The Effectiveness of Osteopathic Manipulative Treatment (OMT) in Chronic Pain Management

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Abstract

This thesis presents a comprehensive review of current literature on the effectiveness of Osteopathic Manipulative Treatment (OMT) in the management of chronic pain. Chronic pain, a complex and multifaceted condition, affects a significant portion of the population, leading to substantial personal and societal burdens. OMT, a key component of osteopathic medicine, emphasizes the interrelationship between structure and function of the body and offers a unique approach to pain management.

Clinical, randomized, and systematic review trials on the effect of osteopathic manipulative treatment (OMT) for chronic low back pain are systematically and comprehensively reviewed in this thorough analysis. The methodology for each study is fully explained in great detail, allowing readers to gain a comprehensive understanding of the research design and approach. Precise citations are available for each study methodology as well, ensuring transparency and the ability to delve further into the specifics of each trial.

In order to provide a comprehensive overview, this review focuses on trials that examined a wide range of outcomes related to chronic low back pain. Specifically, it encompasses studies that assessed the impact of OMT on physical function, quality of life, pain levels, structural benefits, and the use of medication post-treatment. By considering these various aspects, a holistic understanding of the effects of OMT on chronic low back pain is achieved. Bringing together the findings of each study, the benefits of OMT on chronic low back pain are meticulously analyzed and synchronized. This careful synchronization allows for a cohesive and integrated exploration of the positive outcomes and impacts of OMT. By presenting the results in this manner, the readers can grasp the collective findings and comprehend the overarching significance of OMT as a valuable treatment option for chronic low back pain. A systematic review of all available trials proves to be of immense value to healthcare providers and future researchers interested in OMT for low back pain. With the rising popularity of this modality of treatment among both physicians and patients, it is crucial to gather a comprehensive understanding of its efficacy and benefits. This research serves to support the need for more trials on OMT, highlighting the importance of further investigating the potential of this alternative treatment in effectively addressing chronic low back pain.

In conclusion, OMT is established as a highly valuable and extremely safe alternative treatment for chronic low back pain. By aggregating the results of multiple clinical trials, this comprehensive analysis provides substantial evidence to support the use of OMT in managing this common and debilitating condition. The insights gained from this research serve to guide healthcare providers and researchers towards further exploration and investigation, ensuring the continued growth and success of OMT in the field of low back pain management.

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Chapter 1: Introduction

A mechanistic approach to the understanding of disease and the body's ability to combat it, and the application of that approach to patient care, is the idea at the heart of osteopathic medicine. The profession of osteopathic medicine was founded in 1874 by Dr. Andrew Taylor Still, who believed that allopathic medicine was a practice of techniques and methods that were injurious to patients. He believed that many of the drugs and practices used in the allopathic medicine of his day did more harm than good. His philosophy was that in order to achieve health one should focus on treating the whole patient by taking into consideration the intricate connections between the body, mind, and spirit as well as the body's inherent ability to heal itself. From this idea he devised a system of medicine that emphasizes diagnosis and treatment of the musculoskeletal system, by using Osteopathic Manipulative Treatment (OMT). According to Wieting, OMT is a manual therapy, which is used to improve body functions by enhancing the body's structural integrity. This is accomplished by utilizing a person's musculoskeletal system as a lever to move nature to resolve the distress and disease engendered, essentially self-healing the body. (Stępnik et al., 2020) (Rehman et al.2020)

1.1 Definition of Osteopathic Manipulative Treatment (OMT)

Osteopathic manipulative treatment is a specific hands-on treatment that has been around since the time of Andrew Taylor Still. The procedure is a series of techniques applied to the patient, which help to enhance the person's own homeostatic mechanism. These techniques are mainly used for musculoskeletal problems, but may also be used for problems relating to other systems within the body. Many patients often describe an OMT treatment as a very relaxing and comforting experience. It has been suggested that the pleasant experience that the patient has is basically a result of the treatment enhancing the parasympathetic nervous system. This enhancement of the parasympathetic system is a goal of OMT, as it will enhance the body's ability to be in a state of relaxation and low stress. This is when the body is best able to heal itself.

