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Knee osteoarthritis pain in the elderly can be reduced by massage therapy, yoga and tai chi: A review

Tiffany Field

University of Miami School of Medicine, Fielding Graduate University, USA

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ABSTRACT

Background and methods: This is a review of recently published research, both empirical studies and meta-analyses, on the effects of complementary therapies including massage therapy, yoga and tai chi on pain associated with knee osteoarthritis in the elderly.
Results: The massage therapy protocols have been effective in not only reducing pain but also in increasing range of motion, specifically when moderate pressure massage was used and when both the quadriceps and hamstrings were massaged. The yoga studies typically measured pain by the WOMAC. Most of those studies showed a clinically significant reduction in pain, especially the research that focused on poses (e.g. the Iyengar studies) as opposed to those that had integrated protocols (poses, breathing and meditation exercises). The tai chi studies also assessed pain by self-report on the WOMAC and showed significant reductions in pain. The tai chi studies were difficult to compare because of their highly variable protocols in terms of the frequency and duration of treatment.
Discussion: Larger, randomized control trials are needed on each of these therapies using more standardized protocols and more objective variables in addition to the self-reported WOMAC pain scale, for example, range-of-motion and observed range-of-motion pain. In addition, treatment comparison studies should be conducted so, for example, if the lower-cost yoga and tai chi were as effective as massage therapy, they might be used in combination with or as supplemental to massage therapy. Nonetheless, these therapies are at least reducing pain in knee osteoarthritis and they do not seem to have side effects.

Knee osteoarthritis pain in the elderly can be reduced by massage therapy, yoga and tai chi.

Knee osteoarthritis affects some 80% of elderly people. Pharmaceuticals have been relatively effective for the treatment of knee osteoarthritis but often have undesirable side effects. Complementary therapies have also been effective in reducing knee pain but without side effects. This paper is a review of recent (this past decade) empirical studies and meta-analyses (that appeared on PUBMED) on complementary therapies that have reduced knee pain including massage therapy, yoga and tai chi.

1. Knee osteoarthritis

Knee osteoarthritis involves degeneration of the cartilage in the joint with pain in and around the joint as well as joint stiffness and restricted movements that ultimately lead to muscle weakness [1].The pain experience of knee osteoarthritis is apparently due to activation of sensory pain fibers in the arthritic joint and to weakening of the surrounding muscles.

Knee osteoarthritis is reputedly the most common joint disease in the elderly and the largest cause of functional disability with some 80% of people over 65 years of age showing radiological symptoms of osteoarthritis [2]. In the U.S. alone, reportedly 27 million people are affected by knee osteoarthritis with associated treatment costs of $185.5 billion per year [3]. The incidence has supposedly doubled in women and tripled in men over the last 20 years [4]. Leading risk factors for osteoarthritis aside from age and genetics include female gender and obesity as well as excessive sports or occupational stress [5].

The main focus of treatment has been to relieve pain, to restore function and to slow the progression of the disease. The treatments have been classified as pharmacological, non-pharmacological and surgical or combinations of these [2]. Anti-inflammatory drugs as well as non-opioid analgesics have been prescribed for the

E-mail address: tfield@med.miami.edu.

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reduction of inflammation and pain [1]. Although these have effectively reduced the inflammation and pain, they have led to undesirable side effects in long-term follow-up studies including, for example, heart failure and hypertension [6]. Because of these potential adverse side effects, the American College of Rheumatology has advised the use of non-pharmacological therapies including physical therapy and exercise [7].With joint pain and limited mobility, however, most individuals with knee osteoarthritis do not participate in regular physical activity [7]. These epidemiological data highlight the need for complementary/integrative therapies such as massage therapy and lower-impact physical exercise such as yoga and tai chi. The following sections of this paper are reviews of research on these therapies.

2. Massage therapy for knee osteoarthritis

Research on the effects of massage therapy on knee osteoarthritis pain has been limited, although the results have consistently suggested that the pain from that condition can be reduced by massage therapy. The pain, however, has typically been self-reported on visual analogue pain scales (e.g. happy to sad faces or 0–100 thermometer scales) and on the Western Ontario and McMaster Universities Arthritis Index (WOMAC) [8–11] with all the limitations of self-report studies. In this research, more objective observation measures such as range of motion (ROM)-related pain were not taken. ROM was not measured in two of the four studies [8,9]. In the first of these, pain was measured on a 10-point Likert scale, and pain decreased even though, according to the authors of that study, only the patient's healthy foot, hands and upper parts of the shoulders were massaged “shallowly” for 20 min each day of their hospitalization [8].

