

Original Research

Specific Somatic Symptoms Alleviated by Mindfulness Meditation Training

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Abstract:

Background: Mindfulness-Based Stress Reduction (MBSR) is an evidence-based intervention developed to teach mindfulness meditation to a wide range of patients. Although the efficacy of MBSR has been established for a variety of medical and psychiatric conditions, measured outcomes rarely include physical symptoms related to anxiety, depression, and/or stress. The current study presents a secondary analysis of data obtained from patients seeking MBSR for symptoms of anxiety, depression, and/or other stress-related concerns in an outpatient mental health clinic setting. Original analyses from this patient sample found that patients reported reductions not only on measures of anxiety, depression, and stress, but also reported reduced somatic symptoms following MBSR.

Methods: Data for this secondary analysis were available from a subsample of 17 patients. Item analysis of the somatic symptom measure was conducted to determine which of the 15 specific somatic symptoms most often seen in primary care medical settings were endorsed and which symptoms improved following MBSR. A second aim was to determine whether somatic symptoms were related to probable GAD status, and if so, whether somatic symptoms equivalently improved among the probable GAD patient group.



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Results: Somatic symptoms of physical fatigue, sleep disturbance, gastrointestinal symptoms, and various forms of pain were more frequently endorsed. These symptoms improved following MBSR, with the exception of pain in the arms, legs, or joints. Patients screening positive for GAD reported more somatic symptoms before MBSR than patients who screened negative ($p < .026$). Probable GAD patients also reported greater somatic symptom improvement following MBSR ($p < .004$), and both groups of patients reported only minimal to mild somatic symptoms post-intervention.

Conclusions: These results provide preliminary evidence that MBSR may be associated with improvements in somatic symptoms such as fatigue, sleep disturbance, and certain forms of pain for patients with and without probable GAD. However, large controlled research studies measuring somatic symptoms are needed.

Keywords

Mindfulness; meditation; mindfulness-based stress reduction; anxiety

1. Introduction

Mindfulness meditation has become increasingly popular in medical settings since Jon Kabat-Zinn developed his Mindfulness-Based Stress Reduction (MBSR) curriculum at the UMass Medical School Stress Reduction Clinic in 1979. Characterized by its mind-body treatment approach to stress, pain, and chronic illness, MBSR consists of 25-30 hours of intensive instruction in mindfulness meditation and mindful movement delivered to large groups of patients over an eight-week period. Early research conducted within the original UMass Stress Reduction Clinic provided preliminary empirical support for chronic pain [1, 2] and symptoms of generalized anxiety disorder (GAD) and panic disorder [3, 4]. The subsequent proliferation of MBSR randomized controlled trials for a variety of medical conditions established its clinical efficacy not only for chronic pain, but for patient groups suffering from other somatic conditions including musculoskeletal disease, cancer, HIV, cardiovascular disease, and other chronic illness [5].

MBSR also appears effective for psychiatric conditions such as anxiety disorders [6], mood disorders [7], and substance abuse [8]. The Substance and Mental Health Services Administration (SAMHSA) National Registry of Evidence-based Programs and Practices (NREPP) lists MBSR as an intervention evaluated in comparative effectiveness research studies. The observation that MBSR benefits psychiatric patients reporting symptoms of depression, anxiety, and/or stress is not surprising, given that much of the MBSR outcome research conducted with medical patient populations also utilized stress, anxiety, and depression questionnaires as primary outcome measures. Indeed, one meta-analytic review identified 39 mindfulness-based intervention research studies for medical conditions such as cancer, fibromyalgia, chronic pain, diabetes, and chronic fatigue syndrome as well as for psychiatric conditions including various anxiety and mood disorders [9], and all of these 39 studies included outcome measures of anxiety and/or mood symptoms. Hofmann et al. found that mindfulness-based interventions resulted in moderate effect sizes in the

improvement of anxiety symptoms (Hedges' $g = 0.63$) and mood symptoms (Hedges' $g = .059$) across studies, and effect sizes were particularly large for patients diagnosed with anxiety and mood disorders (Hedges' g of 0.97 for anxiety and Hedges' $g = 0.95$ for mood symptoms). In a larger meta-analysis of 209 outcome studies including over 12,000 participants receiving some form of mindfulness-based intervention [10], therapeutic effects were especially pronounced for measures of anxiety, depression, and stress. Thus, much of the cited empirical evidence supporting MBSR in the treatment of various medical and behavioral health conditions involves research finding that MBSR reduced symptoms of anxiety and depression across heterogeneous groups of patients.

