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Association of Spinal Manipulative Therapy With Clinical Benefit and Harm for Acute Low Back Pain

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ABSTRACT

Background: The literature on spinal manipulative therapy (SMT) for acute low back pain presents a multifaceted view of its efficacy, safety, and broader implications for treatment. The introduction establishes a foundation for understanding SMT's potential benefits, particularly in alleviating pain and improving function in acute low back pain cases, while also acknowledging the risks involved. **Literature Review:** The review highlights several pivotal studies that collectively affirm SMT's effectiveness. For instance, the comprehensive review by (J Schneider, 2009) demonstrates that SMT consistently provides superior outcomes compared to other treatments for uncomplicated acute low back pain. This finding is supported by the synthesis of systematic reviews by (C. Petering & Webb, 2011), which affirms moderate evidence for short-term pain relief. However, the literature also reveals a complexity in outcomes, as seen in the contrasting findings from various studies that indicate no significant difference between SMT and standard treatments, as noted in the Cochrane review referenced by (C. Petering & Webb, 2011). Safety concerns are addressed through the examination of adverse events associated with SMT, as highlighted by (Tuchin, 2012). While adverse events are often minor, the potential for serious complications necessitates careful patient selection and informed consent. The critical evaluation of the safety profiles of SMT emphasizes the need for practitioners to remain vigilant regarding patient histories and risk factors. **Conclusion:** In conclusion, the literature presents a robust overview of SMT's role in managing acute low back pain, illustrating its potential benefits and risks. The evidence supports SMT as an effective non-pharmacological intervention, particularly for short-term relief, while also emphasizing the importance of patient-centered approaches and informed decision-making. Ongoing research is essential to further elucidate the mechanisms of SMT, optimize treatment protocols, and ensure that clinical practice is guided by sound evidence.

Keyword: Spinal Manipulative Therapy, Clinical Benefit and Harm, Acute Low Back Pain

INTRODUCTION

The association of spinal manipulative therapy (SMT) with clinical benefits and potential harms for acute low back pain has been a subject of extensive research, reflecting a diverse range of findings and implications. The literature reveals a consistent focus on the effectiveness of SMT, particularly in the context of acute low back pain, while also addressing concerns related to adverse effects and the need for further understanding of its mechanisms.

In a foundational study, (J Schneider, 2009) conducted a comprehensive review of randomized controlled trials, concluding that SMT is consistently more effective than alternative treatments for uncomplicated acute low back pain. This early evidence highlighted the short-term benefits of SMT, establishing a baseline for subsequent research on its efficacy in managing low back pain.

Building on this, (C. Petering & Webb, 2011) provided a synthesis of three systematic reviews, affirming moderate evidence for short-term pain relief from SMT in acute cases. They noted that while SMT showed effectiveness comparable to non-steroidal anti-inflammatory drugs (NSAIDs) for chronic low back pain, the Cochrane review they referenced suggested no significant difference between SMT and standard treatments. This duality in findings illustrates the complexities of SMT's efficacy across different pain durations and types.

(Tuchin, 2012) further explored the safety profile of SMT, acknowledging that while adverse events are common, they typically manifest as minor, short-term issues. However, the potential for serious complications, such as vertebral artery dissection, necessitates careful consideration and documentation of clinical features and risk factors associated with these adverse effects. This study underscores the importance of balancing the benefits of SMT against its potential risks.

The exploration of SMT's mechanisms continued with (M. Bond, 2016), who emphasized the need for a deeper understanding of neurophysiological mechanisms

involved in pain modulation. He argued for a more nuanced categorization of low back pain patients based on biological, psychological, and sociological factors, suggesting that SMT may be an effective non-surgical option for chronic non-specific low back pain.

(Platania, 2018) conducted a critical review indicating that while SMT demonstrates statistically significant short-term effects on pain reduction and functional improvement, the clinical relevance of these effects may be modest. He pointed out that variability in the quality of studies could influence outcomes, suggesting that decisions on SMT usage should consider patient preferences, costs, and the safety of treatment options.

(Glissmann Nim et al., 2020) investigated the specific application of SMT concerning stiffness and pain sensitivity, revealing that the site of SMT application did not significantly affect patient-reported pain intensity or stiffness. However, they observed notable differences in pressure pain thresholds, suggesting that SMT may influence neurophysiological parameters through a segment-dependent mechanism. This finding highlights the continuing need for research into the specificities of SMT applications and their effects on different patient populations.

