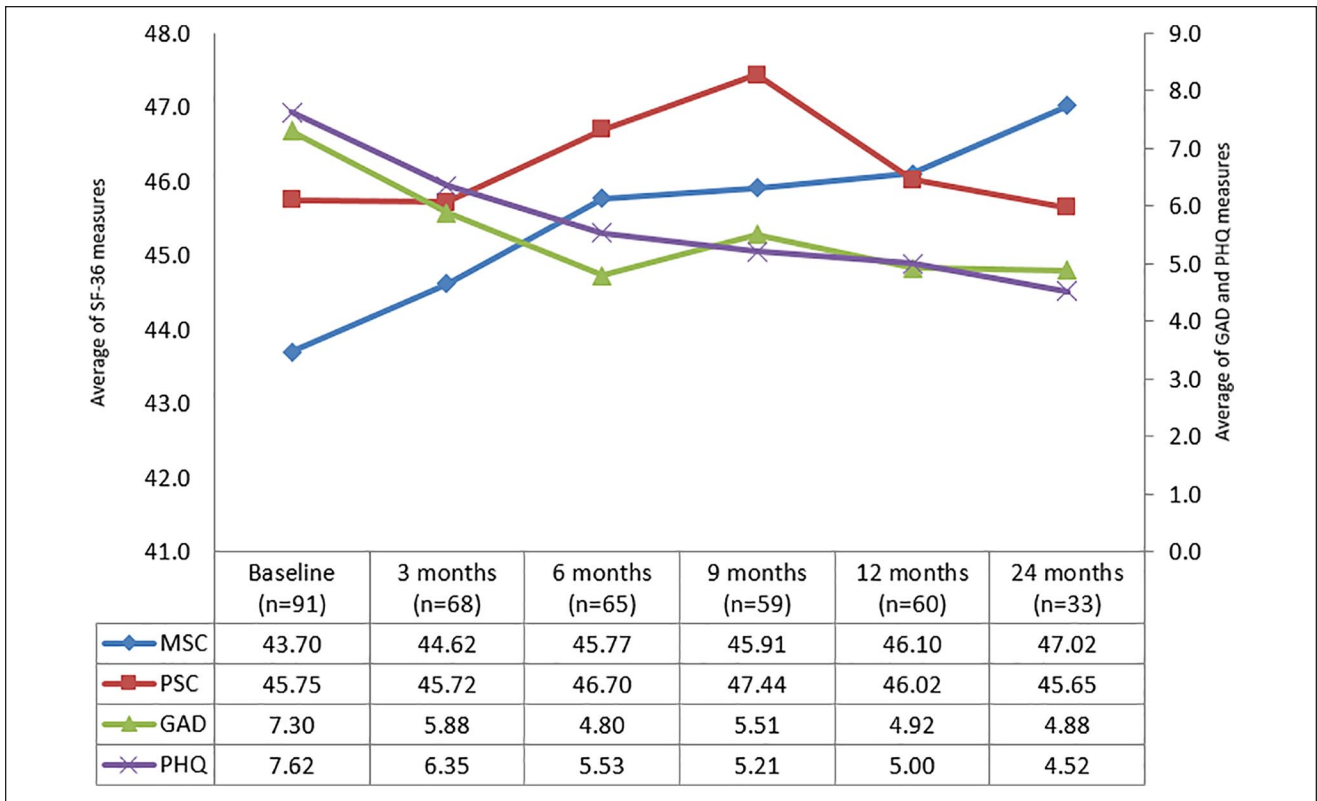


Figure 1. Summary and pattern of outcome measures over the follow-up.

Table 2. Effect of MBSR Intervention at 24 Months Compared With Baseline.

Outcomes	At 12 Months		At 24 Months			Percent Change
	Percent Change	MD	95% CI	P	Percent Change	
MCS	13.94	2.57	-1.17	6.31	0.17	9.60
PCS	1.21	-0.34	-3.1	2.42	0.80	1.80
GAD7	-15.9	-2.39	-4.67	-0.11	0.04*	-11.38
PHQ9	-15.89	-2.27	-4.4	-0.15	0.04*	-15.20

Abbreviations: MBSR, mindfulness-based stress reduction; MD, mean difference; CI, confidence interval; MCS, mental component summary; PCS, physical component summary; GAD7, General Anxiety Disorder Questionnaire; PHQ9, Patient Health Questionnaire.

*Significant.

$P = 0.03$), GAD7 was -2.66 (95% CI = -4.65 to -0.67 , $P = 0.01$), and PHQ9 was -3.01 (95% CI = -4.87 to -1.16 , $P < 0.001$) compared with the respective baseline values. Similarly, all measures showed an improvement at 12 months as well, compared with their baseline values except for PCS outcome.

