The Effectiveness of Myofascial Release Techniques in the Treatment of Myofascial Pain: A Literature Review

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ABSTRACT

Objective: This article provides an overview of literature on the effectiveness of myofascial release techniques in treating myofascial pain syndromes. Emphasis is given to the way the technique was performed, and in what symptomatology the subjects presented with. The technique was examined in how it was applied, and the duration of the applied treatment. The effectiveness of the treatments will be measured in a change of pain symptoms, and in range of motion.

Data Collection: A computer search using PubMed and EBSCOHost generated articles relevant to Myofascial Pain Syndrome, Trigger Points, Myofascial pain, and Myofascial Release.

Data Synthesis: Myofascial pain syndrome is a complex process with a number of different causes. An understanding of the causes and clinical presentation is crucial to the diagnosis. The right diagnosis is vital to determining what treatment to use.

Conclusions: The consensus of the literature in this review, in addition to several noteworthy texts, supports the usage of myofascial release techniques for the treatment of myofascial pain. Myofascial pain can present in clinical settings and can mimic other conditions. Literature relies on palpation, symptomatology, and patient's history as keys to the diagnosis of this condition. According to the literature, applying an appropriate myofascial technique can be a very effective therapy for myofascial pain. Results have shown a decrease in pain, and an increase in range of motion for the joint acted on by the affected muscle.

Key Indexing Terms: Myofascial Release, Myofascial Pain, Myofascial Pain Syndrome, Trigger Points

Introduction: Myofascial pain is characterized by chronic muscle aching with increased sensitivity to pressure. This type of pain is generally a deep, dull ache in the affected muscles, and often refers to a nonspecific zone around the specific muscle. There is generally a tight palpable band of muscle that can be palpated, and these palpable masses are often referred to as “trigger points”. These bands are very sensitive to pressure, and patients will feel a sharp pain when you apply pressure on this exact point. When the patient feels this sharp pain you may feel a twitch in the muscle. There will be no articular pain, but there will be reduced range of motion at the joint acted on by the affected muscle. Sleep disturbances and chronic fatigue are sometimes reported, but these symptoms are more common in fibromyalgia (1).

A trigger point is a hypersensitive papule nodule in a taut band. They can be classified into two categories; active or passive trigger points. Active trigger points are associated with spontaneous complaints of pain, which may be present at rest or during motion. Latent or passive trigger points do not cause spontaneous pain, but may be elicited with manual pressure. They may alter motor recruit patterns and restrict range of motion (2). These trigger points can be either primary or secondary. Primary trigger points develop independently and not as the result of trigger point activity elsewhere. Secondary trigger points may develop in antagonistic muscles and neighboring protective muscles as the result of stress and muscle spasms. Trigger points involve numerous sacromeres of muscle bands. Regional shortening of sacromeres is palpable as hyper contracted muscle fibers (2).

Fascia is a tough sheet of connective tissue that envelopes muscles and fascicles. It is composed of collagen, elastin, and ground substance (3, 4). Ground substance is a gel-like fluid,

that when combined with elastin and collagen make up a tubular network. Fascia interweaves, supports, and protects every other living cell of the body. It can be affected by trauma, inflammation, overuse, underuse, and poor posture. Dysfunctional fascia does not show up on X-rays, magnetic resonance imaging, myelography, computed tomography, or electromyography scans. It can stick to its own fibers that create a pull throughout the structure. This fascia can pull on the skeleton, and compress organs, nerves, blood and lymph vessels (5).

Fascia is a complex structure that connects all throughout the body. Injuries to this structure can vary and be interpreted in many different ways. Tension exerted on spinal fascia is transmitted to the whole spine, and both the upper and lower extremities. Fascia allows for effective load transfer between the spine, pelvis, legs, and arms. Restriction of fascia is responsible for loss of shock absorption, peripheral vascular and nerve entrapments, and loss of motion throughout the body (6). A recent study was conducted by Barker and Briggs and it proved that the posterior fascia extending from the sacrum and lower extremities extends to the upper extremities and human skull. This fascia is continuous, has pain fibers, and is capable of transmitting tension (7).

Anatomical studies have demonstrated the continuity, provided by muscular insertions onto fascia, which exists along the entire posterior upper limb. This continuity can offer a different prospective to the explanation of referred pain. The study was performed on cadavers, and 9 of the subjects were noted to have referral pain from the posterior shoulder to the posterior forearm area. Their distribution of pain did not correspond to a precise nerve

root, but it could be interpreted in terms of fascial connections along the limb. The study noted that the muscular expansions into the fascia are present in all subjects and that they could stretch precise portions of the fascia (8). Studies of myofascial force transmission confirm that the actual stiffness of the general fascia and fascial compartments appear to be very important for the quantity of myofascial force transmission (9).

