ISSN 0008-3194 (p)/ISSN 1715-6181 (e)/2025/33–48/$2.00/©JCCA 2025

Spinal manipulation for fibromyalgia: a narrative review

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Objective: *The purpose of this review was to summarize the available literature on the use of spinal manipulative therapy for the management of fibromyalgia.*

Methods: *A narrative review of the literature was performed through February 29, 2024, using keywords and Boolean operators, such as "manipulation AND fibromyalgia." Databases searched include MEDLINE, ICL, PEDro, the Cochrane Library, Google Scholar, as well as clinical trials registries. Online literature mapping was also used to identify relevant studies. All publications involving spinal manipulation for fibromyalgia management were included, excluding editorials, commentaries, conference proceedings, and trade magazine articles.*

Manipulation vertébrale dans le cadre de la fibromyalgie: un examen narratif

Objectifs: *Le but de cet examen consistait à résumer la littérature disponible sur l'utilisation de la thérapie par manipulation vertébrale dans le cadre de la gestion de la fibromyalgie.*

Méthodes: *On a réalisé un examen narratif de la littérature jusqu'au 29 février 2024, au moyen de motsclés et d'opérateurs booléens, comme « manipulation ET fibromyalgie ». Les bases de données consultées comprennent MEDLINE, ICL, PEDro, la Bibliothèque Cochrane, Google Scholar, ainsi que les registres d'essais cliniques. On a également utilisé la cartographie de la littérature en ligne pour cerner des études pertinentes. Toutes les publications concernant la manipulation vertébrale dans le cadre de la gestion de la fibromyalgie ont été incluses, à l'exception des éditoriaux, des commentaires, des actes de conférence et des articles de magazines spécialisés.*

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Conflicts of Interest:
The authors have no disclaimers, competing interests, or sources of support or funding to report in the preparation of this manuscript.
Disclaimer - The information presented in this publication does not necessarily represent or reflect the positions, strategies, or opinions of the U.S. Government or the Department of Veterans Affairs.
Ethics Statement - Ethical approval was not required for this narrative review as it involved the synthesis of existing data from previously conducted studies. Therefore, there was no involvement with research participants at any stage of this project.

Results: *A total of 38 publications met the inclusion criteria. These results consisted of nine case reports, three case series, four pilot studies, four randomized controlled trials, 14 systematic reviews, and four clinical practice guidelines with publication dates ranging from 1997 to 2023.*

Conclusion: *Higher-quality controlled studies are limited and report mixed results for treating fibromyalgia with spinal manipulation, while lower-quality studies are more likely to report benefit following treatment. Systematic reviews report a lack of established efficacy or inconclusive evidence, while clinical practice guidelines vary widely from strong recommendations against its use to suggesting that it be considered as a component of multi-modal treatment.*

(JCCA. 2025;69(1):33-48)

KEY WORDS: fibromyalgia; chronic pain; manipulation, spinal; manipulation, chiropractic; narrative review

Résultats: *Au total 38 publications ont répondu aux critères d'inclusion. Ces résultats consistaient en neuf rapports de cas, trois séries de cas, quatre études pilotes, quatre essais contrôlés randomisés, 14 examens systématiques et quatre lignes directrices cliniques, ayant des dates de publication allant de 1997 à 2023.*

Conclusion: *Les études contrôlées de meilleure qualité sont limitées et présentent des résultats mitigés pour le traitement de la fibromyalgie par manipulation vertébrale, tandis que les études de moindre qualité sont plus susceptibles de signaler un bénéfice après le traitement. Les examens systématiques présentent une absence d'efficacité établie ou des données probantes non concluantes, tandis que les lignes directrices de pratique clinique varient considérablement, allant de recommandations robustes par rapport à son utilisation à la suggestion qu'elle soit considérée comme étant un élément d'un traitement multimodal.*

(JCCA. 2025;69(1):33-48)

MOTS CLÉS : fibromyalgie, douleur chronique, manipulation, vertébrale, manipulation, chiropratique, examen narratif

Introduction

Fibromyalgia is a complex condition characterized by chronic widespread pain that is now considered a disorder of altered pain processing.[1,2] Fibromyalgia also involves a variety of other features, such as fatigue, memory problems, and sleep disturbance, which can negatively impact an individual's daily activities and quality of life.[1,3,4] The prevalence of fibromyalgia is estimated to be between 5-8% of the adult population and it is more common among females.[5–7] The development of fibromyalgia is multifactorial and associated with a variety of risk factors, such as anxiety, depression, physical or emotional traumas, or poorer overall health.[8]

In 1990 the American College of Rheumatology (ACR) developed the first widely accepted diagnostic criteria for fibromyalgia.[9] The ACR's initial criteria were limited to musculoskeletal features and focused on the number of tender points in various body regions. The diagnostic criteria have since changed and were updated in 2011 and 2016;[10,11] these updated criteria moved away from numbering tender points and included features related to chronic fatigue, disturbed sleep, and cognitive dysfunction (i.e. "fibro fog"). The ACR's 2016 criteria are the current diagnostic standard for fibromyalgia and are outlined in Table 1. The 2016 criteria also highlight how "a diagnosis of fibromyalgia does not exclude the presence of other clinically important illnesses,"[11] emphasizing how fibromyalgia may occur in the presence of other comorbidities. Additionally, since the diagnosis of fibromyalgia does not involve objective findings on standard radiography or laboratory testing, this condition poses a diagnostic challenge that is believed to contribute to fibromyalgia being underdiagnosed, misdiagnosed, or diagnosed following a substantial delay.[12–14]

