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Is mindfulness-based stress reduction effective in decreasing symptoms of anxiety for individuals with anxiety disorder?

Ezinne Ifi, PA-S

A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For  
The Degree of Master of Science

In

Health Sciences—Physician Assistant  
Department of Physician Assistant Studies  
Philadelphia College of Osteopathic Medicine  
Philadelphia, Pennsylvania

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## ABSTRACT

**OBJECTIVE:** The objective of this selective EBM review is to determine whether or not “Is mindfulness-based stress reduction effective in decreasing symptoms of anxiety for individuals with anxiety disorder?”

**STUDY DESIGN:** A selective review of three peer-reviewed, randomized control trials published after 2008.

**DATA SOURCES:** All three randomized control trials were published in the English language and were selected from peer-reviewed journals via the PubMed Database based on their relevance to the clinical question posed above and if they included patient-oriented outcomes (POEM).

**OUTCOMES MEASURED:** All articles analyzed the effectiveness of mindfulness-based stress reduction (MBSR) in decreasing symptoms of anxiety in individuals with anxiety disorder. Improved anxiety symptoms were measured as the following: Self-reported anxiety was measured using the 21-item Beck Anxiety Inventory (BAI), symptoms of anxiety were assessed with the structural interview guided for the HAM-A (Hamilton Anxiety Scale), clinical symptoms and wellbeing were assessed using the Leibowitz Social Anxiety Scale Self-Report and the Social Interaction Anxiety Scale (straightforward items).

**RESULTS:** Hoge et al. found the MBSR to be associated with significant reduction in anxiety as measured by the CGI-S, CGI-I and BAI  $P < 0.0001$ ; *J Clin Psychiatry*. 2013;74(8):786-792. doi: 10.4088/JCP.12m08083 [doi]. Goldin et al. found that among MBSR participants, total meditation practice was associated with decrease in negative emotion and social anxiety symptom severity  $P < 0.02$ ; *Soc Cogn Affect Neurosci*. 2013;8(1):65-72. doi: 10.1093/scan/nss054 [doi]. Boettcher et al. revealed that participants in the MBSR group showed a larger decrease of anxiety from pre- to post -assessment than participants of the control group  $P < 0.001$ ; *Behav Ther*. 2014;45(2):241-253. doi: 10.1016/j.beth.2013.11.003 [doi]

**CONCLUSION:** According to all three articles listed above, MBSR is shown to effectively decrease symptoms of anxiety in individuals with anxiety disorder. Since all three articles lacked blinded participants and made use of numerous patient questionnaires, it shows that concise and well-defined methods of scientific analysis are required in order to fully study the effect of MBSR in reduction of anxiety symptoms.

**KEY WORDS:** MBSR, Anxiety, GAD, Mindfulness meditation

## INTRODUCTION

Anxiety disorder can be described as having extreme uneasiness about matters that are both existent and nonexistent. Symptoms of anxiety have had an increase in prevalence in our society and research on topics such as mindfulness-based stress reduction have also met an increased interest as a strategy for decreasing these symptoms<sup>1</sup>. Although there are medications currently in use for the therapeutic treatment of anxiety in all age groups, the extremity of the effects on patients is a concern to clinicians. Mindfulness meditation is known for its benefits as a therapeutic option in the management of anxiety disorders, specifically its role in reducing symptoms of stress, depression, and fear, which most patients with anxiety disorders feel. Primary care providers are often the first to diagnose and treat anxiety disorders despite its low recognition in our society compared to other disorders in psychiatry.

Anxiety disorder is “the signal of the presence of anger in the unconscious”<sup>2</sup>. Anxiety disorders are grouped as panic disorders, specific phobias, generalized anxiety disorder, social anxiety disorder, post-traumatic stress disorder, and obsessive-compulsive disorder. These anxiety disorders affect the individuals not just mentally, but also physically and may be associated with a higher incidence of chronic impairments as the disease progresses. Anxiety disorder is known as a prevalent psychiatric disorder, which affects about 15% of the overall population<sup>3</sup>. The total annual cost of anxiety disorders has been estimated to be between \$42.3 billion and \$46.6 billion, of which more than 75% can be attributed to morbidity, mortality, lost productivity, and other indirect costs<sup>4</sup>.