Fascial entrapment patterns can appear when a body segment stops receiving appropriate stimuli, establishing a pathological process with deficient circulation and limitation in nutrient supply to the fundamental substance of connective tissue, with its consequent densification. Because this dense tissue is hypomobile, it leads to movement limitations (10). Fat accumulation is therefore favored in the affected body segment, altering the properties of the connective tissue and perpetuating the dysfunction if not corrected. Areas of myofascial entrapment are highly sensitive and painful to all type of stimuli (11).

Myofascial release techniques are used to help alleviate musculoskeletal pain. There are theories why myofascial release can help when dealing with musculoskeletal pain. These theories include the Gate Control Theory, interpersonal attention, parasympathetic response of the autonomic nervous system, and the release of serotonin. The Gate Control theory suggests that sensory stimuli, such as pressure, travel along faster nervous system pathways than do pain stimuli. The faster moving pressure stimuli interfere with the transmission of painful stimuli to the brain, thus “closing the gate” to the brain’s perception of pain. Interpersonal attention refers to the hands-on, individualized attention that the recipient of massage receives. This personal attention and human touch often has a calming effect that decreases

the perception of pain. This relates to the parasympathetic response of the autonomic nervous system. The stimulation of a parasympathetic response decreases the release of stress hormones, anxiety, depression, and pain. The release of serotonin blocks the transmission of noxious stimuli to the brain. Other inhibitory neurotransmitters, such as endorphins, may be released by the pressure that is generated by the treatment. Myofascial release's ability to alleviate pain may relieve muscle spasm, which can be attributed to the application of direct pressure as well (12).

Myofascial release is a widely employed direct manual medicine treatment which utilizes specifically guided mechanical forces to manipulate and reduce myofascial restrictions of various somatic dysfunctions. Myofascial release, when used with other conventional treatment, is effective to provide immediate relief of pain to reduce tissue tenderness (13, 14). Additional post-treatment clinical outcomes include attenuation of edema and inflammation, reduction of analgesic use, improved muscle recovery post trauma and increased range of motion in affected joints (15, 16). Manual manipulative therapy is effective in immediate response changes in tissue texture and pain threshold with patients diagnosed with mechanical neck pain (13). Myofascial release, when used with other treatment modalities, also showed immediate reduction in pain and improved range of motion in patients with cervical myofascial dysfunction (14).

Discussion

Research continues to support the effectiveness of myofascial techniques from the clinical aspect down to the cellular level. Functional roles of fascia may become impaired as a result of repetitive motion injury, physical trauma and inflammation. Traumatized fascia disrupts normal biomechanics of the body, increasing tension exerted on the system and causing myofascial pain and reduced range of motion. Myofascial release is clinically effective for these types of injuries. Investigation into the molecular mechanisms and cellular effects of modeled repetitive motion strain and myofascial release on human fibroblast was constructed in vitro. Fibroblasts treated with modeled repetitive motion strain responded with morphological changes as measured by cellular actin staining, reduction in area perimeter rations and increased focal adhesion kinase activity. Fibroblasts also displayed enhanced cellular apoptosis, likely mediated by death-associated protein kinase. Fibroblasts strained by repetitive motion strain followed by myofascial release displayed attenuation in these responses (17).

Injuries, such as repetitive motion strain, result in abnormal changes to tissue texture affecting passive and active resistance to motion which in turn leads to compromised joint articulation, discomfort, pain, and reduced range of motion. Improvement in these signs and symptoms are often seen post myofascial release treatment (13, 14, 15, and 16). With these types of injuries being a result of repetitive motion strain, massage, a form of myofascial release, has now been requested in the sports field. Information continues to come out on the positive impacts it can have on muscle recovery and mood state. In a recent study designed to evaluate the effect of massage on neuromuscular recruitment, mood state, and mechanical nociceptive threshold after high intensity exercise, massage proved to be very beneficial at

reducing the muscles local fatigue (18). In this study, 62 healthy active students were randomized into two groups. These students participated in an intense training workout, and then were provide a massage treatment afterwards, or a sham treatment. Surface electromyelography of quadriceps were taken of each participant. The EMG of the quadriceps was significantly lower versus baseline after the massage treatment, but not after the sham treatment. This study offers information that massage, after intense exercise, reduces the EMG amplitude of the quadriceps (18). EMG amplitude has been associated with muscle strength, and with the relationship between muscle fiber tension and length. It has been found that acute and chronic massage treatment can increase muscle fiber length (19). Massage is commonly applied to athletes during periods of fatigue in training. Fatigue is associated with muscular fiber changes that reflect the increased effort required to maintain a given level of mechanical performance (20). The relaxation produced by massage has proved capable of reducing local fatigue rate and muscular excitability by inducing relaxation.

