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Review Article

Pain and Massage Therapy: A Narrative Review

Tiffany Field*

Department of Pediatrics, Touch Research Institutes, University of Miami School of Medicine, Miami, Florida, USA and Fielding Graduate University, California, USA

***Corresponding author:** Tiffany Field, Touch Research Institutes, University of Miami School of Medicine, Miami, Florida, USA and Fielding Graduate University, California, USA. Tel: +13059755029; Email: tfield@med.miami.edu

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Abstract

Massage therapy has been frequently used for pain syndromes. For this narrative research review, Pub Med and PsycINFO were searched for the terms pain and massage therapy to identify publications from the last ten years. Inclusion criteria were randomized controlled trials that focused on chronic pain conditions, systematic reviews and meta-analyses that were peer-reviewed and published in English. The chronic pain conditions include back pain (the most frequently studied condition), joints in the lower limb (focused most often on the knees), and the upper body (primarily the shoulders and neck) and arthritis and fibromyalgia. These studies showed positive effects of massage therapy on pain, especially when compared to standard treatment. In contrast, when massage therapy was compared to other physical activities like physical therapy or exercise, the data are less conclusive. Potential underlying mechanisms that have been explored for the massage-pain relief relationship include the stimulation of pressure receptors leading to an increase in vagal activity and a decrease in substance P. Limitations of this literature include a limited number of randomized controlled trials and the frequent absence of a physical activity comparison group.

Pain and Massage Therapy: A Narrative Review

Massage therapy has been frequently used for pain syndromes. For this narrative research review, Pub Med and PsycINFO were searched for the terms pain and massage therapy to identify publications from the last ten years. Inclusion criteria were randomized controlled trials that focused on chronic pain conditions, systematic reviews and meta-analyses that were peer-reviewed and published in English. Although several systematic reviews and meta-analyses on massage therapy for pain research were found in this recent literature, they were focused on specific pain syndromes, e.g. shoulder pain, neck pain, headache or fibromyalgia, not on chronic pain syndromes in general. This broader scope narrative review covers all of these specific pain syndromes plus several others in an attempt to be more comprehensive. The chronic pain conditions include back pain (the most frequently studied condition), joints in the lower limb (focused most often on the knees), and the upper body (primarily the shoulders and neck) and arthritis and fibromyalgia. These studies showed positive effects of massage therapy on pain, especially when compared to standard treatment. In contrast, when massage therapy was compared to other physical activities like physical therapy or exercise, the data are less conclusive. Potential underlying mechanisms that have been explored for the massage–pain relief relationship include the stimulation of pressure receptors leading to an increase in vagal activity and a decrease in substance P. Limitations of this literature include a limited number of randomized controlled trials and the frequent absence of a physical activity comparison group. The statistically significant findings from these studies are briefly reviewed in the following sections.

Chronic Pain Conditions

Massage therapy is frequently used for chronic pain. According to a National Health Interview Survey (N=34,525 adults), 42% of users are patients with chronic pain syndromes [1]. Chronic pain conditions have typically involved various vertebrae and joints in the body including low back pain, knee pain, shoulder and neck pain. The most frequently researched pain syndromes receiving massage therapy in this literature search were low back pain and neck pain.

Low Back Pain

In a longitudinal study on low back pain, as few as 10 massage sessions led to pain reduction in 49% of the 104 low back pain patients at 12 weeks and 40% at 24 weeks [2]. In a smaller sample of patients with low back pain (N=26), EEG signals became less complex (especially beta and theta signals) following massage [3]. The reduction in pain was correlated with the decrease in EEG signal complexity.

Research in this literature on massage for low back pain has often compared different forms of massage or compared massage with other kinds of physical stimulation. In a study comparing tender point deep tissue massage plus lumbar traction versus a control group who received lumbar traction alone, an algometer and visual analog scale were used to assess the pressure pain threshold, muscle hardness and pain intensity [4]. Sixty-four patients were randomly assigned to these two groups. The results suggested that the group who received both deep tissue massage and lumbar traction had a higher-pressure pain threshold, lower muscle hardness and lower pain intensity than the lumbar traction alone group.