MBSR also appears effective for patients diagnosed as GAD in randomized controlled trials [6, 11]. Oftentimes, GAD patients initially present for treatment in primary care medical settings, perhaps because somatic concerns such as insomnia, pain, cardiac symptoms, and gastrointestinal distress are particularly associated with GAD [12]. Indeed, only a small minority of GAD patients presenting for treatment in primary care settings (13%) actually presented anxiety symptoms as their primary complaint [13]. Thus, GAD patients especially may benefit from medical setting MBSR programs because: 1) such programs are available to patients with a variety of diagnoses and health-related complaints, and 2) MBSR resulted in improvements across a wide range of somatic symptoms [5]. However, research examining the impact of MBSR on somatic symptoms largely was conducted with patient groups with other diagnoses, whereas available research supporting the effectiveness of MBSR for GAD typically measured anxiety symptoms and mental health outcomes only rather than accompanying somatic complaints and indicators of general health. The need for research examining whether somatic symptom reduction accompanies GAD diagnostic symptom reduction following MBSR remains.

A growing body of research demonstrated that MBSR directly impacted physiological processes linked to improved health, including increased antibody titers to an influenza [14], smaller post-stress inflammatory responses [15], improved immune function (i.e., increased T cell production of IL-4 and decreased IFN- γ coupled with decreased natural killer cell production of IL-10) [16], salivary cortisol secretion patterns suggesting improved HPA axis functioning [17], decreased systolic blood pressure [18], and increased telomerase activity [19]. However, much of this research was conducted either with nonclinical employee samples or with cancer patients. This gap in the literature raises questions as to whether patients seeking MBSR for anxiety and depressive disorders also suffer from somatic symptoms and whether such symptoms improve following MBSR. This paucity of research is especially problematic for the treatment of GAD: GAD patients are likely to seek care in general medical settings initially and tend to suffer from an array of comorbid symptoms and medical conditions [20], even though recognition of GAD in such settings is poor [12]. Health is a multidimensional construct, and symptoms of anxiety, depression, and stress involve the entire mind-body system. Therefore, a wide range of symptoms should be measured to investigate the impact of mindfulness-based interventions on health.

In a recent naturalistic study of mental health clinic outpatients seeking help for symptoms of anxiety, depression, or other stress-related concerns, 23 patients completing MBSR reported clinically significant improvement across a range of clinical anxiety and depression measures [21]. This observational pilot program was not delivered in the context of a clinical trial in which participants were prospectively recruited for research purposes. Instead, data were collected in the context of a

service program evaluation, and individuals already enrolled in a newly implemented MBSR program at a university-based community mental health clinic volunteered to allow their questionnaire data to be de-identified and used for subsequent research. Some of these patients also completed a standardized self-report measure of somatic symptoms, and total patient ratings collapsed across these 15 symptoms significantly decreased pre to post MBSR intervention as well. The current study further examined data from this subset of patients, taken from this larger investigation, who completed the somatic symptoms measure before and after MBSR intervention. Because the somatic symptom measure was not included in the initial program evaluation battery, only 17 of the patients provided data for this measure. The purpose of these additional analyses were twofold. The first aim was to determine which of 15 specific somatic symptoms most often seen in primary care medical settings were endorsed by this sample of mental health outpatients seeking MBSR for anxiety, depression, or stress-related concerns. Item analysis of the somatic symptom measure was conducted to identify specific somatic symptoms endorsed by these patients and to examine which symptoms improved following MBSR. Given previously demonstrated comorbidities between GAD diagnosis and such physical symptoms (e.g. [20]), the second aim was to determine whether somatic symptoms were related to GAD diagnostic status. Patients who screened positive for GAD before MBSR were compared to patients not meeting GAD screening criteria on the somatic symptom measure before and after the MBSR intervention. These additional analyses were conducted as a secondary analysis, conducted with data available from a subsample of patients taken from a larger sample of patients seeking MBSR for symptoms of anxiety, depression, and/or other stress-related concerns in an outpatient mental health clinic setting.