Other studies have also confirmed that massage may promote muscle recovery after exercise. Post exercise isokinetic knee extension recovery has been improved by quadriceps massage, as demonstrated by one study that reported a greater quantity of leg extensions after 6 minutes of massage (21). Another abstracted study found greater peak torque values after a 10 minute quadriceps massage immediately after short-term intense exercise on a cycle ergometer (22). There was also a study that tested the effect massage had on grip strength. They found that they effect of massage was greater than no massage or than placebo (23).

Long-term effects of massage on post exercise performance may prove to be less beneficial. One study used a 20-minute classical Swedish massage performed 2 hours after maximal eccentric hamstring exercise and revealed no significant changes in peak torque. This finding suggests that massage also has a limited effect if delayed for as long as 2 hours after exercise (24). Research has also shown that there is no significance in getting a massage pre performance. Researchers using full body massage to enhance performance of athlete sprinters (25), amateur boxers (26), and those participating in field events (27) demonstrated no significant improvement in sports performance.

Myofascial release has been studied while examining ranges of motion pre and post treatment. One particular study was performed on a group of asymptomatic adults. There were 35 total subjects without a current history of neck, shoulder, or arm pain. The participants were randomly divided into 2 groups. One was the experimental group, and the other was the control group that received a sham or placebo treatment. Baseline ranges of motion were taken on each participant, and then measured after their treatment. The study found that the group that received the cervical myofascial technique done on their ligamentum nuchae had an increase in cervical flexion, extension, and left lateral flexion (28).

A study conducted in 2005, took a look at the effects of Active Release Technique on hamstring flexibility. The study took 20 male participants aged 21-30 years of age. Each participant had no previous hamstring injury. They began with a 15-minute cardiovascular warm-up consisting of jogging in place. The participants were then asked to perform a sit-and-reach test. The measurements were recorded, and then active release technique was

performed on the participant's dorsal sacral ligament and hamstrings by a certified ART provider. Following the initial treatment the sit-and-reach test was repeated and recorded. Sit-and-reach scores of all participants increased after treatment with Active Release Technique. These results suggested that a single session of Active Release Technique may increase hamstring flexibility in asymptomatic male participants (29).

Another study performed in Toronto, Canada studied the immediate effect on pain thresholds using Active Release Technique on adductor strains. Participants of the study had active adductor strain injuries. Active Release Technique was used to treat the area of injury. Subjects provided verbal pain threshold feedback during the use of a pressure algometer at the completion of each Active Release Technique treatment. The study demonstrated that the areas treated saw an increase in their pain threshold (30).

Fryer and Hodgson concluded that latent trigger points in the upper trapezius muscle treated with muscle pressure release technique elicited improved sensitivity to pressure. These authors concluded a significant increase in the mean pain pressure threshold following treatment protocols but not following sham treatments (31).

Aguilera investigated the immediate effects of ischemic compression and ultrasound for the treatment of myofascial trigger points in the trapezius. Data were collected using active range of motion, surface electromyography, and pain threshold using an algometer. The results suggest that ischemic compression improved active range of motion, decreased muscle activity as measured using electromyography, and increased pain threshold. These results suggest that pain sensitivity can be improved with manual soft tissue techniques utilizing compression (32).

Fernandez-de-las-Penas analyzed the immediate effects of a single treatment session of ischemic compression technique in comparison with transverse friction massage for cervical myofascial trigger point tenderness. Data were collected using a pressure algometer to obtain pain pressure threshold and visual analog scale for pain levels. The results concluded that each technique increased pain thresholds with no significant difference between treatment groups. These results also confirm that manual soft tissue techniques utilizing compression can improve tissues pain sensitivity (30).

Myofascial Release techniques can also play a role in treating peripheral nerve entraptments. Muscles that are constantly being contracted can theoretically compress or apply excessive tensile loading along the course of a nerve (Sajko). A case report about an elite pitching prospect was proposed with dealing with this exact mechanism of injury. The pitcher was dealing with some pain at the elbow and some numbness along the dorsum side of his hand, particularly the thumb and index fingers. The thought process for this case was nerve compression from the decelerating muscles used during the throwing motion. When these muscles undergo eccentric loading they can compress or apply excessive tensile loading along the course of the radial nerve. Treatment for this injury consisted of rest and myofascial release to the involved musculature. Resolution of symptomatology was swift after the conservative management approach was taken (33).