Deep tissue massage has even been as effective as deep tissue massage plus an anti-inflammatory medication [5]. In this controlled, randomized single-blinded trial, 59 patients with chronic low back pain were randomly assigned to either the deep tissue massage alone or the deep tissue massage combined with the anti-inflammatory medication. Pain reduction and function were similar in the two groups, suggesting that deep tissue massage alone can be as effective as when combined with an anti-inflammatory medication.

Deep tissue massage therapy has also been applied with a massage instrument called the Hand Grip T-Bar [6]. This therapy called roptrotherapy was compared to transcutaneous electrical nerve stimulation. The nerve stimulation group received therapy more often than the massage device group (20 minutes per day, five days a week for two weeks versus 20 minutes a day, but only three days a week for two weeks). Despite receiving less therapy, the massage instrument group fared better on pain rating scales, and disability scales (Oswestry Disability Index and Roland and Morris Disability Questionnaire).

Less deep massage forms have also been used. For example, Ayurvedic massage was compared to thermal therapy in a randomized controlled trial [7]. The study was four weeks including a two-week intervention phase followed by a two-week follow-up period. The reduction in back pain was significantly greater for the Ayurvedic massage versus the thermal therapy control group on both visual analog scales and functional ability questionnaires. In a narrative review of studies on Swedish and Thai massage, six papers met inclusion criteria [8]. The authors reported that both Thai and Swedish massage not only relieved the low back pain but also improved physical function, range of motion and mood as well as reduced anxiety. They also suggested that the methodological limitations of these studies highlighted the need for further research.

The two most common therapies for low back pain, namely massage therapy and routine physical therapy have also been compared [9]. In this study, massage therapy significantly lowered pain intensity and improved scores on the Oswestry Disability Index as compared to routine physical therapy, although the range of motion changes did not differ between the two groups. Surprisingly, the massage therapy group fared better even though the routine physical therapy group also received vibrator therapy, ultrasound and transcutaneous electrical nerve stimulation.

At least two extensive reviews have been conducted on massage therapy for low back pain including a review of randomized, controlled trials and a systematic review of systematic reviews. In the review of randomized controlled trials, 25 trials with 3096 participants met inclusion criteria [10]. In three of the trials, massage was applied with a mechanical device and in the remaining 22 trials massage was applied by massage therapists. Although there was significant bias, both performance and measurement bias, because participants and massage therapists could not be blinded, the massage therapy studies led to greater pain relief in both the short and long-term as compared to "inactive controls as well as "active controls". The active controls used as comparisons in these studies included manipulation, mobilization, transcutaneous electrical nerve stimulation, acupuncture, traction, relaxation, physical therapy, and exercises, while the inactive controls included sham therapy, waitlist and standard treatment trials. Notably there were no serious adverse events noted in any of these trials.

In a systematic review of systematic reviews, nine systematic reviews met criteria [11]. The results suggested that massage was a more effective treatment when compared to placebo as well as some "active therapies" including relaxation in the short term. However, there were mixed findings when massage was compared to other manual therapies such as mobilization and acupuncture.

Upper Back Pain

Upper back pain seems to be more diffuse or less localized than lower back pain and is typically associated with muscle tension. Despite the frequent research on lower back pain, only two studies could be found on upper back pain in the recent literature. In a single-blind, randomized clinical trial, 50 adults with upper back pain were randomly assigned to a traditional Thai massage group or a control group who received sham microwave diathermy [12]. Each participant received a 30-minute session of the Thai massage or microwave diathermy (the use of microwaves to generate heat in the body to evenly warm deep tissues without heating the skin). Muscle tension was decreased in both groups,

but only the Thai massage group experienced decreases in EMG (electromyography activity) and pain intensity at the end of the therapy sessions and the Thai massage group had greater decreases on all the measures as compared to the control group.

In a self-massage study, the use of a Wilai massage stick was compared to ibuprofen in 60 patients who were diagnosed with upper back pain related to myofascial trigger points [13]. The Wilai massage stick is a lightweight device made from an aluminum shaft (one inch in diameter) bent into a shape resembling a hook. The top of the stick has a wooden massage ball that can be moved up and down the upper back to massage pressure points. Following random assignment to the massage stick or the ibuprofen groups, the participants were advised to perform daily exercises in addition to either using the massage stick or taking ibuprofen for five days. Assessments were made on pain intensity, pressure pain threshold, tissue hardness and cervical range of motion on the first day after the first treatment session and on the fifth day after the last treatment session. Although the massage group showed significant improvement on all the measures at the two assessment time points, the ibuprofen group only showed a reduction in pain intensity and an increase in cervical range of motion. The authors concluded that the self-massage is a cost-effective alternative to medication for these patients.

