

Mindfulness Miscellany: Therapeutic Indications and Contraindications of Various Meditation Techniques on Specific Human Biomarkers and Conditions, Including Potential Immunomodulation in COVID-19

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Abstract

Meditation has been practiced by specific individuals and groups since ancient times, providing not only spiritual insights but also health benefits. Much more recently, meditation has been investigated for such health-promoting effects and disorder prevention. Transcendental meditation (TM) is the most notable and practiced form of meditation, spanning continents, cultures, and religious affiliations. TM was introduced to the Western world by the revered Maharishi Mahesh Yogi in the mid-twentieth century. Over subsequent decades, the practice of TM has spread globally. Its popularity is based primarily on its ease of learning, being unaffiliated with any religion or philosophy, the relatively short time required each day for its effective practice (two times per day, twenty minutes per session), near-global access for the novice to learn the meditation technique, and the frequently occurring, immediate benefits noted by new practitioners and sustained personal and social benefits in established practitioners.

This review covers a miscellany of meditation topics, highlighting the researched effects of TM on reducing inflammation, in establishing and maintaining healthy blood pressure, its adjuvant application for cancer patients, its potential in COVID-19, in regulating plasma glucose levels and lipid profiles (particularly in the diabetic and overweight and obese populations), as an effective immunomodulator, in enhancing longevity, accelerating wound repair—as well as TM's overall safety and relatively rare adverse events from practicing TM. TM is highlighted as it is the most widely researched meditation techniques globally.

Keywords: Anti-Inflammatory Blood Pressure; Cancer; COVID-19; Immunomodulation; Lipid Profile; Longevity; Plasma Glucose; Psychodermatology

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Abbreviations

AE: Adverse Event; AHA: American Heart Association; BP: Blood Pressure; fMRI: Functional Magnetic Resonance Imaging; IMS: International Meditation Society; NKC: Natural Killer Cell; QoL: Quality of Life; RCT: Randomized Controlled Trial; TM: Transcendental Meditation

Introduction

The meditation tradition is ancient, with a history spanning more than 3,000 years, having ties with Polytheism, Taoism, Confucianism, Judaism, Hinduism, Jainism, Sikhism, and Buddhism. Meditation has become popular in Western countries, such as Europe, the Americas, and Canada.

Practicing meditation helps diminish stress, relax the mind, gain psychological balance, cope with illness, and improve mental and physical well-being [1,2]. In total, 200–500 million people meditate globally. A recent National Health Interview Survey (2017) reported that 16.3% of women use meditation compared to 11.8% of men. Adults 45–64 years are the most likely to utilize meditation (15.9% in the 45–64 age group vs. 13.4% in the 18–44 and 65+ age groups). Moreover, a higher percentage of children aged 12 - 17 (6.5%) practice meditation compared to younger children aged 4–11 (4.7%) [3].

There are many varieties of meditation; however, most variations have four common elements: 1) a distinct and comfortable posture (sitting, lying down, walking, or other positions); 2) a quiet location with as few disturbances as possible; 3) a focus of attention (a specially chosen word or set of words, an object of attention or sensation of the breathing); and 4) an open-minded attitude (letting thoughts, memories, and distractions come and go naturally without judging them) [4].

Common types of meditation are listed in table 1 [5]. Again, there are various forms of meditation, and all come with distinct benefits. Some of the benefits include anxiety reduction, enhanced self-control, healthful awareness, and pain amelioration.

Types of meditation	Description
Zen meditation	Involves sitting upright and following the breathing
Vipassana meditation	Using concentration to intensely examine specific aspects of one’s existence with the intention of eventual transformation
Mantra meditation	Repeating a mantra
Chakra meditation	Aimed at keeping the core chakras of the body—the energy centers—open, aligned, and free-free-flowing
Qigong meditation	Harnessing energy in the body by allowing energy pathways—called meridians—to be open and free-flowing
Yoga meditation	Utilizing various body postures to relax the body and relieve tension
Sound bath meditation	Creating sound vibrations that help focus the mind and develop a more relaxed state
Transcendental meditation (TM)	Sitting comfortably with the eyes closed for 20 minutes twice a day and engaging in effortless practice

