

# **Mindfulness Based Stress Reduction for Generalized Anxiety Disorder: a Review of the Current Literature**

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A capstone project submitted to the Faculty of Graduate Studies of The  
University of Manitoba in partial fulfillment of the requirement for the degree  
of MASTER OF PHYSICIAN ASSISTANT STUDIES

*Physician Assistant Studies, University of Manitoba, Winnipeg*

May 9, 2016

## Abstract

**Introduction:** Anxiety disorders are widespread and often debilitating conditions that can impair social, occupational and educational performance, resulting in lower quality of life for affected individuals and their families. Generalized Anxiety Disorder (GAD) has a lifetime prevalence of 5.7 and is characterized by six months or more of frequent, poorly-controlled worry and anxiety about multiple events or issues that negatively affect sleep, mood, concentration and can result in a broad variety of somatic complaints. While both drug and psychotherapeutic treatments are widely available, GAD is often resistant to treatment, with a long and relapsing-remitting course.

Mindfulness Based Stress Reduction (MBSR) is an 8-week stress relief group program that includes meditation, body awareness and yoga components developed by Jon Kabat-Zinn and first utilized in a clinical context at the University of Massachusetts Medical School in 1979. MBSR integrates contemplative spiritual practices including Zen Buddhism with secular concepts of health and wellness with the goal of reducing the effects of stress on patients. In recent years MBSR and other mindfulness practices have become widely available via Internet, books and structured programs. MBSR is now routinely promoted as an effective and safe method with which to reduce stress, depression and anxiety.

**Methods:** To answer the clinical question: *in adults with generalized anxiety disorder, what is the efficacy of a MBSR program in relieving anxiety from baseline/pre-treatment?* The current medical literature (published from 2006-2016) was surveyed to identify studies focused on the MBSR program and its effectiveness in alleviating symptoms of GAD. Using SCOPUS, Pubmed and Google Scholar databases, nine unique studies were located from 2006-2016 using search terms “generalized anxiety disorder”, “mindfulness based stress reduction”, “MBSR” and “GAD”.

**Results:** Four recent studies were identified that specifically addressed the usefulness of MBSR program in treating GAD. All four studies concluded that MBSR likely has value in reducing symptoms of GAD. However, all four studies were small in size, with MBSR groups ranging from 16 to 79 participants. A number of methodological issues also problematize the real world value of the studies findings in the majority of the studies.

**Conclusions:** Few current studies specifically evaluate the effectiveness of MBSR in treating GAD. Existing studies are generally small and the majority lack robust designs and long term follow up components, which limits their ability to confidently evaluate the real life usefulness of MBSR in treating GAD. While good evidence exists to support the use of MBSR as a low-cost, low-risk treatment for depression, chronic pain and other conditions, further research is needed to determine the usefulness of MBSR in treating GAD and how MBSR could be used confidently in practice to improve outcomes for GAD patients.

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# Introduction

## Anxiety Disorders

Anxiety disorders are a common array of psychiatric conditions involving pathological anxiousness, worry or panic that exact an enormous toll on thousands of individuals and families.

Health Canada estimates that the one year prevalence of anxiety disorders in Canada is 12.2%<sup>1</sup>

(1) The personal costs of anxiety are enormous, with the potential to affect all domains of an individual's life, including relationships, education and employment.

## Generalized Anxiety Disorder

The DSM-5 addresses eight primary anxiety disorders: phobias, panic disorder (with and without agoraphobia), agoraphobia without panic disorder, obsessive-compulsive disorder (OCD), social anxiety disorder (SAD), post-traumatic stress disorder (PTSD), acute stress disorder and generalized anxiety disorder (GAD). (2)

With a lifetime prevalence of 5.7%, Generalized Anxiety Disorder is a common psychiatric disorder, and a driver of significant personal, social and economic costs (3). GAD also exacts a great toll on the health care system, as the disorder is associated with an increased use of health care services and with the development of cardiac disease. (4, 5) The disorder can be a cause of severe occupational impairment; 38% of individuals with GAD experience an average of 6.3 days per month of missed work or severely impaired work function. (6)

The DSM-V diagnostic criteria for Generalized Anxiety Disorder (GAD) in adults:

- 1) Excessive worry and anxiety about multiple events or activities experienced for at least six months, experienced more days than not;
- 2) This excessive worry is not easily controlled by the affected individual;

3) This worry is associated with at least three of the following symptoms:

- a) Feeling ‘keyed up’ or ‘on edge’;
- b) Fatigue;
- c) Difficulties with concentration;
- d) Irritability;
- e) Muscle tension;
- f) Disruptions in sleep: difficulties falling asleep, remaining asleep, achieving high quality sleep. (2)