(Côté et al., 2021) expanded the discussion to include the use of SMT for non-musculoskeletal disorders, illustrating a broader application of SMT beyond spinal pain. While some evidence supports SMT's effectiveness in these contexts, the authors caution that such effects might be short-lived and lack clinical significance, emphasizing the need for an evidence-based approach to treatment.

Finally, (R. Anderson et al., 2024) examined the relationship between SMT dosage and escalated spine care, revealing that lower doses of SMT were associated with significant reductions in the risk of escalated treatment. This study reinforces the role of SMT as a recommended non-pharmacological intervention for low back pain, while also highlighting the economic implications of SMT in reducing healthcare utilization.

Collectively, these articles provide a comprehensive overview of the current understanding of SMT in the management of acute low back pain, illustrating its potential benefits, risks, and the complexities surrounding its application and efficacy. The literature underscores the importance of ongoing research to refine treatment approaches and clarify the underlying mechanisms of SMT.

LITERATURE REVIEW

The article titled "COMPARISON OF MECHANICAL vs. MANUAL MANIPULATION METHODS FOR LOW BACK PAIN" by (J Schneider, 2009) presents a thorough examination of spinal manipulative therapy (SMT) through a systematic review of existing literature. The author undertook a comprehensive search of professional chiropractic journals, focusing on randomized controlled trials that compared SMT with alternative treatments for acute low back pain. This approach allows for a robust evaluation of SMT's efficacy in a clinical setting.

The findings indicate that SMT consistently outperformed other comparison treatments in alleviating low back pain. (J Schneider, 2009) references pivotal studies, including the systematic review by Shekelle et al. (1992), which analyzed 58 articles, including 25 controlled trials, to assess the efficacy and complications associated with spinal manipulation. Their meta-analysis, which combined data from nine studies, revealed that spinal manipulation offers short-term benefits, particularly for uncomplicated acute low back pain. This conclusion is significant, as it underscores the potential of SMT as a viable treatment option for patients experiencing acute episodes of low back pain.

Moreover, (J Schneider, 2009) highlights Lawrence et al.'s (1993) meta-analysis, which further corroborates the findings by demonstrating an increased probability of recovery at three weeks for outpatients with acute and subacute low back pain receiving spinal manipulation. This evidence suggests that SMT may not only provide immediate relief but also enhance recovery timelines for patients suffering from low back pain.

A critical evaluation of the article reveals that while the evidence supporting the efficacy of SMT is compelling, the focus on short-term benefits raises questions about the long-term outcomes of such therapies. The article does not delve deeply into the potential risks or complications associated with SMT, which is an essential consideration for both practitioners and patients. Additionally, the reliance on studies that primarily compare SMT to alternative treatments may limit the understanding of its effectiveness when integrated into a broader therapeutic context.

The article "Treatment Options for Low Back Pain in Athletes" by (C. Petering & Webb, 2011) presents a comprehensive analysis of spinal manipulative therapy (SMT) in the context of low back pain, particularly focusing on its efficacy for both acute and chronic conditions. The authors synthesize findings from three systematic reviews, highlighting that SMT offers moderate evidence for short-term pain relief in patients suffering from acute low back pain. This assertion is critical for clinicians seeking effective treatment modalities for athletes who frequently experience such injuries.

The article further elaborates on the effectiveness of SMT for chronic low back pain, indicating that it is comparable to non-steroidal anti-inflammatory drugs (NSAIDs) and superior to physical therapy in the long-term management of pain. This insight is particularly valuable, as it suggests that SMT could serve as a viable alternative or adjunct to more conventional treatments, thereby expanding the therapeutic options available to practitioners.

Moreover, the authors emphasize that patients with mixed acute and chronic low back pain demonstrated superior pain outcomes when treated with SMT, both in the short and long term, compared to various other treatment modalities. This finding underscores the potential of SMT in addressing complex pain presentations, which is often a challenge in clinical practice.

Interestingly, the article also references a study by Dagenais, which supports the effectiveness of SMT in reducing pain associated with acute low back pain.