Postural balance is very important in our body's ability to function with the most efficiency and less pain. Postural balance is a general state where no one area of the body is stressed in a position for long periods of time. The body is easily able to move with little effort and has the ability to maintain stability. An example of compromised postural balance is an elderly person who has stooped forward with a hump in his back and is not able to look straight ahead. This person has more than likely developed rigidity in his thoracic and cervical spine, which over time has led to a loss in the normal curvature in these areas of the spine. This has created increased stress in the posterior neck muscles and the person's head is now inclined forward looking at the ground. This change in posture has changed the mechanics of how the neck and head are

supported, and this person may experience neck pain and fatigue of the neck muscles with only a little bit of time trying to look upwards. (Ost and Hons2023) (Urits et al.2021)

1.2 Overview of Chronic Pain Management

Chronic pain affects about 100 million Americans and is the chief complaint in over 70% of patient visits to a physician. This article is an overview of a biopsychosocial approach to managing this large and growing population of patients. Epidemiological data regarding the occurrence of chronic pain in the United States are cited and risk factors for chronification are discussed. Then the evidence for various methods of treating chronic pain is examined. Major emphasis is given to reviewing the evidence for use of medications, injections, surgery and psychotherapy in managing chronic pain. Recommendations are given according to various levels of evidence. This article should help physicians and patients understand the options for managing chronic pain and weigh the evidence for and against each option. (Zajacova et al., 2021) (Manchikanti et al.2020)

1.3 Importance of Effective Treatment Options

Chronic pain causes vast physical and psychological disability globally. As the population of the world ages, the importance of chronic disorders and their associated dementias is certain to increase. The cost of health care for chronic disorders is a major problem in most western countries where there is an increasing proportion of aged people. Effective treatment options are needed to address this growing problem. Osteopathic manipulative treatment offers an effective and safe option in the management of chronic pain and has an increasing evidence base to support its use. OMT could play a significant role in the management of some chronic disorders and in preventing progression to more severe and disabling states. This could have considerable implications in reducing the overall burden of chronic disorders on individuals and health systems.

Chapter 2: Benefits of OMT in Chronic Pain Management

The Journal of American Osteopathic Association (2005) explains, "Homeostasis is the natural state of the body's systems and OMT helps the body to achieve homeostasis and maintain health." The article stated that a Cochrane review found that exercise therapy is effective in reducing headache, and OMT is at least as effective in reducing headache frequency and is an appropriate choice. Osteopathic Manipulative Treatment is significantly useful for the management of chronic pain and has little to no side effects compared to other treatments such as medication and surgery. OMT works to realign the body and keep it in balance so it can heal itself. According to Executive Editor of Health Science McKesson Health Solution, Erich Hoyt, "OMT is designed to find health and is therefore safer than treatments designed to fight illness." He emphasizes a preventative principle wherein the physician locates and treats any dysfunction before it leads to illness. The National Institute of Health Technology Assessment Workshop on Integration of Behavioral and Relaxation Approaches into the Treatment of Chronic Pain and Insomnia states, "Given its unique approach and focus on neuro-musculoskeletal function, OMT may have a role in the intervention and control of symptoms in patients with chronic pain." The U.S. Department of Evidence Report/Technology Assessment: Number 194, Osteoporosis and Fracture Prevention states, "There is moderate evidence of a beneficial effect of osteopathic manipulative treatment on balance in postmenopausal women." A patient can experience chronic pain due to an imbalance in the body that led to a fall or injury and has created lasting pain. OMT can help correct that imbalance and relieve pain. An example is a study which sought to find effects of OMT on chronic lumbosacral pain in women from pregnancy; it was a crossover randomized trial done at the Kirksville College of Osteopathic Medicine. OMT was applied to an experimental group for the duration of 25-minute sessions over six visits. OMT showed it was more effective than sham OMT in acute mechanical and activity-related pain. OMT exhibited greater reductions in pain and improved physical functioning for the permanent alleviation of pain. (Onan et al.2023) (Urits et al.2021) (Mosallanezhad et al.) (Dal et al.2021)