Data from the 2009–2011 National Hospital Ambulatory Medical Care Surveys (NHAMCS) states that the annual estimate of Emergency medicine visits due to anxiety is approximately estimated at 1,247,000 and a about 9.6% of those visits will involve an in-patient

admission. Approximately 67% of patients will have a referral for a follow up with their primary care physicians<sup>5</sup>. A major concern in mental health care is that only a few patients with anxiety disorders will seek medical help and most of these patients do not have access to an evidence-based treatment<sup>9</sup>. Another intricate part of the suffering that patients with anxiety undergo is the availability of low treatment rates in the community<sup>9</sup>.

There is an estimate that about 25% of people with anxiety disorder will meet the DSM-IV criteria during their life, with women more commonly affected (30%) than men (20%)<sup>2</sup>.

Signs and symptoms of anxiety disorder include restlessness, insomnia, easy fatigability, lack of concentration, palpitations, chest pain, endless fear, erratic decisions, and headaches.

Pharmacologic treatments such as selective serotonin reuptake inhibitors (SSRIs), selective serotonin and norepinephrine reuptake inhibitors (SNRIs), and benzodiazepines (in severe cases) are being used to control the somatic symptoms of anxiety. Other initial treatment therapies of anxiety symptoms include psychotherapy such as cognitive behavioral therapy (CBT), insight-oriented therapy, and supportive therapy. For the best patient outcome, a combination of psychotherapy, pharmacological therapy, and supportive care is advised.

Mindfulness-based stress reduction is a form of mental training that is associated with a decrease in an individual's tendency to surrender to the excessive worry and fear that patients with anxiety feel, therefore incorporating awareness of these triggers in their daily living and learning a variety of techniques to improve their present experiences which includes emotions, behavior, and thought processes. Mindfulness-based reduction technique is both cost effective and poses a variety of treatment options for both the mental and physical wellbeing of patients with symptoms of anxiety.

## OBJECTIVE

The objective of this selective EBM is to determine whether or not “Is mindfulness-based stress reduction effective in decreasing symptoms of anxiety for individuals with anxiety disorder?”

## METHODS

All three articles were published in the English language, were researched using the PubMed database, were selected from peer-reviewed journals on their relevance to the clinical question posed, and if they included patient-oriented outcomes (POEM). Three randomized control trials were used in this systematic review to compare mindfulness-based stress reduction to other treatment options and required a population based on individuals over the age of 18 with a reported anxiety disorder. The key words used for the data analysis was “Mindfulness-based stress reduction (MBSR) and anxiety” and “GAD and mindfulness meditation”. The comparison groups were stress management education (SME), online discussion forum, and aerobic exercise (AE). The intervention is mindfulness-based stress reduction.

Inclusion criteria applied were randomized control trials published after 2008. Exclusion criteria applied were patients under the age of 18 and randomized control trials published before 2008. The outcome measured was a decrease in anxiety symptoms. The statistical analysis reported in all three articles were based on mean changes from baseline to endpoint, p values, EER, CER, ARR, NNT, RBI. Table 1 details the study type, number of patients in each study, demographics of patient populations of each individual as well as the inclusion and exclusion criteria.

**Table 1. Demographics & Characteristics of Included Studies**

Study	Type	# pts	Age (yrs.)	Inclusion criteria	Exclusion criteria	W/D	Interventions
Hoge <sup>1</sup> (2013)	RCT	93	> 18 yrs.	Met the DSM-IV criteria for	History of other mental health disorder,	3	8 weekly group classes with a

