Effectiveness of Tai Chi in preventing falls and improving balance

Dr Esther Vance and Professor Stephen Lord, Falls and Balance Research Group, NeuRA

Falls continue to be a health issue for older people. One third of community dwelling older people falls each year with 10% of falls leading to injuries that require admission to hospital [1, 2]. Fall-related hospitalisations are increasing at a rate of 3.8% per year for those aged over 65 years, placing an increasing burden on the health care system [3, 4]. In response to this health care need, considerable research has been undertaken to identify pragmatic fall prevention strategies.

One of the strategies extensively evaluated is exercise and systematic reviews have shown that exercise regimes that challenge balance are effective in preventing falls in older people living in the community [5, 6]. Further, it has been found that exercise interventions have maximal benefits if they include at least 2 hours exercise per week and continue for at least 26 weeks [7]

Tai Chi uses slow, sustained smooth and rhythmical movements of the trunk and limbs whilst keeping the centre of mass in a balanced state. It therefore challenges balance and meets the criteria of highly challenging balance exercise necessary for effective falls prevention [(7, 8) 2011]. Tai Chi has also been found to be a cost effective strategy [9] and Tai Chi classes have been successfully led by trained volunteers in some of NSW Health Districts (Southern NSW and Western NSW). Tai Chi has been researched as a physical activity fall prevention strategy for older people for over 20 years with the seminal study by Wolf and colleagues on Tai Chi to reduce frailty and falls (part of the FiCSIT study) published in 1993 [10]. This pioneering study found that a 15 week Tai Chi intervention significantly reduced falls and fear of falling and improved balance control.

This mini review provides a summary of the findings of the reviews that have investigated the effectiveness of Tai Chi to prevent falls and/or improve balance in community dwelling people over 50 years of age. Information on the included reviews is summarised in Table 1.

The reviews conducted to date have included varying numbers of studies depending on their inclusion criteria with some reviews including only randomised controlled trials (RCTs) whereas others have also included pre and post- test studies, cross-sectional and quasi-experimental studies. Not all reviews included a meta-analysis of the results. The main factors differing among the trials include the mix of populations and ages, different styles of Tai Chi and length of intervention, total duration of intervention (varying from 3 – 52 weeks) and number of exercise sessions per week (20 min to 90 min, up to 3 times per week), frailty status of participants and type of control group (i.e. exercise, education or no exercise). These study discrepancies as well as differing review study inclusion criteria have led to some reviews concluding Tai Chi reduces falls and improves balance whereas others have considered the evidence too weak to support such claims (see Table 1).

Cochrane Reviews are considered the gold standard by many researchers, and the 2012 Cochrane Review on fall prevention interventions in the community 2 reported that from 7 RCTs included in their analysis, Tai Chi reduced the rate of falls (Rate Ratio [RaR] 0.72, 95% CI 0.52 – 1.00) and the risk of falling (Risk Ratio [RR] 0.71, 95% CI 0.57 – 0.87) [5]. However, there was substantial heterogeneity
in these findings and a subgroup analysis found the treatment effect was greater in older people who did not have a high risk of falling [5].

Other complementary systematic reviews have also only included RCTs [11-14]. These have reported more equivocal findings with some concluding that there is insufficient evidence that Tai Chi is effective in preventing falls, decreasing fear of falling and improving balance in people in the community over 50 years of age [12, 14]. Other RCT reviews found that Tai Chi was effective in reducing falls or falls risk in younger healthier participants but not in older frailer participants where the Tai Chi intervention increased the risk of falls [11, 13].

Several systematic reviews have included cross sectional and pre post studies as well as RCTs [15-17]. They concluded that the majority of studies demonstrated reductions in total number of falls and fear of falling (FOF), significant improvement in laboratory measures of dynamic balance but less consistent benefits for measures of functional balance. They also noted that balance improvements were equivalent to/no better than programs that included functional balance and resistance training. They identified a number of factors that were associated with improvements; using the style of Tai Chi that was compatible with the participant’s abilities, the duration of the program and method of delivery, social compatibility and previous activity levels of participants.

