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Review

Taichi exercise for self-rated sleep quality in older people: A systematic review and meta-analysis

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ABSTRACT

Objectives: Self-reported sleep disorders are common in older adults, resulting in serious consequences. Non-pharmacological measures are important complementary interventions, among which Taichi exercise is a popular alternative. Some experiments have been performed; however, the effect of Taichi exercise in improving sleep quality in older people has yet to be validated by systematic review. Using systematic review and meta-analysis, this study aimed to examine the efficacy of Taichi exercise in promoting self-reported sleep quality in older adults.
Design: Systematic review and meta-analysis of randomized controlled studies.
Data sources: 4 English databases: Pubmed, Cochrane Library, Web of Science and CINAHL, and 4 Chinese databases: CBMdisc, CNKI, VIP, and Wanfang database were searched through December 2013.
Review methods: Two reviewers independently selected eligible trials, conducted critical appraisal of the methodological quality by using the quality appraisal criteria for randomized controlled studies recommended by Cochrane Handbook. A standardized data form was used to extract information. Meta-analysis was performed.
Results: Five randomized controlled studies met inclusion criteria. All suffered from some methodological flaws. The results of this study showed that Taichi has large beneficial effect on sleep quality in older people, as indicated by decreases in the global Pittsburgh Sleep Quality Index score [standardized mean difference = −0.87, 95% confidence intervals (95% confidence interval) (−1.25, −0.49)], as well as its sub-domains of subjective sleep quality [standardized mean difference = −0.83, 95% confidence interval (−1.08, −0.57)], sleep latency [standardized mean difference = −0.75, 95% confidence interval (−1.42, −0.07)], sleep duration [standardized mean difference = −0.55, 95% confidence interval (−0.90, −0.21)], habitual sleep efficiency [standardized mean difference = −0.49, 95% confidence interval (−0.74, −0.23)], sleep disturbance [standardized mean difference = −0.44, 95% confidence interval (−0.69, −0.19)], and daytime dysfunction [standardized mean difference = −0.34, 95% confidence interval (−0.59, −0.09)]. Daytime sleepiness improvement was also observed.
Conclusions: Weak evidence shows that Taichi exercise has a beneficial effect in improving self-rated sleep quality for older adults, suggesting that Taichi could be an effective alternative and complementary approach to existing therapies for older people with sleep problems. More rigorous experimental studies are required.

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What is already known about the topic?

- The prevalence of sleep disorder is high in older adults, which seriously affects their quality of life.
- Pharmacological measures may have ambiguous effects and potential adverse reactions for treating sleep disorders.
- Evidence from trials indicates that Taichi exercise may improve sleep quality, but evidence is inconsistent and no systematic review has focused on this topic in older people.

What this paper adds

- There are limited high-quality experimental studies concerning Taichi exercise in improving sleep quality in older people.
- This systematic review and meta-analysis indicates that Taichi exercise may improve self-rated sleep quality in older adults.
- There is a pressing need for more experimental studies to probe into the effect of the easy, cheap aerobic exercise.

1. Introduction

Accounting for 1/3 of every body's life span, sleep is an essential physiological process, with vital restorative functions. With aging, sleep disorder becomes increasingly serious, with reported prevalence of sleep disorders between 9% and 12% in adults, and over 20% and 30% in older adults in western countries (Irwin et al., 2006), and about 35% among old Chinese people (Gu et al., 2010). Sleep disorder can result in serious consequences, including increased fatigue, excessive daytime sleep, impaired functioning, emotional or psychiatric disturbance and declined quality of life, especially in older adults (Crowley, 2011; Irwin et al., 2006; Morin and Benca, 2012; Yang et al., 2012). However, only about 15% of clients seek treatment or consultation (Mellinger et al., 1985; Morin et al., 2011). Among treatment measures, pharmacological therapy remains most common (Glass et al., 2005; Nowell et al., 1997; Smith et al., 2002). Evidence shows that the short-term effect (2–4 weeks) of pharmacological treatment for sleep disorder has been confirmed (Holbrook et al., 2000; Nowell et al., 1997), but the long-term efficacy is still lacking (Morin et al., 1999). What is more, pharmacological treatment may have some adverse effects in older people. The drug may result in daytime confusion, drowsiness, and even the great risk of cognitive impairments, falls, and fractures for older people (Glass et al., 2005; National Institutes of Health, 2005).

Regarding the ambiguous effects and potential adverse reactions of pharmacological interventions, an evidence-based non-pharmacological method is of great importance and interest for older adults with sleep disorders (Irwin et al., 2006). Non-pharmacological approaches have a long history of treating sleep disorders, among which physical exercise is increasingly regarded as an effective way (Gooneratne, 2008; Yang et al., 2012). Several systematic review and meta-analyses have been published to discuss the role of physical exercise in alleviating sleep problems (Kubitz et al., 1996; Montgomery and Dennis, 2002). Generally, the positive effect of physical exercise has been verified in treating sleep disorders, although the conclusions of the studies were not fully consistent with each other. A recent systematic review concluded that exercise training has a moderately positive effect on sleep quality in middle-aged and older adults, and therefore, the physical exercise could be viewed as a complementary and alternative approach for treating sleep problems (Yang et al., 2012).

Taichi, a form of traditional Chinese low- to moderate-intensity mind-body exercise, has a long practicing history for body and mind fitness in East, and is now gaining its great popularity in west countries. A large number of studies have been performed to investigate the role of Taichi in treating chronic conditions. Based on the interventional studies, several systematic reviews have been performed to produce high level evidence of Taichi's effectiveness, in terms of on immunity and infections (Ho et al., 2013), cardiovascular conditions (Lee et al., 2007a,b,c; Ng et al., 2012; Yeh et al., 2009), type 2 diabetes mellitus (Lee et al., 2008a,b,c, 2011a,b), chronic musculoskeletal pain conditions (Hall et al., 2009), aerobic capacity (Lee et al., 2009), blood pressure (Yeh et al., 2008), osteoporosis (Lee et al., 2008a,b,c), osteoarthritis (Lee et al., 2008a,b,c), rheumatoid arthritis (Lee et al., 2007a,b,c), bone mineral density in postmenopausal women (Wayne et al., 2007), and certain cancer care (Lee et al., 2007a,b,c, 2010). Wang et al. (2004) suggested that benefits of Taichi were reported in terms of balance function and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. Further, a recent systematic review and meta-analysis by Wang et al. (2010) focused on the effects of Taichi on psychological well-being, illustrating that Taichi has a positive effects in psychological well-being, such as reducing stress anxiety, depression and mood disturbance, and increasing self-esteem. Specifically, systematic reviews and meta-analyses have been published concerning older people population, with conclusions that Taichi may have positive effectiveness in improving their balance function and reducing falls (Leung et al., 2011; Liu and Frank, 2010; Low et al., 2009; Maciaszek and Osiński, 2010; Verhagen et al., 2004), increasing their balance confidence (Rand et al., 2011), and in lowering resting blood pressure (Lee et al., 2010).

Concerning Taichi exercise for sleep quality, several randomized controlled trials have been performed, of which conclusions are inconsistent with each other to some extent. On the other hand, previous reviews have shown that Taichi may play some positive role in alleviating sleep disturbance. To our knowledge, however, the limitation of such reviews is that they have not specifically focused on Taichi as intervention topic for sleep (Gooneratne, 2008; Yang et al., 2012), or just considered sleep quality as one of secondary outcomes (Langhorst et al., 2013), which means less clinical significance. No systematic reviews have solely investigated Taichi as main intervention for sleep quality as primary outcome in any group of population, including older people. Therefore, we performed this systematic