The benefits of tai chi as a self management strategy to improve health in people with chronic conditions

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Submitted for publication: 28 September 2010
Accepted for publication: 27 January 2011

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No funding or competing interests to declare.

Aim. To provide health professionals with information regarding the phenomenon of tai chi, which has now become a world-wide activity with the potential to improve health and well-being in a broad range of chronic illnesses.

Background. Mind-body approaches to health, such as tai chi, are gaining in popularity, particularly amongst people with chronic illness who are seeking self management health strategies that have the capacity to address multiple health needs across both physical and psychological spectrums.

Method. This article has been informed by a broad computerized systematic literature search.

Conclusions. An ever increasing body of research indicates that tai chi has beneficial effects in people with a range of medical conditions in varying populations. Its potential benefits include enhancing cardio-respiratory fitness, reducing blood pressure, improving glucose control in diabetic patients, increasing immune response, alleviating pain, assisting in the rehabilitation of people experiencing chronic health conditions, and promoting psychological well-being. Tai chi’s wide range of reported benefits makes it an ideal self management strategy, for both the elderly and people with chronic conditions, to improve their psychological and physical well-being in a community setting.

Relevance to clinical practice. Knowledge regarding indications for, and effects of, this popular self management intervention will enable health professionals to provide up to date information and advice to patients on the appropriateness of including tai chi in their self management health plans.

Key words: benefits, chronic illness, self management, tai chi
Introduction

Chronic illnesses pose one of the most significant challenges facing health care systems worldwide. The increasing prevalence of conditions such as metabolic syndrome, asthma, arthritis, diabetes, cardiovascular disease (CVD) and depression is expected to consume 80% of Australia’s healthcare expenditure by 2020 (National Health Priority Action Council 2006) and is the leading cause of death and disability in the USA, accounting for 70% of all deaths (Kung et al. 2008). The increasing economic burden resulting from this world-wide problem has been compounded by ageing populations, which in the author’s home country, Australia, is expected to see a doubling of people aged 65 years and older by the year 2036 [Australia Institute of Health and Welfare (AIHW) 2008]. As a result, effective public health strategies directed at early intervention in, and prevention of, chronic illnesses are now a major health priority.

One of the key intervention strategies outlined by the World Health Organization's (WHO) Innovative Care for Chronic Conditions (ICCC) report (WHO 2001) is to educate and support patients to find strategies that enable them to manage their own conditions as much as possible. This has led to the development of specific programs that guide health professionals in how to encourage self-management strategies. Examples of these include the Chronic Disease Self Management Program (Lorig et al. 1999) developed at Stanford University in the USA, and the Flinders Program of Chronic Condition Self Management, which was formerly known as The Flinders Model from Flinders University in Australia (Flinders Human Behaviour & Health Research Unit 2010). Integral to programs such as these are health promotion strategies that assist patients with chronic illness to adopt lifestyles and engage in activities that protect and promote their health.

Initiatives such as the Flinders Program are supported by Government and have resulted in a strong level of interest, from both health professionals and the popular media, in behaviours that assist in promoting and maintaining optimal health. However, health promotion is not only about persuading people to make healthy behavioural and lifestyle changes, but also extends to helping them either access or rearrange circumstances in their physical environments (Egger et al. 2005, p. 14). Clearly, programs offered at the community or neighbourhood level have enormous potential to help people manage chronic conditions and prevent ill health throughout the ageing process. Neighbourhood and community-based programs range from local council sponsored aerobic exercise and weight loss training, at one end of the continuum, to psychological approaches such as meditation, support groups and psychotherapy at the other. The availability and promotion of these type of programs has encouraged many people to seek out a health pursuit which they view will assist them to achieve their personal health management goals. Often such programs also have the added benefit of providing an opportunity for people with chronic conditions to be part of a supportive environment where they can increase their self-efficacy by developing personal skills that assist them to better manage their health. The combination of social opportunities and physical activity also helps people remain socially connected, which in itself, has health benefits. There are a number of interventions that do this by focusing on both the physical and psychological components of health in what is termed the ‘mind-body’ approach.