Another case report detailed a pudendal nerve entraptment case in a cyclist, while using Active Release Technique on the obturator internus. The patient reported with 9/10 pain in the penis and perineum, and caused fasciculations in the surrounding buttock musculature. Pain on

palpation was located at the sciatic notch. He was treated with an obturator internus Active Release Technique protocol. After two weeks of treatment the pain was down to a 5/10, and the patient began cycling again. After 4 weeks of treatment the pain went down to a 1/10 while continuing to cycle. 8 weeks later the pain in his penis and perineum had resolved, and the patient was symptom free (34).

Another study testing the efficacy of ischemic compression for treating carpal tunnel was performed recently. 55 patients suffering from carpal tunnel syndrome were randomized into 2 groups. 37 patients received 15 experimental treatments that consisted of ischemic compression of trigger points located in the axilla of the shoulder, the length of the biceps muscle, at the bicipital aponeurosis, and at the pronator teres muscle at the hollow of the elbow. 18 patients received a control treatment involving ischemic compression on trigger points located in the deltoid muscle, supraspinatus muscle, and the infraspinatus muscle. Outcome measures evaluations were completed at baseline, after 15 treatments, then 30 days following the treatment, and 6 months after that. A significant reduction of symptoms was only noted in the experimental group (35). The study demonstrates that the sites chosen to apply the myofascial technique may make a difference in a patient's outcome.

It has been demonstrated that Myofascial release techniques are beneficial for individuals recovering from myofascial injuries. Myofascial release techniques have also shown benefits in areas other than the musculoskeletal system as well. Recently, massage has been shown to increase tidal volume after lung or heart transplant by 30%. It was shown to increase percutaneous oxygen saturation by 1.6%. This study also demonstrated a reduction in central

venous pressure, and a reduction in pulmonary resistance (36). These resultant effects may, in turn, contribute to a reduction in blood pressure, as it has been shown that an increase in oxygen saturation may diminish activation of the rennin-angiotensin pathway. A deactivation of this pathway will lower serum sodium concentrations by decreasing the production of aldosterone and reducing vasopressor responses via angiotensin 2 productions (37).

Massage has also been shown to decrease post surgery edema in patients (38). Edema is usually caused by a mismatch in hydrostatic or oncotic pressure, which implies that massage may positively modify some of the vascular and lymphoreticular irregularities in patients. These effects, in turn, may have an effect on decreasing someone's blood pressure (37).The effects of massage on blood pressure may have a cellular pathway as well. By stretching tissue through massage there may be a change in fibroblast length and size. The associated cellular adjustments stimulated by this change include modification of signal transduction, mRNA and ribosome location, transcriptional events, cell adhesion dynamics, and production of extracellular matrix (39).

In a recent study, massage therapy was shown to decrease blood pressure. Blood pressures were take pre and post treatment and a reduction in systolic, diastolic, and mean arterial pressures were noted. A reduction in heart rate was also noted. Results in this study demonstrated an average systolic pressure reduction of 10.4 mm HG, a diastolic reduction of 5.3 mm Hg, and a mean arterial pressure reduction of 7.0 mm Hg. The study also demonstrated an average heart rate reduction of 10.8 beats per minute (37).

In another study conducted, it showed that myofascial induction therapies such as, suboccipital muscle technique, compression of fourth intracranial ventricle, and deep cervical fascia technique. During this study, an experimental group was chosen to have the treatments performed, and a control group was selected to have no treatment. According to this studies calculation, the experimental group had a decrease in state anxiety. Also measured was the participant's blood pressure and heart rate. The control group saw no change in their measurements, while the experimental group saw their systolic blood pressure, and heart rate decrease (40).

Myofascial release has also been shown to be beneficial to patients dealing with fibromyalgia. Know as the cause to fibromyalgia is still unknown, there are many hypothesis that exist that try to explain the etiology behind this chronic syndrome. Some studies have shown that the perception of pain in fibromyalgia is related to central nervous system modifications that translate into the amplification of nociceptive impulses (41). This phenomenon is called central sensitization, and it is believed to result from the plasticity of neuronal synapses in response to previous painful experiences. Different degrees of central sensitization have been described, explaining the variations in pain reported by fibromyalgia patients. Although there is no specific peripheral tissue anatomy that characterizes fibromyalgia, it does not diminish the importance of peripheral nociceptive mechanisms (42, 43). Central sensitization leads peripheral pain generators to trigger major nociceptive impulses that will in turn increase central sensitization. The most frequent peripheral pain generators in fibromyalgia include myofascial trigger points, degenerative joint disease, inflammatory joint disease, bursitis, tendinitis, development alterations, hypermobility syndrome, neuropathic