Table 4 shows the effect of MBSR intervention at 12 months and 24 months compared with baseline, for each measure of the SF-36 questionnaire. A large effect was obtained for improvement in Role-physical (RP), Vitality (VT), Role-emotional (RE), and Mental health (MH) at 12

months and 24 months after MBSR intervention. However, none of these measures were found to be statistically significantly improved after intervention either at 12 months or 24 months as compared with respective baseline values.

Various subgroup analyses were conducted to evaluate treatment effect by characteristics of those enrolled (age at diagnosis, year of diagnosis, chemotherapy received, type of surgery, presence of comorbidities, and obesity). We found that the interventional MBSR therapy exhibited a particularly marked improvement for all scores (except PCS) among older participants (age ≥ 50 years), and was

Table 3. Longitudinal Effects of MBSR Intervention on Outcomes.

Outcomes	RC		95% CI	P ^a
MCS				
At 12 months	2.37	-0.44	5.19	0.10
At 24 months	4.07	0.48	7.66	0.03*
PCS				
At 12 months	-0.13	-2.06	1.81	0.90
At 24 months	0.01	-2.15	2.17	0.99
GAD7				
At 12 months	-2.22	-3.63	-0.80	<0.001*
At 24 months	-2.66	-4.65	-0.67	0.01*
PHQ9				
At 12 months	-2.32	-3.82	-0.81	<0.001*
At 24 months	-3.01	-4.87	-1.16	<0.001*

Abbreviations: MBSR, mindfulness-based stress reduction; RC, regression coefficient; CI, confidence interval; MCS, mental component summary; PCS, physical component summary; GAD7, General Anxiety Disorder Questionnaire; PHQ9, Patient Health Questionnaire.

^aP value comparing the effect of MBSR intervention at 12 and 24 months in relation to baseline (reference).

*Significant.

Table 4. Effect of MBSR Intervention at 24 Month on Individual SF-36 Measure.

SF-36	At 12 Months				At 24 Months			
	Mean Difference	95% CI		P	Mean Difference	95% CI		P
PF	1.50	-4.25	7.25	0.60	1.21	-6.36	8.79	0.75
RP	-4.17	-10.76	2.43	0.21	-3.60	-13.27	6.08	0.45
BP	1.13	-5.29	7.56	0.73	-1.82	-11.50	7.86	0.70
GH	-1.80	-7.83	4.23	0.55	0.12	-8.38	8.62	0.98
VT	-4.58	-9.31	0.14	0.06	-5.49	-12.02	1.03	0.10
SF	-2.08	-9.79	5.63	0.59	0.00	-9.27	9.27	1.00
RE	-4.44	-11.83	2.94	0.23	-4.80	-17.07	7.47	0.43
MH	-4.50	-10.18	1.18	0.11	-4.39	-11.59	2.80	0.22

Abbreviations: MBSR, mindfulness-based stress reduction; SF-36, short form; CI, confidence interval; PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health perceptions; VT, vitality; SF, social functioning; RE, role-emotional; MH, mental health.

most notable among survivors who were identified as being 3 or more years post-diagnosis, but not before (Table 5). The effect of intervention on any outcomes was not found to be statistically different according to received type of treatment, presence of comorbidities, or obesity.

Discussion

To our knowledge, the long-term effect of a MBSR intervention has not been previously reported in Hispanic BC survivors. This study suggests that MBSR-based practices have significant long-term benefits in improving mental health in this minority group of BC survivors.²⁴ Survivors reported less anxiety and depression, compared with baseline measurements and showed a trend toward improved Mental Component Summary of QoL. This bilingual

intervention, using mindfulness-based techniques, provided in the context of psychological care, during an 8-week group course, demonstrated long-term sustainable effects among Hispanic BC survivors. The strengths of this study include the following: the focus on Hispanic minority, the use of validated anxiety, depression, and QoL measurement scales with scores reaching near normal values after 12 months into the program for GAD7, and PHQ9, and favorable outcomes observed at 24 months of follow-up, indicating persistent benefits.

The impact of this intervention was noted during the first 12 months of attending the MBSR course and persisted through to 24 months indicating continuous benefit for Hispanic BC survivors. We also noted that postmenopausal women might derive the best outcome from this interventional approach. Further studies are needed to

Table 5. Comparison of Change of Major Outcomes at 24 Month According to Age.

