

## In Brief

Diabetes poses a major life stress that requires considerable physical, emotional, and psychological accommodation and coping. Mind-body therapies have drawn significant interest for their potential to assist in managing stress and adaptation to chronic illness. This review highlights the literature and research on Mindfulness-Based Stress Reduction to improve the health and well-being of individuals with diabetes.

# Mindfulness-Based Stress Reduction and Diabetes

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## Overview of Mind-Body Approaches

Mind-body medicine is a field that focuses on “the interactions among the brain, mind, body, and behavior, and on the powerful ways in which emotional, mental, social, spiritual, and behavioral factors can directly affect health.”<sup>1</sup> Mind-body approaches include guided imagery, biofeedback, clinical hypnosis, yoga, expressive arts therapies, and meditation. The potential of mind-body interventions to improve health and well-being of those with diabetes and related conditions has drawn significant interest, as researchers examine whether mind-body approaches constitute safe, practical, and cost-effective methods to assist those adapting to the demands of the diabetes, its care, and the associated stresses and elevated risk of depression.<sup>2</sup> Mindfulness-Based Stress Reduction (MBSR) is a commonly used mind-body approach that has been demonstrated to positively affect people with various chronic illnesses. In this article, we will focus on applications of MBSR that may be relevant to those with diabetes.

## Mindfulness-Based Stress Reduction

MBSR was developed in 1979 by Dr. Jon Kabat-Zinn and his colleagues at the Stress Reduction and Relaxation Program at the University of Massachusetts Medical Center.<sup>3</sup> MBSR combines mindfulness meditation and gentle Hatha yoga into a structured clinical program that can be taught to individuals or in a group format. MBSR is a form of integrative

therapy that taps into the powerful interaction of the mind and body.

Rooted in Theravada Buddhist *vipassana* (translated as “insight”) meditation,<sup>4</sup> MBSR is a nonreligious program that focuses on cultivating an enhanced moment-to-moment non-judgmental awareness of experience.<sup>5</sup> Originally designed to help facilitate adaptation to the stressors of medical illness and assist people in managing stress and pain,<sup>3</sup> MBSR has evolved into a practice that is being applied to a wide variety of health problems as well as being used for general health and overall stress reduction.

MBSR is offered in medical centers, clinics, and hospitals across the United States and abroad and consists of a 2.5-hour/week, 8-week course with a 1-day retreat.<sup>3,6</sup> Participants receive training in formal mindfulness meditation techniques, including a body-scan meditation, a sitting meditation, and gentle Hatha yoga involving simple stretches and postures. The primary focus of the program is on the progressive development of mindful-awareness through the practice of mindfulness meditation.

The use of meditation as an intervention in mental health and health care has grown significantly during the past 30 years, expanding beyond a strictly religious and spiritual context. Meditation is broadly defined as the intentional self-regulation of attention,<sup>7,8</sup> with practices generally falling into two categories: those emphasizing concentration and those emphasizing mindfulness. An example of a con-

centrative practice is Transcendental Meditation, which includes the use of mantras (sounds or phrases used repetitively) to concentrate attention. Mindfulness practices, in contrast, focus on cultivating a nonjudgmental present moment awareness of the inner and outer world.

Both types of meditation are often associated with relaxation techniques; meditation, however, is fundamentally different in both its method and objective. Rather than seeking a state similar to deep relaxation in which bodily tension is released, the overall orientation of meditation is one of non-striving and nondoing.<sup>6</sup> The primary goal is on developing mental discipline leading to a state of deeper awareness and movement beyond reflexive thinking; a state of physiological relaxation is achieved, but it is not the primary focus of the practice.

In MBSR, mindfulness meditation assists practitioners in refining awareness through the practice of a nonreactive, nonevaluative, moment-to-moment awareness from an intentionally nonjudgmental perspective. Participants are encouraged to observe their thoughts and emotions but to let them pass without judging them or becoming immersed in them.<sup>9</sup> This allows both positive and negative thoughts and emotions to pass quickly and can cultivate a greater awareness of the ways thoughts, feelings, and behaviors affect emotional, mental, and physical health. This may also help reduce distractive or ruminative thoughts and assist practitioners in better noticing, understanding, and integrating their own perception of self and the environment.<sup>10</sup> By combining mindfulness meditation with gentle yoga, MBSR also cultivates a greater awareness of the body and mind and the powerful interaction between them.

### Body and Mind Dimensions of Diabetes

Before we address the applications of MBSR to those with diabetes, it is important to note that diabetes as a disease affects both body and mind.

Diabetes poses a major life stress that requires considerable physical, emotional, and psychological accommodation and coping. This heavy burden is related to at least four principal factors:

1. **Anxiety.** In a study on behavior and mental health including

> 200,000 adults, Li et al.<sup>11</sup> found that people with diabetes were 20% more likely than those without diabetes to have an anxiety condition at some point in their lifetime. The highest rates of anxiety were reported in Hispanics and adults < 30 years of age.

