



CLINICAL REVIEW

The effect of meditative movement on sleep quality: A systematic review



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SUMMARY

The purpose of this systematic review was to identify and assess evidence related to the efficacy of meditative movement (MM) on sleep quality. We conducted a comprehensive review of relevant studies drawn from English and Chinese databases. Only randomized controlled trials (RCTs) reporting outcomes of the effects of MM (tai chi, qi gong, and yoga) on sleep quality were taken into consideration. Twenty-seven RCTs fulfilled our inclusion criteria and formed the basis for this review. Due to clinical heterogeneity, no meta-analysis was performed. Seventeen studies received a Jadad score of ≥ 3 and were considered high-quality studies. Findings of the 17 studies showed that MM has beneficial effects for various populations on a range of sleep measures. Improvement in sleep quality was reported in the majority of studies and was often accompanied by improvements in quality of life, physical performance, and depression. However, studies to date generally have significant methodological limitations. Additional RCTs with rigorous research designs focusing on sleep quality or insomnia and testing specific hypotheses are needed to clearly establish the efficacy of MM in improving sleep quality and its potential use as an intervention for various populations.

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Introduction

Meditative movement (MM), also called complementary/alternative exercise or mind-body exercise, is a recently coined term for gentle exercises that incorporate some form of movement or body positioning, breathing, and relaxation [1,2]. MM techniques, most commonly tai chi, qi gong, and yoga, incorporate a number of common components: a) focusing the mind; b) movements that are usually slow, relaxed, and flowing, but may range from a high level of dynamic movement to quiescent static postures, with or without specific choreography; c) a focus on breathing to rest the mind, which also “energizes” the body; and d) a deep state of physical and mental relaxation [3]. Tai chi and qi gong have roots in ancient China as traditional Chinese medicine practices [4]. Yoga, originally a spiritual practice, has origins in India [5]. When the

forementioned components are combined (as they are in tai chi, qi gong, and yoga), these practices have been shown to produce a wide range of health benefits that may or may not be achieved with any single element [6]. A number of randomized controlled trials have focused on the positive effects of MM in various populations with specific medical conditions, including fibromyalgia [7], breast cancer [8], cardiovascular conditions [9], and diabetes [10].

The construct of sleep quality is poorly defined yet widely used by researchers, clinicians and patients. The term insomnia has been thought of both as a symptom and as a disorder with certain diagnostic criteria in the medical literature and popular press. Poor sleep quality is a key feature of insomnia [11]. Sleep quality is commonly assessed in studies of MM. However, sleep quality is usually a secondary outcome. Relatively few studies focus on using MM to treat insomnia or improve sleep quality.

A previous systematic review of MM found support for improved sleep quality; however, it focused solely on cancer patients, the intervention included only yoga, and Chinese literature was not included [12]. A narrative review of mind-body

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Abbreviations

AIS	Athens insomnia scale
DSM-IV-TR	diagnostic and statistical manual, fourth edition, text revision
ECG	electrocardiogram
ESS	Epworth sleepiness scale
GSDS	general sleep disturbance scale
ISI	insomnia severity index
MM	meditative movement
PSG	polysomnography
PSQI	Pittsburgh sleep quality index
RCTs	randomized controlled trials
YOCAS	yoga for cancer survivors

interventions for the treatment of insomnia found that mind-body interventions could improve sleep quality and reduce the use of hypnotic drugs in a hypnotic-dependent population. However, this review included not only tai chi, qi gong, and yoga but also cognitive behavioral therapy, music therapy, and several other interventions. In addition, only studies in which the main objective was to treat insomnia were considered in this review [13].

The present systematic review comprehensively summarizes the known effects of MM (specifically tai chi, qi gong, and yoga) for improving sleep quality in order to guide evidence-based clinical decision-making and to inform future research.

Methods

Methods of data searches, study selection, data extraction, quality assessment, and analysis were all specified in advance and documented according to protocol.