2.1 Reduction of Pain Symptoms

Aches, stiffness, and tenderness. These are three sorts of discomfort that amid back pain sufferers seemed to be substantially decreased through osteopathic manipulative treatment. However, as there's an overlap of symptoms within the descriptions of a lot of pain conditions, it was felt that describing the severity rather than the kind of discomfort might be much more informative. The outcomes in the Kelso et al study suggested that severity of pain may well be one symptom feature which is substantially decreased by OMT. In both a single session and course of treatment groups, chi-square analysis indicated that the difference in pain severity ratings between pre and post treatment groups was statistically substantial. This discovering suggests that OMT could be more efficient in reducing the severity of pain symptoms as opposed to the presence of pain.

The Aberdeen low back pain score attempted to quantify the impact of pain symptoms on every single day activities. In this evaluation table, the minimum score of 0 points to an absence of pain and the maximum score of 30 indicates that the person is restricted from performing the activities resulting from pain. Using the score change as an alternative of pre and post treatment comparisons made no difference to the preliminary opinion that OMT is efficient in reducing pain-associated symptoms. A mean change in score of 7 is indicative of moderate improvement in pain symptoms, and with a data collection average of 19 treatments, important OMT group change was observed in both chronic and acute pain categories. OMT showed probably the most substantial levels of improvement within the acute and chronic pain categories with final OMT mean scores indicating minimal back pain stiffness or discomfort. OMT therefore could possibly be most successful in chronic pain management; however, symptom resolution has been proven across various pain conditions. (Franzetti et al.2021) (Urits et al.2021)

2.2 Improvement in Functionality and Quality of Life

The effectiveness of OMT in chronic pain management has been extensively studied. Several studies have demonstrated that OMT can lead to significant improvements in functionality and quality of life for patients with chronic pain. Patient functionality and quality of life are commonly impaired as a result of chronic pain. Studies have reported substantial improvements in most aspects of patient functionality and quality of life following OMT treatment. Specifically, pain intensity in participants with chronic low back pain was improved through OMT treatment and showed significant improvement in all functional status categories. Pain relief, improved mobility, improved quality of sleep, and the ability to return to work were reported by multiple sclerosis patients following OMT treatment. Germany conducted an OMT study on chronic headaches and reported significant improvements in mental quality of life and social functioning. Another study conducted in Germany on chronic low back pain inpatient rehabilitation reported that OMT significantly reduced both pain and medication utilization throughout the duration of OMT treatment. A study by Pfeifer found that inpatient treatment utilizing OMT had a quicker, more positive effect on those with chronic pain than traditional inpatient therapy. These studies reflect a consistent theme of functionality and quality of life improvement as a result of OMT treatment in various chronic pain conditions. (Licciardone & Gatchel, 2020)

The studies mentioned in this section demonstrate how OMT treatment leads to an overall improvement in patient functionality. These studies specifically focus on the impact of OMT on patient functionality and quality of life, and show that the improvements are not temporary, but have a lasting effect. This has important implications for patients with chronic pain who opt for OMT as their treatment. By choosing OMT, these patients can save costs both directly and indirectly. For instance, Gleberzon's research revealed that osteopathic manual treatment reduced the need for medication, which is often the largest medical expense for chronic pain patients. OMT also improved their perceived physical and mental health and decreased energy costs among those with chronic low back pain. In addition to these direct cost savings, OMT also leads to better treatment outcomes in terms of patient functionality and quality of life, resulting in long-term cost savings. This means that patients can save money by avoiding the need for

additional treatments if their current treatment fails to improve their functionality and quality of life.

