

Does the Practice of Chen Style Tai Chi Cause Knee Damage? A Literature Review Incorporating Artificial Intelligence

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ABSTRACT

Tai chi has been referred to as a form of moving meditation. It is a gentle form of exercise that incorporates movement, breathing and meditation. It has been used as a form of medical treatment for a wide range of ailments in China for hundreds of years. It is considered a component of traditional Chinese medicine [TCM]. In recent decades it has become increasingly popular as a supplementary form of treatment in Western medical practices. Many prior studies have found that the use of some tai chi styles, such as the Yang and Sun styles, have been effective in the treatment of arthritic knee pain. The Chen tai chi style differs from those styles, in that it incorporates some high-impact movements that place additional stress on the knees. In the past few years, the use of artificial intelligence as a tool of medical research has increased. The present study attempts to identify prior studies that have used Chen style tai chi with the goal of determining whether the Chen style has long-term detrimental effects on knee health. Microsoft Copilot, an artificial intelligence chatbot, was utilized to find relevant studies. Copilot summarized three studies and one article that were not relevant for purposes of the present study. A search of the PubMed database found two studies that were not relevant. The present study concluded that the use of artificial intelligence in medical research can be a good first step, but that its results must be verified for relevance and accuracy. The present study also concluded that more research is needed on the long-run effects of the Chen style of tai chi on knee health.

Keywords: Knee; Osteoarthritis; Osteoporosis; Arthritis; Tai Chi; Chen Style; Copilot; Artificial Intelligence

Abbreviations: SD: Stretch Down; PWHM: Part the Wild Horse's Mane; KOA: Knee Osteoarthritis; TCM: Traditional Chinese Medicine

Introduction

Tai chi has been referred to as a form of moving meditation. It is a gentle form of exercise that incorporates movement, breathing and meditation. It has been used as a form of medical treatment for a wide range of ailments in China for hundreds of years [1-8]. It is considered a component of traditional Chinese medicine [TCM]. In recent decades it has become increasingly popular as a supplementary form of treatment in Western medical practices [9-65]. In the past few years, the use of artificial intelligence as a tool of medical research has increased [66-95]. The present study attempts to identify prior studies that have used Chen style tai chi with the goal of determining whether the Chen style has long-term detrimental effects on knee health. Microsoft Copilot, an artificial intelligence chatbot, is utilized to find relevant studies. Performing high-impact stomping moves in

tai chi has its benefits and detriments. One positive aspect of hard stomping moves is that they can increase bone density. One possible drawback is that such moves, if practiced over time, can cause knee damage, or at least that is the belief held by some tai chi practitioners. Chen style tai chi incorporates high-impact stomping moves among its postures. The purpose of the present study is to address the issue of whether high-impact stomping moves can cause knee damage if practiced on a regular basis over time. We decided to ask this question to Microsoft Copilot, an artificial intelligence chatbot, the goal being to find medical studies that might have examined this question.

Methodology

We chose to posit this question to Microsoft Copilot, a popular chatbot (as of this writing). However, there are some caveats. Copilot

and other chatbots have sometimes been found to produce inaccurate results [96-100]. Thus, caution and due diligence are called for in any studies that incorporate artificial intelligence. Another potential problem is that some studies have found chatbots to be biased [101-109]. This finding is especially prevalent for studies that examine political questions, although there is also a possibility that bias can exist for medical studies, especially if the medical study includes a controversial political issue. We gave the following instruction to Copilot.

Instruction

Chen style tai chi includes stomping moves. Have any studies been conducted to determine whether the regular practice of Chen style tai chi over time causes knee damage? Write a two-part essay. In part 1, summarize studies that have found that the regular practice of Chen style tai chi can cause knee damage. In part 2, write an essay summarizing studies that have found that the regular practice of Chen style tai chi does not result in knee damage. Cite references.

Copilot Essay

Studies Suggesting Chen Style Tai Chi Can Cause Knee Damage

Some studies have explored the biomechanical effects of Chen style Tai Chi on the knee joint and have found that certain movements can lead to increased stress on the knee [110]. For instance, a study published in the journal *Medical & Biological Engineering & Computing* analyzed the load and stress distribution on the knee joint during typical lower limb movements of Chen style Tai Chi [110]. The study found that movements such as “stretch down” (SD) and “part the wild horse’s mane” (PWHM) resulted in greater knee joint forces and contact stresses, which could potentially aggravate knee pain in individuals with knee osteoarthritis (KOA) [110]. The researchers suggested that practitioners should consider elevating their postures to reduce knee flexion angles and decrease the required muscle strength and load on the knee joint [110].