The mind-body approaches to health are gaining in popularity, particularly amongst people seeking self-management health strategies that have the potential to address multiple health needs across both physical and psychological spectrums (Larkey et al. 2009). One of the most popular of these approaches is tai chi, which is estimated to have approximately 5 million practitioners in the US alone (Wayne & Kaptchuk 2008a) with one particular volunteer based tai chi group that originated in Canada, the International Taoist Tai Chi Society (2010) having around 40 000 members in approximately 500 branches throughout more than 25 countries.

The wide ranging appeal of tai chi can be explained by its non-stress exercise style and ability to induce a feeling of relaxation and well-being (Sandlund & Norlander 2000). It is characterised by slow and gentle stretching like movements, often combined with breathing techniques and meditation, which assist to concentrate the mind and generate states of mental and physical relaxation and improve physical strength and fitness. These attributes make it an ideal adjunct health intervention for people suffering with chronic illness.

Background

Tai chi has its roots in the ancient Chinese martial arts, and is also known as tai chi chuan, tai ji or taijiquan. Due to its emphasis on mindfulness and movement it is also called ‘moving meditation’ (Jin 1992, p. 361) or ‘meditative movement’ (Larkey et al. 2009, p. 231). The philosophy on which tai chi is based is originally derived from Lao Tzu Theory, which dates back to 575 BC. Lao Tzu, who is also referred to as Old Sage or Li Erh, was an ancient Chinese philosopher and founder of Taoism. The central doctrine of this theory advocates a simple honest life, without desire or selfish intentions and promotes ‘inner stillness’ to achieve...
Tai chi appeared in China during the 11th and 12th centuries, although its exact origins are unclear. The commonly accepted belief is that it originated from the Wu-Tang Mountain where a Shaolin monk, called Zhang San-Feng, left his Buddhist monastery to learn from Taoist hermits. This resulted in the Wudonshan sect of Taoism and the emergence of a martial art that ‘used softness and internal power to overcome brute force’ (Kurland 1998, p. 106). The alternative belief maintains that the first practice and teaching of tai chi appeared in the Chen village family, where Chen Wang-Ting, a ninth generation family member founded tai chi, basing it on a combination of his experiences as a soldier and knowledge from the Chinese classical texts on boxing (Tang & Gu 1963). During the subsequent period, tai chi instruction was exclusively the domain of either Buddhist or Taoist monks, until the 17th and 18th centuries when China was conquered by the invading Manchu. The reigning Manchu then passed laws preventing the ownership of weapons which, in turn, prompted the transfer of knowledge, from the monasteries to the people, of a modified form of self defence that did not require weaponry and was based on the strengthening of the body systems (tai chi). Following this, during the late 18th century, various family schools or styles of tai chi emerged. These were the Chen, Yang, Wu and Sun styles (Wong 1991). Each style has a characteristic technique which differs in the posture, form, order, pace and level of difficulty but all styles emphasise movement coordination, relaxation and mindfulness.

Although the original Taoist forms of tai chi, as taught in monasteries, incorporated body and mind discipline, scriptures, divination, metallurgic sciences and medicine, the focus changed over time. Subsequently various styles of tai chi evolved due to the needs of the people, focusing predominately on self-defence and physical fitness. Tai chi is now practised widely as a form of exercise in China and plays a significant role in public health following the introduction by the Chinese Government, in 1956, of a simplified 24 movement tai chi form (Tang & Gu 1963). The current popularity of tai chi in China is illustrated by the event of the first National Fitness Day celebrated in Beijing in August 2009, where 3 million people practised tai chi together (Chang 2009).

Tai chi is now becoming increasingly popular in many other countries outside of China due to its perceived health-related benefits (Yan & Downing 1998, Klein & Adams 2004) and the styles of tai chi practice are subsequently evolving to meet the needs of the new and varying environments. Hence, there are now many different derivations as individual masters of tai chi change the form to adapt to different cultures and the varying needs of either health or defence and the restraints of time and space. Adaptation of the form to meet the changing needs of the people is considered part of the Taoist way.

