

The Health Benefits of Tai Chi and Chi Gung: A review of the evidence

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Summary

The results from controlled research studies suggest that Tai Chi can have a significant beneficial effect in at least six areas of functioning: improvements in balance; reductions in blood pressure; oxygen uptake; flexibility and strength; emotional stress and coping with multiple sclerosis.

Introduction

A computerised literature search of the last ten years of all medical and psychological English-language journals found 27 articles. 19 of these described experimental research. It is these experimental studies, which form the basis of this article. It is recognised that there is likely to be a vastly higher number of studies if we had also taken into account Chinese-language publications. However, this was not done because the aim of this review was to describe the results of the application of the Western scientific method to Tai Chi. Rightly or wrongly, many Western scientists consider that Eastern journals are less rigorous in their evaluation of papers sent for submission. Western scientists thus tend to be more convinced by research papers that have been vetted and reviewed by Western journals. The authors of this article wished to produce a review that would hold validity for the Western doctor, physiotherapist, nurse, or NHS manager. We therefore limited the article to those studies published in peer-reviewed English-language formats.

The experimental studies of therapeutic effectiveness can be grouped into 6 areas:

1. [Improvements in balance - reducing falls in the elderly](#)
2. [Reductions in blood pressure](#)
3. [Oxygen uptake](#)
4. [Flexibility and Strength \(of knee extensions\)](#)
5. [Emotional stress](#)
6. [Multiple sclerosis](#)

This review will address each of these areas in the sections below:

Improvements in balance - reducing falls in the elderly

Wolf, Barnhart and Kutner et al (1996), compared Tai Chi (TC) with Computerised Balance Training (BT) and education (ED). In a randomised, blind trial 200 participants aged 70 and over, from an initial 977, who met the inclusion criteria, were assigned to one of the three groups. There were few differences between the three groups in terms of baseline characteristics. The Tai Chi group met twice weekly to practice 10 movements synthesised from the 108 that comprise Tai Chi; the group was also encouraged to practice for at least 15 minutes a day for the duration of the study.

Balance training involved the use of a Balance System that enabled participants to observe their own centre of mass represented as a cursor on a monitor. Participants were required to move the monitor to different points on the monitor by altering their centre of mass, therefore allowing the extent of postural sway to be gradually increased. The obvious drawback to this system is that it could not be practised at home, as Tai Chi could. The education group received no physical intervention, but met weekly for discussion of relevant issues.

At a 4-month follow-up, it was shown that the onset of falls was delayed by 45.7% among those that received Tai Chi training, this was significantly greater than the Balance Training or education groups.

In another trial, Wolf, Barnhart, Ellison and Coogler (1997) investigated the effect of Tai Chi training on participants' ability to minimise postural sway, therefore increasing

stability and reducing risk of fall. 72 participants, aged 70 or above, were randomly assigned to either Tai Chi, Balance Training or education; differences in baseline characteristics were controlled for. After 15 weeks of intervention, only the Balance Training group showed greater stability; however, it was the Tai Chi group alone that expressed a reduction in their fear of falling.

Tse and Bailey (1991) compared postural control among elderly practitioners and non-practitioners of Tai Chi, all of whom were between the ages of 65 and 86 and had no major health problems that might confound the results. The Tai Chi practitioners performed significantly better on three of five balance tests used: single right leg standing with eyes open, single left leg standing with eyes open and heel-to-toe walking. A main effect of sex was also shown; with male participants performing significantly better than females on each of these tests regardless of group. No difference was shown on either right or left single leg standing with eyes closed, either between groups or between sexes. Tse and Bailey suggest that the 'eyes closed' tests may have been equally novel for both groups, although they do acknowledge that as this was a post-hoc comparison, other factors or activities could have contributed to the differences between the groups. Indeed, two members of the Tai Chi group did practice other types of exercise.

Tai Chi does not have benefits only for older practitioners: Jacobson, Chen, Cashel and Guerrero (1997) demonstrated significant improvements in lateral body stability (balance) among 24 Tai Chi Chuan naive participants aged 20 to 45, following a 12-week intervention period. Similarly, Shih (1997) found that among 11 participants aged 20 to 43 the average velocity of sway (under dynamic conditions) decreased significantly after a 16-week Tai Chi training program.