The World Health Organization’s International Classification of Diseases defines GAD in adults (F41.1) as “anxiety that is generalized and persistent but not restricted to, or even strongly predominating in, any particular environmental circumstances (i.e. it is ‘free-floating’).” (7) Key somatic symptoms of the disorder include “nervousness, trembling, muscular tensions, sweating, lightheadedness, palpitations, dizziness, and epigastric discomfort”. (7)

Development of GAD as an adult is related to a variety of social, biological and demographic risk factors including female sex, the experience of chronic illnesses or other mental illnesses, low income, recent traumatic or challenging events and adverse events during childhood. (8)

Patients with GAD frequently experience other psychiatric issues, with 90% of individuals experiencing another mental health issue over a lifetime including phobias, alcohol dependence and depression (9). Kessler et al. have established that major depressive episodes are one of the most frequent psychiatric co-occurrences (10). This common comorbidity can have severe consequences for patients; in individuals with both GAD and depression, the course of illness is longer and results in greater occupational impairment than depression or GAD alone (4). Treating GAD successfully will, therefore, involve the management of concomitant

depression in many patients. GAD treatment is further complicated by the course of the condition, which is characterized as chronic, frequently presenting with periods of remission and relapse (11).

### **Current Treatments**

Pharmacological and psychotherapeutic treatments are mainstay treatments for generalized anxiety disorder. Despite the widespread use of both drugs and psychotherapy, GAD is chronic and resistant to treatment, and 30-60% of GAD sufferers do not experience remission despite treatment (12).

The treatment of GAD may be further complicated by the stigma of behavioral health issues like anxiety for patients. Such stigma might dissuade some individuals from pursuing medical treatment. The nature of the disorder itself may also contribute to its intractability, given the strong elements of hyper-vigilance and social inhibition involved in GAD for many patients, which can prevent them from feeling comfortable with new interactions, experiences and relationships. The chronic and resistant nature of GAD necessitates a long-term and multi-pronged approach to both achieve remission and to prevent future relapses.

### **Pharmacological interventions**

#### ***Antidepressant Medications***

Selective Serotonin Reuptake Inhibitors (SSRIs) and Serotonin–Norepinephrine Reuptake Inhibitors (SNRIs) are the first-line pharmacological treatments for GAD (11). SSRIs commonly used to treat GAD include paroxetine, sertraline, and escitalopram. (11) The SNRIs Venlafaxine and Duloxetine have also been proven effective in treating GAD in random control trials. (11) However, several factors can prevent GAD patients from benefiting from antidepressant use. While these medications can be useful in reducing GAD symptoms, side effects of SSRIs can be

a barrier to compliance. Side effects of SSRIs and SNRIs are common and include weight gain, gastrointestinal distress, sedation, sexual impairment and perhaps most distressing in the context of the treatment of those with GAD, increased anxiety. (13, 14) The use of these drugs also involves increased costs to individuals and health care systems. Tricyclic antidepressants are also a pharmaceutical option for adults with GAD but should be prescribed with an abundance of caution given their potential for toxic cardiac side effects and orthostatic hypertension (15, 16).

### ***Benzodiazepines***

Benzodiazepines (BZDs) are anxiolytics that quickly and powerfully reduce acute symptoms of anxiety; BZDs are indicated for short-term acute anxiety or anxiety exacerbations in otherwise well-controlled patients. (15) The use of BZDs in the long-term treatment of GAD is, however, problematic due to the strong potential of adverse effects. These effects include benzodiazepine dependence and abuse, distressing withdrawal symptoms, cognitive impairment and psychomotor slowing and an elevated risk of motor vehicle accidents; side effects that are particularly undesirable in the context of GAD treatment include the reduction of BZDs' anxiolytic effects over time and the potential rebound anxiety. (15, 17)

These drugs should be used with particular caution in several specific populations. Clinicians should be aware that BZD use by older adults subjects patients to increased risk of falls, dangerous driving and impaired daily functioning and mobility. (16) (18) Care should be also taken to avoid benzodiazepine use in GAD patients who have a history of alcohol or drug dependence due to the risk of addiction. (19) These drugs should not be taken with alcoholic drinks as BZDs heighten the effects of alcohol (19). Poly-pharmacy involving benzodiazepines is also a growing concern; recent research has implicated the use of BZDs Alprazolam and

Diazepam as important factors in unintentional fatal drug overdoses in the state of Oklahoma.

(20)

Pharmacological therapy can be effective for some patients with GAD, but practitioners must take into account a number of challenges and risks inherent in the use of drug treatment. The disorder remains resistant to treatment in many cases, even with pharmaceutical interventions. Pharmacological treatments of GAD also involve long-term costs that may problematize treatment for certain patients and could result in failure to adhere to drug treatment. Some common medications used to treat GAD like benzodiazepines present profound risks to large populations and may not outweigh their benefits over time. The stigma around psychiatric drug use may also affect the willingness of some patients to comply with pharmacological GAD treatment.