Chair massage is another cost-effective form of massage that is rarely studied. In the only chair massage study that could be found in this recent literature, 50 office workers were randomly assigned to a massage or a control group [14]. The massage group received eight massage sessions twice a week for 15 minutes. Based on the Cornell Musculoskeletal Discomfort Questionnaire, greater effects were noted for the massage group including greater pain reduction in the lower and upper spine. The pain threshold also significantly increased at all points that were examined.

Lower Limb Chronic Pain

Massage studies have been conducted on parts of the lower limb including the heel, leg and the knee. These have focused on the plantar flexor (calf muscles) in the case of the foot including the gastrocnemiusand the soleus muscles. And, they have involved the hamstrings and quadriceps being massaged in the case of knee pain.

Heel Pain: In a single-blind randomized clinical trial on plantar heel pain syndrome (heel pain during heel rise and squatting), 69 patients were randomly assigned to a self–stretch exercise program plus deep massage therapy to the calf muscles or a self-stretch exercise program plus ultrasound therapy [15]. The patients received eight treatments over a four-six-week period. At the beginning and end of that period, the patients' functional status was measured by the Foot and Ankle Computerized Adaptive Test. A group by time interaction effect suggested that massage therapy was significantly more effective than ultrasound therapy.

In a more complex single-blind, randomized control trial, tender points were first identified in 150 individuals' plantar flexor muscles (gastrocnemius or soleus) [16]. The participants were then randomly assigned to five different groups including:

1) Heavy rolling massage on the tender calf,
2) Heavy rolling massage on the contra lateral calf,
3) Light rolling on the tender calf,
4) Manual massage on the tender calf and
5) No intervention.

A pressure algometer was used to measure the pressure pain threshold following 30 seconds and up to 15 minutes after the intervention. At 15 minutes post-intervention, the pressure pain threshold was higher following the rolling and the manual massage of the tender calf, but rolling was also effective for the contra lateral calf. The authors suggested that while the results on the tender calf may have related to the release of fibrous adhesions, the effect of rolling massage on the contra lateral limb suggests that more central pain-modulator systems may be playing a role in these effects.

Knee Pain: Massage therapy for knee pain has been the focus of many studies, although only four could be found in this review of the recent literature. All four studies recruited knee osteoarthritis patients. In the first of these, Thai traditional massage was compared with standardized physical therapy for knee osteoarthritis in older adults [17]. Problematically, the treatments were confounded in that the Thai traditional massage group received Thai exercise plus traditional massage and the standardized physical therapy group performed strengthening exercises with Swedish massage. Although both groups experienced a reduction in pain and increased function, only the Thai massage group improved performance on the six-minute walk test.

One other study focused on the optimal massage dose for those with knee osteoarthritis [18]. In this study, pain was decreased but range of motion was not changed following massage, possibly because only the quadriceps muscles were massaged. In another study, patients with knee osteoarthritis benefited from self-massage, which might be expected given a more intensive dose of daily massage [19].

To assess the question of whether both extensors and flexors needed to be massaged to increase range of motion in the knee, 48 adults with knee pain were randomly assigned to a moderate pressure massage therapy group or a waitlist control group [20]. The massage group was given a 30–minute massage once per week for four weeks that consisted of moderate pressure stroking (moving the skin) focused on the quadriceps, the hamstrings and the tendons and ligaments surrounding the knee. The massage group showed an increase in range of motion and a decrease in

range of motion–associated pain immediately after the massage and greater increases in range of motion and decreases in range of motion–related pain as well as less self–report pain and sleep disturbances than the waitlist control group by the last day of the study. The authors suggested that the range of motion changes that were unique to this study related to both the hamstrings and quadriceps being massaged instead of the quadriceps alone. It may be necessary to massage both the extensor and flexor muscles to increase range of motion of painful joints.

Upper Body Chronic Pain

Hand and shoulder pain have received some attention in this massage therapy research literature. But neck pain has been the focus of many more studies.