pain, injuries, trauma, repeated muscle pulls, visceral pain, disk herniation, spinal stenosis, and recurrent cephalgia (44, 45). There is no evidence of muscle disease in fibromyalgia, but there are reports of dysfunction in intramuscular connective tissue or fascia. This inflamed fascia can trigger a peripheral nociceptive stimulus that can lead to central sensitization in fibromyalgia (46, 47, and 48). Immunohistochemical studies of fascial tissue biopsies reveal an increase in collagen levels and inflammation mediators in connective tissue surrounding muscle cells (46). In line with these findings, studies suggest that there are latent and active trigger points in patients with fibromyalgia and myofascial pain syndrome (47, 48, 49, and 50).

In a recent study performed to test the benefits of massage-myofascial therapy on pain, anxiety, quality of sleep, depression, and quality of life in patients with fibromyalgia. The study was a randomized controlled clinical trial performed on 74 fibromyalgia patients. These patients were randomly assigned to an experimental group and a control group. The experimental group received massage-myofascial release therapy, and the control group received a sham or placebo treatment. Pain, anxiety, quality of sleep, depression, and quality of life were determined at baseline, right after they received the treatment, and at 1 month and 6 months. Immediately after treatment and at 1 month follow up, anxiety levels, quality of sleep, pain, and quality of life were improved in the experimental group over the placebo group. However, at 6 months post intervention, there were only significant differences in the quality of sleep index. This study demonstrated that massage-myofascial release therapy reduces the sensitivity to pain at tender points in patients with fibromyalgia, improving pain perception. Release of fascial restrictions also demonstrated a reduction of anxiety levels, and an improvement in the quality of sleep (51).

Now, not all soft tissue or myofascial release techniques are going to provide the same benefits. It will vary from technique to technique, and the results will vary from technique to technique. In a recent study conducted in 2006 at the National University of Health Sciences Massage Therapy Clinic, different types of massages were used on their subjects and the results varied accordingly. In this study the patient's blood pressure was measured on 150 current adult massage therapy clients with blood pressures lower than 150/95. Their blood pressure was measured before and after a therapeutic massage. Results showed that certain types of massage had more of an impact than others. In this study there were 6 different types of massage. Some types lowered the blood pressure, and some types increased the blood pressure. The six types of massage were Swedish massage, deep tissue massage, myofascial release, sports massage, trigger point therapy, and craniosacral therapy. The type of massage proved to be the most significant factor in this study. The technique that used significantly less pressure, like Swedish massage, showed a decrease in blood pressure. The techniques that used high levels of pressure, like trigger point therapy and sports massage, showed an increase in blood pressure (52). This study shows that results can vary with what type of myofacscial technique is used, and how much pressure is applied while using the technique.

Other studies have shown the benefits of massage for dealing with patients with dysmenorrhea. The effects of massage therapy on dysmenorrhea caused by endometriosis were studied to track women's quality of life after being diagnosed with endometriosis. This studied examined 23 patients with endometriosis, and the visual analog scale and McGill questionnaires were given once before massage therapy, and then twice after. The intervention lasted 20 min, and was conducted at specific points of the abdomen, side, and the back of the

sacrum. The results showed decreased in pain intensity after the intervention, and 6 weeks after the intervention (54).

Overall myofascial release techniques offer a wide variety of benefits. Along with these benefits come side effects as well. In a recent study on the side effects of massage care, it was demonstrated that 10% of clients receiving massage care had a minor negative side effect. These minor negative side effects were listed as bruising, headache, fatigue, and increased discomfort or soreness. Discomfort and soreness made up 9% of the 10% that had a minor negative side effect (53).

Conclusion

Myofascial release treatments are very diverse, and can vary in their application, but when applied to injuries involving the myofascial tissue, they seem to be very effective. Myofascial release is a hands-on manual therapy that applies force directly to the specific tissue involved. These techniques rely on the provider's sense of touch and perception to find the affected tissues involved. Treatments will vary in pressure, duration, motion, and tension. Due to this variation results and outcomes may vary as well. Providers usually rely on palpation and patient's symptomatology to find an inflamed or fibrotic area. The goal of these treatments is to loosen up or relax these tightened areas found in the soft tissues of the human body. Treatments are designed to relieve these irritated areas, and hopefully when doing so, relieve symptoms as well. When applied appropriately and in a timely manner these soft tissue or myofascial techniques have proved themselves as an effective treatment.

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