Table 1.
Current Diagnostic Criteria for Fibromyalgia[11]

1. Generalized pain in at least 4 of 5 body regions
2. Symptoms present at a similar level for at least 3 months.
3. A.) Widespread Pain Index score ≥ 7 and a Symptom Severity Scale score ≥ 5 or B) Widespread Pain Index score 4-6 and a Symptom Severity Scale score ≥ 9

The complex nature of fibromyalgia, coupled with evolving diagnostic criteria, has complicated the diagnosis and subsequent management of this condition.[12,13] Various factors have been reported to complicate the treatment of fibromyalgia, including difficulties regarding patient education as well as limited knowledge regarding evidence-based treatment options.[13,15,16] Numerous agencies have emphasized the foundational importance of multimodal non-pharmacologic interventions for fibromyalgia management, such as patient education, regular physical activity, and a focus on self-care strategies.[17–19] These recommendations also advocate for the integration of psychological treatments when patients exhibit maladaptive pain beliefs (i.e. fear-avoidance) or have comorbid mood disorders. Simultaneously, they recommend limiting pharmacologic interventions to those with severe pain or sleep disturbances. While non-pharmacologic management strategies form the foundation of fibromyalgia treatment, specific treatment guidance remains limited, particularly concerning the appropriate use of manual therapies for this condition.[20–23]

The use of complementary and integrative health (CIH) treatments are more common among individuals with musculoskeletal pain and CIH utilization is common and reported to be increased among patients with fibromyalgia.[22,24] The use of "chiropractic treatments" are reported by approximately 40% of individuals with fibromyalgia.[22,25,26] Reasoning for patients seeking such treatment for fibromyalgia management may include limited response to other treatments, availability of care, limited side effects, patients' preference, and promotion of non-pharmacological treatments by treatment guidelines.[17,27–29] While chiropractic is a healthcare profession that is not limited to the delivery of spinal manipulation, this treatment does play a central role in the profession's identity and is by far the most common service provided during clinical encounters.[30,31] Despite the frequent use of chiropractic by individuals with fibromyalgia, uncertainty exists regarding the effectiveness of spinal manipulation for fibromyalgia management. Therefore, the objective of this narrative review was to identify and summarize the available literature regarding the use of spinal manipulative therapy for the treatment of fibromyalgia.

Methods

A literature search was performed up to the date of February 29, 2024, using Boolean operators and relevant search terms, such as "manip* AND fibromyalgia," "spinal manip* AND "fibromyalgia," "chiropr* AND fibromyalgia;" our database search strategy is outlined in Appendix 1. Our search involved the following databases: National Library of Medicine (MEDLINE via PubMed), Index to Chiropractic Literature (ICL), Physiotherapy Evidence Database (PEDro), Cochrane Library, ClinicalTrials.gov, International Clinical Trials Registry Platform, and Google Scholar from the time of their inception to the search date. We searched the grey literature and manually searched the reference lists of included studies to identify relevant publications that may not have been captured by our search strategy. We also used literature network mapping websites to identify relevant studies via network diagrams; the two sites used for literature mapping were Connected Papers and Research Rabbit.

Full-text versions of the articles were obtained online or via inter-library loans, with the assistance of two technical librarians, employed at a chiropractic college, and the relevant data was extracted by both authors of this study. Data extraction included the year of publication, title, authors, study design, interventions provided, number of study participants, demographic characteristics, as well as the study's results or conclusions.

Inclusion criteria

We included peer-reviewed publications involving spinal manipulation for the management of fibromyalgia. We accepted publications using any form of thrust-based spinal manipulation technique (i.e. high-velocity, low-amplitude; HVLA),[32]passive manual therapeutic maneuver during which a synovial joint is beyond the normal physiological range of movement (in the direction of the restriction applied to any spinal or pelvic region that was deliv-

ered by any qualified healthcare professional. We included publications describing the use of spinal manipulation as an isolated treatment or as a component of multimodal therapy, whereas spinal manipulation was delivered along with other forms of treatment. We also included results published in any language, as long as an English version could be obtained.

Exclusion criteria

We excluded studies that did not involve spinal manipulation for fibromyalgia management. Therefore, studies involving various forms of manual therapy (e.g., massage, myofascial release, craniosacral therapy) or rehabilitation activities (e.g., exercise, strength training) were excluded, if not performed in combination with spinal manipulation. Publications reporting on outcomes unrelated to standard fibromyalgia features (e.g., psychological sense of coherence) were excluded. We also excluded results in the form of editorials, commentaries, conference proceedings, articles published in trade magazines, or clinical trial registrations (Appendix 2).

Results

A total of 38 publications met our inclusion criteria. Results consisted of publications between the years of 1997 and 2023 and involved a total of nine case reports, three case series, four pilot studies, four randomized controlled trials, 14 systematic reviews, and four clinical practice guidelines.

Case reports

A total of nine case reports were published from 2011-2022 (Table 2).[33–41] Each of these nine case reports described the management of females with fibromyalgia, ranging in age from 31-64. Five of these case reports (56%) describe SMT provided in combination with additional forms of treatment (e.g., traction, massage, ergonomic advice),[34,38–41] while the other four (44%) provided SMT in isolation and each of these four reports limited SMT to the cervical spine.[33,35–37] How treatment plans were reported across all nine case studies was highly variable and not always completely reported, which made it difficult to report aggregate data regarding treatment frequency and total visit numbers, but a conservative average of the available studies is approximately 50 total visits over an average duration of 32 weeks. Notably, not all case reports provided SMT at every visit; the same four case reports that limited SMT to the cervical spine described multiple visits where patients were evaluated, but SMT was determined to be unnecessary. These nine case reports universally described highly favourable outcomes for patients with fibromyalgia, reporting improvements in pain and/or physical function. Six of these nine cases (67%) described improved physical function (e.g. walking, running, swimming, or daily activities),[33–35,37,40,41] while three of the nine cases (33%) objectively measured physical functioning via the SF-36 and Rand-36 questionnaires[36,38,39].