Hand Pain: The hand pain studies illustrate the effectiveness of self-massage. In one of these, 46 adults with hand pain were randomly assigned to a moderate pressure massage therapy group or a standard treatment control group [21]. The massage group was massaged by a therapist once a week for a one-month period and the participants were taught self-massage and were asked to perform the self-massage on a daily basis. After the first and last sessions and at the end of the one-month period, the massage group had less pain and greater grip strength as well as lower anxiety, depression and sleep disturbance scores.

The same research group performed a similar study but compared a massage therapy with a massage therapy plus topical analgesic application group [22]. The massage plus topical analgesic group showed greater improvement in hand function as measured by a digital hand exerciser on the first and last sessions. The massage plus topical analgesic group also had a greater decrease in hand pain, depressed mood and sleep disturbances by the end of the study. As expected, self-massage and the application of a topical analgesic complemented the massage effects.

Shoulder Pain: Shoulder massage has yielded mixed findings. In a clinical trial, massage improved internal rotation range of motion in adults with shoulder pain [23]. In another clinical trial that compared several forms of therapy for shoulder pain, acupoint massage was more effective than the other therapies [24].

In a systematic review and meta-analysis of studies on massage therapy for shoulder pain, 15 studies (635 participants) met criteria [25]. Massage therapy was noted to reduce shoulder pain both in the short-term and the long-term. The author concluded that more randomized controlled studies with larger samples were needed. In a review of studies on soft-tissue massage versus exercise for pain, 23 papers met inclusion criteria [26]. The authors found low-quality evidence for soft tissue massage improving range of motion (flexion and abduction) and in reducing pain. In this systematic review and meta-analysis, exercise produced greater improvements than placebo or no treatment on pain but not in shoulder function.

The same authors conducted a randomized controlled trial on shoulder pain comparing a group that received soft-tissue massage plus exercises versus a group that received exercise only for four weeks. Contrary to the results of their systematic review and meta-analysis, they found that the group who received exercise only showed a greater reduction in pain scores from baseline to 12 weeks. There were no group differences on active flexion, abduction and hand-behind-the-back range of motion. It is surprising that while this treatment lasted only four weeks, the outcome measures were taken at 12 weeks when the effects could have been reduced by the withdrawal from treatment. It could be that the exercise only group fared better than the exercise plus soft-tissue massage group because the exercise group continued exercising for the intervening eight weeks or because of the irritating nature of soft-tissue massage for its lack of pressure.

When moderate pressure has been compared to light pressure on the massage of the upper limbs including the shoulder and the upper arm, more positive effects have been observed for the moderate pressure group [27]. In this study, 42 adults with pain in the upper limbs were randomly assigned to a moderate or a light pressure massage group. The therapist massaged the upper limbs once a week for four weeks. The participants were also taught the self-massage protocol and asked that they exercise their upper limbs daily. After the first and last massage sessions, the moderate versus light pressure massage group had less pain and greater grip strength. By the end of the fourth week, the moderate pressure group had less pain, greater grip strength and greater range of motion in their upper joints (elbows and shoulders). This study highlights both the effectiveness of moderate pressure as well as self-massage as complementary to the therapist-delivered massages.

Neck Pain: This is one of the most common musculoskeletal ailments [28]. In one study, 50 patients with chronic neck pain were randomly assigned to a cupping massage or a waitlist control group [29]. The cupping group received 5 massages on a twice weekly basis. After three weeks, the cupping massage group reported significantly less neck pain and also less pressure pain sensitivity. Also, increased functioning and improved quality of life were reported for the cupping massage versus the waitlist control group.

The same authors conducted a study comparing cupping massage by a partner with progressive muscle relaxation over a 12-week period [30]. The interventions were conducted twice weekly for 12 weeks and the groups were compared on a pain intensity analog scale, pressure pain thresholds and pain-on-motion. Although both groups showed significantly less pain at the end of the treatment period, cupping massage was also more effective for decreasing pressure pain sensitivity. The equivalent pain reduction following cupping and progressive muscle relaxation may relate to cupping massage on the neck being painful, especially if the

partner has not been well trained. Further research is needed to clarify these effects.