Variables	Difference (24 Months – Baseline)			
	Difference (SD)	P	Difference (SD)	P
	Age <50 years (n = 9)		Age ≥50 years (n = 24)	
MCS	0.05 (16.14)	0.99	3.51 (7.78)	0.04*
PCS	-3.28 (7.91)	0.25	0.76 (7.62)	0.63
GAD7	-0.33 (7.68)	0.90	-3.17 (5.89)	0.01*
PHQ9	-1.89 (7.52)	0.47	-2.42 (5.5)	0.04*
	Year of diagnosis (<3, n = 22)		Year of diagnosis (≥3, n = 11)	
MCS	1.48 (11.71)	0.56	4.75 (7.74)	0.07
PCS	-1.49 (7.7)	0.38	1.95 (7.81)	0.43
GAD7	-0.82 (5.43)	0.49	-5.55 (7.34)	0.03*
PHQ9	-0.95 (5.8)	0.4	-4.91 (5.74)	0.02*

Abbreviations: SD, standard deviation; MCS, mental component summary; PCS, physical component summary; GAD7, General Anxiety Disorder Questionnaire; PHQ9, Patient Health Questionnaire.

*Significant.

determine more appropriate survivorship interventions in premenopausal and younger women with BC, as these subgroups were not observed to derive the same benefit.

The mindfulness approach was first described by Kabat-Zinn¹⁶ in patients with chronic pain, where it was associated with improvement of mood, anxiety, and depression. This approach was also reported to have desirable effects in patients with other chronic illnesses (eg, heart disease, depression, and anxiety).^{21-23,32} In BC survivors, the MBSR intervention has been reported to improve both mental and physical outcomes,³³⁻³⁵ as well as decrease anxiety and depression.²¹ It was also suggested as an adjunctive therapy to facilitate psychosocial adjustment in BC patients receiving radiotherapy.²² A recent meta-analysis, involving 9 MBSR studies, showed a large positive effect on the mental health of BC patients.²³

The exact mechanisms through which MBSR exerts its therapeutic effects are unclear, but its utility in cancer patients is not uncharted. A number of mechanisms have been spotlighted by researchers studying mindfulness interventions in this population. Labelle et al³⁶ found that mindfulness is effective in alleviating patterns of rumination and worry during early stages of the intervention. Similarly, Chin et al³⁷ found in one randomized controlled trial that mindfulness is associated with acceptance skills that facilitated stress resilience. In younger BC survivors, Boyle et al³⁸ found that mindfulness meditation allows patients to exercise self-kindness. This is particularly helpful in patients who continue to struggle with intrusive thoughts about their cancer experience as well as a fear of recurrence after finishing treatment. Mindfulness not only ameliorates psychosocial well-being of vulnerable groups through enhanced emotional regulation, it also plays a role in the physical experience of cancer-related pain.³⁹ This is corroborated by several studies suggesting that an 8-week

MBSR intervention might induce functional and structural neurological changes, including neuroplastic changes in key areas for emotional reactivity (amygdala, insula), body awareness (insula, somatosensory cortex), self-consciousness (posterior cingulate cortex, pons), mood, and arousal regulation (brainstem regions—locus coeruleus, and raphe nuclei).⁴⁰

Our findings are consistent with the pioneers of MBSR and previously reported literature suggesting the benefits of applying an 8-week MBSR program to a single group of BC survivors, with intervention assessment at baseline and after the completion of the course. The University of Massachusetts is one of the pioneers of MBSR. Their work with MBSR over the past 35 years has consistently demonstrated clinically relevant reductions in medical and psychological symptoms across various medical conditions.⁴¹ Although their MBSR intervention also spans over the course of 8 weeks, they report continued medical benefits for up to 4 years on follow-up in some cases.⁴¹ Matousek et al⁴² evaluated a cohort of 59 BC survivors, 18 years or older, who had completed medical treatment for BC. They reported reductions in stress, depression, and medical symptoms, as well as significant improvement in mindfulness, coping with illness, and a sense of coherence following an 8-week MBSR. This is similar to another small study conducted by Lengacher et al,⁴³ which involved 19 BC survivors, stages 0 to III, aged 21 or older, within 1 year after treatment, and showed lower self-reported scores at the posttest assessment for anxiety, trait anxiety, depression, and Perceived Stress Scale, with significantly improved QoL after an 8-week MBSR program.