Reduction in blood pressure

There is significant evidence to suggest that the practice of Tai Chi can lead to a significant reduction in blood pressure. Chen and Sun (1997) compared an experimental group (n = 23) who received a simplified Tai Chi Chuan training program twice weekly with a control group (n = 13) who maintained their usual level of exercise. Pre-tests established the participants' resting blood pressure (systolic and diastolic).

After 16 weeks, post-tests showed no significant difference in blood pressure between the two groups. Eighteen of the participants in the experimental group and ten of those in the control group completed both the pre- and post-tests. Participants in the experimental group were now asked to continue practising Tai Chi for the next nine months, with monthly 'booster' sessions. Control participants were also offered the opportunity to receive Tai Chi training at this point. After nine months, the experimental group alone was tested further; they showed significant improvements in both systolic and diastolic resting blood pressures, as compared with pre-test measures.

Similarly, in a pilot study involving 20 American adults aged 60+ Sun, Dosch and Gilmore et al (1996) found a significant reduction in resting systolic and diastolic blood pressure following a 12-week training program of Tai Chi Chuan combined with education about physiology, common diseases among older adults, emotional and mental health and stress management. A control group with similar social activities and comparable pre-test measures showed no such reduction.

Tai Chi can also have benefits for patients with more serious health problems.

Channer, Barrow and Barrow et al (1996) examined the relative benefits of Tai Cho Chuan, aerobic exercise and a non-exercise support group for individuals recovering from acute myocardial infarction. Participants' ages ranged from 39 to 80 (mean: 56). Over the 11 sessions, a general reduction in diastolic blood pressure was observed in the Tai Chi Chuan group but not in either the aerobic or support group.

Some of the research in this area focuses on the effects of "Chi Gung". Like Tai Chi, Chi Gung has the aim of assisting the flow of energy (the 'Chi') around the body, but in Chi Gung this is done through breathing and simple repetitive movements rather than the dance-like 'form' of Tai Chi.

Kuang (1986) reports on the long-term benefits of Qigong (Chi Gung) as a preventative of stroke. Participants ranged from 21 to 69 years of age and were all receiving drug treatment for hypertension. They were categorised as either 'consistent Qigong' - practised Qigong for more than three-quarters of the follow-up period, 'non-consistent Qigong' or control, comparable on age, course of disease and blood pressure. All participants continued with their course of drugs throughout the study. Mortality in the 'consistent Qigong' group was just 11(2%), as opposed to 29(3%) in the non-consistent group and 41(7%) in the control group.

Oxygen uptake

The research on oxygen uptake is again concerned largely with older adults, who are obviously more likely to be affected by declining cardio-respiratory function.

Lai, Lan, Wong and Teng (1995) examined the training effects of Tai Chi Chuan on 84 older participants (mean age: 64) over a 2-year period. The experimental group (n = 45) was recruited from a Tai Chi club and had been practising Tai Chi regularly for a minimum of 1 year. The control group (n = 39), who were matched for age, weight and height and had a normal level of activity, was recruited from various senior citizen centres. During the two years of the study, the experimental group practised Tai Chi Chuan approximately 5 times a week. 2-year post-test measures showed a significant difference in oxygen uptake between experimental and control participants for both males and females.

Lan, Lai, Wong and Yu (1996) also evaluated cardio-respiratory function among 41 elderly Tai Chi Chuan practitioners (mean age: 69) and a sedentary control group of matched age, body size and blood pressure. The experimental group had been practising Tai Chi for an average of 11.8 years. Each participant was required to perform an incremental bicycle exercise test at a pedalling rate of approximately 60 rpm for as long as possible, while breath-by-breath measurements were taken to establish cardio-respiratory function. The Tai Chi Chuan group showed significantly higher peak oxygen uptake (19% higher among male participants, and 18% higher among females) than the sedentary group.

A further study, Lan, Lai, Chen and Wong (1998) examined the benefits of Tai Chi Chuan to naive volunteers recruited from senior citizen centres. 38 participants between the ages of 58 and 70 took part in the study, 20 in the experimental group and 18 as controls. Pre-test measures were taken using an incremental bicycle exercise, with breath-by-breath measurements used to establish oxygen uptake. The experimental group then had 1 hour of Tai Chi Chuan practice once a week; after 12 months the Tai Chi Chuan group showed a significant increase in cardio-respiratory function (16.1% increase among male participants and 21.3% increase among females). The control group showed no such improvement.