In another study, patients with neck pain were divided into two groups to receive kinesiotherapy and physiotherapy or to receive kinesiotherapy, physiotherapy and therapeutic massage [28]. The effectiveness of the interventions was measured by a digital inclinometer, the Neck Disability Index and a visual analog scale. Both groups experienced significant pain reduction and improved performance, but the group who received therapeutic massage also showed increased range of motion (lateral bend to the right and lateral bend to the left). These results are not surprising given that the group who received massage had three forms of treatment as opposed to the comparison group who were given only two types of treatment.

Cervical and scapulothoracic exercise with and without connective tissue massage were compared in another study [31]. Sixty patients with chronic mechanical neck pain were randomly assigned to these two groups to receive the interventions three days per week over four weeks. Pressure pain threshold was measured with a digital algometer and pain intensity with a visual analog scale. At the end of the treatment, pain intensity had diminished in both groups, although pain intensity at night, pressure pain thresholds and anxiety levels favored the group who received both the stabilization exercises and connective tissue massage. These results are not surprising in as much as the group who experienced the greater changes were receiving two as opposed to one form of treatment.

Connective tissue massage was compared to classic massage in still another study [32]. For this protocol, 45 females who experienced neck pain for 3 to 6 months were randomly assigned to the two groups to receive the massages on the thoracic spine and the neck for one session. Pressure pain threshold was measured by an algometer and the muscle relaxation response was assessed with electromyography biofeedback. The results suggested that a relaxation response followed the connective tissue massage while pain reduction occurred after the classic massage.

In still another neck pain study, 48 staff and faculty members of a medical school were randomly assigned to a massage or waitlist control group [33]. The massage group was given weekly moderate pressure massages focused on the neck. The massage therapist also taught those participants self-massage and asked them to practice the massage daily. The massage group experienced reduced pain and range of motion associated pain as well as an increase in range of motion following the first and last day massages. At the end of the study, the massage group had greater increases in range of motion and a greater reduction in range of motion–associated pain. As the authors suggested, these results highlight the importance of targeting the most affected muscle group for pain reduction and assessing range of motion-related pain before and after massage therapy. Once again, the use of moderate pressure massage and daily self–massages between sessions suggest that pain reduction can be sustained, and that self-massage can be a more cost-effective therapy for individuals with chronic pain.

Another study that highlights the effectiveness of focusing massage on the area of pain showed a 69% reduction in neck pain [34]. In this study, neck and upper thoracic spine massage and manipulation were performed.

In a systematic review and meta-analysis on massage therapy for neck pain, two reviewers identified randomized clinical trials that met the inclusion criteria of the PEDro scale [35]. Based on the 15 randomized clinical trials that met inclusion criteria, the meta-analysis suggested that massage therapy yielded better immediate effects for pain relief as compared to less active therapies. There was no evidence, however, for improved function (range of motion), and follow-up data suggested no sustained effects.

In another systematic review and meta-analysis by a different research group, 12 randomized controlled trials were selected based on the PEDro scale [36]. Better effects were noted for massage therapy in reducing both neck and shoulder pain when massage was compared to less active therapies. However, massage therapy did not show better effects for neck pain or shoulder pain when compared with more active therapies like physical therapy and exercise. These data are consistent with already presented results.

A mechanism study explored the effect of therapeutic massage on peripheral blood flow using dynamic infrared thermography [37]. The data suggested that applying therapeutic massage to the neck and shoulder increased peripheral blood flow

Headaches: Headaches significantly impact the health and performance of individuals. Massage has been given to increase pressure pain thresholds and reduce headache intensity in patients with chronic tension–type headache and migraine headaches. In one study, physiotherapy with manual therapy, cervical muscle stretching, and massage were effective in reducing tension-type headaches [38]. However, so many different type therapies were applied that it's not clear which one was effective. In another study, massage increased cervical range of motion in adults with cervicogenic headache [39].

Thai traditional massage has been compared to ultrasound in a study in which 72 participants were randomized to those groups [40]. The treatments were applied for three weeks. After the end of the treatment period and at nine weeks follow-up, the Thai traditional massage group showed a significant increase in pressure pain threshold compared with the sham ultrasound group. The follow-up effects at nine weeks (six weeks after the end of treatment) are surprising and suggest that maybe the massage group had continued their treatment on their own or applied self–massage which is relatively easy to do for headache pain. In one study, for example, self-massage of the nape of the neck reduced

the incidence of headaches by 65%. Even a single session has effectively reduced headache pain along with anger and tension [41].