Aim

The role of nurses in providing care to people with chronic conditions continues to enlarge exponentially as the world’s populations age (Forbes & While 2009). In recognition of their expanding role, this article seeks to provide nurses and other health professionals with information on the history of tai chi and its emergence as a world-wide activity with the potential to improve health and well-being for people with a broad range of chronic illnesses. As the phenomenon of tai chi has grown in popularity there has been a simultaneous burgeoning of research into its health effects. The various areas of research are discussed to provide an overview of the current state of evidence for the use of tai chi by people with chronic illnesses. Knowledge regarding indications for, and effects of, this popular self management intervention will enable nurses and health professionals to provide up to date information and advice regarding its use to patients under their care.

Methods

A broad computerized systematic literature search was conducted to provide information for this overview. Data bases included CINAHL, MEDLINE, Proquest, PubMed, SCOPUS (Elsevier), Academic OneFile (Gale), APAFT/APAIS (Informit), Health Collection, EBSCOhost, PsycINFO and Chinese databases [China National Knowledge Infrastructure (CNKI) and Wanfangdata]. The search terms used were limited by the key words: Tai chi, T’ai Chi, Tai chi chuan, Taiji or Taijiquan. There was no restriction on population characteristics but, for feasibility reasons, the publications chosen had to be written in English or Chinese and related to issues associated with chronic illness. The initial search revealed 686 publications for the period encompassing 1976–2010. Of these papers all relevant meta-analyses and syntheses, systematic reviews, randomized controlled trials (RCTs) and qualitative papers which were published in the last 10 years, were selected to provide information for the following overview. If any paper published prior to 2000
was deemed by the authors to be important to contributing to the discussion in a specific area of chronic illness, this was also included.

Discussion

What health research says about tai chi

An increasing amount of academic interest in the potential health benefits of this practice has accompanied the rapid growth in numbers of people adopting tai chi as a means of improving their health and well-being. The popularity of tai chi and the associated increasing need for clinical validation of its benefits was foreseen in the 1970s (Klein & Adams 2004). Since then, there has been an ever increasing body of research focusing on evaluating the effects of tai chi on disease prevention and rehabilitation.

A large number of systematic reviews and a few meta-analyses have reported that tai chi is beneficial to individuals with a wide range of chronic conditions in varying populations. Reported benefits include enhanced cardiorespiratory fitness, reduced blood pressure (BP), improved glucose control in diabetic patients, increased immune response, alleviation of pain, reduction in the number of, and risk for, falls and improved psychological well-being and quality of life (Wu 2002, Verhagen et al. 2004, Wang C et al. 2004, 2009, 2010a, Wang W et al. 2009, Lee et al. 2007a,b, 2008a,b, Sherrington et al. 2008, Yeh et al. 2008b, 2009). These findings will now be discussed in more detail in relation to the specific area of chronic illness researched.

Cardiovascular disease and hypertension

Three recent systematic reviews have examined the cardiovascular effects of tai chi (Lee et al. 2007a, Yeh et al. 2008b, 2009). The most recent (Yeh et al. 2009) reviewed the cardiovascular effects of tai chi as an exercise intervention for patients with CVD or with CVD risk factors, whilst Yeh et al.’s (2008b) earlier review focused on nine randomized controlled trials that examined the effects of tai chi on BP amongst patients with and without cardiovascular conditions. These reviews reported findings such as decreased serum B-type natriuretic peptide levels, total cholesterol, mean triglycerides, and low-density lipoprotein cholesterol and an increase in high-density lipoprotein cholesterol and exercise capacity. The authors concluded that there were significant positive effects associated with tai chi in relation to reductions in BP and CVD risk factors.

Positive metabolic changes have also been associated with tai chi exercise of low to moderate intensity, with metabolic equivalents (METs) ranging from 1.5–4.6 (Yeh et al. 2009), depending on the type of form practised. For example, a meta-analysis by Taylor-Piliae and Froelicher (2004) found that maximum oxygen uptake during tai chi varies between 40–55%, depending on the style and duration of the intervention, and that women have been found to derive more positive effects than men, with people who previously had sedentary lifestyles gaining the most benefit from tai chi. This review also illustrated that a greater improvement in aerobic capacity was observed in people performing the classical Yang Style (108 postures) over a 52-week intervention, however, benefits have also been reported in studies using intervention durations as short as 8–16 weeks (Taylor-Piliae & Froelicher 2004). Additional benefits observed also included a significant improvement in sleep stability and disease-specific quality of life (Yeh et al. 2008a).