Studies Suggesting Chen Style Tai Chi Does Not Result in Knee Damage

Conversely, other studies have highlighted the potential benefits of Chen style Tai Chi for knee health, particularly for individuals with knee osteoarthritis [111]. A randomized controlled trial published in *BMC Complementary Medicine and Therapies* evaluated the efficacy and safety of Tai Chi on knee pain and muscle strength in middle-aged and older adults with KOA [111]. The study found that regular Tai Chi practice significantly reduced knee pain and improved muscle strength, suggesting that it could be a safe and effective intervention for managing knee osteoarthritis [111]. Additionally, a narrative overview published in the *Journal of Ageing Research and Healthcare* synthesized data from various studies and concluded that Tai Chi could enhance mobility, reduce pain, and improve overall quality of life for older adults with knee osteoarthritis [112]. The review emphasized

that Tai Chi’s gentle, low-impact movements help maintain joint flexibility and strength without causing strain [113].

Author Comments

Perhaps the most obvious flaw in the Copilot part 2 essay is the fact that nowhere does it refer to studies that have found that the regular practice of Chen style tai chi does not result in knee damage. Numerous studies have found that the practice of tai chi in general can improve knee health [114-130]. However, the other main styles of tai chi (Yang and Sun styles, for example) do not include strong stomping actions, whereas Chen style tai chi does include some strong stomps. Thus, part 2 of the essay seemingly does not analyze the effect of the practice of Chen style tai chi on long-term knee health. To investigate this issue further, we decided to read the sources cited by Copilot to determine whether the summaries given by Copilot omitted any relevant information. The Haino et al. study [110] focused on the Chen style, but did not address the strong stomps that exist in some Chen style tai chi forms. It discussed lower limb movements such as the deep squat, single whip, brush knee and parts of the wild horse’s mane postures, which exhibit greater lower limb force than other tai chi styles. The authors of that study did suggest that these lower stances might aggravate pain in patients with osteoporosis, and that this additional stress and pain could be mitigated by performing these moves with a higher stance. Thus, it appears that the practice of Chen style tai chi, if practiced in the traditional way using lower stances than those used in other tai chi styles, can result in additional knee pain, and even long-term damage, compared to the practice of other tai chi styles such as the Yang and Sun styles.

Or maybe not. Low stances can also strengthen the leg muscles that support the knees. The Hongyu Yue et al. study [111] was not really a study at all. In that publication, the authors merely discussed a study they were going to conduct in the near future that would incorporate the Yang-8 tai chi style. Thus, this prospective study would not use the Chen style of tai chi, which makes this prospective study irrelevant for purposes of the present study. The Marks study [112] was a review of existing literature on the effect of tai chi in general to the alleviation of arthritic knee pain. The finding was that many studies concluded that the practice of tai chi had a significant effect on relieving knee pain of those suffering from osteoarthritis of the knee. The study did not focus on the effect of Chen style tai chi in particular on the alleviation (or worsening) of knee pain. Thus, the Marks study is irrelevant for purposes of the present study, since it did not examine the issue of whether the practice of Chen style tai chi, which includes high impact foot stomps, can have an adverse effect on long-run knee health. The Knowridge article [113] discussed tai chi in general. It did not discuss the Chen style in particular. Thus, this article is irrelevant for purposes of the present study, the purpose of which was to find studies that examined the effect of Chen style tai chi on long-term knee health. The Copilot search cited three studies and one article that were not quite on point.

The next step was to search the PubMed database to see if any relevant studies could be found. A search for Chen style tai chi and knee found two studies, neither of which were relevant. One of those studies found that the practice of Chen style tai chi was safe and effective for individuals over age 50 who suffered from functional disability [114]. However, that study was conducted over 12 weeks, and thus did not study the long-term effects of practicing Chen style tai chi on knee health. Also, it did not compare the relative effects of Chen style tai chi to other tai chi styles that include only low-impact movements.

Concluding Comments

If anything is to be learned from the present study, it is that the use of artificial intelligence such as Microsoft Copilot can be useful as an initial step in medical research in that it is able to identify potentially relevant medical studies, but that the use of AI should only constitute a preliminary step in medical research, since the AI findings may be irrelevant or misleading. Thus, due diligence is called for. The AI findings must be verified by actually reading the articles cited by AI. One must not simply rely on the AI findings without conducting further investigation. Numerous studies have found that the practice of tai chi can increase knee health [115-131] and can be effective in battling knee osteoarthritis and osteoporosis. However, certain tai chi styles, such as the Yang Style and the Sun style, involve only low-impact moves, and thus do not cause excessive stress on the knee joints. Chen style is different in this regard, since it incorporates higher-stress foot stomps, which may or may not result in knee damage if practiced over a long period of time. The present study was unable to find any definitive studies that prove or disprove the belief that the practice of Chen style tai chi can, over time, result in knee damage. That does not mean that such studies do not exist. It only means that such studies were not found in the present study. More research is needed on this point.

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Conflict of Interest

None.

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