Data searches and study selection

Articles were screened and selected based on the following study inclusion/exclusion criteria:

Inclusion criteria

- a) Investigated tai chi, qi gong, or yoga
- b) Measured effects on sleep quality
- c) Randomized controlled trials (RCTs)

Exclusion criteria

- a) Assessed sleep quality without using recognized scales or questionnaires specialized for sleep quality, such as the Pittsburgh sleep quality index (PSQI) and the Athens insomnia scale (AIS), or objective measures, such as actigraphy and polysomnography.
- b) Used mixed interventions, such as tai chi with music therapy.

Randomized controlled trials (RCTs) reporting outcomes of the effects of MM on sleep quality were identified. A study was operationally defined as an RCT in this review if the allocation of participants to treatment and comparison groups was reported to be randomized.

Since many tai chi and qi gong studies were published in Chinese, we included relevant publications from both Chinese and

English-language databases (our team consists of three researchers from China and five researchers from the U.S.). Two reviewers independently searched and screened the titles and abstracts of the English-language studies identified by the search against the eligibility criteria, and two reviewers independently searched and screened the Chinese-language studies.

Research articles that were published in English from the start date of each database up to December 31st, 2014, and that concerned the effects of MM on sleep quality, were identified from the following databases: Medline, PubMed, PsycINFO, Cochrane Reviews, Ovid, EBSCOhost, and all of the journals in the Harvard Countway Library of Medicine. Using the same search criteria, studies published in Chinese were identified from the following databases: CNKI, Wan Fang Med Online, and VMIS. For potentially eligible studies in both languages, full text versions were obtained and the search criteria reapplied. Disagreement was resolved by discussion. For English databases, the key words used included the following combination of medical subject headings (MeSH) and free text terms: “Tai-ji/Tai Chi/Chi, Tai/Tai JiQuan/JiQuan, Tai/Quan, Tai Ji/taiji/Taijiquan/Tai Chi/Tai Chi Chuan,” “Ch’i Kung, qi gong,” “yoga,” “sleep quality,” “insomnia,” “sleep complaints,” “sleep disturbance,” and “sleep disruption” as main subject headings or text words in titles and abstracts. For Chinese databases, the key words used included equivalent Chinese terms as main subject headings and text words in titles and abstracts.

Fig. 1 shows the process used to select studies.

Data extraction and quality assessment

The characteristics of the original research in English and in Chinese were each independently assessed by two reviewers, who then extracted the data. A third reviewer checked the extracted data from both English and Chinese searches. Disagreements were resolved by discussion and consensus. Relevant information was collected regarding date of publication, study sites, language of the publications, and clinical domains (see Table 1). Duplicate publications, which meant that two or more journals published the same research data, were represented as a single study in the systematic review.

The methodological quality of the RCTs was evaluated using the Jadad scale, which includes the following five questions: 1) Was the trial described as randomized? (The words random, randomly, or randomization must be used) 2) Is the method of randomization appropriate? (The methods used to generate the sequence of randomization must be described) 3) Was the study described as double-blind? (The word double-blind must be used) 4) Is the method of blinding appropriate? (If not, one point is deducted) 5) Is there a description of withdrawals and dropouts? (The reasons need to be included, and if there are no withdrawals, it must be stated as such). Each question is given a maximum score of one point. The scale awards 1–5 points to RCTs. RCTs with ≤ 2 points are considered low-quality studies, and RCTs with ≥ 3 points are considered high-quality studies [14]. When necessary, additional information was sought from authors of the study reports (see Table 2).

The inter-rater agreement between each of the two reviewers for methodological quality as measured by kappa (k) was 0.802 ($p < 0.001$) for English-language studies and 0.845 ($p < 0.001$) for Chinese-language studies.

Assessment of heterogeneity

Clinical, methodological, and statistical heterogeneity were assessed. Clinical heterogeneity generally came from sample characteristics (e.g., age, gender, and disease). Methodological

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