				GAD, scored > 20 on HAM-A	Substance abuse in past 6 mos., SI in past 6 mos., if on medication it has been < 4 wks., any medical illness, psychotherapy for GAD, > 4 classes of meditation training, pregnant/lactating, personality disorders		single weekend "retreat" day, and daily home practice guided by audio recording
Boettcher <sup>7</sup> (2014)	RCT	91	> 18 yrs.	> 18 yrs., internet access, met the DSM-IV criteria for , not involved in any psychological treatment, has no prior experience with MBSR, not on any med for anxiety if yes, dose is constant 3 mos. before treatment	Currently receiving other psychological treatment, non-stable use of psychoactive medication, deemed suicidal or suffer from other psychological disorders	17	8 modules including 12 MBSR exercises lasting 10 mins for a period of 8 weeks
Goldins (2012)	RCT	56	33± 9	Individuals who met the DSM-IV criteria for SAD	Current pharmacotherapy/psych disorder than anxiety disorders, h/o head trauma, previous MBSR course/regular meditation practice or AE regime 3 or > times/week for > 2 mos.	14	8 weekly 2.5 hr group classes, a 1-day meditation retreat and daily home practice

## OUTCOMES MEASURED

The statistical analysis in the Hoge et Al.<sup>1</sup> study utilized the 21-item Beck Anxiety Inventory (BAI) which is a self-report of anxiety level. Symptoms of anxiety were also assessed with the structural interview guided for the HAM-A (Hamilton Anxiety Scale) which is used to measure the severity of a person's anxiety.

The statistical analysis in the Goldin et Al.<sup>8</sup> study had participants complete measures of clinical symptoms using the Liebowitz Social Anxiety Scale which is used for to assess social phobia and the Social Interaction Anxiety Scale used to measure distress when interacting with a stranger. These scales were used at baseline and post-intervention<sup>6</sup>. The statistical analysis in the Boettcher et Al.<sup>7</sup> study utilized the Beck Anxiety Inventory

## **RESULTS**

Hoge et Al.<sup>1</sup> conducted a randomized control trial on 93 subjects: three withdrew their consent, for reasons unknown, from the MBSR group between week one and eight, and 11 discontinued from the comparison group of Stress Management Education (SME) due to scheduling problems and consent withdrawal both before treatment and in weeks one and eight. In total, 45 individuals completed treatment from the MBSR group and 30 individuals from the SME group. All subjects who were enrolled in the study had to undergo at least one class and were also included in the modified ITT analysis<sup>1</sup>. Beck Anxiety Inventory (BAI) scores were not available for the first seven participants<sup>1</sup>. Participants were randomly divided into two groups. Symptoms of anxiety were assessed at baseline and week eight (endpoint). The intervention for the MBSR candidates was made up of eight weekly group classes with a weekend retreat day and daily home practice guided by audio recordings. They also had in-class practices which included breathing awareness, a body scan, and gentle Hatha yoga<sup>1</sup>.

The SME course was an active control for comparison with MBSR group and did not have any mindfulness components. It also consisted of an eight-week two-hour class with twenty minutes homework exercises and a four-hour weekend special class which included gentle strength and posture exercises with a physical therapist<sup>1</sup>. Mean BAI scores showed a significant change for both MBSR and SME groups. Analysis of MBSR and SME patients showed that

interventions in both the treatments reported significant reduction in HAM-A scores. However, according to the HAM-A scale, the endpoint results did not show a significant difference between MBSR and SME treatments. Comparatively, MBSR was associated with higher anxiety reduction level according to the results obtained in the BAI scales. The comparative difference between MBSR and SME was found to be of statistical significance. A greater rise in positive self-statements in response to anxiety and was reported to be  $p < 0.0001$  and Table 2 shows the mean change  $\pm$  standard deviations from baseline and endpoint in participants from both the MBSR group and the SME group.

**Table 2. Anxiety Changes In Mean  $\pm$  Standard Deviations And P-Values Of Both Groups In Hoge Et Al**

	Baseline mean $\pm$ SD	Endpoint mean $\pm$ SD	P-value
<b>HAM-A scale</b>			
MSBR	21.26 $\pm$ 7.35	13.65 $\pm$ 7.01	< 0.0001
SME	22.12 $\pm$ 5.89	16.27 $\pm$ 7.26	< 0.0001
<b>BAI scale</b>			
MBSR	16.01 $\pm$ 8.81	9.10 $\pm$ 7.11	<0.0001
SME	14.31 $\pm$ 8.19	11.33 $\pm$ 5.65	0.012