Case series

A total of three case series were published from 2000-2001 (Table 3).[42–44] These three case series describe the management of 40 total individuals with fibromyalgia with ages ranging from 11-76. The majority of the patients described in these case series were female (88%, 35/40) with only one case series including males.[42] Two of these case series provided SMT in combination with additional treatments,[43,44] while one provided SMT as an isolated treatment.[42] These case series described a total number of visits that ranged from 18-48 over a treatment duration of four weeks to seven months. Each of these three case series described highly favourable outcomes for most patients with fibromyalgia, primarily reporting improved pain, improved function (e.g. resuming daily activities), and reduced fatigue.

Pilot studies

A total of four pilot studies were published from 1997-2018 (Table 4).[45–48] These four pilot studies involved a total of 101 study participants with fibromyalgia. Demographics related to age and sex were not consistently reported across these four studies, preventing our ability to report aggregate data, but the majority of study participants were middle-aged females.

The first pilot study was published in 1997 and was a crossover, randomized controlled trial (RCT), whereas the control group became a second treatment group after a four-week wait period.[45] This study involved 21 total participants between the ages of 25-70 and provided SMT in combination with stretching, massage, and patient education at a frequency of three to five treatments per week for a four-week duration. This pilot reported general improvements in pain and spinal ranges of motion, while

Table 2.
Summary of case reports

Authors	Year	Patient	Intervention	Treatment Visits	Outcomes
Alibhoy N.[33]	2011	45-year-old female	SMT limited to the cervical spine	A total of 79 visits over a 17-month duration (no frequency reported). SMT was provided on 47 of the 79 visits (60% of all visits).	Resolution of back pain, headaches, sciatica, and knee pain as well as improved tolerance for walking, standing, swimming, and daily functioning (Positive Results)
Briggs L.[34]	2011	36-year-old female	SMT, instrument-assisted spinal manipulation, spinal traction, trigger point compression, ice, heat, and high-voltage electrical stimulation	Initial treatment involved 36 visits over a 12-week duration with treatment frequencies of 2-5 visits per week. After this initial series, a long-term treatment plan was provided for the next 14 years with frequencies of up to 3 treatments per week, which "decreased as the patient felt better" (no total treatment number reported).	Improved pain from a 10/10 to a 2/10, improved gait, and normalization cervical and lumbar ranges of motion at the end of the first 12-week treatment. After 14 years of treatment, her pain was improved to a 1/10 and her migraine frequency was reduced (Positive Results)
Bennett C, *et al*.[35]	2012	64-year-old female	SMT limited to the cervical spine	A total of 35 visits over a 3-month duration with a visit frequency of 3 times per week for the first month followed by 2 times per week for the next 2 months. SMT was provided at 4 of the 35 visits (11% of all visits).	Improved neck and mid-back pain, improved tolerance for standing and walking, as well as improved strength energy levels that were describes as "80% relief of symptoms" (Positive Results)
Soriano W, *et al*.[36]	2014	31-year-old female	SMT limited to the cervical spine	Approximately 40 total visits over an 8-month duration. Visit frequency was twice per week for the first month followed by once per week for the next 7 months (no details provided after this period). SMT was provided 5 times over a duration of 1.5 years with ongoing visits since this time.	Improved back pain, radicular pain, knee pain, foot pain, and headaches described as "an 80% relief." She returned to her running activities and various quality-of-life measures were also improved, via SF-36 questionnaires (Positive Results)
Tedder N, *et al*.[37]	2015	32-year-old female	SMT limited to the cervical spine	A total of 41 visits over a 6-month duration. SMT was provided on 8 of the 41 visits (20% of all visits), but no treatment frequency was reported.	Complete resolution of fibromyalgia symptoms and improved physical activity/ exercise (Positive Results)
Fedorchuk C, *et al*.[38]	2017	40-year-old female	SMT limited to the cervical spine, traction, and postural exercises	A total of 44 treatments over a 5-month duration (no treatment frequency reported).	Improved pain, headaches, fatigue, and increased physical functioning via SF-36 questionnaire (Positive Results)
Chance M.[39]	2018	61-year-old female	SMT limited to the cervical spine, cranial manipulation, and nutritional supplements	A total of 21 treatments over a 6-month duration with a frequency of 3 times per week for the first week, once per week for the next 6 weeks, followed by twice per month for the next 4 months.	Improved pain, fatigue, sleep, quality of life, general health, and physical functioning via Rand-36 questionnaire (Positive Results)
Dunton TA, *et al*.[40]	2020	48-year-old female	SMT or instrument-assisted spinal manipulation	Approximately 52 total visits over a 6-month duration. Visit frequency was 3 times per week for 12 weeks, twice per week for the next 8 weeks, followed by once per week for 8 weeks with ongoing weekly visits since this time.	Improved fibromyalgia symptoms, improved neck ranges of motion, and improved quality of life with an overall description of "over 75% relief in symptoms" (Positive Results)
Chu EC, *et al*.[41]	2022	44-year-old female	SMT, massage, cervical traction, ultrasound, ergonomic advice, and home exercises	Approximately 107 total treatments over a 26-month duration. Initial treatment frequency of 3 times per week for 3 months, then twice per week for the next 6 months, and finally once per month for the next 17 months.	Improved pain from a 6/10 to a 2/10 rating, improved sleep quality, improved mood, and her fatigue was "mostly resolved" (Positive Results)