However, it juxtaposes this with a Cochrane review from 2004, which concluded that SMT did not significantly differ from standard treatments in terms of pain reduction or the ability to perform daily activities. This critical evaluation of the conflicting evidence presents a nuanced perspective on the efficacy of SMT, suggesting that while there is support for its use, the variability in outcomes necessitates further investigation.

The article "A replication of the study ‘Adverse effects of spinal manipulation: a systematic review’" by (Tuchin, 2012) provides a comprehensive examination of the effectiveness and risks associated with spinal manipulative therapy (SMT) in the treatment of acute low back pain. (Tuchin, 2012) emphasizes the necessity for health care providers to critically assess both the therapeutic benefits and the potential adverse events (AE) linked to SMT.

The article establishes that SMT is supported by robust evidence for alleviating low back pain, highlighting its efficacy in clinical settings. However, (Tuchin, 2012) draws attention to the prevalence of adverse events following SMT, which, while typically minor and transient, can occasionally lead to serious complications. Notably, the article discusses conditions such as vertebral artery dissection (VAD), which can result in cerebrovascular accidents (CVA). Although serious adverse events are described as rare, (Tuchin, 2012) points out that they may occur unpredictably following neck manipulation, raising concerns about the safety profile of SMT.

A critical evaluation of the material reveals a significant conflict regarding the frequency and severity of serious adverse events associated with SMT. The article references a previous study by Ernst (2007) that identified 28 articles detailing 32 case reports of complications, predominantly from cervical manipulation. The life-threatening nature of some of these complications, particularly VAD, underscores the importance of thorough documentation of clinical features and the identification of predisposing risk factors for adverse events.

(Tuchin, 2012)'s work calls for increased vigilance among practitioners regarding the potential risks of SMT, particularly in patients with underlying conditions that may predispose them to adverse outcomes. The need for clear communication with patients about the risks and benefits of SMT is essential to ensure informed consent and to foster a better understanding of the treatment's implications.

The article titled "BIOLOGICAL EFFECTS OF SPINAL MANIPULATION IN CHRONIC NON-SPECIFIC LOW BACK PAIN PATIENTS" by (M. Bond, 2016) delves into the efficacy of spinal manipulative therapy (SMT) as a treatment method for chronic low back pain (CLBP). The author highlights a significant gap in understanding the clinical predictors that determine which CLBP patients are likely to benefit from SMT. This lack of clarity may hinder the broader application of SMT in clinical settings.

(M. Bond, 2016) emphasizes that a substantial number of low back pain cases do not have identifiable pathologies, which necessitates a management approach that considers biological, psychological, and sociological factors. This holistic perspective aligns with contemporary healthcare paradigms that advocate for patient-centered care. The article underscores the importance of understanding the neurophysiological mechanisms underlying pain modulation, suggesting that better insights into these mechanisms could enhance the clinical application of SMT.

The author references the American Chiropractic Association's definition of manipulation as a manual maneuver that can extend the three-joint complex's range without compromising anatomical integrity. This definition is crucial as it frames SMT within the context of safe practice, which is a primary concern for both practitioners and patients. Furthermore, (M. Bond, 2016) points out that recent clinical practice guidelines from various countries endorse the use of SMT for managing low back pain, indicating a growing recognition of its potential benefits.

However, while the article presents a strong case for SMT, it also acknowledges the need for further research to clarify its efficacy and the specific patient characteristics that predict successful outcomes. This critical evaluation highlights

a dual challenge: the necessity for more rigorous studies to substantiate the claims of effectiveness and the importance of developing a nuanced understanding of patient profiles that may respond positively to SMT.

The article titled "Efficacia delle manipolazioni thrust nel trattamento del low back pain in fase acuta e in fase cronica. Revisione della letteratura" by (Platania, 2018) provides a comprehensive review of the efficacy of spinal manipulative therapy (SMT) in treating acute and chronic low back pain (LBP).

(Platania, 2018) presents high-quality evidence indicating that SMT offers a statistically significant short-term effect in reducing pain and improving function compared to other interventions. This finding is particularly relevant in the context of acute low back pain, where timely intervention can be critical for patient recovery. However, the author notes that while the benefits of SMT are evident, the effect sizes are modest and may not be clinically significant, suggesting that the improvements may not justify the use of SMT over other treatment modalities ((Platania, 2018)).

