



Review

Transcendental meditation for lowering blood pressure: An overview of systematic reviews and meta-analyses



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ABSTRACT

Background: Transcendental meditation (TM) is a stress reduction technique that can potentially lower blood pressure (BP) safely. The American Heart Association recommends that TM may be considered in clinical practice.

Objective: To provide an overview of all systematic reviews and meta-analyses of TM on BP for evidence-informed clinical decision making.

Method: Systematic searches of PubMed, EBSCOhost, Cochrane Library, Web of Science, Embase, and PsycINFO for all systematic reviews and/or meta-analyses of randomized controlled trials (RCTs) with TM as an intervention, and outcome measures include systolic BP (SBP) and diastolic BP (DBP). Qualitative and quantitative data were synthesized. The methodological quality of the selected reviews was assessed using the AMSTAR checklist.

Results: Eight systematic reviews and meta-analyses are included. Among them is an Agency for Healthcare Research and Quality report, a Cochrane systematic review, 4 independent reviews, and 2 reviews from a TM related institution. The quality of most of the included reviews is fair with a mean score of 5.75/11 on the AMSTAR scale. Overall, there exists a clear trend of increasing evidence over the years supporting the efficacy of TM in lowering BP. However, some conflicting findings remain across reviews and potential risk of bias exists in many of the RCTs included in these reviews.

Conclusion: Practising TM may potentially reduce the SBP by ~4 mm Hg and DBP by ~2 mm Hg. Such effect is comparable with other lifestyle interventions such as weight-loss diet and exercise. Further evidence from long-term well-designed RCTs conducted by independent researchers is needed.

1. Background

Hypertension is a major public health issue worldwide.¹ It affects about 31.1% of the adult population worldwide, with an estimated 1.39 billion people had hypertension in 2010.² Infamous relationships exist between hypertension with one or more of these lifestyle conditions: chronic stress, obesity, high dietary sodium intake, excessive alcohol consumption, smoking, and minimal physical activity.³ Psychosocial stress is also a pivotal consequential contributor to an elevated blood pressure (BP).⁴ With each 2 mmHg increase in systolic BP (SBP), there is a 7% increased risk of mortality from coronary heart disease and a 10% increased risk of mortality from stroke.⁵ Thus, unmanaged hypertension can cause serious harm to human health.

To prevent adverse health consequences of hypertension, there exist formal guidelines for individuals to adopt lifestyle changes to safely reduce BP.⁶ Proven approaches include weight loss, reduced sodium

intake, minimized alcohol consumption, and exercise. However, adherence to dietary strategies (with the focus on a diet rich in fruit and vegetables and low in saturated fat) has been shown to be difficult to maintain.⁷ Beyond dietary strategies, non-pharmacological treatments, such as the transcendental meditation (TM), is readily adopted and has the capacity to safely lower BP.⁷

TM is a mantra meditation technique where consciousness is directed towards repetition of a word, or a phrase as an object of focus.⁸ The process allows “the ordinary thinking process to become more quiescent and a unique psychophysiological state of ‘restful alertness’ to be gained”.⁹ It has been described as “a simple, natural, and effortless procedure, optimally practiced twice a day for twenty minutes while sitting comfortably with the eyes closed”.¹⁰ The standard TM course offered by the Maharishi Foundation (the TM organization) includes an introductory and preparatory lecture, a one-hour session of personal instruction, and consecutive follow-up sessions over the next three

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days. After which, students will practice on their own as a daily routine.¹⁰

The effect of TM on BP has been extensively studied. In the American Heart Association (AHA) scientific statement on alternative approaches to lowering BP published in 2013,⁷ TM was conferred a Class IIB, Level of Evidence B recommendation on its BP-lowering efficacy; the highest among all behavioral therapies. The AHA scientific statement suggested that TM might be considered in clinical practice to lower BP, after a review of evidence from available systematic reviews, meta-analyses, as well as recent clinical trials not included in the published reviews.

Newer systematic reviews and meta-analyses on this topic have been published since the recommendation by AHA, offering new data and insights. With the speed of information production today, it has become increasingly challenging to keep up-to-date with currently available evidence.¹¹ Hence, there is a need for an overview of all published systematic reviews and meta-analyses on the effect of TM on BP, which synthesize and integrate information to facilitate evidence-informed decision making by clinicians, researchers and patients.

2. Methods

2.1. Literature search

We conducted a targeted keywords systematic search on PubMed, EBSCOhost (All), Cochrane Library (Issue 2 of 12, February 2017), Web of Science, Embase, and PsycINFO (1967 to February Week 4 2017) without any restriction in year of publications. Keywords used were “blood pressure” AND “transcendental meditation” AND (“meta-analysis” OR “systematic review”). We also manually searched the reference lists of selected articles to identify any additional systematic reviews and/or meta-analyses. The search was conducted between February and March 2017 by two authors (SLO and MG).