Table 1. Common types of meditation

Discussion

A bit about transcendental meditation (TM)

In transcendental meditation (TM), a mantra is silently repeated for 15–20 minutes twice each day (preferably in the morning and afternoon) while the practitioner sits with their eyes closed [6]. As mentioned previously, there are many types of meditation; however, TM is one of the most popular. TM is not a religion, philosophy, or lifestyle. Instead, it is a method for experiencing a greater sense of calm and peace in daily life. The practice of TM differs subtly from other forms of meditation in that the practitioner silently repeats a mantra. As a vehicle to focus and calm the mind, the TM mantra is a nugatory sound compared to meditation techniques that utilize words, phrases, or visualizations [2]. This simple, natural, and effortless TM technique enables the practitioner's mind to settle into a state of peace and harmony. The regular practice of two times for twenty minutes each session per day produces the most favorable results [6–9].

History of TM

The TM movement originated in India, inspired by ancient Vedic tradition [10]. In the 1950s, Maharishi Mahesh Yogi popularized TM practice throughout India and then the world. Maharishi learned this technique from his guru, Brahmananda Saraswati. In 1955, Maharishi began publicly teaching TM [11]. To bring the technique to as many people as possible, he introduced training programs from 1958, beginning with a world tour in Rangoon, Burma.

Maharishi, then, taught this TM technique in 1959 at various locations in the USA, London, and Germany. In 1959, he founded the Spiritual Regeneration Movement in Los Angeles, while opening an office there—which was the only location in the United States that taught TM from 1959–1965 [12].

Englishman Henry Nyburg was trained by Maharishi, becoming the first TM teacher in Europe, and with Maharishi's authority, founded the International Meditation Society (IMS) in 1960. Under Bill Whiting's direction, Maharishi established The School of Meditation in London in 1961, collaborating with the Study Society and the School of Economic Science. Maharishi continued world tours to offer the benefits of TM to more people, earning distinction, praise, and acclaim globally. With celebrity endorsements, such as those from the Beatles and Beach Boys that he mentored, the TM movement rapidly gained momentum during 1960–1970.

The first scientific study on TM was published in 1970 [13]. Maharishi announced his World Plan in 1972 in Mallorca, Spain. He strove to establish one TM center for every million people in the world. A university was founded in 1975 in Lake Lucerne, Switzerland.

Since the late 2000s, millions of people have learned TM while Maharishi was overseeing his extensive multinational movement. According to *The Columbian* newspaper, the TM movement claimed that six million people worldwide have become TM practitioners as of 2006 [14].

Application of scientific scrutiny and the physiological effects of TM

In transcendence, the practitioner's awareness follows the slightest impulse of thought into the realm of pure consciousness. As a result, successful practitioners have access to all creativity, intelligence, and a state of pure being.

TM, unlike other meditation practices, advocates a relaxed state of mind without focusing on breathing. Instead, a trained and proficient TM teacher instructs a novice to utilize a particular thought or sound (mantra) that resonates within the practitioner. Repeating this mantra, the practitioner experiences that sound and effortlessly follows thought, reaching the transcendental region of consciousness, knowing (experiencing) their true nature.

TM relieves stress, lowers blood pressure (BP), reduces anxiety, ameliorates depression, and enhances cognition [15]. Its most significant advantage is that it is easy to learn and master. For some, it takes only a few days or a few minutes to feel pain reduction, diminished anxiety, or lessening the impact of overwhelming thoughts—without waiting weeks or months of daily practice for perceived results.

The Cleveland Clinic reports that its research on the benefits of meditation is ongoing. Current studies indicate that meditation can help people sleep better, manage pain more effectively, improve self-esteem, enhance concentration, and help lessen the symptoms of menopause and irritable bowel syndrome [16].

