



The effectiveness of traditional Chinese medicine-based lifestyle interventions on biomedical, psychosocial, and behavioral outcomes in individuals with type 2 diabetes: A systematic review with meta-analysis



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ABSTRACT

Background: Integrative diabetes care, which combines conventional diabetes therapy with traditional Chinese medicine (TCM)-based interventions, has gained popularity worldwide. Numerous TCM-based lifestyle modification approaches have been proposed for individuals with type 2 diabetes (T2DM).

Objectives: To synthesize and present the best available evidence on the effectiveness of TCM-based lifestyle interventions in individuals with T2DM.

Design: We undertook a systematic review of randomized controlled trials or controlled clinical trials.

Data sources: Six English and four Chinese electronic databases were searched from their inception to December 2016.

Review methods: Trials investigating the effectiveness of various TCM-based lifestyle interventions among adults with T2DM were reviewed. Studies were excluded if TCM-based lifestyle interventions were only part of the intervention regimen. Two reviewers independently selected studies according to pre-specified inclusion and exclusion criteria and appraised the risk of bias of the included studies. One reviewer extracted details of the included studies and the second reviewer checked the extracted data critically. When feasible, data were statistically pooled for meta-analysis. Otherwise, narrative summaries were used.

Results: Twenty-four studies were included. The pooled analysis of the eight studies on tai chi showed tai chi practice for at least 150 min per week was beneficial in lowering glycosylated hemoglobin (mean difference, -1.48% ; 95%CI, -2.58% to -0.39% ; $p < 0.001$). Tai chi was effective in reducing fasting blood glucose (mean difference, -1.14 mmol/L; 95%CI, -1.78 to -0.50 mmol/L; $p < 0.001$) and body mass index (mean difference, -0.62 ; 95%CI, -1.14 to -0.11 ; $p = 0.02$), and improving quality of life. The effects of tai chi on blood pressure and waist circumference were inconclusive due to the limited number of studies. The meta-analysis of the 12 studies on ba duan jin demonstrated beneficial effects on glycosylated hemoglobin (mean difference, -0.77% ; 95%CI, -0.97% to -0.56% ; $p < 0.001$), fasting blood glucose (mean difference, -0.82 mmol/L; 95%CI, -1.05 to -0.59 mmol/L; $p < 0.001$), body mass index (mean difference, -2.77 ; 95%CI, -4.11 to -1.43 ; $p < 0.001$), and depression (mean difference, -4.53 ; 95%CI, -7.12 to -1.94 ; $p < 0.001$). Conclusions on the effects of ba duan jin on quality of life cannot be drawn because only two studies measured the outcome. Evidence regarding the effectiveness of other TCM-based lifestyle interventions is limited.

Conclusions: Tai chi and ba duan jin are potentially effective options for individuals with T2DM to improve biomedical and psychosocial well-being. Further well-designed studies are needed to explore the optimal intervention dose and to investigate the effectiveness of other TCM-based lifestyle interventions.

What is already known about the topic?

- The use of traditional Chinese medicine (TCM)-based lifestyle interventions in individuals with Type 2 diabetes is gaining increasing popularity worldwide.
- Various TCM-based lifestyle interventions, including TCM-based diabetes education, dietary behavioral intervention, exercises, and psychological care have been proposed. However, studies

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demonstrated mixed results in improving biomedical, psychosocial, and behavioral outcomes among individuals with Type 2 diabetes.

What this paper adds

- The review showed that tai chi, a TCM-based exercise, was effective in improving glycemic control, weight management, and quality of life, especially when it was practiced for at least 150 min per week.
- Ba duan jin, a type of qigong, also demonstrated beneficial effects on glycemic control, weight management, and depression.
- Only one study determined the effects of TCM-based psychological intervention and no eligible study on the effectiveness of TCM-based health education or dietary behavioral intervention was identified. Further well-designed studies are needed in order to determine the effectiveness of other TCM-based lifestyle interventions.

1. Introduction

The prevalence of diabetes mellitus (DM) has steadily increased in recent decades. DM greatly burdens individuals, their families, and society. Individuals with DM, especially those whose glycemic control is poor, usually suffer from various complications, such as cardiovascular diseases, kidney diseases, and foot damage (American Diabetes Association, 2015). Individuals with DM and their family members are susceptible to psychosocial problems such as depression, distress, and social isolation (Kovacs et al., 2013; Pan et al., 2012). Individuals with type 2 DM (T2DM) are more likely to experience depression. A recent systematic review suggests a significant association between depression and risk of mortality when comparing individuals who had both depression and DM with those with a diagnosis of DM alone (Park et al., 2013). Besides, DM can lead to increased health expenditures and decreased productivity. Despite its high prevalence and tremendous burdens, most individuals with DM do not successfully maintain good glycemic control (Gao et al., 2014; Irazola et al., 2017).