The positive effects of massage on headache pain were likely mediated by increased heart rate variability (vagal tone) following massage. In a systematic review and meta-analysis based on seven studies on headache patients, heart rate variability was increased with a medium effect size [42]. Heart rate variability has been notably increased following massage therapy in many studies.

TMJ: In a study on 41 temporomandibular patients with myofascial pain, masseter and temporal massage using an oral rehabilitation robot was given every two weeks for a total of 10 sessions [43]. Changes in masseter muscle thickness were assessed by sonograms and showed a decrease in masseter muscle thickness in the therapy group. The massage was effective for reducing myofascial pain in 70% of the patients. A subsequent study by the same research group similarly used a massage robot and assessed the maximum mouth opening and muscle pain following 10 sessions of treatment [44]. After three sessions they were able to determine the difference between those who benefited from the treatment and those who did not on the basis of sonographic features. An interesting comparison would be the effects of similar treatments by a person and the robot massager.

Arthritis: A systematic review of studies on massage therapy for both osteoarthritis and rheumatoid arthritis yielded seven randomized controlled trials that included 352 participants [45]. The PEDro scale was used to assess risk of bias and the GRADE approach was used to assess the quality of evidence. Their results suggested low to moderate quality evidence that massage therapy is superior to less active therapies in reducing pain and improving functional outcome. They concluded that it was unclear whether massage therapy was more effective than other forms of treatment.

Fibromyalgia: In one of the first randomized controlled trials on fibromyalgia, massage therapy was compared to relaxation therapy on sleep, substance P and pain [46]. In this study, 24 adult fibromyalgia patients were randomly assigned to a massage therapy or a relaxation therapy group to receive 30-minute treatments twice weekly for five weeks. Across that time, the massage therapy group had more sleep hours and less sleep movements based on the actometer readings. In addition, substance P that results from insufficient deep sleep and causes pain was reduced. The patients' physicians also rated fewer tender points.

In another randomized controlled trial, massage therapy decreased the sensitivity to pain at tender points in patients with fibromyalgia [47]. In a narrative review, six randomized controlled trials were identified, and all studies revealed short-term benefits of massage for fibromyalgia, but as the author noted, all the reviewed studies had methodological problems [48]. In a more recent systematic review and meta-analysis of randomized control trials of massage therapy for fibromyalgia, nine trials involving 404 patients met inclusion criteria [49]. The meta-analysis revealed that the massage therapy of five weeks duration reduced pain, anxiety and depression, but the effects on sleep disturbance were not significant.

In another systematic review and meta-analysis evaluating the effectiveness of different styles of massage for fibromyalgia, ten randomized controlled trials met criteria [50]. This meta-analysis revealed that myofascial release had large, positive effects on pain and medium effects on anxiety and depression, and those effects were maintained in the medium and short term respectively. A narrative analysis revealed that myofascial release reduced fatigue and stiffness, Shiatsu reduced pain and increased the pressure pain threshold as well as reduced fatigue and sleep problems, and Swedish massage did not improve outcomes.

Reviews and Meta-Analyses on Massage Therapy for A Variety of Pain Syndromes

In a systematic review of randomized clinical trials on massage therapy for musculoskeletal disorders, 26 eligible trials included 2,565 participants [51]. The sample sizes ranged from 16 to 579 (M=95) and only 10 studies were considered low risk for bias. Low to moderate level evidence suggested that pain is reduced by massage therapy as compared to no treatment in the short term for people with shoulder pain and osteoarthritis of the knee, but these effects were not noted for low back pain or neck pain. Low to moderate level evidence was also noted for improvement of function in the short-term for people with low back pain, knee arthritis or shoulder pain. No clear benefits of massage were noted as compared to acupuncture, joint mobilization, manipulation or relaxation therapy in people with low back pain and general musculoskeletal pain. The authors concluded that massage had no greater benefit than other forms of active treatment.

A systematic review on Traditional Thai massage yielded more definitive results. The six research papers that met inclusion criteria found a pre-to post treatment pain reduction that varied from 25% to 80%. This pain reduction was associated with reduced disability, muscle tension and anxiety and increased flexibility. These effects were surprisingly maintained for up to 15 weeks.