In the other two WOMAC studies, ROM was measured but did not change [10,11]. In one of these studies a self-massage protocol was used [10]. This raises the possibility that the pressure being applied was not sufficient (moderate pressure massage being key to positive effects). This would be especially true if the participants were not instructed to use moderate pressure and given that they would not be inclined themselves to apply pressure to the area around the painful joint. In the second study, pain and stiffness were reduced, and increased function was noted on the self-report WOMAC scale, but the ROM results were negative [11]. This could be related not only to the use of low pressure massage but also to the massage not being focused on the affected leg [11]. Only 50% of the hour-long massages were applied to the affected leg, and the massage protocol, again, may have lacked sufficient pressure to increase ROM.

A comparison between Thai massage and Swedish massage for a sample of older people with knee osteoarthritis further supported the need for moderate pressure [9]. In that study, the group who received Thai massage (which typically involves more pressure than Swedish massage) reported a greater reduction in pain on the WOMAC than the group who received Swedish massage.

Based on these mixed findings, we recently conducted a knee osteoarthritis massage study in which moderate pressure massage was applied to the affected leg by massage therapists [12]. Because earlier research was only focused on the quadriceps muscles, we designed a massage therapy protocol that was focused on the hamstrings as well as the quadriceps muscles, thinking that both sets of muscles were involved in ROM (flexion and extension of the knee). And the assessments not only included self-reported pain, but also ROM and ROM-related pain. Moderate pressure massage therapy (moving the skin) was used inasmuch as it has been noted to be more effective than light pressure massage (light stroking) with adults with hand pain [13], upper arm and shoulder pain [14] and neck arthritis pain [15]. For example, in the study on adults with arthritis in their upper limbs, the moderate pressure massage group versus the light pressure massage group had less pain and greater grip strength following the first and last sessions.

By the end of the one-month treatment period the moderate pressure group was reporting and showing less ROM-related pain behavior (e.g., grimacing), and greater range of motion. Further, the massage in our study was focused on the quadriceps muscle inasmuch as researchers have reported a relationship between quadriceps weakness, increased pain and altered walking patterns [9]. But, the hamstrings were also massaged given that the previous studies [10,11] failed to find ROM increases when focusing only on the quadriceps. The results of this study on increased ROM and decreased self-reported pain as well as decreased ROM-related pain are consistent with those we have previously reported, i.e. changes in ROM and pain following moderate pressure massage in adults with arthritis of the upper limbs [14] and in the neck [15]. Other researchers have noted a reduction in knee osteoarthritis pain following massage, but only by self-report (WOMAC), not by direct observation of ROM-related pain [10,11]. In one of the few studies on massage for adults with knee osteoarthritis, for example, pain and stiffness were reduced and functionality was increased [10]. However, no ROM changes resulted from this self-massage study, possibly because it was a self-massage study and because it is not clear that moderate pressure massage was applied. As we have noted in our earlier studies, moderate pressure is necessary for positive changes to occur [13–15]. The positive effects in our self-massage studies may have derived from moderate pressure being applied and/or the combination of therapist massage (once a week) and the participants' self-massage (once a day).

Another potential interpretation for the inconsistent findings between the increased ROM we noted and the lack of change in ROM following massage reported by the other group is that their knee self-massage was focused solely on the quadriceps muscle group {10}. The authors of that self-massage study suggested that despite the earlier research on joint cartilage degeneration as the key factor in knee arthritis, the more recent research had noted that quadriceps muscle weakness that affects joint loading and proprioceptive deficits contributed to knee arthritis [10]. Others have also found relationships between weak quadriceps muscles and increased pain and limited walking [9]. That was the rationale for their self-massage protocol focusing on the quadriceps muscle [10]. However, the findings from our study suggest that it may be necessary to massage both the hamstrings and the quadriceps muscles to achieve increased ROM, especially since the hamstring muscles are noted to work together to flex the knee (12).

Our results may be inconsistent with those of Perlman et al. [11] for different reasons. They again found changes on the WOMAC self-report scale on pain, but no changes in ROM even though their massages were longer (30–60 min), more frequent (two to three times weekly) and for a longer study period (8 weeks) than ours. As already mentioned, their Swedish massages may have lacked sufficient pressure, and, as already mentioned, the lower limbs were only massaged 50% of the sessions. Their results were inconsistent with ours in that they only observed reduced pain after 5 weeks of 60- minute massages two or three times weekly (as opposed to their lower dose group receiving only 30- minute massages two or three times weekly) [11]. One possible explanation for the positive effects following the shorter and less frequent massages in our study (20 min weekly for 4 weeks) is our use of moderate pressure massage [12], although it is not clear what pressure was used in their study [11]. Cross-study comparisons are difficult because of the different massage protocols and the various outcome measures used, i.e. self-report pain scales in their study [11] and the more directly observed ROM-related pain measures in our study.

Combining therapist-delivered massage with daily self-