Diabetes

Current research reports that tai chi is likely to have beneficial effects for people with Type 2 diabetes in a variety of complex physiological areas. These range from improvements in fasting blood glucose, serum lipid profiles and the immune system to increased mobility and quality of life, with a positive correlation between improvement and compliance with the regularity of the program being evidenced (Tsang et al. 2007). Significant physiological outcomes include reduction in fasting blood glucose and HbA1c (Song et al. 2009), increased nerve conduction velocities and improved insulin resistance index (Hung et al. 2009), lower triglycerides, and glycated serum proteins, in addition to higher fasting plasma insulin levels (Jiang 2007, Zhang & Fu 2008). One author (Jiang 2007) has postulated that tai chi may contribute to enhanced insulin sensitivity in patients with diabetes by improving insulin receptor and cell adhesion due to an increasing maximal oxygen consumption and glucose uptake in skeletal muscle.

Mobility impairment is one of the major concerns amongst people with diabetes. This type of impairment has been linked to diabetes complications and low muscle power (Bruce et al. 2005, Orr et al. 2006). Tai chi has been shown to have positive effects on the muscular skeletal and nervous systems, with evidence of increased respiratory function, flexibility, knee extensor and flexor muscle strength and improvements in peripheral nerve modulation, particularly bilateral median and tibial nerves, and distal sensory latencies of bilateral ulnar nerves (Lan et al. 1998, Hung et al. 2009). Improvements in functional ability have also been evidenced in a large number of studies, including a meta-analysis.
(Sherrington et al. 2008) and several recent systematic and critical reviews (Verhagen et al. 2004, Li et al. 2009, Low et al. 2009, Rogers et al. 2009, Maciaszek & Osiski 2010). The conclusion of this body of research is that tai chi can reduce and prevent falls in the older by improving balance, musculoskeletal strength and flexibility and by enhancing neuromuscular components related to quiet standing and gait (Wayne & Kaptchuk 2008b). The effects of tai chi on falls prevention have been well described in an internationally recognised multicenter study, the frailty and injuries: cooperative studies of intervention techniques (FICSIT), which was designed to test the effect of short-term exercise on reducing falls and fall-related injuries in the older (Wolf et al. 1996).

A novel series of studies have also been conducted on the effects of tai chi on the immune systems of people with diabetes (Yeh et al. 2006, 2007, 2008). After 12 weeks of tai chi practice, researchers found significantly increased CD4CD25 regulatory T-lymphocytes and transforming growth factor β (TGF-β) and interleukin 10 (IL-10) (Yeh et al. 2006). The CD4+CD25+ regulatory T cells are a component of T regulatory cells that play a crucial role in inhibiting excessive actions of auto-reactive T cells in the pancreas, thereby preventing diabetes progression, whilst TGF-β inhibits autoimmune diseases via the regulation of the size of the CD4+CD25+ regulatory T-cell pool (Peng et al. 2004). Continuing work from their previous study, Yeh et al. (2008) further confirmed the effect of regular tai chi exercise on the immune system in a group with Type 2 diabetes compared to a group of age matched normal controls. Participants with diabetes initially had higher HbA1c and a lower T-cell transcription factor (T-bet) than normal controls. Following a 12-week tai chi intervention, they demonstrated a significant decrease in HbA1c and an increase in T-bet expression along with an increase in IL-12 and a decrease in IL-4 concentration. The authors concluded that these findings may indicate a pathway for how regular tai chi exercise combined with medication may provide better immune regulatory and metabolic function for patients with Type 2 diabetes. Further, a new study has reported an increased complement factor H, acting to protect against microangiopathy and macular degeneration in tai chi users (Yang et al. 2010), indicating additional likely positive effects of tai chi on the immune system.

Based on this body of evidence, specific ‘short forms’, or special tai chi programs, have now been tailored to help address specific health problems experienced by people with diabetes. For example, a program based on the Sun and Yang styles of tai chi has been endorsed by Diabetes Australia (Lam 2000).