In a systematic review and meta-analysis of randomized controlled trials on patients experiencing pain in the general population, 60 high-quality and seven low-quality studies were included in the review and meta-analysis [52]. Their results suggested that massage therapy treated pain more effectively than sham, no treatment and even more active therapies like exercise. As compared to more active therapies, massage was even more effective for reducing anxiety and improving health-related quality of life.

In a unique systematic review of systematic reviews different forms of massage therapy were explored for various

pain conditions to provide a "evidence map" of the therapies [53]. Pub Med, Embase and Cochrane databases were searched for systematic reviews on pain outcomes resulting from massage therapy. The quality of each systematic review was assessed using the Assessing the Methodological Quality of Systematic Reviews (AMSTAR) criteria. Of the 31 systematic reviews identified, 21 were considered high quality. The common massage types included Swedish massage, myofascial therapies, Shiatsu, Chinese traditional massage, Thai massage, and slow stroke massage. The most common type of pain was neck pain although benefits were also shown for labor, back, shoulder, neck, temporomandibular disorder, cancer and fibromyalgia.

Potential Underlying Mechanisms

At least three potential underlying mechanisms have been explored for the effects of massage therapy on chronic pain conditions. These include enhanced vagal activity, reduced pro-inflammatory processes and decreased substance P. Stimulating pressure receptors would enhance vagal activity and the other underlying mechanisms would follow including pro-inflammatory effects and decreased substance P.

Significant literature has highlighted the vital role of vagal-nociceptive networks in the processing of pain, although very few studies have measured vagal activity in chronic pain patients. In a systematic review and meta-analysis, those patients with chronic pain showed lower vagally- mediated heart rate variability [42]. In one attempt to enhance vagal activity, subjects were given transcutaneous vagal nerve stimulation as compared to a sham group who received no stimulation [54]. Although the effects of transcutaneous vagal nerve stimulation were limited in this study, others have shown that vagal activity can be enhanced by massage therapy. For example, in one massage study, patients with myofascial pain dysfunction syndrome were randomly assigned to a group who received physical therapy only versus a group who received physical therapy plus self-massage[55]. The self-massage group not only showed a decrease in pain and an increase in pressure point thresholds but also significant increases in high-frequency heart rate variability suggesting enhanced vagal activity.

The role of substance P in pain and inflammation has been noted in many studies [56]. In one study, for example, a strong association between chronic pain in patients with arthritis and substance P was reported, and a strong correlation was noted between the concentration of substance P and chronic pain intensity in those patients [57]. Unfortunately, substance P has only been measured in two studies that could be found in the literature. In the first, substance P decreased as deep sleep increased in patients with fibromyalgia who were given moderate pressure massage [46] and, in the other study, Thai massage led to a reduction in substance P and pain perception in patients with low back pain [58] .

Inflammatory mediators including the cytokines, e.g. IL-6 and IL-10 and TNF-alpha have been implicated in pain conditions 59]. At least one massage study has shown the reduction of inflammatory cytokines and tumor necrosis factor-alpha following massage therapy for exercise–induced muscle injury [60].

These limited data on potential underlying mechanisms for the positive effects of massage therapy on chronic pain conditions highlight the need for further research. Although many studies have documented pain reduction following massage therapy based on self–report, the medical community is unlikely to adopt massage therapy protocols for pain conditions without documentation of underlying mechanisms.

Limitations of This Literature

As in many massage therapy studies, methodological limitations constrain the conclusiveness of these pain therapy studies. Many massage therapy studies are not randomized controlled trials which limits their inclusion not only in systematic reviews and meta-analyses but also in narrative reviews like the current one. Without randomization, self-selection factors contribute to initial level differences between groups.

Although random assignment diagrams are recently being included in papers, differential attrition (dropout rates) are rarely specified and intention-to-treat analyses which would identify differences between the retained and attrition groups are often not conducted or described. In addition, double-blinding is typically not possible in massage trials including the blinding of therapists and participants which is one of the primary criteria for inclusion in systematic reviews and meta-analyses. Blinding of the assessors should be possible except when the actual treatment session is being observed or rated. At the very least, researchers should clarify whether blinding was attempted, what blinding procedures were used or whether blinding was not possible.