Boettcher et Al.<sup>7</sup> also conducted a randomized control trial that was converted to dichotomous data focusing on the treatment of anxiety disorders using internet-based mindfulness. Unlike other studies, Boettcher et Al. investigated remote regulation of anxiety disorders without necessarily meeting the individuals physically. The participants were randomly allocated to either forum-controlled group (CG) or mindfulness treatment group (MTG). Ninety-one individuals met the inclusion criteria listed in table 1 and were randomized. Forty-five were from the MTG group while forty-six were from the CG. Of the MTG group, forty completed the post assessment while thirty-five completed the follow up assessment. Of the CG, forty-four complete the post assessment. All the discussions and forums were held online. Key activities in

the MTG and CG sessions included topics on anxiety disorders, coping mechanisms, and anxiety reduction techniques among other mental health issues. The MTG were given instructive audio files presenting mindfulness exercises which included instructions for sitting meditation, mindfulness movement, three different types of body scans and four different forms of breathing exercises<sup>7</sup>. Those in the control group received access to a closed, anonymous and supervised online discussion forum with a new topic presented for discussion each week. Topics were related to those of anxiety and panic and were not therapeutic<sup>7</sup>. Results showed that subjects enrolled under MTG treatment group substantially benefitted from the therapy with statistics showing a significant decrease in anxiety levels<sup>7</sup>. Both groups reported a reduction in anxiety disorder levels, though MTG was of greater statistical significance<sup>7</sup>. For both groups the data was continuous and had to be converted to a dichotomous data. They were recorded as improved, no change and deteriorated. For the MTG group ( $N = 40$  participants total):  $N$  of improved was 28,  $N$  of no improvement was 11 and that of those who deteriorated was 1 making everything above 28 effective for the experimental event rate (EER). For the CG ( $N = 44$  participants total):  $N$  of improved was 14,  $N$  of no improvement was 30 and that of those who deteriorated was 0, making anything above 14 effective for the control event rate (CER). There was a statistically significant difference with a  $p$ -value  $<0.001$  between groups. The study also utilized the BAI as well. Table 3 shows the control event rate (CER), experimental event rate (EER), absolute risk reduction (ARR) relative benefit increase (RBI), and the calculated numbers needed to treat (NNT).

**Table 3. Baseline Change In Anxiety Symptoms In Boettcher Et. Al<sup>7</sup>.**

EER	CER	ARR	RBI	NNT
0.70	0.318	0.382	1.20	3

The randomized control trial conducted by Goldin et al<sup>8</sup> compared MBSR and aerobic exercise (AE) in patients above the age of 18 with social anxiety disorder (SAD). It included a total of 56 participants who met the inclusion criteria in table 1 above. Participants were assigned to MBSR (N=31) and AE (N=25) respectively<sup>8</sup>. All participants were recruited through a web-based community listings and referrals from mental health providers<sup>8</sup>. Participants were administered the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV-L) which is a structured interview designed to assess for current episodes of anxiety by a clinical psychologist and were assigned to 8 weeks of either MBSR or AE using Efron's biased coin randomization procedures. The MBSR group was administered an 8 weekly 2.5-hour group class, a 1-day meditation retreat, and daily home practice. Participants were trained in formal meditation (i.e. breath-focused, body scan, open monitoring), informal practice, and Hatha yoga<sup>8</sup>. Those in the AE group had a 2-month gym membership at no cost and were required to complete at least two individual AE sessions and one group session (other than meditation and yoga) each week during the 8-week interventions<sup>8</sup>. Participants were administered a self-report clinical and well-being measures before and after the MBSR and AE<sup>6,8</sup>. The report of the findings focused on the differential effects of AE versus MBSR while providing ratings of emotion regulation and negative emotions. Total meditation practice among MBSR patients was associated with a greater decrease in negative emotions when implemented as emotion regulation intervention ( $p=0.02$ ). No association was found among AE patients regarding negative emotion reduction ( $p>0.69$ ). Table 3 focuses on the measure of clinical symptoms and wellbeing for participants in the MBSR and AE group using the Leibowitz Social Anxiety Scale Self-Report and the Social Interaction Anxiety Scale (straightforward items)<sup>6,8</sup>.