2. **Depression.** Depression is a common problem in people with diabetes. About 25% of adults with diabetes will experience depression at some point, although the similarly high prevalence of depression in those with other serious chronic diseases argues against a specific genetic link between depression and diabetes.<sup>2</sup> Depression in people with diabetes is often long-lasting and severe, may be untreated more than half the time, and has high relapse rates.<sup>12</sup> The American Diabetes Association recommends routine depression screening for people with diabetes, as well as long-term monitoring for depression recurrence in those with a history of depression.<sup>13</sup>
3. **Social burden.** In addition to major issues related to anxiety and depression, diabetes has long been recognized for its potential to interfere with social interactions and relationships.<sup>14,15</sup> The impact of social burden, sometimes referred to as stigmatization, is considerable, if incompletely understood.
4. **Diabetes complications.** Over the course of living with diabetes, > 70% of patients will suffer a heart attack or stroke, > 5% experience blindness in one or both eyes, ~ 10% experience amputation of a toe or worse, and ~ 5% must cope with end-stage renal disease. These and other major complications of diabetes add stress and further increase the risk of depression, anxiety, and poor quality of life.<sup>16,17</sup>

### MBSR Research

Among the key questions to consider about MBSR and diabetes are 1) Can MBSR interventions help patients with diabetes cope with high rates of anxiety, depression, stress, and social burden?; 2) Can MBSR interventions lead to better control of blood glucose, blood pressure, or other metabolic parameters?; and 3) Can MBSR interventions lower the rates or risks of long-term macrovascular (heart attacks, strokes) or microvas-

cular (eye, kidney, foot) complications in those with diabetes? To examine these questions, we first review what is known about the use of MBSR in diabetes and then briefly discuss the state of MBSR research in chronic disease and healthy populations to further explore the potential benefit MBSR may hold for diabetes care.

### MBSR in diabetes

Adapting to the daily treatment needs and managing the psychosocial issues associated with diabetes can prove challenging and stressful for patients. It is widely recognized that stress is linked to a host of negative consequences for people living with diabetes, including impaired glycemic control, depression, decreased mental and physical health, and an overall decrease in quality of life.<sup>18-32</sup>

There has been only one study to date looking at the effects of MBSR in patients with type 2 diabetes. A small, prospective, observational pilot study of 14 patients conducted by Rosenzweig et al.<sup>33</sup> looked at the effects of MBSR on measures of A1C, blood pressure, body weight, and psychological symptoms, including anxiety, depression, somatization, and general psychological distress. This uncontrolled study found a reduction in A1C of 0.5% and reduced mean arterial pressure of 6 mmHg; decreases in depression, anxiety, and general psychological distress in patients completing the program were also observed. Analysis suggested that lifestyle changes did not account for the reduction in A1C. Mean body weight did not change for participants, and there were no reported changes in medication, diet, or exercise that could account for the improved glycemic control.

### MBSR in other chronic conditions and in health

Although the research on MBSR and diabetes is sparse, there have been a number of studies on its use with other chronic conditions and in healthy populations. MBSR has been studied in chronic pain,<sup>4,34,35</sup> cancer,<sup>36-42</sup> rheumatoid arthritis,<sup>43</sup> fibromyalgia,<sup>44-46</sup> HIV,<sup>47</sup> solid organ transplant,<sup>48,49</sup> and severe psoriasis.<sup>6</sup> It has been looked at in patients with depression and anxiety,<sup>50-54</sup> those receiving general medical care,<sup>55,56</sup> in the general population for stress reduction,<sup>57</sup> and to assist with behavioral lifestyle changes such as

quitting smoking.<sup>58</sup> It has also been studied in those providing care to others, such as caregivers of children with chronic conditions and mental health therapists.<sup>59,60</sup> This research taken in aggregate has shown decreases in medical symptoms, improved functioning and quality of life, reductions in psychological distress, and decreases in mood disturbances such as depression and anxiety.

Recently MBSR has been combined with cognitive behavioral therapy into a new therapeutic modality called Mindfulness-Based Cognitive Therapy (MBCT). Teasdale et al.<sup>52</sup> examined the impact of MBCT on a population of chronically depressed patients. The outcome measure, relapse/recurrence, was assessed during a 60-week period. Patients who had experienced three or more episodes of depression had a significantly reduced risk of relapse/recurrence with MBCT. Barnhofer et al.<sup>53</sup> also recently looked at MBCT in addition to usual treatment compared to treatment alone for patients suffering from chronic-recurrent depression. They found a decrease in reported symptoms from the severe to mild level in the MBCT group and no significant change in the usual-treatment group.