Legend: SMT; spinal manipulative therapy

Table 3.
Summary of case series

Authors	Year	Patients	Intervention	Treatment Visits	Outcome
Amalu WC.[42]	2000	23 total patients, consisting of 18 females and 5 males. Ages ranged from 11-76 (mean age of 35)	SMT limited to the cervical spine	A mean treatment total 31 visits (range of 20-48 treatments). The mean treatment duration was 3.5 months (range of 3-7 months). Treatment was initiated at a frequency of 3 times per week for 4-8 weeks, followed by extended follow-ups.	Improvement reported for 92-100% of all fibromyalgia and chronic fatigue symptoms along with returning to normal activities, maintained for at least 1.5 years (Positive Results)
Hains G, *et al*.[43]	2000	15 total patients. All 15 were females (mean age of 51)	SMT combined with ischemic compression	All patients received a total of 30 treatments at a frequency of 2 or 3 per week over a duration of 10-15 weeks.	Nine of the 15 patients (60%) were classified as "respondents" with reports of improved pain, sleep, and fatigue levels (Positive Results)
Wise P, *et al*.[44]	2001	2 total cases were reported, consisting of a 40-year-old female and a 58-year-old female	SMT combined with paraspinal massage, lifestyle advice, and ergonomic advice	A total of 18 visits over a 10-week duration with a visit frequency of 3 times per week for the first 2 weeks, 2 times per week for 4 weeks, followed by once per week for the last 4 weeks.	Favourable results were described for pain and fatigue. The authors recommended "optimal improvement" after 12 treatments over a 5-week duration, while minimal benefit occurred beyond this period (Positive Results)

Legend: SMT; spinal manipulative therapy

recommending an adequately powered follow-up RCT of 81 study participants.

The second pilot study was published in 2002 and involved a total of 24 participants between the ages of 30-65, all of which were female.[46] This study involved three treatment groups as well as a control group; all treatment groups received standard medical care while group 1 received SMT, group 2 received SMT along with education on self-trigger point therapy, and group 3 received moist heat treatments. Each group received one treatment per week over a duration of 23-weeks. This pilot reported the most favourable improvements in pain and function (e.g. daily activities) for those in the two groups involving SMT, but failed to report power calculations for a follow-up RCT.

The third pilot study was published in 2009 and involved 27 total participants, all of which were females between the ages of 21-59.[47] All participants were involved in a resistance training program, while 44% (12/27) were assigned to the treatment group. Treatment consisted of SMT and soft-tissue ischemic compression at a frequency of twice per week for a duration of 16 weeks. The remaining 66% (15/27) of all study participants functioned as the control group. This study failed to show any difference between the treatment and the control groups regarding fibromyalgia pain or function. Uniquely, this study was not labeled as a pilot study and no power calculations were reported. This study's small sample size and lack of sample size calculations lead the authors of this narrative review to classify this study as a pilot.

The fourth pilot study was published in 2018 and involved a total of 29 participants, most of which were female (93%, 27/29) with a mean age of 51.[48] This study involved two treatment groups along with a control group and provided treatment once per week for a six-week duration. This pilot reported more favourable improvement in pain and global impression of health when SMT was combined with gabapentin medication, while recommending an adequately powered follow-up RCT involving between 63 and 126 study participants.

Randomized controlled trials

A total of four randomized controlled trials (RCTs) were published from 2014-2023 (Table 5).[49–52] These four RCTs involved 370 total study participants and 69% (255/370) of all participants were females.

The first RCT was published in 2014 and involved a total of 89 participants, 54% (48/89) of which were female, with a mean age of 54.[49] This study involved a treatment group that received thoracic SMT, soft-tissue treatment, and lumbosacral mobilizations at a frequency of once per week for five weeks, while the control group

Table 4.
Summary of pilot studies

Authors	Year	Participants	Intervention	Treatment Visits	Control	Conclusion
Blunt KL, *et al*.[45]	1997	21 study participants. Sex: no breakdown reported Age: range 25-70 (mean of 49)	SMT, massage, stretching, and education on fibromyalgia, sleep, body mechanics	3-5 treatments per week for a 4-week duration (range of 11-15 total treatments)	Wait list for 4-weeks, which when crossed over to receive the same treatment as group 1	A follow-up RCT with 81 participants was calculated for adequate power. This study describes improved pain and range of motion of the cervical and lumbar regions for those receiving treatment (Positive Results)
Gamber RG[46]	2002	24 study participants. Sex: all females Age: range of 30-65 (no mean reported)	Group 1: SMT and standard medical care Group 2: SMT, education on trigger point therapy, and standard medical care Group 3: Moist heat and standard medical care	1 treatment per week for a 23-week duration (23 total treatments) Groups using SMT were allowed to also add myofascial release, stretching, and craniosacral therapy at the treating clinician's discretion	Standard medical care (any medications currently taking)	No calculations for an adequately powered follow-up study were reported. This study described improved pain and function when SMT is combined with standard medical care, compared to standard medical care alone. (Positive Results)
Panton LB, *et al*.[47]	2009	27 study participants (all female, mean age of 48)	SMT, ischemic compression to the neck and back, and resistance training	2 treatments per week for 16-week duration (32 total treatments)	Resistance training alone	No calculations for an adequately powered follow-up study were reported. Adding chiropractic to resistance training had no impact on pain perception or fibromyalgia impact. (Negative Results)
Marske C[48]	2018	29 study participants. Sex: 27 females, 2 males Age: mean of 51 (no range reported)	Group 1: SMT alone Group 2: SMT and gabapentin	1 treatment per week for a 6-week duration (6 total treatments)	Medication only (gabapentin)	A follow-up RCT with 63-126 participants was calculated for adequate power. Improvements in pain and overall health favors SMT groups with the greatest improvement with SMT combined with gabapentin (Positive Results)

Legend: SMT; spinal manipulative therapy, RCT; randomized controlled trial

received no treatment. This study reported improved pain and sleep as well as reduced fibromyalgia impact, favoring the treatment group.