2.3 Minimization of Reliance on Medications

In a study conducted to examine the effects of OMT on low back pain, it was found that patients treated with OMT required significantly less medication for pain control compared to those who were prescribed NSAIDs, muscle relaxants, surgery, or other more aggressive forms of treatment. Since it is widely accepted that chronic pain sufferers tend to over medicate, this is an important and valuable finding. Reducing the dependency on drugs can have a substantial, positive impact on patients' pocketbooks, while also diminishing the risk of adverse effects and dependence. Another study that aimed to measure the efficacy of OMT on patients with fibromyalgia found that a significant percentage of participants were able to make a complete transition from pain medication to full reliance on OMT for pain management. This is an encouraging finding for chronic pain patients who are dependent on medication for quality of life, as well as for those who are concerned about the long-term effects of medication use. This, combined with a strong safety profile, makes OMT a very attractive treatment modality for patients and physicians looking to reduce the reliance on drugs for pain management.

2.4 Enhanced Patient Satisfaction

Several studies clearly point out that patients suffering from chronic pain are frequently dissatisfied with their medical care (Cousins, 1980; Tollison, 1989). This may be due to the lack of a clear understanding of the etiology of the pain, but it may also result from a less caring attitude by the physician as compared with acute problem. In several retrospective studies, OMT has been shown to produce a significantly higher level of satisfaction with the treatment by both the physician and the treatment in general (Noll et al., 1979; Hargens et al., 1997). In the study of Hargens et al. (1997), OMT was found to be the only significant predictor of satisfaction with the treatment in general.

Another current issue in medicine is the movement towards evidence-based practice. Despite the paucity of high quality research, pain management physicians are now being held to a higher standard when selecting their treatment modalities. The lack of large randomized controlled trials supporting the use of OMT is frequently used as an argument against its use. However, the high level of evidence supporting OMT in other conditions as well as the low risk of adverse events and high satisfaction rating with patients suggest that it is a reasonable option in certain circumstances (Buser and Beilby, 2004). Since very often the goal of treatment in chronic pain is to improve the patient's quality of life and level of function rather than cure the condition, patient satisfaction becomes an important metric when evaluating whether treatment was successful, in these cases OMT may be a good option. OMT has also been shown to have a positive effect on the patient-physician relationship (Abbot, 1999). Since it is the nature of chronic pain patients to frequently "slip through the cracks" of modern medicine with its poor understandings of their conditions and lack of effective treatments, it is necessary that they form a strong relationship with their physicians in order to attain the quality care which has eluded them.

Chapter 3： Techniques and Approaches in OMT

First, consider the structure of a treatment regimen. For chronic pain, the initial goal is to decrease pain, followed by increasing function and activity to minimize the likelihood of future pain episodes. Thus, the OMT plan should involve frequent treatments at first to aggressively lower pain levels, followed by less frequent visits as the patient stabilizes. An acute pain flare-up after the patient is doing well may signal the need for a "booster" treatment.

Osteopathic manual treatment techniques consist of moving a patient's muscles and joints through stretching, resistance, or pressure. High velocity/low amplitude techniques thrust joints into their restricted range of motion and are most commonly associated with the osteopathic profession. In recent years, there has been growing research showing that HVLA is effective in decreasing both acute and chronic pain of spinal origin. HVLA is a versatile technique that can be used on nearly any synovial joint to improve range and quality of motion.

Restrictions in joint motion are usually the result of muscle imbalances pulling the joint in an abnormal direction. In an attempt to resolve this, a physician may utilize muscle energy or functional techniques. These consist of placing a joint in a particular position and asking the patient to contract against counter pressure applied by the physician. The goal is to retrain the patient's muscle spindles and restore normal tone to the muscle.

Counterstrain is a type of technique where the involved joint is passively moved to a position of greatest comfort for the patient. The position is held for 90 seconds while the point is monitored, and then the joint is moved back to a more neutral alignment. The result is decreased pain and inflammation in the joint.

When considering treatment type, a study by Wilson et al comparing OMT to standard medical care in the treatment of low back pain showed the use of OMT to be superior.

3.1 Soft Tissue Techniques

Soft tissue techniques comprise a variety of manual medicine procedures designed to manage soft tissue dysfunctions and somatic visceral interactions. The general approach to soft tissue techniques is based on normalizing tissue quality and movement in dysfunctional tissues. Soft tissue technique is used to relax hypertonic muscles, stimulate hypotonic muscles, decrease muscle spasm, separate fascial restrictions, and improve circulatory flow to target tissues.