#### Summary of MBSR effects

MBSR shows promise for facilitating adaptation to chronic illness and improving medical and psychological symptoms and quality of life. It is important to note, however, that although many studies observed benefits attributed to MBSR, study design or analysis limitations constrain the interpretation of results. In a critical review of MBSR research, Bishop<sup>61</sup> noted that although there has been widespread and growing use of MBSR, many of the studies designed to evaluate its clinical effectiveness have been rife with methodological problems related to measurement and design. Many studies used repeated measures but lacked an active control group. Studies that have included control groups have generally had a passive control group, not controlling for time and attention provided during group support. Some studies have also used a combined intervention, thus making it difficult to draw conclusions on the effectiveness of MBSR per se. Although noting the serious limitations of the research in the field to date, Bishop nonetheless concluded that MBSR does appear promising

and that serious continued investigation is warranted and needed.<sup>61</sup>

#### Potential Mechanisms Underlying MBSR

The primary hypothesized pathway through which MBSR likely affects health is through its effect on stress. There has been considerable discussion during the past decades of the role stress plays in overall health, with widespread belief that stress can lead to disease. Stress appears to influence the development of negative emotional states such as anxiety or depression, which in turn may negatively affect both behavior and biological processes. Behaviors such as smoking, overeating, lack of sleep, and exercise influence the risk of disease, and biological processes are affected by stress through the endocrine response system. This system is particularly reactive to stress and, through the hypothalamic-pituitary-adrenocortical axis and the sympathetic-adrenal-medullary system, affects a wide range of physiological processes.<sup>62</sup> Prolonged or repeated activation of the endocrine system can interfere with its ability to regulate physiological systems in the body, thus increasing the risk of physical and psychiatric disorders.<sup>63</sup> Associations between psychological stress and disease have already been established for a number of conditions including depression, cardiovascular disease, and HIV/AIDS, with evidence emerging for many other conditions.<sup>62</sup>

Another mechanism that strongly affects the stress response is perception—how people perceive chronic illness and their adaptive coping skills. How people experience illness and whether they are able to adapt to a long-term chronic condition involves both their emotional and cognitive appraisal of their illness and their ability to accept and cope with the condition. Lazarus and Folkman<sup>64</sup> identified appraisal as central to the stress process. MBSR, with its emphasis on experiencing life fully and nonjudgmentally, may assist in cultivating a more stable and nonreactive approach to life, even in stressful situations. The moment-to-moment focus of awareness often promotes a nonjudgmental acceptance of the present experience rather than ruminations on previous or anticipated events. This nonreactive acceptance of the present situation may help facilitate a more

positive appraisal of illness, enhancing coping skills and decreasing stress.

#### Future Applications of MBSR in Diabetes Care

More work is needed to assess whether MBSR may enhance diabetes self-management programs that mediate their effects through improved personal skills, self-efficacy, knowledge, and communication. Beyond these potential contributions, MBSR may also usefully address stress and psychosocial issues typically associated with chronic conditions such as diabetes. These stressors can interfere with adaptation to diabetes, which is clearly a key factor in long-term self-management and also affects metabolic outcomes through the neuroendocrine system.<sup>30,65–69</sup>

In addition to MBSR, other techniques that focus on stress reduction such as patient empowerment, stress management, and biofeedback may help patients navigate psychosocial issues related to diabetes.<sup>68,70,71</sup> These interventions have shown some success in improving the ability of patients to manage their diabetes,<sup>72</sup> and, along with MBSR, may facilitate patient adaptation to the burdens of diabetes and the lifestyle changes diabetes care necessitates.<sup>73–75</sup>

Before the potential of MBSR as an adjunctive therapy for those with diabetes can be fully assessed, major questions need to be answered. Research in MBSR and diabetes is still in its infancy. Although some data suggest that MBSR may improve blood pressure and glucose control, much more work is needed to better understand the myriad possible applications of MBSR to diabetes care. For example, the positive impact of MBSR on pain and on depression or anxiety suggests a promising opportunity to evaluate the impact of MBSR on those with mental health conditions, painful neuropathies, or related complications. The ability of MBSR techniques to lower stress and improve coping could have very broad applications in the care of diabetes and related conditions.

#### Conclusions

At this time, there is insufficient evidence to assert that MBSR, a mind-body-based integrative therapy, is a proven intervention to help people adapt to the demands of diabetes and its treatment. There is, however, some

evidence that MBSR can facilitate adaptation to other chronic conditions and may lead to an improved self-regulatory approach to the management of stress and emotions.<sup>61</sup> MBSR interventions seek to establish and reinforce a nonreactive, nonjudgmental approach to thoughts and emotions and to cultivate acceptance through moment-to-moment awareness or “mindfulness.”<sup>76</sup> This assists in managing stress by facilitating acceptance and modifying appraisal, a key component of the stress response. The long-term impact of MBSR on glucose and blood pressure control and on the risk of long-term diabetes complications remains to be determined but is a topic clearly worthy of increased research attention.

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