The article also highlights the variability in the quality of the studies reviewed, with some studies classified as low quality suggesting that SMT may not be more effective than passive physical therapies or simulated treatments. This inconsistency raises concerns regarding the reliability of the evidence and underscores the importance of considering study quality when interpreting results. The presence of bias in lower-quality studies may skew results, leading to misleading conclusions about the efficacy of SMT.

Furthermore, (Platania, 2018) concludes that high-quality evidence does not demonstrate clinically meaningful differences between SMT and other treatments for pain reduction and functional improvement in chronic low back pain patients. This finding prompts a consideration of other factors, such as treatment costs, patient preferences, and safety, when deciding on the use of SMT ((Platania, 2018)).

The article "The effect on clinical outcomes when targeting spinal manipulation at stiffness or pain sensitivity: a randomized trial" by (Glissmann Nim et al., 2020)

explores the efficacy of spinal manipulative therapy (SMT) in treating acute low back pain (LBP) by examining the effects of targeting manipulation at either the stiffest lumbar segment or the segment with the lowest pain threshold. The study is significant as it addresses a crucial gap in understanding the mechanisms by which SMT provides pain relief, particularly given the complex nature of LBP, which is often devoid of a specific pathoanatomical cause.

The authors conducted a randomized trial involving 132 participants, with the primary outcome being patient-reported low back pain intensity post-treatment. Secondary outcomes included biomechanical stiffness and neurophysiological pressure pain threshold. The use of linear mixed models for data analysis revealed that the site of SMT application did not significantly affect the reported intensity of pain or stiffness among the participants. However, a notable finding was the substantial difference in pressure pain threshold between the two groups, suggesting that SMT may modulate neurophysiological parameters through a segment-dependent neurological reflex pathway.

This study contributes to the ongoing discourse around SMT by indicating that while the site of manipulation may not directly correlate with subjective pain relief or stiffness, it does influence neurophysiological responses. This distinction is critical as it underscores the complexity of pain management in LBP, where subjective experiences of pain do not always align with measurable physiological changes. The authors highlight the need for further research to clarify which patient populations might benefit most from SMT and the optimal parameters for its application, as current clinical guidelines lack consensus on these issues.

The implications of this research are particularly relevant in the context of the broader clinical landscape for LBP treatment, where various interventions are available but often lack specificity in their application. By positioning SMT as a second-line intervention, the authors align with clinical guidelines that prioritize education and exercise as first-line therapies. The study's findings suggest that while SMT may not directly alleviate pain or stiffness, it could play a role in

enhancing neurophysiological thresholds, thereby potentially contributing to a more comprehensive management strategy for acute low back pain.

The article titled "The global summit on the efficacy and effectiveness of spinal manipulative therapy for the prevention and treatment of non-musculoskeletal disorders: a systematic review of the literature" by (Côté et al., 2021) presents a comprehensive examination of the role of spinal manipulative therapy (SMT) in both musculoskeletal and non-musculoskeletal disorders. The authors highlight that while SMT is widely recommended for managing conditions such as back pain, neck pain, and headaches, there is a notable incidence of patients seeking SMT for non-musculoskeletal issues, which constitutes 3 to 10% of the patient population in chiropractic and osteopathic practices.

A critical aspect of the article is its exploration of the physiological mechanisms purportedly influenced by SMT, including the potential effects on the autonomic nervous system and overall physiological function. The authors reference laboratory studies that suggest certain manual therapies can alter body functions, such as heart rate variability and inflammatory cytokines. However, they also emphasize that the clinical significance of these findings remains questionable. Two systematic reviews cited in the article indicate that any physiological effects observed are short-lived and lack substantial clinical implications. Furthermore, a recent randomized controlled trial comparing SMT to a successful sham control found no evidence supporting the clinical efficacy of SMT in this context.

The authors effectively synthesize the existing literature, providing a balanced view of the potential benefits and limitations of SMT. They argue that while there is a historical precedent for the treatment of non-musculoskeletal disorders within chiropractic and osteopathic practices, the lack of robust evidence from clinical trials calls into question the appropriateness of such treatments. The article suggests a need for further research to clarify the efficacy of SMT, particularly in non-musculoskeletal contexts, and to ensure that clinical practice guidelines are based on sound evidence.