A healthy lifestyle is important to gain optimal control over glycemic level. In recent years, integrative medicine, which combines conventional DM therapy with complementary and alternative interventions, has gained popularity in T2DM treatment worldwide (Nahas and Moher, 2009). Traditional Chinese medicine (TCM) is an important component of complementary therapies for DM care.

TCM is based on two fundamental theories, namely the Yin-yang theory and Five Elements theory (Lao et al., 2012). TCM postulates that human body is a miniature version of the surrounding universe, and human physiological functions are maintained by “Qi”, or vital energy, which flows through the body. According to the Yin-yang theory, human body is a whole, composed of two interdependent and transferable opposites: Yin and Yang. Extreme Yang is postulated to be able to change into Yin, while Yin in its extreme gives rise to Yang (Su et al., 2012). Harmony or equilibrium between Yin and Yang supports health, and otherwise, causes diseases. Five Elements theory evolved from an ancient Chinese philosophy in which the universe is consisted of five basic elements: wood, fire, earth, metal, and water. The theory describes the relationships between human body and the environment, and the physiological and pathological interactions among the organs within the body. TCM-based therapeutic approaches, including lifestyle interventions, cure diseases and sustain health by maintaining the flow of “Qi”, the balance between Yin and Yang, and/or the homeostatic regulation of the five elements (Lao et al., 2012).

TCM provides numerous lifestyle modifying approaches for individuals with DM, such as TCM-based DM education, dietary behavioral intervention, exercises including tai chi and ba duan jin, and TCM-based psychological care.

As the TCM paradigm is established on an empirical basis, to incorporate TCM-based lifestyle interventions into evidence-based DM care, it is necessary to evaluate their effectiveness not only by clinical trials, as has been intensively done in recent years, but also by

systematic reviews.

Several systematic reviews (Huang and Yeh, 2013; Lee et al., 2009; Xin et al., 2007) of the effectiveness of TCM-based lifestyle interventions for individuals with T2DM have been conducted, however, conclusions cannot be drawn for several reasons. First, the conclusions of these reviews are inconsistent. Xin et al. (2007) concluded that the effects of qigong on glycosylated hemoglobin (HbA1c) were inconsistent, whereas the other two reviews demonstrated a favorable effect of Qigong. Second, these reviews focused only on the effects of qigong and did not evaluate the effects of other forms of TCM-based lifestyle interventions. Third, the effects of TCM-based lifestyle interventions on psychosocial and behavioral outcomes, such as depression, quality of life (QOL), and self-management, were not addressed in the reviews. In addition, all these reviews were published before 2012. With the rapid progress in research in this field, the findings of these reviews may be out of date.

Hence, the objective of this review was to synthesize and present the best available evidence on the effectiveness of TCM-based lifestyle interventions on biomedical, psychosocial, and behavioral outcomes among individuals with T2DM.

2. Methods

2.1. Search strategy

Six English electronic databases—MEDLINE, EMBASE, PsycINFO, CINAHL, AMED, and the Cochrane Central Register of Controlled Trials—and four Chinese electronic databases—China National Knowledge Infrastructure, Wan Fang, SinoMed, and Airiti Library—were searched from their inceptions to December 2016. The initial keywords were “type 2 diabetes mellitus”, “traditional Chinese medicine?based lifestyle intervention*”, and “biomedical, psychosocial and behavior?ral outcome*”. Variations of different terms were used for a systematic search. The detailed search strategy for MEDLINE is presented in Appendix A. Similar search combinations were used for particular databases. The reference lists of all relevant articles were reviewed to identify potential missed studies.

2.2. Study selection

Two reviewers (Yu and Huo) independently screened the titles of all identified articles. For studies whose relevance could not be decided by their titles, abstracts or full text articles were retrieved for further assessment. Both reviewers independently assessed the abstracts and full texts of all potential articles for their relevance according to the pre-specified criteria.

To be eligible for inclusion in this review, studies should have the following features:

2.2.1. Population

Adults (≥ 18 years old) with a clinical diagnosis of T2DM.

2.2.2. Interventions

Participants in the intervention groups had to have received TCM-based lifestyle intervention(s) including TCM-based DM education, dietary behavioral intervention, exercises including but not confined to tai chi, ba duan jin, and static qigong, and/or TCM-based psychological care. There was no restriction on the format (individual/group, supervised/self-monitored), settings (hospital/community), frequency, or duration of the intervention.

2.2.2.1. Operational definitions

2.2.2.1.1. *TCM-based DM education.* Any education that increases the awareness and favorably influences the attitudes and knowledge relating to the improvement of diabetic control and health, which was designed based on the theories or philosophies of TCM.

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