In addition to the special exposure cohort study design projects, randomized controlled trials have also supported the beneficial role of MBSR on BC survivors.^{17,33} One study included 332 participants; 155 survivors were randomized

to a 6-week MBSR program and 167 to usual care. Assessment was done at baseline, 6 weeks, and 12 weeks. Results showed improvement in anxiety, fear of recurrence, and fatigue among the MBSR group.³³ Another study suggested that MBSR was an effective intervention to improve mood, QoL, and well-being compared with standard care in a trial with 229 BC survivors who completed treatment and were randomly assigned to an 8-week MBSR program or standard of care, with assessment done at week 0, week 8, and week 12.⁴⁴

Also of note is that, within our cohort, older patients (≥ 50 years) demonstrated a trend toward significant improvement, when evaluating results at baseline and 24-month follow-up, in the MCS, GAD7, and PHQ9 scores, compared with younger patients (< 50 years). These findings may corroborate the increased need of mental health support among the elderly, as this group has been previously identified as being especially vulnerable to mental and emotional distress related to cancer.⁴⁵ Therefore, the authors recommend the use of age stratification in future studies.

The results presented by the authors, in this study, are unique in that previous reports did not evaluate a long-term follow-up in this patient population after active treatment. Some studies have reported long-term outcomes, but have included patients during active treatment (chemotherapy, radiotherapy, or surgery), an exclusion criterion in our report. One trial that included 172 women with stage I or II BC during active treatment²²—compared an 8-week MBSR group with nutrition, educational intervention, and usual care—included 40 patients who were having radiotherapy during the MBSR. Assessment was done through self-administered questionnaires at 4 months, 12 months, and 24 months. MBSR facilitated psychosocial adjustment in BC patients receiving radiotherapy and was suggested as an adjunctive therapy.²²

In addition, our data are also unique due to its focus on Hispanic BC survivors as noted above. To the authors' knowledge, this study provides the first evidence to support MBSR as an intervention with long-term favorable outcomes for Hispanic BC survivors. Findings from this report are consistent with other studies suggesting that survivorship programs targeting Hispanic BC survivors can help minimize disparity and help survivors improve their QoL through self-healing,⁴⁶ dietary changes approach,⁴⁷ and exercise-related interventions.^{48,49} There is a paucity of literature, however, on the application of MBSR in Hispanic patients. One report showed that MBSR improves 5 of the 8 short form SF-36 measures among Spanish-English speaking patients with different original medical and mental problems.⁵⁰ Another small pilot study examined the MBSR program effect among 8 multiethnic, low-income women with abnormal Pap smear. Women who completed the

MBSR program had a significant reduction in anxiety and an increase in self-compassion.⁵¹ The study reported here did not appreciate a significant improvement on physical-related outcomes in the participating Hispanic BC survivors. This is possibly explained by the lack of specific fitness or exercise intervention beside the techniques used in MBSR (body scan, yoga, breathing techniques, etc). Future studies should consider measures that would improve physical health in BC survivors.

This study had several limitations, including small sample size and the nonrandomized design. We had originally recruited 94 BC Hispanic survivors; however, only 33 completed the full 24-month follow-up. This loss-to-follow-up rate underscores the challenge in conducting long-term survivorship during interventional research projects, overall, and particularly within minority-centered projects. The authors noted a lack of adherence to in-person follow-up visits in many participants, even when coordinating those visits with routine 3-month follow-up oncology care. The low retention rate of the recruited survivors may be attributed to several factors, including low socioeconomic status, transportation issues, lack of financial support, family obligations, and low compliance. Most of the participants were low income and could not afford transportation for the visits required for assessment. Studies using remote MBSR sessions or home-based training interventions might be warranted in minority BC survivors and should be considered in future studies to improve compliance and outcomes. The lack of a control group, as would be seen in a randomized control study, makes it difficult to say with absolute certainty that the same clinical effect would be seen with other treatments. Comparisons from baseline, however, allowed our patient population to serve as their own control.

Conclusion

In summary, this study is the first to assess the benefits of psychosocial care, based on MBSR, among Hispanic BC survivors. Furthermore, it provided evidence of the long-term benefits of a MBSR-based intervention, utilizing several important and vital measures that would optimize survivors' well-being and improve their outcome. An advantage of MBSR is that it lends itself to remote teaching sessions and home-based training, which might be warranted in minority BC survivors to improve compliance and adherence.

Minority-centered cancer and survivorship research is still needed to decrease continuing health disparities among Hispanic and other minority cancer survivors.

Authors' Note

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Declaration of Conflicting Interests

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Ethics Approval and Informed Consent

Ethical approval was obtained from TTUHSC-EP Institutional Review Board (IRB) prior to conducting this study. The consent form in both languages (English and Spanish) approved by the IRB was presented to all eligible participants in the study prior to their enrollment. All eligible subjects had given signed consent prior to receiving MBSR intervention. TTUHSC-EP IRB reviewed our study protocol and approved it for collecting and publishing the data (IRB#: E13111).

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