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Traditional Chinese Exercise for Cardiovascular Diseases: Systematic Review and Meta-Analysis of Randomized Controlled Trials

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Tai Chi is good for your heart – yet this systematic review does not live up to expectations

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Tai Chi is good for your heart – yet this systematic review does not live up to expectations

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Researching the effects of Tai Chi and Qigong for health and well-being ourselves we are excited to see that the Journal of the American Heart Association has also identified this as an important topic for publication, as evidenced by the publication by Wang et al.¹ Tai Chi and qigong are in fact quite popular in the US, and an estimated 2.88 million US adults practiced Tai Chi or qigong in 2012 for health prevention and for treating specific health conditions². As such a review on this topic is highly relevant to a large number of Tai Chi and qigong users, health care providers and policy.

However, unfortunately the impact of this review is hampered by the fact that it has not followed state of the art methodology as recommended by the Cochrane organisation, and as such cannot provide a truly valid and reliable summary of evidence for the use of traditional Chinese exercises for cardiovascular diseases. In the following we will focus on some of the most important shortcomings which we believe have limited the validity of the results.

Inclusion criteria

The authors have provided a list of inclusion criteria, however, among the included trials we find two studies that do not fit those inclusion criteria. Blake (2009) and Cheung (2005) both included patents with traumatic brain injury, e.g. due to accidents. As such those trials do not appear to have examined cardiovascular disease patients, and either should have never been included or have had their reasons for inclusion made explicit. Furthermore the meta-analyses combined studies across a variety of different patient samples, outcomes and outcome time points. This contradicts Cochrane recommendation, which state that “Before undertaking a meta-analysis, review authors must ask themselves the standard question about whether primary studies are ‘similar enough’ to justify pooling” (Cochrane handbook, chapter 13.6.2.4). As such the pooling of all studies together in meta-analyses cannot be considered appropriate.

Risk of bias assessment

The authors explicitly state that they “used the Cochrane Collaboration tool for assessing the risk of bias of the included trials”. However, even a cursory look at the risk of bias table used by authors indicates that they have not performed the risk of bias assessment thoroughly as indicated by a low risk of random sequence generation for all included trials. Complementary medicine research findings are regularly criticised for low methodological quality and potential sources of bias (for example our systematic review on risk of bias in yoga trials found nearly 80% of trials with unclear or high risk of bias for random sequence generation³). Even though the reporting of trials has improved tremendously over the last years, it is highly unlikely that all included trials have a low risk of bias for random sequence generation. In order to illustrate how risk of bias assessment went wrong, we compared our ratings with those presented in the systematic reviews, for the categories random sequence generation and allocation concealment for all trials published in English, see Table 1.

While the review authors suggested 100% of included trials low risk of bias, using the criteria laid out in the Cochrane handbook we judged that only 2 out of 18 trials reported adequate random sequence generation, and two trials were even considered high risk of bias (Lee, 2003, Lee, 2004). Some of the errors are significant: while those trials referred to their methodology as randomised controlled trial, allocation was based on geographic region (which is considered inadequate by Cochrane (Chapter 8.9.1.)). Most other trials in the review mentioned that they randomly allocation their participants, however lacked any details on how the random list was generated. For allocation concealment we could also confirm low risk of bias in only 3 trials compared to 8 trials according to the review authors. In our view most trials did not provide sufficient information on whether allocation was actually concealed. As such our comparison shows a substantial lack of agreement in the majority of trials for selection bias alone.

Finally, the authors did not recognise that the study by Yeh (2011) actually referred to a study protocol published online prior to the trial conduction (ClinicalTrials.gov), and as such they have missed the chance to confirm low risk of bias for selective reporting, instead giving an 'unclear' rating. Protocols as such provide the opportunity to match protocol and publication, and find inconsistencies that indicate potential risk of bias. It can only be recommended to all journals publishing clinical research to only include RCTs that have published a protocol before conducting the study.

Conclusion

Systematic reviews and meta-analyses are widely accepted as the 'gold standard' in evidence synthesis representing the 'highest level of evidence' in the field. However, this favoured position is dependent on reviews being conducted using rigorous methodology and judgement, to minimise the chance of potentially misleading and erroneous results. This systematic review has already received an Altmetric score of 290 with the majority of mentions referring to this review as proof that Tai Chi benefits the heart. Had the authors applied best-practice to their review, a more accurate representation would be that the evidence as promising but insufficient at best. Whilst research in this important topic is an unqualified public good, focused attention on research quality is necessary to ensure that the results – whether positive, negative or neutral – are relevant and accurate.

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Competing Interests: None declared.

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