The article "Dosing of lumbar spinal manipulative therapy and its association with escalated spine care: A cohort study of insurance claims" by (R. Anderson et al., 2024) provides a comprehensive analysis of the impact of spinal manipulative therapy (SMT) on the management of acute low back pain (LBP). The study specifically investigates the relationship between different dosages of SMT and the subsequent need for escalated spine care, highlighting significant findings that contribute to the understanding of effective treatment protocols.

The authors present compelling evidence that both low and moderate doses of SMT are associated with a notable reduction in the relative risk of escalated spine care, quantified at 55% and 42%, respectively. This reduction is particularly significant given the high prevalence of LBP, which affects approximately 38% of the population annually and is a leading cause of global disability ((R. Anderson et al., 2024)). The findings underscore the importance of non-pharmacological approaches in the initial management of LBP, aligning with current treatment guidelines that advocate for conservative care strategies.

Moreover, the article contextualizes the economic burden of LBP treatment, estimating healthcare costs at around $87 billion annually in the United States. This financial aspect is critical, as it highlights the potential cost-effectiveness of SMT compared to more invasive treatments. The authors note that previous studies have indicated substantial reductions in various healthcare utilization metrics, including imaging, surgeries, and the use of opioids, when SMT is employed as a primary treatment modality ((R. Anderson et al., 2024)). This suggests that SMT not only provides clinical benefits in terms of pain relief—comparable to non-steroidal anti-inflammatory drugs—but also contributes to a more efficient healthcare system by decreasing the reliance on more intensive medical interventions.

The article also addresses patient satisfaction and perceived effectiveness of SMT, which are essential components of treatment success. The high return rates for SMT indicate that patients often experience significant relief and are likely to continue seeking this form of therapy, further supporting its role in the management of acute LBP.

CONCLUSION

The literature on spinal manipulative therapy (SMT) for acute low back pain presents a multifaceted view of its efficacy, safety, and broader implications for treatment. The introduction establishes a foundation for understanding SMT's potential benefits, particularly in alleviating pain and improving function in acute low back pain cases, while also acknowledging the risks involved.

The review highlights several pivotal studies that collectively affirm SMT's effectiveness. For instance, the comprehensive review by (J Schneider, 2009) demonstrates that SMT consistently provides superior outcomes compared to other treatments for uncomplicated acute low back pain. This finding is supported by the synthesis of systematic reviews by (C. Petering & Webb, 2011), which affirms moderate evidence for short-term pain relief. However, the literature also reveals a complexity in outcomes, as seen in the contrasting findings from various studies that indicate no significant difference between SMT and standard treatments, as noted in the Cochrane review referenced by (C. Petering & Webb, 2011).

Safety concerns are addressed through the examination of adverse events associated with SMT, as highlighted by (Tuchin, 2012). While adverse events are often minor, the potential for serious complications necessitates careful patient selection and informed consent. The critical evaluation of the safety profiles of SMT emphasizes the need for practitioners to remain vigilant regarding patient histories and risk factors.

The exploration of SMT's mechanisms, particularly in relation to neurophysiological responses, is further elaborated upon by (M. Bond, 2016). This study suggests that understanding these mechanisms may enhance the clinical application of SMT, particularly for patients with chronic non-specific low back pain. The nuanced approach to categorizing patients based on various factors aligns with contemporary healthcare paradigms advocating for individualized treatment strategies.

In terms of clinical relevance, (Platania, 2018) points out that while SMT shows statistically significant effects on pain reduction, the clinical significance may be modest. This raises questions about the justification of SMT over other treatment modalities, particularly in light of the variability in study quality.

The review also delves into the economic implications of SMT, with (R. Anderson et al., 2024) indicating that appropriate dosing of SMT can significantly reduce the need for escalated spine care. This finding underscores SMT's role not only as a therapeutic intervention but also as a cost-effective strategy in managing low back pain.

In conclusion, the literature presents a robust overview of SMT's role in managing acute low back pain, illustrating its potential benefits and risks. The evidence supports SMT as an effective non-pharmacological intervention, particularly for short-term relief, while also emphasizing the importance of patient-centered approaches and informed decision-making. Ongoing research is essential to further elucidate the mechanisms of SMT, optimize treatment protocols, and ensure that clinical practice is guided by sound evidence.

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