Anti-inflammatory effect of TM

Immune cells that are activated over the long-term—without any apparent infection or injury—result in chronic inflammation, contributing significantly to developing many diseases and disorders, including diabetes, cancer, Alzheimer's, heart disease, stroke, and depression. The positive influence of meditation on stress reduction and immune function may be due to the decreased pro-inflammatory hormones that regulate the stress response [17]. The outcomes of TM on inflammation are not precisely documented, but a 1977 study found a significant jump in plasma phenylalanine during TM practice, but not during ordinary relaxation [18]. Phenylalanine is a pain reliever and antidepressant. TM is also more likely to result in milder, easier-to-control exacerbations in arthritic people.

Regulation of blood pressure by practicing TM

Studies and reviews have examined the effect of TM on BP and other risk factors associated with cardiovascular disease (CVD) [19–21]. The TM program has been shown to reduce BP significantly. TM has a similar BP-lowering effect as a first-line antihypertensive drug, compared in a health education intervention as a control [22–24]. Regular TM practice has been shown to reduce systolic BP by 4.7 mmHg and diastolic BP by 3.2 mmHg, respectively—which are clinically significant [25]. TM is cited in the American Heart Association (AHA) scientific statement on alternative approaches to BP reduction, published in 2013. TM received the highest classification of all behavioral therapies for its efficacy in BP reduction: Class IIB with Level of Evidence B [26]. Thus, clinicians might consider recommending TM to specific hypertensive patients to reduce BP, according to the scientific statement of AHA.

When adolescents at risk for hypertension engage in the TM program, their CV functioning seems to improve both at rest and during acute laboratory stress [24]. Regular TM practice resulted in a significant reduction in diastolic BP, with an average of 9 mmHg lower than controls [27]. This finding may also have significant implications for the primary prevention of CVD—when screening normotensive subjects with ambulatory monitoring of BP instead of clinic BP.

Walton, *et al.* (2002) observed from these studies that TM programs can be effectively implemented in diverse populations with generally high compliance [20]. These studies reported a significant reduction in BP in both sexes. TM was twice as effective as progressive muscle relaxation in reducing BP in older hypertensive African Americans [20]. Thus, TM appears to address psychosocial stress and curb recurrent CVD events by alleviating specific risk factors, including hypertension. However, in contrast, some researchers point out insufficient high-quality studies to conclude that TM decreases BP cumulatively [28]. Moreover, other researchers opine that data availability is lacking to determine whether or not TM is effective in preventing CVD—due to this lack of evidence [29].

TM and cancer

Cancer patients often use meditation to soothe their minds and bodies—as it reduces exacerbating stress. Cancer patients can benefit from meditation by lessening specific symptoms and improving their quality of life (QoL), including checking anxiety and depression, diminishing nausea (from the illness or chemotherapy), and augmenting their immune systems [30]. A randomized controlled single-blind trial by Nidich, *et al.* (2009) reported that TM improved the QoL of 130 women in cancer stages II, III, and IV [31]. However, a 42% reduction in mortality risk was not statistically significant [31]. To verify such a risk reduction level and examine the relationship between survival status and changes in QoL factors, larger sample sizes, and longer-term trials are recommended.

In addition to promoting physiological well-being, meditation can improve a person's capacity to disengage hyperreactive responses to stress triggers. Studies have shown that emotional and psychosocial stress can contribute to the onset and progression of breast cancer

[31]. Also, in addition to affording breast cancer patients a sense of inner peace and relief, TM subdues their fear and sense of helplessness when facing this life-threatening disease. There have been further studies indicating that TM is beneficial for cancer patients. However, there have been relatively few studies with varying study designs, making a comparative analysis problematic. Thus, it is necessary to conduct more TM research studies and extensive studies regarding TM and cancer. The beneficial effects of meditation on cancer prevention, treatment, or cure have not been verified.