As the reviews have included studies that have been heterogeneous and variable in their quality and inclusion criteria, it might also be insightful to summarise three of the better quality RCTS that have included falls as the primary outcome measure. These studies included large numbers (256-702) of participants with participants attending Tai Chi programs 1-3 hours per week for 16-26 weeks with control groups including stretching exercise, low level exercise or being on a waiting list [18-20]. Two of these studies found the Tai Chi programs were effective in reducing falls and improving balance in mainly healthy older community dwellers [19, 20]. One study found there was no difference between the Tai Chi group and the low level exercise group (this included mainly seated stretching and low level strength and cardiovascular exercises) with a similar falls reduction over a 17 month follow up period [18].

A recent integrative review by Hackney & Wolf [8] concluded that interventions such as Tai Chi had an impact on balance in older adults as this type of training involves gait, balance, coordination, functional exercise and muscle strengthening. Their caveat was that adherence was critical to achieving improvement in balance and mobility [8]. Finally, an overview of systematic reviews of Tai Chi for a range of conditions including falls prevention concluded that three of the included studies showed positive effects on preventing falls whereas one study did not [21]. Their overall conclusion was that Tai Chi was effective in preventing falls in older people.

In conclusion, there have been a large number of studies and reviews on the effectiveness of Tai Chi on balance control and fall prevention. The studies conducted have been very heterogeneous in design and therefore have provided a range of results. Overall, it appears that Tai Chi is effective in reducing falls and improving balance in general (non-frail) populations of older community dwelling people. As with all exercise interventions, long term adherence appears necessary for effective fall prevention. Tai Chi has also been found to be a cost effective in this population and therefore can be recommended as an evidence-based intervention for this group.
References

4. AIHW and B. C, Hospitalisations due to falls by older people, Australia 2009-10, in Injury research and statistics series no 70. 2013, AIHW: Canberra.

Tai Chi mini-review


<table>
<thead>
<tr>
<th>Reference</th>
<th>No of RCTs and other studies included</th>
<th>Quality of RCT and other studies</th>
<th>Meta-analysis</th>
<th>Review Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schliecher, Weddam &amp; Wu 2012 [16]</td>
<td>14 RCTs (5 cross sectional &amp; 5 pre/post-test designs)</td>
<td>variable</td>
<td>no</td>
<td>Majority of studies demonstrated reductions in total number of falls, fear of falling and significant improvement in lab based balance measures.</td>
</tr>
<tr>
<td>Gillespie et al 2012 [5]</td>
<td>7 RCTs</td>
<td>Good quality</td>
<td>yes</td>
<td>Tai Chi reduces the risk of falling overall but is less effective in people at higher risk of falling.</td>
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<tr>
<td>Leung et al 2011 [12]</td>
<td>13 RCTs</td>
<td>Good quality (PeDro score &gt;6)</td>
<td>yes</td>
<td>Tai Chi improved balance and reduced falls in non-frail older people and equivalent to / no better than stretching exercise or wellness education program.</td>
</tr>
<tr>
<td>Logghe et al 2010 [14]</td>
<td>9 RCTs</td>
<td>Good quality</td>
<td>yes</td>
<td>Compared with exercise controls Tai Chi participants showed significant improvements in fall rates and static balance, however when compared with non-exercise controls no improvement was found with Tai Chi in fall rates or static balance but there was a significant improvement in fear of falling.</td>
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<tr>
<td>Gregory &amp; Watson 2009 [11]</td>
<td>7 RCTs</td>
<td>variable</td>
<td>no</td>
<td>Tai Chi Chuan was effective in reducing fall risk in healthy older people but not for frailer older people.</td>
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<tr>
<td>Low et al 2009 [13]</td>
<td>7 RCTs</td>
<td>Good</td>
<td>no</td>
<td>About half the studies showed that Tai Chi was effective in fall reduction particularly in the less frail population.</td>
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