## **Psychotherapy**

### ***Cognitive Behavioral Therapy***

Cognitive Behavioral Therapy is recognized as an effective treatment for anxiety disorders, improving anxiety in GAD patients with similar efficacy as medications (21, 22). This modality is better tolerated than pharmacological treatments in GAD patients, with lower attrition rates versus pharmacotherapy, with lower costs for patients. (21) CBT also appears to reduce the frequency of co-morbid psychiatric conditions (depression) in GAD both immediately post-treatment and at 12 months after therapy (23).

Like medications, the administration of CBT may be useful in many GAD cases, but the course of generalized anxiety disorder remains chronic, with a high rate of relapse with treatment. Additional treatment options are required to increase the chances of remission for GAD patients, necessitating the investigation of alternative modes of treatment like MBSR.

## **Mindfulness-Based Therapies**

Mindfulness-Based Therapies (MBT) encompasses contemporary medical and psychiatric treatments integrating concepts of mindful awareness based on millennia-old meditative traditions including Buddhism and yoga. The practice of mindfulness is intended to create an enhanced but non-judgmental awareness of momentary experience, including thoughts, emotions and sensations. The goal of MBT is to draw awareness to both the present moment and our internal reactions to what we are experiencing in that moment.

A variety of mindfulness-related or ‘contemplative’ therapies have emerged in the past four decades, including mindfulness-based stress reduction (MBSR), mindfulness-based relationship enhancement (MBRE), dialectal behavioral therapy (DBT), acceptance and commitment therapy (ACT) and mindfulness-based cognitive behavioral therapy (MCBT) (24). This paper will focus on the evidence regarding mindfulness-based stress reduction (MBSR), the oldest and most well-established of these approaches.

### ***Mindfulness Based Stress Reduction***

Mindfulness-Based Stress Reduction is an instructor-lead program utilizing mindfulness meditation exercises and yogic movements, usually delivered in a group setting over a period of eight weeks with frequent homework assignments aimed at integrating classroom material into participants’ lives. The MBSR program was developed at University of Massachusetts Medical School’s Stress Reduction Clinic in 1979 by molecular biologist Jon Kabat-Zinn. (25) The program has been used for almost four decades to manage chronic pain, emotional stress and to reduce distress, anxiety and depression in patients with cancer and other chronic medical conditions (25). Jon Kabat-Zinn describes MBSR as ‘a training vehicle for the relief of suffering’

and combines Zen Buddhism, ‘non-dual’ Buddhism, Vipassana/Insight mediation styles and hatha yoga practices in a secular health-focused context. (26, 27)

MBSR and mindfulness practices have gained increasing popularity in recent years, becoming a mainstream interest. Magazines, websites, television shows and podcasts are devoted to the integration of mindfulness into education, business and health care. MBSR programming based on Kabat-Zinn’s original work is now accessible through hundreds of programs around the world. The MBSR group program is offered by many institutions including universities, schools, occupational safety organizations and unions to help relieve stress and enhance coping skills. The program is also available to the public via community mental health organizations; in Manitoba, the Canadian Mental Health Association and Klinik offer MBSR training as part of their community mental health programming. (28, 29) Costs to attend the program are variable and can range up to several hundred dollars, with some community organizations offering courses at low or no cost for those with financial challenges. (28, 29)

MBSR programs are also available specifically for health practitioners to prevent and combat burnout and compassion fatigue. (29) The program is offered to staff in many clinics and hospitals, and MBSR groups have been created specifically for residents and medical students at more than a dozen medical and dental schools including McMaster, McGill and Dalhousie universities. (30) Doctors Manitoba recently partnered with St Boniface Hospital in Winnipeg to offer an MBSR program specifically for physicians concerned about the impact of burnout and stress on their personal lives, health status and professional practices. (31)

## **Established Therapeutic Uses of MBSR**

### **Pain Relief**

MBSR has been used to help manage chronic pain since its inception in the late 1970s. (25) A recent Manitoba study showed MBSR employed in the primary care setting with chronic pain patients resulted in significant improvement in several domains: levels of pain, disability, psychological distress, engagement in life activities, willingness to experience pain and subjective rating of current pain. (32)

### **Cancer Care**

A 2003 study of early breast and prostate cancer patients showed that MBSR participation resulted in increased quality of life and decreased experiences of stress in participants. (33) This study also found that MBSR participation also positively affected the immune system of cancer patients, with a decrease in disease-related cytokine production (lower T cell production of IL-4, IFN- $\gamma$  and reduced natural killer cell production of IL-10). (32) A more recent meta-analysis of MBSR shows significant improvements in depression, confidence, stress and anxiety in breast cancer patients after MBSR programming. (34)

### **Mental health**

A recent systematic review of MBSR studies found that the program is moderately effective in reducing symptoms of depression. (35) Mindfulness-based approaches are recognized as effective interventions in the treatment of Borderline Personality Disorder. MBSR has been shown to improve symptoms of BPD and increase the amount of gray matter in the brains of BPD patients. (36)

## **Methods**

### **MBSR for Generalized Anxiety Disorder: a Review of the Current Literature**

This paper aims to examine the utility of MBSR in the treatment of generalized anxiety disorder.