2.2. Selection of reviews

Criteria of inclusion: (1) English language systematic reviews and/or meta-analyses of clinical trials only with at least one randomized controlled trials (RCTs), (2) TM as an intervention for review, (3) Outcome measures of review include SBP and diastolic blood pressure (DBP), (4) Any systematic review not specific to TM must provide a detail review on the effect of TM on BP, (5) Any meta-analysis not specific to TM must conduct a subgroup analysis specific to TM and BP. Selection of reviews was performed by two authors (SLO and MG) and any differences were resolved through discussion with the third author (SCP) to reach a consensus.

2.3. Data extraction

Data extracted from selected systematic reviews include authors, year of publication, overall objectives, inclusion criteria, total number of included trials, aggregated sample size of all included trials, and selected concluding quote. We also extracted the list of all included trials for comparison across reviews. For meta-analyses, sample sizes for TM and control, weighted mean difference (WMD) between TM and control for SBP and DBP, reported heterogeneity (p-values and I^2 values) were extracted for all main and subgroup analyses reported. Data extraction was conducted by SLO and the results were reviewed by SCP. Any discrepancy found was resolved through discussion to reach a consensus.

2.4. Quality assessment

We used “A Measurement Tool to Assess systematic Reviews” (AMSTAR) checklist to assess and report on the methodological quality of the selected systematic reviews and meta-analyses.¹² AMSTAR has

Table 1
Full text articles excluded with reasons.

Full text articles excluded	Reasons
Eisenberg et al. ²²	Not providing sufficient information
Devine & Reifschneider ²³	Not providing sufficient information
Canter & Ernst ²⁴	Duplication
Barnes & Orme-Johnson ²⁵	Non-systematic review
Black et al. ²⁶	Not providing sufficient information
Brook et al. ⁷	Not systematic review of RCTs
Orme-Johnson & Barnes ²⁷	Not providing sufficient information
Nagele et al. ²⁸	Not providing sufficient information
Younge et al. ²⁹	Not providing sufficient information

been demonstrated to have good agreement, reliability, construct validity, and feasibility across a diverse range of reviews. AMSTAR is also easy to apply.¹³ SLO performed the quality assessment and the results were reviewed by SCP. Disagreement was resolved through discussion.

3. Results

3.1. Search results and characteristics of reviews

Sixty-seven records from database searches and nine records from manual reference lists searches were found. After removing the duplicates, screening, and assessing for eligibility, eight review articles met our inclusion criteria.^{14–21} Nine articles were excluded with reasons after assessing the full text^{7,22–29} (See Table 1), inclusive of the AHA scientific statement which did not meet the first selection criterion. Five of the included reviews provided meta-analyses for quantitative synthesis.^{14,15,17,19,20} A summary of the search process is shown in Fig. 1. The characteristics of these reviews are summarized in Table 2. The list of all trials reviewed and meta-analyzed by the selected reviews are summarized in Table 3 with full references available in the References section.^{9,30–54}

3.2. Qualitative and quantitative synthesis

Walton et al.²¹ reviewed TM as a potential intervention to address psychosocial stress and reduce recurrent cardiovascular disease (CVD) events by lowering risk factors including hypertension. Five studies were included with four of them being RCTs.^{43,45,47,49} and the fifth⁴⁶ being a subgroup analysis of one of four RCTs. This review found both clinically and statistically significant reductions of BP with up to 13 mm Hg in SBP and 8 mm Hg in DBP reported in each study with no meta-analysis conducted. Walton et al. noted from these studies that TM program can be effectively implemented in diverse populations with a generally high compliance; significant reduction of BP in both sexes and at both ends of the spectrum of CVD risk can be achieved; and TM was twice as effective compared to progressive muscle relaxation (PMR) in reducing the BP of hypertensive older African Americans. Relatively short time of follow-up ($< = 4$ months) was noted as a shortcoming of all the included studies.

Canter and Ernst¹⁶ included six RCTs^{33,40,43,45,47,49} with one³³ available only as an abstract. Four of which were also reviewed by Walton et al. Canter and Ernst disputed the findings of Walton et al. on the ground of methodological weaknesses and risk of bias in all the included trials. Assessing quality based on a modified Jadad scale with a maximum of four (4) points, only half of the included trials scored three (3) and above^{45,47,49} Of the two trials that scored the maximum four (4) points, only one,⁴⁷ found statistically significant difference between groups that favored TM, and the other one⁴⁹ did not. One trial, which scored three (3) on the modified Jadad scale⁴⁵ also did not show a statistical difference between the groups. Consequentially, positive outcomes were associated with trials with lower quality. Furthermore, all trials were conducted by authors that had some form of

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