Pain management in muscular skeletal conditions

A number of reviews have reported the effectiveness of tai chi in assisting with the reduction of pain and disability associated with musculoskeletal conditions, particularly osteoarthritis (OA) and rheumatoid arthritis (RA) (Han et al. 2004, Lee et al. 2007b, 2008b, Hall et al. 2009). One meta-analysis found tai chi effective in decreasing pain and disability and improving health related quality of life (HRQL) and physical function in people living with chronic musculoskeletal pain (Hall et al. 2009). Another two systematic reviews specifically linked tai chi to improvements in resolving pain and disability related to both OA and RA (Lee et al. 2007b, 2008b). In one RCT, involving a population of older women with knee OA (Ni et al. 2010), tai chi participants demonstrated significant improvements in pain, stiffness, physical function, the 6-minute walk distance and the stair climb time after undertaking tai chi for 2–4 times per week for 24 weeks. These improvements in mobility may also indirectly enhance self-efficacy and confidence by providing more independence in activities of daily living, as is evidenced by qualitative statements from study participants, such as: ‘After the Tai chi class I was full of energy and ready to face my life [Female, 59 years]’ (Uhlig et al. 2010, p. 47).

Other positive effects have also been demonstrated for people suffering with headaches where after a 15-week intervention there were significant improvements in headache, energy/fatigue, social functioning, emotional wellbeing, mental health and headache impact score observed in the tai chi group, compared to usual care (Abbott et al. 2007). The mechanisms involved in the positive effects observed are unknown, but it may be related to relieving the potential causes of headaches, such as stress or tension, by the slow and mind-focusing movements, deep breathing and relaxation that characterise tai chi.

Mental health

Mental illness is a significant health problem affecting one in four of the world’s population at some time during their lifetime (AIHW 2008). The positive effect of physical activity on mental health is well known (Craft & Perna 2004, Humphel & Iverson 2007) and has resulted in tai chi becoming an area of interest in research into psychological disorders. Several studies, including a recent meta-analysis (Wang et al. 2010a) and a number of reviews (Sandlund & Norlander 2000, Wang C et al. 2004, Wang W et al. 2009, Dechamps et al. 2007, Ospina et al. 2007) have evaluated existing data in relation to tai chi and psychological well-being. Combined quantitative meta-analysis and qualitative evidence synthesis found regular
tai chi activity significantly reduced stress, anxiety and depression and enhanced mood in both healthy adults and patients with chronic conditions. Although studies in the meta-analysis used a variety of styles, frequency and duration of tai chi, the majority featured interventions of at least 2–3 times per week for at least 20 minutes for an average of 40–60 minutes per session. Consequently the authors found there was insufficient evidence to report a dose-response effect (Wang et al. 2010a).

Due to the close relationship between depression, anxiety and physical illness the effect of tai chi on such mood disorders has been investigated primarily in patients with a variety of chronic conditions such as HIV (Galantino et al. 2005), osteoarthritis (Wang et al. 2009), fibromyalgia (Wang et al. 2010b) and CVD (Taylor-Piliae et al. 2006, Barrow et al. 2007). This is an ongoing area of study, with the effects of tai chi being investigated, by an Australia research team, in relation to indicators for metabolic syndrome, health related quality of life and psychological health (Liu et al. 2010). The percentage of people with clinical depression in this preliminary study was reported to drop from 60–20% with significant improvements in weight loss and blood glucose control after a 3-month intervention. These findings have provided support for a larger study, the Mental and Metabolic Syndrome Innovative Lifelong Exercise (SMILE), which focuses on depression and obesity. This study has been funded by the Australian National Heart Foundation and the Beyondblue Cardiovascular Disease and Depression Strategic Research Program and is currently ongoing [University of Queensland (UQ) News 2010].

**Contributions of tai chi to improved quality of life and social capital**

Health related quality of life and self-esteem can be significantly reduced in people with chronic conditions due to decreased physical, psychological and social functioning. Tai chi has shown reported improvements in overall self-esteem, physical self-worth, physical condition, sport competence, body attractiveness and physical strength (Li et al. 2001, 2002, Ho et al. 2007, Lee et al. 2009). Improvements in these areas have the capacity to also enhance self-efficacy and improve quality of life by giving people a feeling of control over their bodies and the surrounding environment.