The clinical question applied to recent literature is: in adults with generalized anxiety disorder, what is the efficacy of a MBSR program in relieving anxiety from baseline/pre-treatment?

### **Search Strategy**

A literature review of articles addressing MBSR and its effectiveness in treating anxiety disorders was conducted using SCOPUS, Pubmed and Google Scholar databases, 9 unique studies were located from 2006-2016 using search terms ‘Mindfulness based stress reduction’, ‘MBSR’, ‘GAD’ and ‘generalized anxiety disorder’.

Studies included in the review were required to study the effect of MBSR on levels of anxiety in adults with generalized anxiety disorder (GAD). Exclusion criteria included studies examining non-MBSR mindfulness-based interventions including mindfulness based cognitive behavioral therapy (MCBT) and studies addressing anxiety disorders or anxiety-related conditions other than GAD. Using these parameters, 4 papers were identified for review.

The literature review process revealed that there are few dedicated studies utilizing a randomized control trial model aimed specifically at treating GAD with a strict MBSR program, without cognitive behavioral therapeutic components (MBCT).

## Results

### 1. Mindfulness-based stress reduction for patients with anxiety disorders: Evaluation in a randomized controlled trial (2011)

Vollestad et al.'s 2011 study evaluated the efficacy of MBSR in the treatment of a variety of anxiety disorders, including GAD (37). Participants selected for the study were adults from ages 18 to 65 who met diagnostic criteria for either panic disorder with or without agoraphobia (PD/AG), social anxiety disorder (SAD) or GAD via the M.I.N.I. International Neuropsychiatric Interview. (37)

Exclusion criteria included the use of anti-anxiety medications or other anxiolytic treatments, substance abuse/dependence, suicidality or other severe mental health conditions like psychosis. Participants were not excluded due to SSRI or MAOI use if the dosage of these medications had been stable for more than three months and the individuals taking these medications were willing to remain on said stable dose for the length of the study.

39 participants were offered an MBSR component, which was an 8-week program modeled on Kabat-Zinn's original protocol, with 31 completing the program. (37) 37 participants were placed in a waitlist control group (WLC) and received MBSR at a later time; three participants in this group dropped out before completion of the study. (37)

Using the Pennsylvania State Worry Questionnaire as a measurement of worry—one of GAD's key symptoms—the authors determined that 100% of the 31 MBSR group participants who completed the MBSR program were within clinical range of a GAD diagnosis at baseline. (17) The PSWQ is a 16 question diagnostic tool that is used to determining a diagnosis of GAD versus other anxiety disorders and is useful in quantifying the levels of worry experienced by individuals. (38)

The Vollestad study also used PSWQ scores to assess the severity of GAD in both active treatment and control groups post-treatment. The PSWQ scale ranges from 16 to 80 and while cut-off scores defining GAD have varied in previous studies, a PSWQ score of 60 is regarded as an indication that a patient can be considered a 'high worrier' who is severely affected by GAD. (38)

**Results:** Mean PSWQ scores in the study showed significant improvement in the MBSR treatment group, post-treatment versus pre-treatment (54.5 versus 63.6), compared to the control group (61.1 post-treatment versus 62.3 post-treatment). (38) After six months, the MBSR group maintained its improved score at a nearly identical 52.2. Similarly, PSWQ scores post-treatment showed that 8 MSBR program participants (26% of the total of the MBSR group) had recovered from GAD and 12 (39%) had their GAD symptoms 'reliably improved'. (38)

This study is limited for the purposes of assessing MBSR for use with GAD patients by its inclusion of a heterogeneous mix of anxiety disorders. It is impossible to tease out the effects of MBSR on GAD specifically apart from the use of self-reported PSWQ scores to track worry pre and post-treatment. A more focused patient population may be of higher value in evaluating MBSR for GAD and providing guidance for MBSR as a therapeutic tool in GAD populations.

This study is also limited by a small sample size. Only 39 individuals were allocated to MBSR group and 37 to the WLC cohort; the number of participants with a primary diagnoses of GAD is even smaller and more problematic: 13 individuals with GAD were included in the trial, with 8 allocated to the MBSR group and 5 to the WLC.