The second RCT was published in 2015 and involved 120 participants, 57% (68/120) of which were male, with an age range of 45-65.[50] This study involved two groups. Both groups received patient education, exercise, and cognitive behavioral therapy (CBT), but the treatment group also received 20 cervical spine treatments consisting of SMT, mobilizations, massage, and traction over a 12-week duration. No differences were observed between groups at the 12-week follow-up, but improvements in fibromyalgia impact were observed at the one-year period, favoring the treatment group.

The third RCT was published in 2021 and involved 101 participants, 94% (95/101) of which were female, with a mean age of 51.[51] This study involved two groups. The treatment group received full-spine SMT along with spinal mobilization, traction, and stretching at a frequency of once per week for six weeks, while the control group received sham manipulation. No between group differences were reported regarding pain, fatigue, physical function, or quality of life.

The fourth RCT was published in 2023 and involved

60 participants, all of which were female, with a mean age of 42.[52] This study involved two treatment groups and one control group. All three groups received standard medication management, but the first treatment group also received full-spine SMT, while the second treatment group received sham SMT. Both treatment groups (SMT or sham SMT) were treated twice per week for a three-week duration. The primary outcome for this study was pain rating and between-group comparisons, which showed no difference between any of the groups at one-month follow-up, but the SMT group showed improvement over the sham SMT group and the control group at three-month follow-up period.

Systematic reviews

A total of 14 systematic reviews were published from 2002-2017 (Table 6).[53–60] These systematic reviews cited a variety of literature sources, including other systematic reviews, pilot studies, case series, a study protocol, multiple conference proceedings, surveys, an editorial, and a trade magazine article. Additionally, trials describing the treatment of fibromyalgia with massage or craniosacral therapy were occasionally cited as and categorized as evidence for "chiropractic" treatment. Pilot studies were the most common citation type cited by these 14 systematic reviews and, uniquely, none of the four RTCs captured by this narrative review (Table 5) were directly cited by any of the systematic reviews.

The conclusions resulting from these systematic reviews were widely variable. Two of the systematic reviews (2/14, 14%) reported positive results and suggested "limited evidence supports spinal manipulation"[57] or that "studies suggest that there is some evidence that chiropractic manipulation may benefit persons with FM" (i.e. fibromyalgia)[59]. Five of the systematic reviews (5/14, 36%)[53,54,60–62] reported inconclusive results and mentioned how the available evidence is generally of low methodological quality and "uninterpretable in terms of therapeutic efficacy,"[54] that there is "inconclusive evidence in an unclear direction,"[60,61] or that "no firm con-

Table 5.
Summary of randomized controlled trials

Authors	Year	Participants	Intervention	Treatment Visits	Control	Results
Castro-Sánchez AM, *et al*.[49]	2014	89 study participants (48 female, 41 male), mean age of 54)	SMT limited to the thoracic spine, soft-tissue release, and lumbosacral mobilizations	1 treatment per week for a 5-week duration (5 total treatments)	No treatment	Manual therapy was effective for improving pain intensity, widespread pressure pain sensitivity, impact of fibromyalgia symptoms, sleep quality, and depressive symptoms (Positive Results)
Moustafa, IM, *et al*.[50]	2015	120 study participants (68 male, 52 female), ages 45-65	SMT limited to the cervical spine, cervical mobilizations, cervical massage, cervical mobilizations, education, exercise, and CBT	3 treatments per week for a 4-week duration, followed by 1 treatment per week for 8 weeks (20 total treatments in 12 weeks)	Education, exercise, and CBT	No differences between groups were observed on the Fibromyalgia Impact Questionnaire at 12-weeks, but significant differences favoring the SMT group at 1-year (Mixed Results)
Coste J, *et al*.[51]	2021	101 study participants (95 female, 6 male), mean age of 51	SMT, spinal mobilizations, traction, and stretching of hips and piriformis regions	1 treatment per week for a 6-week duration (6 total treatments)	Sham treatments mimicking the treatment group, but all were "stopped halfway" with no thrusting	No difference between the sham and the experimental groups for pain, fatigue, functioning, and quality of life (Negative Results)
Ince B, *et al*.[52]	2023	60 study participants (all female), mean age of 42	Group 1: SMT along with medication Group 2: Sham SMT intended to resemble SMT, but "using a smaller force than usual" along with medication	2 treatments per week for 3-week duration (6 total treatments)	Medication alone	No between-group differences were reported at the 1-month follow-up, but the SMT group showed improved in pain ratings 3-month follow-up when compared to the sham SMT and control groups (Mixed Results)

Legend: SMT; spinal manipulative therapy, CBT; cognitive behavioral therapy

clusions were drawn for efficacy" for managing fibromyalgia with SMT[62]. Seven of the systematic reviews (7/14, 50%)[55,56,58,63–66] reported negative results and made statements such as how chiropractic is "not currently recommended,"[55] that "there was no evidence to indicate that chiropractic may be effectively used to treat the symptoms of FM (i.e. fibromyalgia),"[65] that the available studies "fail to demonstrate that spinal manipulation is an effective intervention" for fibromyalgia,[64] that "there is "no overall effect,"[63] or that there is "no reliable positive evidence"[66] favoring spinal manipulation for fibromyalgia management.