**Table 4. Pre & Post Treatment, 3 Mos. Follow Up And P-Value Of Mean  $\pm$  SD Changes In Clinical Symptoms Between The MBSR And AE Group<sup>6,8</sup>**

Measure	Group	Pre Mean (SD)	Post Mean (SD)	3 mos. FU Mean (SD)	P-value
Leibowitz social anxiety scale (self-report)	MBSR	86.82 (20.91)	55.50 (18.52)	55.56 (16.76)	0.001
	AE	87.38 (16.06)	61.41 (28.64)	54.86 (25.09)	0.001
Social interaction anxiety scale (straightforward items)	MBSR	43.50 (9.85)	33.88 (7.66)	29.91 (7.38)	0.004
	AE	45.81 (9.05)	34.56 (14.10)	27.80 (14.83)	0.01

## DISCUSSION

The studies focused on mindfulness-based stress reduction among individuals with anxiety disorders. Hoge et al<sup>1</sup> was the first detailed research to target the use of MBSR in stress reduction. Mindfulness-based stress reduction takes the meditation technique where individuals have calm sessions to reflect on negative thoughts. As reflected in the case of participants exposed to MBSR, the individuals under therapy developed positive behavior that reduced stress and anxiety. Mindfulness helps them clear negative thoughts, hence reduced self-judgment and increased kindness to self. Increased satisfaction to self improves self-esteem which reduces anxiety levels. With the attribution of anxiety tendencies to situational factors such as lack of self-belief, the study appreciates that developing positive emotions about self reduces stress. Lower level of positive emotion increases risk of anxiety symptoms. Indeed, the reported statistical significance in the use of MBSR is a good intervention towards reducing stress and anxiety disorders. Certain limitations were evident in the study. First, the sample was small, thus needs a replication study to warrant a substantial conclusion from the results of the study. Secondly, the study includes psychiatric patients which would be treated a purposive sample and not randomized as outlined in the study design.

Goldin et al's study findings support Hoge et al's result on the efficacy of MBSR in reducing stress and anxiety level. Aerobic exercise is an intervention which promotes mindfulness, especially when used as a meditation technique. AE and mindfulness were found to have a varied impact on emotional regulation. The AE and MBSR influence behavioral outcomes critical in impacting anxiety scales. MBSR had a higher impact on negative emotional regulation compared to AE owing to the vast involvement of negative emotion in emotional regulation. Mindfulness as a form of meditation works on emotions such as fear, sadness, and irritability among other negative emotions. As put forward in the study, continuous training enables an individual to develop habitual thinking which impacts cognition and other abilities. Pharmacological interventions in the management of stress and anxiety disorders has been widely adopted. Most studies advocate for psychotherapy and counseling among other techniques in management of anxiety in the current treatment set up.

The internet was found to be an important platform for reducing stress and anxiety disorders. With billions of people using the internet today, internet-based approach can be the trend in reaching stress-ridden individuals for improved health and quality of life. Participating in mindfulness programs improved with a significant decrease in anxiety symptoms. By large, internet-based forums provide interactive platforms where people share ideas and experiences. People narrate their stories and challenges which can be addressed at peer level or by psychotherapists. Studies show that the technique promises better results especially with the increased digitalization and internet use.

## **CONCLUSION**

The results of these randomized controlled studies revealed that mindfulness-based stress reduction reduces anxiety symptoms. Though the level of significance differs, all the studies

appreciated that mindfulness as a technique impacts stress level in individuals with anxiety. As in Hoge et al<sup>1</sup>, Goldin et al<sup>8</sup>, and Boettcher et al<sup>7</sup> agreed that mindfulness impacts psychological response to stress. It is agreed upon that integrating pharmacological interventions with mindfulness improve anxiety and anxiety-related symptoms. Implementing the study insights while working on cited limitations will be essential in future management of stress, anxiety disorders, and related symptoms. Despite the statistical significance noticed in the MBSR interventions, future studies should explore the relation between the proposed interventions and clinical outcomes. Implementing the study insights while working on cited limitations will be essential in future management of stress, anxiety disorders, and related symptoms. Despite the statistical significance noticed in the MBSR interventions, future studies should explore the relation between the proposed interventions and clinical outcomes. Use of larger sample size and longer study duration should be implemented in future research.

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