Participants on stable doses of common antidepressants were also allowed to continue pharmacotherapy throughout the study, which may have had an unaccounted-for effect on the experience of generalized anxiety disorder symptoms during the course of the trial.

## **2. Effects of Mindfulness-Based Stress Management on Reduction of Generalized Anxiety Disorder (2012)**

A 2012 study by Asmaee et al. examined pre and post-treatment anxiety and depression symptoms in 37 male participants who completed a standard 8-week MBSR program. (40)

Eligibility criteria included medically stable Persian-speaking adults (18 or older) who met criteria for GAD as per the Structured Clinical Interview for DSM-IV. Exclusion criteria included psychosis, substance dependence/abuse, suicidal ideation, homicidal ideation and past experience as a participant in an MBSR program.

Following a randomization process, participants were placed into an MBSR group (n=16) or a control group that did not receive any treatment (n=15). The outcomes observed in the active MBSR group were compared to the inactive control group.

Using the Beck Anxiety Inventory (BAI), the Pennsylvania State Worry Questionnaire (PSWQ) and the Beck Depression Inventory – Second Edition (BDI-II), the study evaluated anxiety, worry and depression symptoms of the participants in both MBSR and control groups before and after the MBSR intervention.

Results: The authors of the study concluded that the MBSR group subjects experienced what they consider to be 'significant' reduction in anxiety, depression and worry post-treatment.

(38) The MBSR group saw a significant reduction in worry post-MBSR mean PSWQ score (32.22 pre-MBSR versus 12.20 post-MBSR), while the control group's baseline PSWQ mean score of 32.56 was actually lower than its post-intervention mean score of 34.44. (40)

The authors state that the results of this trial indicate that MBSR could act as an effective treatment for symptoms of GAD and call for further RCTs of MBSR for GAD to better evaluate the program's potential to treat GAD. (40)

The study's strengths include the use of a non-intervention control group and the utilization of a variety of tools to measure anxiety, worry, and depression. One major limitation of this study is the use of a very limited sample size (16 in MBSR group and 15 control group participants), which weakens the widespread applicability of the results.

Another potential limitation involves the demographics of study participants. All subjects in this trial were male. Women are two to three times more likely than men to be affected by GAD over the course of a lifetime. (41) There is also a variation between men and women in the presentation of the disorder, responses to pharmacological treatments, the course of disease and experience of comorbidities. (41) An exclusive focus on men in this study could be seen as a positive step in understanding men's specific response to MBSR, but given GAD's higher prevalence in women and the paucity of research on MBSR and GAD, a study that excludes women should be considered a lost opportunity to better understand this common disorder.

The use of a non-treatment control group in this study, presents an ethical problem as the study authors opted not to provide the participants with any intervention. Given the extent to which GAD negatively affects patients and the fact that established treatments exist, designing a GAD study with no therapeutic or wait list component for half of study subjects may be considered an unethical one. (42)

### **3. MBSR reduces anxiety, depression and suicidal ideation in veterans (2014)**

In 2014, Serpa et al. published an observational study examining the effects of MBSR programming on anxiety, depression and suicidal ideation in American combat veterans. (43) Any veteran personally replying to an advertisement or referred by a mental health professional was included in the study, with the exception of individuals with advanced dementia. (43)

105 veterans were offered the standard 8-week MBSR program with an additional orientation session. 79 individuals completed both pre and post-treatment assessments and comprised the active study group. (43)

The intense mental health treatment needs of the study participants differentiate this study from others on MBSR, which usually exclude individuals with psychosis, suicidal ideation, and other severe behavioral disorders. The veterans in this study experienced a variety of severe mental and behavioral issues including psychotic symptoms, suicidality and personality disorders. (43)

Suicidal ideation amongst study subjects prior to the mindfulness intervention was common, with 24.05% of participants reporting ideation within the past 2 weeks. (41) Following completion of the MBSR program, the frequency of suicidal ideation was reduced to 12.66% of, almost half the pre-intervention rate. (43)

Results: Study participants were evaluated for GAD using the DSM-4 Generalized Anxiety Disorder Questionnaire. The mean score pre-MBSR was 10.06 (SD 5.46) with a post-treatment mean score of 6.67 (SD 4.44.). 41% of the participants (n=32) experienced clinical improvement in GAD symptoms following the MSBR program and three participants (3.8% of study population) experienced worsened anxiety. (43)

It is the authors' position that MBSR appears to treat both GAD and depression. (43) Given the frequent co-occurrence of GAD and depression, the authors see a role for MBSR as a potential intervention for GAD patients. Participants also experienced improvements suicidal ideation. (43)

The limitations of this study include the small number of participants and a largely male sample (89% male subjects), which raises concerns similar to Asmaee et al.'s exclusively male 2012 study. Serpa et al.'s trial also notably lacked a rigorous experimental design and did not

employ a non-treatment group to control for non-specific effects of the MBSR program. The principle aim of the study authors was to give veterans access to MBSR and no eligible individual was denied full MBSR treatment.