TM and COVID-19

TM effects on COVID-19 have not been studied in randomized controlled trials (RCTs). However, RCTs on heart disease and mortality have shown a causal relationship between these health benefits and the practice of TM. Research indicates that the TM technique boosts the immune system. During TM, functional magnetic resonance imaging (fMRI) depicts decreased blood flow to the brain stem, constraining viral infection to the brain [32]. Also, the human body is protected from viruses by circulating lymphocytes in TM practitioners. Compared to non-TM practitioners, TM practitioners have more T cells CD+, CD4-, and CD8+ lymphocytes that destroy virally-infected cells and tumor cells, more B lymphocytes (that identify and neutralize foreign substances, such as bacteria and viruses), and more natural killer cells (NKCs) that respond rapidly to virally infected cells and tumor formation [33].

Orme-Johnson, *et al.* (1987) reported that TM practice appeared to strengthen the body's defenses against viral infections. Based on 5-year health insurance statistics for 2,000 people practicing TM, there were 73% fewer hospitalizations among patients with viral infections of the nose, throat, and lungs. The oldest group, those over 40, was reported to have the most significant decrease. This study concluded that regular TM practice is an excellent starting point to combat viral infections [34]. Thus, future well-controlled studies on any such beneficial TM effects on coronavirus infection are warranted.

Regulation of plasma glucose level with TM

Several studies suggest implications for educational and psychological practices for diabetic patients. Psychophysiologists should consider offering TM classes to patients at their first clinic appointment. Clinical studies have shown that combining acupuncture therapy, hypnotherapy, and TM reduces type 2 diabetic patients' blood sugar levels more effectively than placebo therapy [35]. TM practice can help slow the progression of coronary heart disease by reducing insulin resistance—as demonstrated in a 16-week study of patients with CVD. TM (n = 52) and health education (n = 51) were compared for their effect on improving fasting blood glucose and insulin levels. TM significantly reduced insulin resistance and augmented stable autonomic nervous system functioning [36].

Blood glucose and insulin levels are aggravated by stress hormones, such as cortisol, adrenaline, and noradrenaline. TM helps balance blood glucose and insulin levels by reducing these neurohormones, thus helping to improve metabolic syndrome and diabetes. It has been demonstrated that the short-term practice of the TM technique can reduce blood sugar and insulin resistance, thus decreasing risk factors for diabetes.

Immunomodulation by TM

Some studies have been conducted regarding TM's impact on the immune system. In Mills, *et al.* (1990), results revealed that non-TM practitioners express a low level of functional lymphocyte beta-adrenergic receptors and a significant reduction of leukocyte deoxyribonucleic acid repair [37]. Moreover, Infante, *et al.* (2014) found that TM practitioners expressed a comparatively higher percentage of T cells (CD3+CD4-CD8+ lymphocytes), B cells, and NKCs—while CD3+, CD4+, and CD8- lymphocytes tended to have lower levels [33]. When comparing the two groups (non-TM practitioners versus TM practitioners), no statistically significant differences were noted in the total number of leukocytes, granulocytes, monocytes, lymphocytes, or CD3+ lymphocytes. However, regular meditation can modulate the activity of the neuroendocrine axis, resulting in positive changes in immune mediator cells.

TM effects on enhancing longevity

According to Schneider, *et al.* (2005) and Alexander, *et al.* (1989), in conjunction with standard care, TM practice decreases stress in older people with high BP in a pooled analysis of two RCTs. As a result of TM, all-cause mortality decreased by 23%, cardiovascular disease mortality contracted by 30%, and cancer mortality decreased by 49% [38,39]. This research regime used a combination of lifestyle changes, such as meditation, yoga, and nutrition, to promote heart health and lessen risk factors for chronic diseases, such as high BP, smoking, stress, harmful levels of LDLs, cholesterol, and atherosclerosis.

Plasma lipid profile and TM

Chronic hyperactivity of the sympathetic nervous system can raise and maintain high serum cholesterol levels despite dietary restrictions. Cooper and Aygen (1979) examined TM on hypercholesterolemic subjects, assessing how TM affected their blood cholesterol levels. The researchers concluded that TM significantly reduced fasting serum cholesterol levels [40].

Furthermore, a study comparing TM practitioners with matched controls found 15% lower serum levels of lipid peroxides in the TM group compared to the non-TM group [40,41]. It was not clear how TM affected cholesterol levels, but it is posited that the improvements in the TM group were due to more efficient lipid metabolism or healthier eating habits—or a combination of both factors.