Flexibility and Strength

Flexibility and strength have been combined in this section not because they are related, but due to the overlap of the research in these areas. Chen and Sun (1997) found a significant improvement in joint flexibility to be one of the most immediate benefits of Tai Chi training, after just 16 weeks of ongoing practice. Similarly, Sun, Dosch and Gilmore et al (1996) found a significant improvement in the shoulder and knee flexibility, ($p = .0085$ and $p = .0082$) respectively, of their experimental group after 12 weeks of training. Similar results were found by Lan, Lai, Wong and Yu (1996): significantly higher trunk flexibility ($p < .01$) among Tai Chi Chuan practitioners as compared with controls, across both sexes.

Lan, Lai, Chen and Wong (1998) measured both trunk flexibility and strength of knee extensions. After 12 months of Tai Chi Chuan training, the male experimental group showed significant increases in flexibility ($p < .05$), and strength of knee extensor ($p < .01$) and flexor ($p < .05$), and the female experimental group showed similar increases in flexibility and strength (all at $p < .05$).

Significant differences ($p < .05$) between experimental participants and controls on measures of strength of knee extensions following Tai Chi Chuan training was also shown by Jacobson, Chen, Cashel and Guerrero (1997) among their younger Tai Chi-na• ve participants.

Emotional Stress

The benefits of Tai Chi and Chi Gung extend not only to physical health, but also to emotional and psychological well-being. Wolf, Barnhart and Kutner et al (1996) established that Tai Chi training led to a reduction in expressed fear of falling, and Chen and Sun (1997) found that their experimental group showed a significant improvement in anxiety scores on both the Taylor Manifest Anxiety scale and the State Anxiety Inventory. Kutner, Barnhart and Wolf et al (1997) found that participants aged 70 and above who completed a 15-week Tai Chi training period reported an increased

sense of confidence, whereas no such difference was experienced by participants who received Balance Training or education.

Jin (1991) explored the efficacy of Tai Chi, as opposed to brisk walking, meditation and reading, in reducing emotional and mental stress. In a blind, counter-balanced investigation, 48 male and 48 female participants, all Tai Chi Chuan practitioners, were randomly assigned to one of these four treatments. Participants were required to complete challenging mental arithmetic and other difficult mental tasks under time constraints and noisy conditions, and exposed to an emotional stressful film. Physiological levels were monitored throughout to ensure that the both conditions were sufficiently stressful. Stressful conditions lasted for 1 hour, followed by 1 hour of treatment: either Tai Chi, walking, meditation or neutral reading. Tai Chi was shown to be equal to brisk walking in terms of effect on heart rate and blood pressure, making it an effective form of exercise, but there was no significant difference between Tai Chi and the other treatment groups in terms of stress-reduction. There have been some interesting recent accounts of using some of the principles of Tai Chi/Chi Gung such as grounding and centering and mindfulness of breathing to help cope with the symptoms of psychosis. Mills (2001) gives a qualitative description of this work but there are as yet no quantitative studies.

Multiple Sclerosis

Many of the above benefits of Tai Chi e.g. enhanced balance, flexibility, strength and stress-reduction, are relevant to MS sufferers. Based on this premise, Mills, Allen and Carey-Morgan (2000) conducted a pilot study to investigate the effect of Tai Chi practice on the severity of symptoms experienced by patients with Multiple Sclerosis. 8 participants aged between 42 and 56 took part in the study. Participants experienced at least one symptom, on an ongoing basis that was attributable to their Multiple Sclerosis. Pre- and post-test measures were taken of psychological and emotional health (using Profile of Mood States (POMS)), balance (length of time standing on one leg), and a symptoms checklist. Significant differences were found between pre-and post-test measures on depression and balance. Comparison with a control group showed significant improvements on a range of other symptoms (Mills and Allen 2000).

Ratings given by relatives or carers supported the participant's own estimates of improvement. Considering this was a pilot study, using only eight participants, the effect size was quite large. One would expect statistical significance to increase further with a larger sample.

Concluding Comment.

The practice of Tai Chi/Chi Gung as a strategy for health improvement appears to be supported by the evidence of several well controlled trials as described above. The implications of this evidence-base are interesting to contemplate. Does it mean that the purchasers of health care, such as primary care groups, should now be buying-in the services of Tai Chi instructors as well as, or possibly even instead of, more traditional forms of intervention which possibly have less evidence to support them? Such a question is beyond the scope of this paper. However if the health service is really to practise evidence-based medicine, then this is an issue that surely deserves consideration.

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