Clinical practice guidelines

A total of four clinical practice guidelines were published between 2004 and 2020 (Table 7).[17,29,67,68] These guidelines cited various sources, including systematic reviews, pilot studies, a conference proceeding, a trade magazine article, and a massage therapy trial. The most common citation type was pilot studies, followed by systematic reviews, and none of the RTCs captured by this narrative review were directly cited by any guidelines.

The recommendations reported in these clinical practice guidelines were extremely variable. Two of the guidelines (2/4, 50%) reported positive recommendations,[29,67] while the remaining two guidelines reported negative recommendations.[17,68] Of the two guidelines reporting positive recommendations, they reported "weak evidence for efficacy"[67] or suggested that SMT is generally "recommended" for consideration into a broader multidisciplinary approach to treating fibromyalgia.[29] The two guidelines reporting negative recommendations were more direct and described how chiropractic is "not recommended" and "should not be implemented"[68] due to a lack of established effectiveness as well as concerns about safety, leading to a "strong against" rating.[17]

Discussion

This narrative review summarizes the available literature regarding the use of spinal manipulative therapy (SMT) for fibromyalgia. We identified a total of 38 publications, which largely consist of retrospective observational reports (e.g., case reviews or case series) or summary articles like systematic reviews or clinical practice guidelines. Very few well-designed controlled trials exist on this topic and such studies are foundational to establishing treatment efficacy. Those that do exist are difficult to compare due to variations in study methodologies, such as simultaneously combining SMT with various forms of additional treatment or having considerable differences in treatment frequency and duration.

Quality controlled trials investigating the use of SMT for fibromyalgia management describe highly variable results, ranging from positive,[49] negative,[51] or mixed outcomes depending on follow-up timeframe[50,52]. These variable results are contrasted against the almost uniformly favourable outcomes reported in case reports and case series and may also contribute to the variations seen in the plethora of systematic reviews that have been published on this topic. Systematic reviews also tended to rely heavily on data from pilot studies or other lower quality sources of information (Table 5). It is possible that the low number of high-quality RCTs on this topic, combined with frequent citations to lower levels of evidence among systematic reviews, has resulted in the heterogeneous recommendations reported across current clinical practice guidelines. These variable recommendations are illustrated in Figure 1 and stand to create confusion among clinicians interested in the best available evidence regarding SMT for fibromyalgia management. Figure 1 also highlights the need for more quality experimental trials on this topic. The authors of this narrative review also encourage future studies that compare standard fibromyalgia care to standard care, combined with SMT, to evaluate whether SMT is an effective form of complementary treatment. Studies comparing standard care to SMT, in isolation, may also be used to evaluate whether SMT is an effective form of alternative treatment for fibromyalgia management. We would also like to encourage reporting data regarding adverse events associated with such treatments and using patient-centred outcome measures reflective of a modern understanding of the features associated with fibromyalgia, such as the Widespread Pain Index (WPI) or Symptom Severity Scale (SSS) outcome measures. Without such studies, our understanding of whether SMT is a safe and effective treatment approach for fibromyalgia will continue to be incomplete.

Females represent most of the individuals involved in the existing literature on SMT for fibromyalgia management. This narrative review shows that about 90% of the patients described in the available case reports and case studies were female (Tables 1 and 2) and the majority