Additionally, no long-term follow-up was pursued by the authors, making it impossible to discern the longevity of the noted benefits of MBSR on GAD symptoms. GAD is a chronic disorder and any treatments considered in its treatment should be tested over the long term. Given that MBSR programming is delivered within a time-limited group setting, long-term evaluations of results post-treatment are needed to help determine the resilience of positive results once patients have completed treatment.

#### **4. Randomized Controlled Trial of Mindfulness Meditation for Generalized Anxiety Disorder: Effects on Anxiety and Stress Reactivity (2014)**

A 2014 study carried out by Hoge et al. focused on adults with DSM-IV criteria for current primary GAD and Hamilton Anxiety Rating Scale (HAMA) scores of 20 or higher. This study is believed to be the first RCT on MSBR for GAD with an active control group. (12)

Exclusion criteria for the study included a personal history of complex mental disorders including psychosis or schizophrenia, post-traumatic stress disorder, bipolar disorder, intellectual disability, recent suicidal ideation (within past 6 months), alcohol or substance dependence/abuse within the past 6 months, serious medical issues or unstable clinical status, pregnancy or breastfeeding and significant prior experience with meditation practices (including yoga, tai chi and meditation classes). Individuals taking psychiatric medications who had not been on a stable dose for a minimum of 4 weeks and those with an intention to change their doses over the course of the trial were also excluded, as were those undergoing current psychotherapy for GAD. (12)

Potential study subjects were initially screened by phone and then received the Structured Clinical Interview for the DSM-IV (SCID). 89 participants were randomly placed into one of two groups: an MBSR group and a control group that received stress management programming (SME group). 48 participants were included in the MBSR group and 41 in SME group. (12) The MSBR model used in the study was a slight variation of the original 8-week MBSR protocol. Group sessions were shorter in length, and an additional 'metta' or 'lovingkindness' meditation component was introduced. (12)

Results: The MBSR group experienced significant reductions in mean scores of 4 of 5 clinical outcome measures versus the SME group: the Clinical Global Impressions-Severity of Illness (CGI-S), the Clinical Global Impressions-Improvement (CGI-I), the Beck Anxiety Inventory (BAI) and the Pittsburg Sleep Quality Index (PSQI). Both groups experienced similar reductions in anxiety using the Hamilton Anxiety Rating Scale (HAMA). (12)

The MBSR cohort reported greater post-treatment reductions in anxiety than the SME cohort and showed a stronger response to treatment as a group. Response to intervention was measured as a Clinical Global Impressions - Improvement rating of 1 or 2, signifying a result of 'very much improved' or 'much improved'. (12) MBSR group participants had a response rate of 66% (n=29) while SME participants had a response rate of 40% (n=14). (12) The number needed to treat for MBSR was 3.9 with a confidence interval of 95%. (12)

Participants in both cohorts also underwent a Trier Social Stress Test both before and after MBSR. This test is designed to instigate emotional stress in subjects by requiring them to carry out stressful tasks while being 'evaluated' by observers in white coats and presumably recorded by a 'conspicuous video camera.' (12)

The authors found that MBSR group experienced improvements in TSST- related anxiety following treatment that were greater than those reported by the SME group. This aspect of the

study suggests that MBSR may be effective in cultivating stress resilience in addition to alleviating GAD symptoms. (12)

Limitations of this study include a small sample size, a shortcoming shared by the previously discussed trials. Some participants in this study were on stable psychiatric medications, which may have affected their experience of anxiety during the study period. No clinical diagnostic assessment like the SCID was performed at the end of the trial and only self-reported data was used to determine the effects of both the MBSR and SME interventions. A clinical assessment of members of both groups would provide stronger data on the clinical state of participants post-treatment. (12)

This study is likely the strongest of those carried out on MBSR for GAD, improving upon some of the weaknesses limiting previous research on this topic. More studies with similarly robust frameworks should be carried out with follow up components and larger numbers of participants, to allow researchers to better understand the long-term effects of MBSR and its applicability to larger and more diverse populations of people with GAD.

## **Discussion**

The current research available suggests that Mindfulness-Based Stress Reduction may be an appropriate therapy for the management of GAD, particularly GAD experienced concomitantly with depression. More research is required to determine how to integrate MBSR into a comprehensive approach to treating GAD, in concert with CBT and/or appropriate pharmacotherapy. The actual effectiveness of this modality is not known at this time because there are a limited number of high quality studies examining MBSR for GAD. Given the popularity and accessibility of MBSR and other mind-body approaches, there is a need for larger

and more rigorous studies to evaluate the efficacy and real-world application of MBSR for common conditions like anxiety.