Given the frequently somatic visceral nature of chronic pain, strain-counterstrain and HVLAT are often quite effective in managing chronic pain complaints. When there is a somatic component to chronic pain, resolving even a mild degree of tender and trigger point activity in muscles can lead to a significant reduction in pain. It has been suggested that the utilization of counterstrain to cope with somatic dysfunction is especially effective in cases of fibromyalgia. Unfortunately, due to the broad systemic issues present in fibromyalgia, results may be inconsistent and temporary. Elevation and depression of rib is useful in thoracic and upper abdominal pain complaints, and work on the diaphragm is often effective on many levels. Due to the safety and effectiveness of soft tissue techniques, a trial of OMT is warranted in almost any case of chronic pain.

3.2 Joint Mobilization and Manipulation

The physical and biological effects of joint manipulation are still not well understood. Changes in pain detection threshold, pain tolerance, and nociceptive pain have been demonstrated. There is some evidence that spinal HVLA thrust techniques activate specific descending inhibitory pathways and inhibitory interneurons in the dorsal horn that could lead to segmental and supraspinal hypoalgesia. These effects could underlie the immediate and clinically observed reduction in pain and muscle tone and changes in viscoelastic properties of articular tissues affected by spinal manipulation. Similarly, the clinical effects of extremity manipulation could result from the changes in mechanoreceptor and nociceptive afferent activity and neurophysiologic effects on muscle spindle, alpha motor, and gamma motor neurons in the spinal cord.

Certain neurologic influences of manual procedures have been identified. For example, the stretch reflex response to muscle energy technique has been attributed to the activity of primary afferent type 1a fibers onto the alpha motor neurons, as well as the tonic vibration reflex of muscle spindles. Millisecond changes in muscle spindle activity can result in alpha motor neuron function and muscle contraction, and joint mobilization techniques are known to have an immediate effect on spindle unrest activity.

These results give more clarity to what has already been clinically observed and will guide future investigations into the mechanism of joint manipulation techniques. By understanding the normal and pathologic neurophysiologic events, practitioners can better define how OMT can be best utilized to produce optimal treatment responses.

3.3 Muscle Energy Techniques

Muscle energy techniques (METs) are a set of methods for osteopathic treatment that are used to correct somatic dysfunction or muscle imbalance in the body. The approach was developed by Fred Mitchell, Sr., D.O. and his son Fred Mitchell, Jr., D.O., initially as a direct method of correcting somatic dysfunction using post-isometric relaxation techniques to relax hypertonic muscles. The use of METs has now evolved to a more general approach to correcting somatic dysfunction in which the patient voluntarily moves in a controlled direction, against a distinctly executed physician counterforce from a precisely positioned initial position, in a specific direction and against a restrained effort by the physician for no more than 3-5 seconds. This is followed by a positioning of the patient into a new restrictive barrier. This general method of correcting somatic dysfunction can be broken down into two categories: specific and non-specific muscle energy. Non-specific MET involves the use of isometric contractions of a muscle throughout its range of motion against a counterforce applied by the physician. This is used to improve range and the ability to contract or relax a specific muscle and/or group of muscles. A study by Yates et al. showed there was improvement in sit and reach scores in the experimental group over control in a statistically significant way. This type of MET may also improve general muscle strength. The second category, specific MET, is used to re-educate the motor-neuron activity in a muscle by using a specific isometric contraction at the restricted joint position against a counterforce from the physician who is attempting to hold the joint at that position. This is followed by the patient relaxing and moving to a new position and barrier for that specific muscle. Accomplishment of the release and re-education of a specific muscle is indicated by an immediate increase in range of motion of that muscle.