Table 6.
Summary of systematic reviews

Authors	Year	Cited Articles Involving SMT	Conclusion
Sim J, *et al*.[53]	2002	1 citation, which was a pilot study[45]	The evidence is insufficient for meaningful conclusions. (Inconclusive Results)
Ernst E.[54]	2003	1 total citation, which was a pilot study[45]	The available evidence was noted to have methodological weaknesses that make this pilot study uninterpretable in terms of therapeutic efficacy. (Inconclusive Results)
Holdcraft L, *et al*.[55]	2003	4 total publications were cited; including 1 pilot study[45], 2 surveys,* and 1 editorial*	The evidence is insufficient to support therapeutic benefit of chiropractic treatment for fibromyalgia management and this treatment is not currently recommended for treating fibromyalgia. (Negative Results)
Ernst E.[56]	2009	4 total publications were cited, including: 2 pilot studies,[45,47] 1 study protocol,* and 1 trade magazine article*	There is no evidence to suggest that chiropractic is effective for treating fibromyalgia. (Negative Results)
Schneider MJ, *et al*.[57]	2009	9 total publications were cited, including: 2 pilot studies,[45,46] 2 case series,[43,44] 4 conference proceedings,* and 1 trade magazine article*	Limited evidence supports spinal manipulation for fibromyalgia. The article describes emerging literature on a variety of CAM therapies for the conservative management of fibromyalgia, including spinal manipulation, while noting the lack of experimental studies on the topic. (Positive Results)
Baranowsky J, *et al*.[58]	2009	2 total publications were cited and both were pilot studies[45,46]	Chiropractic did not show superiority to the control group and noted the lack of experimental evidence to support the use of chiropractic care for fibromyalgia. (Negative Results)
Porter NS, *et al*.[59]	2010	2 total publications were cited, including: 1 pilot study[45] and one non-manipulation study investigating supplements*	There is some evidence that spinal manipulation may provide benefit for fibromyalgia, but the literature consists of a small number of studies of generally low methodological quality highlight the need for further investigation. (Positive Results)
Bronfort G, *et al*.[60]	2010	6 total publications were cited, including: 3 systematic reviews,[56,57,67] pilot studies,[45–47] 1 conference proceeding,* and 1 trade magazine article*	The evidence regarding the effectiveness of spinal manipulation for the treatment of fibromyalgia is inconclusive and does not provide clear direction. (Inconclusive Results)
Terhorst L, *et al*.[63]	2011	3 total publications were cited and all 3 were pilot studies[45–47]	Manipulative treatments of fibromyalgia showed no overall effect. The authors also emphasized how the literature consists of a small number of studies, each with very small sample sizes. (Negative Results)
Posadzki P, *et al*.[64]	2011	2 total publications were cited and both were systematic reviews[56,57]	The available studies fail to demonstrate that spinal manipulation is an effective intervention for fibromyalgia. (Negative Results)
Terry R, *et al*.[65]	2012	1 systematic review[56] was cited	There is no evidence to indicate that chiropractic may effectively treat fibromyalgia while stating how little evidence supports adopting chiropractic treatments for fibromyalgia treatment. (Negative Results)
Clar C, *et al*.[61]2010	2014	5 total publications were cited, including: 3 systematic reviews[58,59,63], 1 cranio-sacral study,* and 1 study involving only soft-tissue therapy*	There is inconclusive, but potentially favourable, evidence for the use of chiropractic spinal manipulation for fibromyalgia management. (Inconclusive Results)
Lauche R, *et al*.[66]	2015	4 total publications were cited and all 4 were systematic reviews[55–57,63]	There is no reliable or positive evidence for chiropractic interventions for fibromyalgia management. (Negative Results)
Perry R, *et al*.[62]	2017	7 total publications were cited, including: 2 systematic reviews,[56,58] 3 pilot studies,[45–47] 1 conference proceeding,* and 1 trade magazine*	No firm conclusions were drawn regarding the efficacy of spinal manipulation for fibromyalgia management. (Inconclusive Results)

*Not cited due to not meeting inclusion criteria for this narrative review
Legend: CAM; complementary and alternative medical therapies, SMT; spinal manipulative therapy

Table 7.
Summary of guidelines

Authors	Year	Cited Publications	Recommendation
Goldenberg DL, *et al*.[67]	2004	2 total publications were cited; 1 pilot study[45] and 1 massage study*	There is weak evidence for efficacy of spinal manipulation for managing fibromyalgia (Positive Recommendation)
Winkelmann A, *et al*.[68]	2012	4 total publication were cited; 2 pilot studies,[45,47] 1 conference proceeding,* and 1article from a trade magazine*	Chiropractic is not recommended for fibromyalgia and this recommendation had a strong consensus. This article also stated that chiropractic should not be implemented for fibromyalgia management. (Negative Recommendation)
Macfarlane GJ, *et al*.[17]	2017	1 systematic review was cited,[56]	Chiropractic received a *strong against* recommendation due to a lack of established effectiveness as well as safety concerns (Negative Recommendation)
Hawk C, *et al*.[29]	2020	1 systematic review was cited[61]2010	Spinal manipulation is recommended for consideration as part of a multidisciplinary approach to fibromyalgia, which incorporates active, passive, and mind-body interventions. (Positive Recommendation)