There are a number of issues related to the evaluation of MBSR for GAD and which should be tackled in future research. Unlike studies of pharmaceutical treatments, blinding within study populations is not possible with an intervention like MBSR (45). Larger numbers of patients must also be studied, and these patients should be followed for longer periods of time. Research on the interaction of MBSR with accepted GAD treatment modalities like CBT and medication should also be carried out, to determine the comparative effectiveness of GAD treatments and to evaluate the usefulness of a multi-modal approach including MBSR.

More work must be done to employ MBSR for maximum benefit to patients, including the determination of a minimum/ideal 'dose' of MBSR for GAD and the real life longevity of clinical improvements attributable to MBSR. Further research could also shed light on the appropriateness of other forms of meditation for GAD for those unable or unwilling to join an MBSR group but for whom meditative practices hold an appeal and may be a suitable fit.

### **Adverse Effects of MBSR**

Meditative practices may not be appropriate for all individuals with mental health issues, and meditation can provoke adverse experiences in patients (44). Some long-term practitioners of meditation have been found to experience bothersome side effects including “relaxation-induced anxiety and panic, paradoxical increases in tension, less motivation in life, boredom, pain, impaired reality testing, confusion, and disorientation, feeling ‘spaced out,’ depression, increased negativity”. (44) Dependence on or addiction to the practice of meditation is a potential issue that may have negative consequences for some patients. (44)

Participants in three of four studies reviewed for this paper reported adverse MBSR-related effects. In the trial undertaken by Vollestad et al. in 2011, one participant complained of exacerbation of anxiety, which caused the individual to exit the study. (17) Similarly, 3.8% of participants in the 2014 study of a complex American combat veteran population by Serpa et al. experienced increased levels of anxiety attributed to MBSR (43). Hoge et al.'s study reported one adverse effect (n=1 or 2% of study participants), specifically 'muscle soreness'. (12) These types of side effects could render MBSR inappropriate for some GAD patients. When compared with the broad range of side effects related to pharmacological treatments of anxiety, the side effect profile of MBSR may be considered less problematic for the majority of patients.

Because there is a small possibility of adverse side effects like increased anxiety during practice, teachers and facilitators of MBSR and other mindfulness and meditation-based practices should be well-trained and well-prepared to assist MBSR participants who experience negative experiences like panic attacks during practice. (45)

### **Clinical Implications**

Existing research suggests that MBSR could be of use in treating GAD in adults. Clinicians who would like to incorporate MBSR programming in their practice or would like to refer patients with GAD to an MBSR practitioner or group must decide whether this treatment is viable option in specific cases. For a patient to fully benefit from participation in MBSR, he or she must be highly engaged, motivated, possess high intellectual functioning and be accepting of the MBSR methodology and philosophy.

Several logistical issues must also be considered when determining the appropriateness of MBSR for patients, including the individual's ability to attend programming. Patients must have

the capacity to travel to, pay for and participate in eight or more MBSR group sessions and complete homework when outside of a group setting.

The availability of programming is a basic factor determining the practicality of MBSR in treating GAD. MBSR is not available in all Manitoba communities and all areas of larger centers like Winnipeg. This limited availability restricts the number of patients who can access the programming. MBSR programs delivered online, via audio programs or through bibliotherapy could be used for GAD patients who cannot access mindfulness groups in their communities, although research is needed to confirm the real world usefulness of these interventions.

## **Conclusion**

Anxiety disorders are serious and widespread psychological conditions that have a profound negative impact on individuals, families and workplaces. Generalized anxiety disorder is relatively common and can have detrimental effects in all areas of a patient's life, limiting education and work opportunities, affecting sleep and relationships and negatively affecting one's quality of life and general health status. While both pharmacological and cognitive behavioral approaches are currently used to treat GAD, it is with varying degrees of success. Current treatments are not sufficient to bring about long term remission in a large percentage of GAD cases, making research and investigation into alternatives and supplementary therapies for GAD necessary.

Mindfulness has become a popular marketing and media buzzword and an increasingly common concept related to wellness, health, and lifestyle. MBSR and other forms of meditative and mindfulness-based modalities are easily accessed via books, websites, therapists, yoga and fitness studios and community organizations. The increasing accessibility of mindfulness

therapies and their use to treat a variety of health issues requires the medical community to examine the true value of mindfulness to patients.