2. Method

2.1 Participants

All participants were patients who presented for outpatient mental health services at a university-based psychological services center. This community mental health clinic serves individuals from the local community for a variety of behavioral health concerns for a sliding scale fee. Patients presenting with symptoms of anxiety, depression, or other stress-related concerns enrolled in the clinic's MBSR program. Specific psychiatric diagnoses were not required for participation in the MBSR program, and therefore diagnostic interviews were not conducted at the point of intake. Clinic patients decided to enroll in MBSR following referral by a mental health professional within the community or they were self-referred after learning about the MBSR program. All patients completed a battery of self-report measures during the first and final MBSR session to monitor individual clinical progress and to conduct ongoing program evaluation. A total of 23 patients enrolled in the MBSR clinical program, agreed to allow their data to be de-identified and used for research purposes, and completed assessment measures immediately before and immediately after the MBSR program. However, only 17 of these patients did so after the measures used for the secondary analysis were added to the assessment battery.

2.2 Measures

Patient Health Questionnaire-15 (PHQ-15; [22]). The PHQ-15 is reliable and valid self-report measure with excellent internal consistency (Cronbach's alpha = .80) and containing 15 items assessing specific common somatic complaints. These 15 somatic symptoms account for more than 90% of the symptoms seen in primary care settings with the exception of upper respiratory symptoms [22]. Patients provide frequency ratings of each symptom by rating how much they have been bothered by each problem on a 0-2 scale (0 = Not bothered; 1 = Bothered a little; 2 = Bothered a lot). Item ratings are summed to produce a total score ranging from zero to 30.

Generalized Anxiety Disorder 7 (GAD-7; [23]). The GAD-7 is a brief self-report measure of GAD symptoms designed to screen for probable GAD in primary care medical settings. Respondents rate the frequency of seven specific GAD symptoms over the last two weeks on a 0-3 point Likert scale. The total of the seven items result in scores ranging from zero to 21. Evidence of excellent internal consistency (Cronbach alpha = .92), good test-retest reliability, and validity was demonstrated, with an optimal cut point of 10 correctly classifying patients diagnosed as GAD 89% of the time and correctly excluding patients without GAD in 82% of cases [23].

2.3 Procedure

All research procedures were approved by the University of Nevada, Reno Institutional Review Board (IRB) before patient data were collected. Patients arrived at their first MBSR group session after previously enrolling into the MBSR program and consenting to treatment. After completing an assessment battery of self-report questionnaires measures, patients were invited to participate in voluntary clinical research. Patients could choose to allow the same assessment questionnaires used to track their individual progress in the program to be de-identified and combined with other participants' scores, per the IRB-approved protocol. The author provided all MBSR sessions. MBSR was delivered in cycles of the 8-week MBSR curriculum to groups of six to ten patients per cycle. The MBSR instructor is a licensed psychologist with a Ph.D. in clinical psychology. At the time of MBSR delivery, she had over ten years of personal meditation practice, attended two to six extended residential silent meditation retreats taught in the *vipassana* insight meditation tradition, and completed foundational training programs in MBSR provided by the Oasis Institute for Mindfulness-Based Professional Education at the UMass Center for Mindfulness in Medicine, Health Care, and Society.