*Not cited due to not meeting inclusion criteria for this narrative review

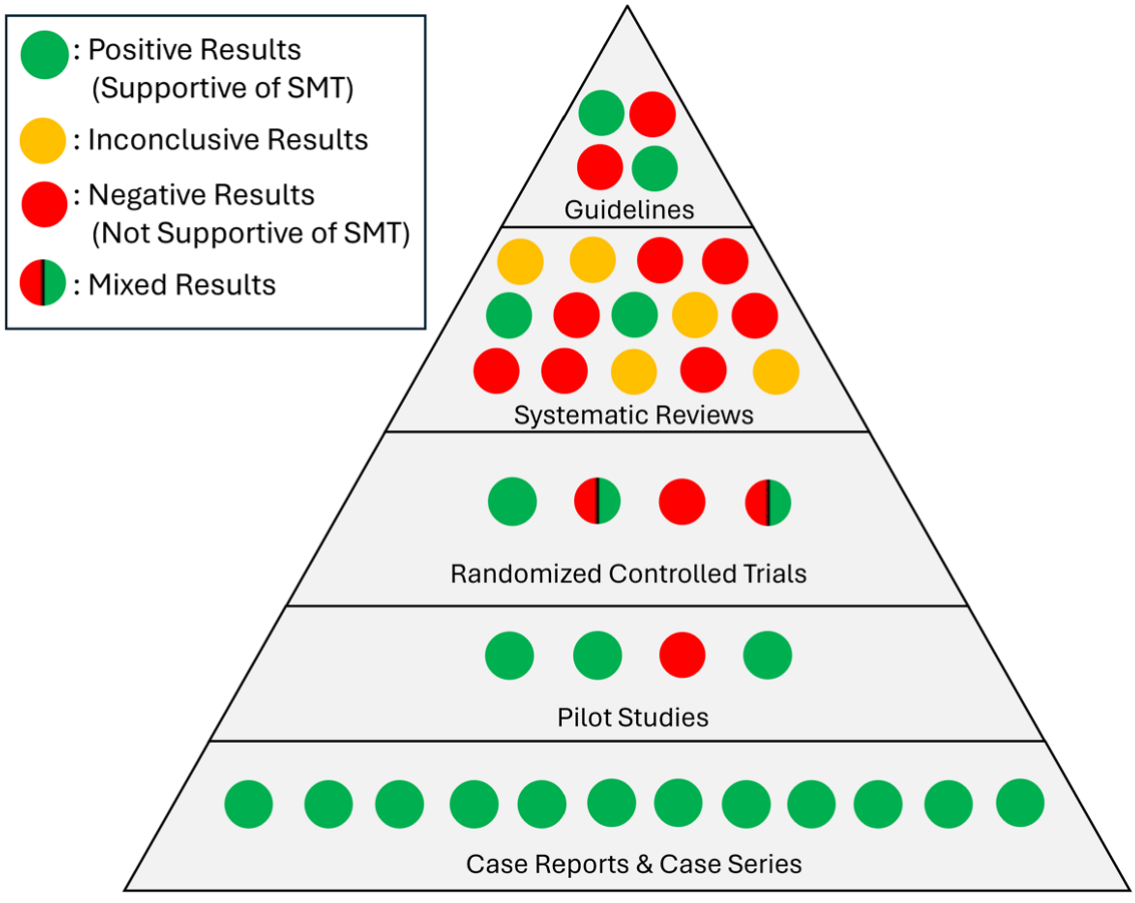

Figure 1.
Hierarchy of evidence regarding spinal manipulation for fibromyalgia

of study participants included in clinical trials were also female (Tables 3 and 4). While fibromyalgia has been described as being more prevalent among females,[69] descriptions of females having lower pressure pain thresholds, higher rates of chronic fatigue, more frequent headaches, and higher rates of irritable bowel syndrome are likely to have biased fibromyalgia diagnoses toward females[49,70]. The authors of this review encourage future research on this topic to deliberately include males and non-binary individuals, in an attempt to further explore this topic.

As mentioned in the Introduction of this narrative review, the diagnostic criteria of fibromyalgia has undergone an evolution since ACR's initial criteria in 1990, which was limited to musculoskeletal complaints, to the most recent 2016 revisions which better reflect the current understanding of fibromyalgia. What was originally believed to be a peripheral soft-tissue condition is now understood to primarily be a disorder of central pain processing. Manual therapies applied to peripheral tissues, such as manipulative techniques, have been shown to have favourable effects on patient's pain experience,[71,72] but much remains to be known about the "black box" of mechanistic reasoning connecting an intervention with clinically relevant outcomes[73]. Manual therapies have been described to impact centrally-mediated neurophysiologic pain processing,[74–76] and training clinicians from this perspective has been proposed,[77] but future research is needed to further explore whether these mechanisms have a clinically meaningful impact among individuals with fibromyalgia. Future research could also investigate whether adding spinal manipulation to evidence-based behavioural health treatments, such as cognitive behavioural therapy for chronic pain (CBT-CP) or mindfulness-based stress reduction (MBSR), impacts treatment outcomes for fibromyalgia management. Investigating patients' motives for seeking chiropractic care for fibromyalgia management and/or their treatment goals from such care may also be valuable research contributions, as these appear to be lacking in the available literature.

Limitations

There are inherent limitations to this review. The nature of narrative reviews is less structured than other study designs, which may limit the reproducibility of our search results. Searching the grey literature and manually searching reference lists may introduce selection bias and it is also possible that our search strategy failed to discover relevant studies. Service fees associated with accessing the Allied and Complementary Medicine Database (AMED) and Cumulative Index for Nursing and Allied Health Literature (CINAHL) databases prevented our ability to include these into the search strategy, but including these databases may have discovered additional results. Lastly, grading publication quality was not a component of this review, so it is not possible to objectively compare the quality of the included results.

Conclusion

The existing body of literature on the efficacy of spinal manipulative therapy (SMT) for fibromyalgia management reveals a scarcity of high-quality controlled studies. Lower-quality reports suggest positive effects, while controlled trials report mixed results. Systematic reviews consistently highlight a lack of established efficacy or inconclusive evidence. Clinical practice guidelines exhibit significant variability, ranging from strong recommendations against the use of SMT to recommendations advocating its consideration as part of a multi-modal treatment approach.

Authors' roles

CBR conceptualized this project and developed the methods. CBR and SRH were both involved with the literature search, analyzing search results, and drafting of this manuscript.

Acknowledgments

The authors would like to acknowledge the assistance of Kari Dugan and Brandon Zhou, Technical Library Assistants at the David D. Palmer Health Sciences Library; these two assisted in retrieving full-text versions of various articles that were not able to be retrieved by this study's authors.

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Appendix 1.
Electronic search strategy

Date	February 29, 2024
Databases	• National Library of Medicine (MEDLINE via PubMed) • Index to Chiropractic Literature (ICL) • Physiotherapy Evidence Database (PEDro) • Cochrane Library • ClinicalTrials.gov • International Clinical Trials Registry Platform (ICTRP) • Google Scholar
Search Terms	• "manip* AND fibromyalgia" • "spinal manip* AND "fibromyalgia" • "chiropr* AND fibromyalgia" • "osteop* manip* AND fibromyalgia" • "physical therap* AND fibromyalgia" • "physiotherapy* AND fibromyalgia" • "occupational therap* AND fibromyalgia"

Appendix 2.
List of referenced studies excluded from this review

Conference proceedings:

1. Lo K, *et al*. Osteopathic manipulative treatment in fibromyalgia syndrome. J Am Osteopath Assoc. 1992; 92: 1177.
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Unable to verify existence of citation:

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