Current research tells us that MBSR may have a role in treating GAD. Patients with GAD may benefit from augmentation of their current treatment (pharmacological and/or psychological) with MBSR. MBSR has fewer risks relative to pharmacological options, and its costs are considerably lower for most patients. If patients have access to an MBSR group with a well-qualified therapist, MBSR can be safe and potentially effective in reducing the distressing symptoms of this common and often debilitating disorder.

MBSR has been proven to effectively treat depression, a condition that is frequently coexisting in patients with GAD. For patients with both GAD and depressive episodes, MBSR may hold promise as a low-cost, low-risk method of relieving both depressive and anxiety symptoms. Serpa et al.'s study of veterans with complex mental health issues demonstrates that MBSR may also be helpful in treating those with serious comorbid emotional and behavioral issues, including suicidal ideation.

Ultimately, the evidence supporting this suggestion is limited due to the small number of well-constructed studies on the topic. More research must be carried out to better understand the potential of MBSR as a therapeutic option for GAD. Studies should be more rigorous, better constructed and of broader scope, both concerning the number of individuals involved in studies and the length of time that studies follow subjects post-treatment. Further research is also needed to understand the role sex-based differences may play in the clinical outcomes of MBSR for GAD.

If medical professionals are to incorporate MBSR into their practices or recommend MBSR to treat anxiety with maximum benefit for patients, the medical community must seek to understand better the practice's effectiveness through rigorous, thoughtful and wide-reaching

research studies. Mindfulness appears to be a promising modality for GAD patients, and further research on its clinical merits, taken into consideration with patient preference, means and lifestyle, side effect profiles may allow practitioners to more effectively harness its potential.

# Figures

## POPULATION CHARACTERISTICS, STUDY TYPE, FOLLOW UP, PRIMARY OUTCOME MEASURES AND RESULTS

AUTHOR, COUNTRY, YEAR	PARTICIPANTS, INCLUSION CRITERIA	TYPE OF STUDY	FOLLOW UP	PRIMARY OUTCOME MEASURES	RESULTS
Vollestad et al. Norway, 2011	31 MBSR subjects / 37 waitlist (WLC)  66.7% female 33.3% male  Diagnostic criteria for GAD, SAD or PD/AG as per M.I.N.I.  13 GAD participants: 8 MBSR/ 5 WLC	RCT	6 months (MBSR only)	PSWQ (Penn State Worry Questionnaire)	Mean baseline versus post-treatment  <b>MBSR:</b> PSWQ score, 62.9 versus 52.3  PSWQ mean 52.2 at 6 month follow-up.  <b>WLC:</b> Mean PSWQ 62.9 baseline vs 61.3 post-treatment.
Asmaee et al. Iran, 2012	16 MBSR subjects  100% Male  GAD as per the Structured Clinical Interview for DSM-IV	RCT Control group w/no intervention	None	PSWQ BAI BDI	Mean baseline versus post-treatment  <b>MBSR</b> PSWQ: 32.22 vs 12.20 BAI: 31.32 vs 12.93 BDI: 33.53 vs 14.13  <b>Control:</b> PSWQ: 32.56 vs 34.44 BAI: 28.31 vs 28.31 BDI: 31.06 vs 30.50
Serpa et al. USA, 2014	79 subjects  Military veterans  Largely male (no %)	No control group	None	Generalized Anxiety Disorder-7 Scale	<b>MBSR:</b> Mean baseline GAD: 10.06 vs 6.67 post-MBSR  41% subjects: GAD Improved clinically  Suicidal Ideation: 24% participants pre-MBSR vs 12.66% post
Hogo, et al. USA, 2014	48 MBSR subjects (52% male/48% female)  41 SME subjects (46% male/54% female)	RCT	None	Hamilton Anxiety Scale (HAM-A)  Clinical Global Impressions-Severity (CGI-S)  Clinical Global Impressions-Improvement (CGI-I)  Beck Anxiety Inventory (BAI)  State-Trait Anxiety Inventory STAI-S	Mean baseline versus post-treatment  <b>HAM-A:</b> MBSR: 21.46 vs 13.65 SME: 22.12 vs 16.27  <b>CGI-S:</b> MBSR: 4.54 vs 3.75 SME 4.38 vs 3.58  <b>CGI-I:</b> MBSR 60% responder status SME 40% responder status  <b>BAI:</b> MBSR: 16.01 vs 9.10 SME: 14.31 vs 11.33  <b>STAI-S:</b> MBSR 53.9 to 40.8 SME 52.2 to 45.2

**Table 1: Overview of MBSR for GAD studies: population characteristics, study type, follow up, primary outcome measure, results**

## **Acknowledgements**

The author is grateful for the guidance and wisdom shared by Jennifer Wilson (MPAS CCPA) and the University of Manitoba Physician Assistant Studies Program (MPAS) faculty and staff. The author would also like to acknowledge her MPAS classmates for their friendship and support over the past two years.

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