MBSR delivery followed the standard 2009 Curriculum Guide [24] and is described in greater detail elsewhere [25]. The first MBSR session provided introductory information about the program and group member introductions, after which participants were guided through a brief breathing meditation, a mindful eating raisin exercise, and a 45-minute body scan meditation. The following two sessions continued body scan and breathing meditations with ongoing discussion of practice experiences, introduced mindful movement practice, and presented didactic material regarding the role of perception in stress. Later sessions expanded upon previous practices with additional mindful movement sequences and a formal sitting meditation practice exploring different objects of attention, such as the breath, other body sensations, sounds, and thoughts and emotions. In addition,

didactic material addressed the nature of stress reactivity and how mindfulness can increase skillful responding. After a full-day retreat guiding meditation practice throughout the day in an intensive format, the final two weekly sessions emphasized implementing mindfulness practice in daily life. All patients completed a battery of self-report assessment measures at the beginning of the first MBSR session and repeated these measures during the final MBSR session. Thus, assessment measures were collected at two time points: 1) at the beginning of the first MBSR session, and 2) near the end of the final MBSR session. After data from all patients consenting to research participation were de-identified and entered for analysis, data from only those participants who completed the PHQ-15 and the GAD-7 at both time points were selected for subsequent analysis.

2.4 Data Analysis

Frequencies of individual endorsed symptoms were calculated. In addition, patients were categorized as “probable GAD” or screening negative for GAD based upon the optimal GAD-7 cutoff score of 10. Independent-samples *t*-test compared these two groups on somatic symptoms before MBSR. Repeated measures analysis of variance (ANOVA) on PHQ-15 scores with probable GAD status as a between subjects factor was conducted to examine the effect of probable GAD group status on pre-intervention to post-intervention PHQ-15 scores.

3. Results

Of the 17 patients with data available for this secondary analysis, 14 were women and three were men. Fourteen patients self-identified as Caucasian/White, one as Hispanic, one as African American, and one as Native American. Patient ages ranged from 24 to 64 years old ($M = 44.18$, $SD = 12.04$).

Frequencies that each rating category (0 = Not bothered; 1 = Bothered a little; 2 = Bothered a lot) was endorsed for each of the 15 somatic symptom items pre and post MBSR appear in Table 1. Inspection of these frequencies revealed that, before MBSR, patients were most often “bothered a lot” by “feeling tired or having little energy” ($n = 9$) and “trouble falling or staying asleep, or sleeping too much” ($n = 8$). After MBSR, only three patients continued to report this level of fatigue, and four of eight patients were still “bothered a lot” by sleep disturbance. Before the intervention, nearly 30% of the sample were “bothered a lot” by the following three somatic symptoms: back pain ($n = 5$); constipation, loose bowels, or diarrhea ($n = 5$); nausea, gas, or indigestion ($n = 5$). At the end of the intervention, these frequencies reduced to two patients for the back pain item and to only one patient for both gastrointestinal symptom items. A high frequency of patients also noted they were at least “bothered a little” by symptoms of stomach pain ($n = 9$), pain in the arms, legs, or joints ($n = 10$), and headaches ($n = 9$). These frequencies notably reduced following MBSR for the stomach pain and headache symptoms, whereas frequencies for the pain in the arms, legs, or joints item were largely unchanged. Frequencies of the remaining symptom items were low before the intervention, although further reductions were noted following the intervention, with the exception of the fainting item, which was never endorsed at either time point.

To examine whether somatic symptoms were related to probable GAD diagnosis, a GAD-7 cutoff score of 10 was applied to identify patients screening positive for GAD diagnosis before the MBSR intervention. Seven of the 17 patients screened positive for GAD before the intervention, and

probable GAD patients scored higher on the PHQ-15 total measure ($M = 12.43$; $SD = 4.54$) than patients who screened negative for GAD ($M = 7.30$; $SD = 3.97$) before the intervention [$t(15) = 2.47$, $p < .026$]. Repeated measures analysis of variance (ANOVA) on PHQ-15 scores with probable GAD status as a between subjects factor yielded a significant time by probable GAD status interaction effect [$F(1, 15) = 11.22$, $p < .004$]. Inspection of means revealed that this interaction effect appears due to the higher pre-intervention PHQ-15 levels for the GAD positive group compared to the GAD negative group, as both groups reported comparable low levels of somatic symptoms following MBSR (Post $M = 4.86$; $SD = 4.60$ for the GAD positive group and Post $M = 5.50$; $SD = 4.17$ for the GAD negative group).