Determining the control condition has become increasingly difficult as massage therapy has been noted to be effective and cannot be withheld from participants. For ethical reasons, usual or standard care procedures are no longer acceptable because those participants would be deprived of a treatment known to be effective. For the same reasons, sham treatments which may be even aversive (e.g. light versus moderate pressure massage) would not be acceptable and the no treatment or standard treatment control groups have been confounded by the lack of attention and touch given to the control participants. Waitlist controls were the control condition of choice for many years. However, for chronic pain conditions, potential participants are less willing to forego therapy for the waitlist period. Waitlist controls that are assessed following the treatment period may be less comparable to waitlist controls that precede the treatment period because they are experiencing withdrawal from the treatment which may result in less than baseline performance. Very little longitudinal research has been conducted to assess the withdrawal of treatment

effects or the duration of positive effects. In those studies that have included follow-up assessments, the effects appear to be short-lived, highlighting the importance of a continued dose of massage therapy.

More active treatment controls such as exercise and yoga might prove to be as effective as massage therapy. For example, research suggests that the effects of massage therapy and yoga are very similar, possibly because they both entail stimulation of pressure receptors [61]. These more active therapies could be effectively used by chronic pain patients. Although these more active therapies such as yoga and exercise may require more effort and compliance on the part of the participants, they may be more cost-effective and may enable a greater dose (from being self-therapies) that may result in greater effects than massage therapy. Several meta-analyses have shown that when massage therapy was compared to less active therapies, massage effects were superior. However, when massage therapy was compared to more active therapies, the effects were often equivalent. It is also not surprising that when massage is combined with another therapy and compared to that therapy, receiving two therapies as opposed to one yields better results. This study design is flawed in that respect. In studies where the one therapy yields better effects than two therapies combined suggests that the added therapy may have been aversive in some respect.

Determining the type of massage to offer and the location on the body for the massage are still major questions to be addressed. Some research has been conducted on the type of massage offered to determine optimal pressure. For example, moderate pressure massage (moving the skin) has been more effective than light pressure massage. Other comparisons have been made, for example, between Swedish massage and Thai massage. Despite the comparative data on these, investigators continue to use their favorite massage style. Comparisons have not been made between massages focusing on the area of pain, for example, focusing on the low back region in a chair massage or providing a full-body table massage for chronic low back pain. Many studies have effectively focused on the specific area that is painful.

Parametric data are also needed on the timing and frequency of massage as there is also significant variability on these dimensions. For research on massage most investigators have been constrained to providing infrequent (once per week) short sessions (20-30 minutes). But assessments of the optimal dose massage have not been made. At the very least, researchers need to provide procedural details and a rationale for selection of particular procedures including the type of therapy, and the ways that the therapy and the research were conducted. Inadequate description of procedural details limits the possibility of replications.

The cost-effectiveness of massage therapy would vary as a function of whether it is being offered by companions/relatives or by staff members or by the self. Presumably a greater, more frequent dose could be received from companions, although comparisons have not been made between staff-provided and companion-provided massages. In addition, several studies have documented the therapeutic effectiveness of self-massage which could be routinely applied and become part of the lifestyle of those with chronic pain conditions. Therapists could be the teachers of companion-provided and self–provided massage. It is surprising that self – massage has not been researched more often in as much as it is not only cost-effective but very easily applied and can be done more frequently for greater treatment effects and for continuing benefits.

Many studies are limited by the use of visual analog scales for the assessment of pain intensity and pain thresholds as they are more subjective self-reports than measurement, for example, by an algometer. Unfortunately, when the algometer was used, visual analogs were not used, so the data on reliability of the visual analogs has not been assessed. In addition, most of the studies were limited to pain assessments even though pain would be expected to affect many psychological factors such as depression and anxiety and they certainly would be expected to affect vital signs. Presumably the psychological reactions to pain would exacerbate the pain, as in a circular process. These issues highlight the importance of multivariate research.

Despite these limitations, the research on massage therapy for pain has become increasingly robust. Randomized, controlled trials with more active comparison groups such as exercise and physical therapy appear in the recent literature. The results of these studies have generally suggested that massage therapy reduces pain and increases function for those experiencing chronic pain conditions.

Conclusion

Massage therapy has significantly reduced pain and increased function in all of the chronic pain syndrome studies that have been published over the last decade. The research has become increasingly robust. However, more multivariate, randomized controlled trials are needed to replicate these data so that massage therapy will be widely adopted into general practice as a complementary therapy for chronic pain syndromes.

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