No influential or formal study has compared the effectiveness of TM with that of statins, which lower cholesterol. If a person takes statins, it is advised that they do not abruptly stop taking the medicine without consulting their doctor; TM should not be deemed a replacement for a patient's essential medicine.

Skincare and TM

Based on an Indian study by Shenoj and Prabh (2018), “psychodermatology” refers to a holistic approach to treating skin diseases, including the effects of stress on the cutaneous system. Anxiety, dysthymia, and depression are prevalent difficulties encountered in patients with skin diseases (psoriasis, vitiligo, and urticaria) [42]. However, it has not been directly scrutinized whether TM can treat or prevent skin disorders. The practice of TM can, however, mitigate these psychological comorbidities.

TM in weight loss and management

Science explains that hormonal factors influence hunger and appetite issues in many people. These hormones are directly affected by stress, as are many of their secretions. As a result, the body loses its natural intuition (response) needed in times of stress. TM helps practitioners cultivate mental and physical balance to begin seeking foods that their bodies naturally require and desire. Moreover, those who experience lower stress levels are better equipped to determine the foods and the amounts of foods that will satisfy their natural metabolic requirements (by not overeating or consuming an unhealthy diet). Since TM effectively controls stress, food selection and consumption are better controlled as well as obesity, weight loss, and weight management. However, no randomized clinical trials have shown primary evidence of weight loss by practicing TM.

Wound repair and TM

Chronic and non-healing wounds, such as diabetic foot ulcers and radiation injuries, carry a high level of morbidity and represent a significant health care burden. These wounds require complex supervision, including antibiotic treatment, dressings, and sometimes revascularization. Also, the tissue affected by these wounds does not receive sufficient oxygenation due to a poor oxygen (blood) supply. Thus, randomized placebo-controlled studies are essential to ascertain the actual efficacy of TM on the mechanism of action for various types of wounds.

Safety and side effects of meditation

Several studies have linked meditation practices to “strange” states of mind. However, not all of these studies support the idea that some individuals may develop a “meditation sickness” [43,44]. The beneficial influence of long-term meditation on challenging, complex, or dangerous outcomes, such as hospitalization and suicide, has been documented in recent studies by Lindahl, *et al.* (2018) and Van Dam, *et al.* (2018) [44,45].

It is estimated that, based on an average of 5% adverse events (AEs) in the general psychotherapy literature, almost 1 million people in the United States alone have experienced AEs with meditation [46]. AEs described with TM are abdominal ulcers (3-month practice), abnormal temporal lobe activity, psychological disorders, memory problems, sleep paralysis, auditory and visual hallucinations, derealization, and identity loss [47–50].

Some meditative practices requiring movement may not be accessible to people with physical limitations.

Meditation should be discussed with a health care provider before commencing the practice. Also, the meditation instructor should be made cognizant of any physical or psychological condition in those about to undertake meditation. Meditation has been linked to mental health problems, such as anxiety and depression, but it has exacerbated such symptoms only in rare cases. To reiterate, before starting a meditation practice, those with mental health conditions should consult their health care provider and notify their meditation instructor of their condition.

Conclusion

Transcendental meditation is an uncomplicated mental technique that can be learned quickly and practiced twice a day for twenty minutes each session. More than 600 studies have evaluated TM’s health-promoting, preventive, and ameliorating effects in 33 countries from 210 universities or research institutions. Numerous psychological, emotional, and physical gains have been correlated with TM.

In addition to improving cognitive function, TM and other specific meditation techniques support heart health and lessens stress. Regulation of hormonal balance and stress management can better the quality of life in patients with neurobehavioral conditions, metabolic disorders, and cancer. With TM, there is no requirement to change one’s belief system, religion, or philosophical orientation to begin and practice TM. Adults and adolescents find transcendental meditation simple to learn, frequently feeling immediate benefits.

Conflict of Interest Statement

The authors declare that this paper was written without any commercial or financial relationship that could be construed as a potential conflict of interest.

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