Table 1 Frequencies of each rating category endorsed for each somatic symptom item of the PHQ-15 outcome measure administered pre and post MBSR (N = 17).

Somatic symptom	Pre	Pre	Pre	Post	Post	Post
	Not Bothered	Bothered A Little	Bothered A Lot	Not Bothered	Bothered A Little	Bothered A Lot
Stomach pain	8	8	1	13	3	1
Back pain	7	5	5	10	5	2
Pain in arms, legs, joints	7	7	3	7	8	2
Feeling tired/ little energy	3	5	9	6	8	3
Sleep disturbance	1	8	8	7	6	4
Menstrual cramps/problems	11	4	2	15	1	1
Sexual dysfunction	15	2	0	16	1	0
Headaches	8	7	2	12	4	1
Chest pain	12	4	1	17	0	0
Dizziness	13	3	1	15	1	1
Fainting spells	17	0	0	17	0	0
Heart pounding or racing	11	5	1	13	4	0
Shortness of breath	12	5	0	14	3	0
Constipation or diarrhea	8	4	5	11	5	1
Nausea, gas, indigestion	5	7	5	10	6	1

4. Discussion

Patients seeking psychological services for symptoms of anxiety, depression, and/or stress also endorsed common somatic symptoms of physical fatigue, sleep disturbance, gastrointestinal symptoms, and various forms of pain. Improvement on these somatic symptoms following MBSR – with the possible exception of pain in the arms, legs, or joints – appears to have driven the overall reduction in somatic symptoms previously reported. Patients screening positive for GAD reported

more somatic symptoms before MBSR than patients who screened as GAD negative, yet a significant time by probable GAD status interaction effect revealed that probable GAD patients reported greater somatic symptom improvement following MBSR than GAD negative patients. Both groups of patients reported only minimal to mild somatic symptoms post-intervention. Taken together, these findings suggest that mindfulness meditation interventions may benefit patients reporting a range of common somatic symptoms, even if such patients also complain of anxiety, depression, and/or stress or appear to suffer from GAD. Given the low endorsement rates of certain PHQ-15 symptoms in this sample (e.g., menstrual cramps or other problems with periods, pain or problems during sexual intercourse, chest pain, dizziness, fainting spells, heart pounding or racing, and shortness of breath), the current investigation does not address whether patients primarily bothered by those specific symptoms also would benefit from MBSR.

Although these results are promising, the lack of rigorous research methodology found in this preliminary investigation limits the conclusions that can be drawn from these data. These data were obtained from a small subset of clinic patients seeking MBSR in a naturalistic setting. Thus, this one-arm observational study was not conducted in the context of a clinical research trial and did not include a proper control group. These results should be considered very preliminary and interpreted with caution. Randomized controlled trials conducted with larger samples of patients certainly are needed. Importantly, such studies must include physical symptom measures in addition to the usual anxiety and depression outcome measures to address the impact of MBSR on comorbid somatic symptoms. Assessment of physical as well as mental health outcomes in MBSR research would reflect a more holistic and integrative medicine approach to healing. Indeed, the MBSR intervention approach itself stems from holistic views of health and healing grounded in ancient Buddhist meditation traditions. In conclusion, MBSR offers a secular means of teaching mindfulness meditation that may alleviate a variety of common somatic and psychological complaints seen across general and specialty medical settings.

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Author Contributions

The author was responsible for research design, providing the intervention, recruitment and data collection, data analysis, and writing the article text.

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Competing Interests

The author has declared that no competing interests exist.

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