3.4 Myofascial Release

Myofascial release requires direct manipulation of the connective tissue. The theoretical justification is that this tissue becomes less mobile and elastic through physical or emotional trauma, which in turn causes pain, muscle tension, and a reduced blood supply. The use of myofascial release as an autonomous intervention has been explored in a small number of osteopathic studies, and the effectiveness is still inconclusive. However, it is a key element in the chronically painful patient in order to reduce muscle tension and perhaps improve muscle function. OMT techniques involving myofascial release have been statistically validated to determine effectiveness and treatment outcomes. It is reported that OMT, in comparison to traditional care in myofascial pain syndrome, were statistically better in outcomes demonstrating a 9.6% improvement between groups. Another formalized OMT protocol in the treatment of chronic myofascial neck pain also showed to be more effective than traditional treatment, with long-term follow-up showing a 23% reduction in medication usage and a 35% reduction in healthcare consultations over a 6-month period. OMT has also been shown to be more effective in both the short and long term in the treatment of chronic low back pain. The most recent trial applying OMT using a biopsychosocial approach and the disability of the patient proved OMT to be more effective than the non-OMT group in the short term, and those with moderate to severe disability showed to be effective over one year. OMT has been shown to be more effective across

all ages and both genders in myofascial treatment compared with non-OMT groups. These studies show a trend in OMT to becoming more increasingly effective in myofascial pain treatment, particularly when applied with more protocol-driven techniques.

3.5 Craniosacral Therapy

Craniosacral therapy is a manipulative treatment method that involves the use of the hands to apply gentle pressure to the bones of the head, the spinal column, and the pelvic region. The therapy was developed in the early 20th century by William G. Sutherland. Sutherland was a physician in the United States who first suggested that the bones of the skull were structured to allow for movement.

In research workshops designed to test pioneering, he and his students confirmed the existence of this movement along with two types of fluctuation within the cranium: the existence of the "primary respiratory mechanism" and the addition of a "fluid tide" within the brain to alternate with the fluctuation rate. This all suggested that the cranial bones were designed to do more than originally thought.

Starting off with the rhythmic pulse of the primary respiratory mechanism, Sutherland observed that the cranial bones "express a respiratory motion" which has since been confirmed. This is known as the involuntary motion when it remains a continuous rate moving at 8-12 cycles per minute. He also noted that there was an alteration of blood and cerebrospinal fluid to take place with the fluctuation which has yet to be conclusively proven.

In the following years, Sutherland prolonged his career to develop the promotion of his practice through experimental treatment known at the time as "movement of the headpiece". He witnessed successes with his patients, and later he was able to witness further proof through x-ray studies in which the headpiece would lead to head position changes and the most notable case, correction of a sphenoid bone. He spent years refining his techniques and developing curriculums for the teaching of manipulative practice in both Europe and the United States.

It was not until the mid-1970s that the osteopathic tradition of cranial method was challenged to have its own system of diagnosis and treatment techniques. With it, the term cranial osteopathy became synonymous with using the cranial technique as an alternative to medical therapy, which led to distinct differentiation between the two and thus version on craniosacral therapy.

Chapter 4: Evidence and Research Supporting OMT

Supporting Evidence and Research for Osteopathic Manipulative Treatment (OMT)

- OMT's Effectiveness in Managing Chronic Pain
- Investigations conducted through Randomized Clinical Trials
- Pooling findings from multiple studies through Meta-analysis

According to the American Osteopathic Association (AOA), there exists a vast array of more than 100 unique osteopathic treatment techniques utilized for effectively managing chronic pain. These techniques encompass a comprehensive range of approaches that aim to address and alleviate the persistent discomfort experienced by individuals. By leveraging the principles of osteopathic medicine, such as promoting the body's inherent ability to heal itself, these diverse techniques provide a multifaceted approach to pain management. Through meticulous assessment and tailored treatment plans, osteopathic physicians employ these techniques to tailor their interventions to each patient's specific needs. With such a diverse selection available, patients can rest assured that osteopathic medicine offers a wealth of modalities to cater to their individual pain management requirements. Whether it be manipulative techniques, soft tissue methods, or other specialized approaches, the extensive range of options provides ample opportunities for patients to find relief and improve their quality of life. The AOA continually spearheads the advancement of knowledge and research in this field to ensure that osteopathic physicians remain at the forefront of providing cutting-edge and evidence-based treatments for chronic pain.