Although most tai chi schools and associations practice the same philosophy originating from Taoism, health professionals need to be aware that the size, style, structure, capacity and aims of these organisations can vary significantly. Differences can exist in regard to the type of service provided to the community and the degree to which they contribute to enhancing community capacity for health and well-being. For example, tai chi may be taught through a variety of methods that concentrate on content ranging from competition style martial art forms to forms that promote health and health recovery. Health promotion and health recovery groups also take place in a range of settings, from small business run enterprises and specific disease focused groups, such as those endorsed by the Arthritis Foundation and Diabetes Australia, to volunteer groups such as the International Taoist Tai Chi Society. For example the Taoist Tai Chi Society is characterised as a health promotion charity, which aims primarily to promote health and prevent illness within a community setting. When viewed from a societal perspective, contributions such as these that are made towards the health of a community are referred to as social capital (McMurray 2003). Social capital is defined as ‘the institutions, relationships, attitudes, and values that govern interactions among people and contribute to economic and social development’ (Grootaert & Van Bastelaer 2001, p. 4). The importance of social support for individual health and community well-being is being increasingly recognised by health researchers and community health professionals in relation to public health (Stone 2001). Organisations such as the International Taoist Tai Chi Society promote a climate of engagement, participation, sacrifice and reciprocity through its volunteer and charitable ethos. This adds another dimension to the value offered to public health by practicing tai chi within such an organisation and demonstrates it is important to move beyond the concept that tai chi is just another type of exercise.

**Limitations of research to date**

Although there have been many RCTs and systematic reviews referenced in this discussion some of these studies may have overestimated the efficacy of tai chi in regard to health benefits, such as reducing pain and disability, due to small sample sizes and short-term effects (Schieir et al. 2010). Additionally, there is a large variation in the style of interventions used in these studies in regard to tai chi style and intensity and duration of the exercise, making it difficult at this stage to formulate individualised practice recommendations. Compounding this problem are findings from a recent review on the quality of reporting in tai chi trials that found only 23% of RCTs provided adequate details of the type of intervention used (Li et al. 2009). Therefore, there exists an important need for large sample longitudinal studies investigating the potential long term benefits of tai chi, and further randomized controlled trials determining the most effective forms of tai chi for promoting health and health recovery in specific chronic illnesses.
Lastly, despite the popularity of this intervention there is very little known regarding the patterns of practice amongst people who choose to practice tai chi for health reasons. Only one USA study reporting the patterns of use of tai chi was identified and this used retrospective data from the 2002 National Health Interview Survey (Birdee et al. 2009). The authors concluded people of Asian descent, educated and living in Western or Northeastern US were more likely to be tai chi users, as well as people with musculoskeletal diseases, severe sprains and asthma. Interestingly, the majority of tai chi users (75%) did not disclose their tai chi practice to their health professionals although they stated tai chi was important for their health. The latter is an important finding and has implications for health professionals who are assisting patients with chronic illnesses to develop self management plans.

Implications for practice

As the position of the practice nurse expands and becomes more diversified (Porritt 2007), and more roles become available to all nurses in assisting to manage chronic illnesses (Forbes & While 2009), it is essential that nurses become intimately aware of primary and secondary community initiatives that may enhance and promote the health and well-being of people with chronic conditions. Increasing knowledge of the indications for and the contribution that interventions such as tai chi make to the lives of people with chronic illnesses is therefore essential. The key points to take away from this article are summarised in Fig. 1 and form an indispensable part of the toolkit required for the nurse to advise patients on the appropriateness of including tai chi in their self management health plan.

Conclusion

Tai chi’s wide range of reported benefits makes it an ideal self management strategy, for both the elderly and people with chronic conditions, to improve their psychological and physical well-being in a community setting (Reid et al. 2008). Further to this, evidence of the combined contribution of tai chi to health and social capital provides support for the potential integration of tai chi into the health care systems of countries such as Australia and the USA, as a strategy to promote community and public health. Consequently, tai chi is attracting attention from not only individuals with health issues who seek successful self management strategies, but also healthcare professionals and researchers who wish to identify suitable interventions to recommend to their patients to assist in both treating disease, and the promotion of health.

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