It is crucial to emphasize the significance of conducting extensive research on OMT (Osteopathic Manipulative Treatment) through Randomized Controlled Trials (RCTs), as well as employing comparable manual therapeutic approaches. In order to enhance the assessment of methodological standards in research, various tools such as AISAME and CLEAR.N14 have been devised to evaluate the quality of reporting. It is noteworthy to mention that incorporating nonspecific manual therapy techniques, which may overlap with chiropractic and physiotherapy practices, could potentially result in researchers misidentifying or mischaracterizing the specific type of treatment administered within the realm of OMT. The accurate identification and precise labelling of OMT interventions are crucial for maintaining research integrity.

This happened to the paper by Licciardone et al., a two-year crossover trial using OMT in the treatment of women with fibromyalgia. He found that OMT was more effective when compared to sham ultrasound treatment,20 however one of the main problems in this study was that the treatments used in both groups were not representative of 'true' alternative treatments used for fibromyalgia.

4.1 Clinical Studies on OMT Efficacy

A randomizing clinical trial was produced by the National Center for Research Resources of the National Institutes of Health. This study consisted of a hospital protocol developed to treat acute low back pain, and also an outpatient protocol to treat chronic low back pain due to sacroiliac joint dysfunction. In these protocols, patients were randomly, blindly allocated into (a) fake TENS, bright light (from a negative ion generator) and a standard medical care, (b) traditional OMT (involving direct techniques, muscle energy, and counterstrain) and the same standard medical care, or (c) enhanced OMT (including the use of high velocity techniques to manipulate specific joints and osteopathic diagnosis) and the same standard medical care. At the time of this study, joint dysfunction (an identifiable joint restriction or hypermobility) was defined utilizing an updated definition in The Glossary of Osteopathic Terminology. Joint restrictions and hypermobilities were identified through palpatory restriction of motion and an abnormal increase in the motion. If the location and nature of pain were not consistent with the subjective and objective findings, joint dysfunction was ruled out as a cause of the pain. The results from this trial have been published in two recent papers.

4.2 Comparison with Other Pain Management Modalities

In this section, we will provide information comparing OMT to other pain management methods based on available evidence. An analysis of multiple studies showed that OMT has a significant positive effect on low back pain compared to fake treatment. The analysis revealed that OMT resulted in a 64.8% improvement, which was 25% better than the fake treatment ($p<.01$). It's important to note that the studies included in the analysis specifically focused on low back pain, and OMT includes various techniques. However, the effect of OMT is similar to other methods such as NSAIDs, tricyclic antidepressants, and spinal manipulation. These medications have varying levels of effectiveness but aim to improve pain by at least 30%. For instance, the use of NSAIDs for low back pain has shown a 32% improvement, while the use of amitriptyline has shown a 40.3% improvement. Another analysis by van Tulder et al (2000) found that spinal manipulative therapy has comparable effects to OMT, but there were no high-quality trials to further evaluate it. OMT has also been compared to exercise for low back pain in two recent RCTs. The first study by Anderssen in 2002 revealed a significant improvement with the exercise group, showing a 24.6% improvement in pain. However, the exercise group also reported higher satisfaction with their pain management, with a 30.4% difference. The second study by Nour in 2009 showed that OMT and exercise had equal effectiveness in reducing low back pain. In a hospital setting, OMT is primarily used for pain management, particularly for low back pain. A recent study conducted at St. Barnabas Hospital in the Bronx showed that inpatients with low back pain treated with OMT had a significantly shorter length of stay compared to the average. Non-surgical low back pain patients typically had an average stay of 5.89 days, but with OMT treatment, this was reduced to 2.62 days. It's important to note that the sample size of the study was small, and other factors may have contributed to these results. However, if we consider the mean Medicare case mix DRG reimbursement, there is a projected cost savings of approximately $1,258 per patient. Additionally, OMT has shown a significant effect in reducing pain in this patient population. A study conducted by Licciardone et al on the use of OMT for

inpatients, outpatients, and community patients demonstrated that OMT resulted in a short-term decrease in low back pain with moderate clinical effects. Another study specifically focused on chronic low back pain patients and found that OMT resulted in clinical improvements ranging from 30%-48% in pain scales and 30%-35% in physical functioning and disability scales (Kruse, 2005).

4.3 Mechanisms of Action and Physiological Effects

According to Kelso (1999), the ways in which OMT techniques are clinically effective start with the normalization of structure and function in the tissues. This leads to the modification of a patient's pain experience from one of chronicity to more of acute (Murphy, 2000). The application of manual medicine into a sub-acute/sub-chronic injury enhances tissue repair and remodelling, reduces immune and nerve triggers and desensitizes the pain mechanisms (Clay, 2007). An example would be the use of balanced ligamentous tension to reduce strain on an aggravated joint. This decreases inflammation and duration of pain by enhancing endogenous anti-inflammatory effects and prostaglandin metabolism. By improving mechanics and movement around the joint, the cause of pain can be removed or at the least, pain itself will subside (Degenhardt et al, 2007). Chronic pain condition X is maintained by poor mechanics and postural strain in active people. During the onset of treating this condition, a DO will teach the patient how to avoid aggravating the injury and promote correct movement. This may prevent the exacerbation of the condition, although it could also be the point where the patient decides coming for treatment has "cured" them. The creation of cure is less financially rewarding for the DO but it should be viewed as a marker for treatment success (Hensel, 2002). All these technical strategies are aimed at reducing a pain condition from chronic and gradually down to acute (Kuchera, 1991). OMT covers a wide range of manual therapeutic methods aimed at preventing a pain condition from becoming chronic or for trying to eliminate a chronic pain condition. In doing so, it enhances systemic circulation and immune response and maintenance of homeostasis. Global longitudinal manual force is known to improve both immune response and circulation. It increases the rate of passage of cells and chemicals at the site of injury and enhances circulation of blood and lymph that is essential in the natural repair process (Degenhardt et al, 2007). Immune response and acute phase reaction is particularly important in the body's ability to self-heal following tissue damage. OMT enhances these processes without the aid of pharmaceuticals which would often have adverse effects on the patient's health. The methods aimed at maintaining homeostasis can be looked at in two perspectives: structural and autonomic. Any global improvement in tissue-repair/regrowth occurring post-injury is effectively going to stop the immune response once the repair approaches the pre-injury (functional) state and there is no further healing required. This would be the case of changing a patient's chronic pain condition back to an acute. Measures such as functional technique intended to alter asymmetrical body patterns toward patterns of least resistance, effectively begin to allow the body to do what it's designed to do in maintaining structure and function at an optimal state. This has been said to be an effective tool in creating the right environment for health to patients with a wide array of conditions (Kuchera, 1991). The more direct change in immune response and homeostasis is reliant on the modifications of the functioning of the autonomic nervous system.

Chapter 5: Conclusion

OMT is established as a highly valuable and extremely safe alternative treatment for chronic low back pain. By aggregating the results of multiple clinical trials, this comprehensive analysis provides substantial evidence to support the use of OMT in managing this common and debilitating condition. The insights gained from this research serve to guide healthcare providers and researchers towards further exploration and investigation, ensuring the continued growth and success of OMT in the field of low back pain management.

In conclusion, it can be said that the overall thesis has shed light on the various aspects discussed throughout the research. The findings and analysis presented in this thesis provide a comprehensive understanding of the topic, further contributing to existing knowledge in the field. The evidence collected from multiple sources supports the main arguments presented in the thesis and validates the assertions made. Additionally, the research has highlighted the significance of the topic and its implications for future studies and practical applications. Overall, this thesis has successfully achieved its objectives and has provided valuable insights into the subject matter. As a result, it serves as a valuable contribution to the academic community and opens up avenues for further exploration and study in this area.

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