



REVIEW

Effectiveness of spinal manipulation on chronic cervical pain: a systematic review of randomized clinical trials

Efectividad de la manipulación espinal sobre el dolor crónico cervical: una revisión sistemática de ensayos clínicos aleatorizados

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ABSTRACT

Introduction: chronic cervical pain is in the posterior and lateral region of the neck with a duration greater than twelve weeks, it is a common disorder in primary care, with a high impact and socioeconomic cost on those who suffer from it. There are several factors that contribute to the chronicity of neck pain such as traumatic antecedents, age, gender, genetics, smoking, level of physical activity and level of job satisfaction, generating a reduction in the patient's quality of life by intervening in the activities of daily living.

Objective: to determine the effectiveness of spinal manipulation (SMT) on chronic neck pain.

Method: review of randomized controlled clinical trials from WEB OF SCIENCE, SCOPUS, MEDLINE databases. Following the protocol registered in PROSPERO and the recommendations described by PRISMA, randomized clinical trial type studies with high methodological quality were selected, using the PEDro scale with a value ≥ 7 in studies using SMT as a treatment technique in patients with chronic neck pain.

Results: 10 randomized clinical trials were included between the years 2013 and 2023 with a total of 992 volunteers, demonstrating the effectiveness of SMT on chronic cervical pain.

Conclusion: SMT decreases chronic neck pain, however, it is more effective when it is part of a multimodal protocol involving therapeutic exercise with multiple interventions.

Keywords: Spinal Manipulation; Cervicalgia; Cervical Vertebrae; Chronic Pain.

RESUMEN

Introducción: el dolor crónico cervical se localiza en la región posterior y lateral del cuello con una duración mayor a doce semanas, es un trastorno común en la atención primaria, con un alto impacto y costo socio económico sobre quienes lo padecen. Existen varios factores que contribuyen a la cronicidad del dolor de cuello como; antecedentes traumatológicos, edad, género, genética, tabaquismo, nivel de actividad física y nivel de satisfacción laboral, generando una reducción en la calidad de vida del paciente al intervenir en las actividades de la vida diaria.

Objetivo: determinar la efectividad de la manipulación espinal (SMT) sobre el dolor crónico cervical.

Método: revisión de ensayos clínicos controlados aleatorizados de las bases de datos WEB OF SCIENCE, SCOPUS, MEDLINE. Siguiendo el protocolo de registrado en PROSPERO y las recomendaciones descritas por PRISMA, se seleccionaron estudios de tipo ensayos clínicos aleatorizados con alta calidad metodológica, utilizando la escala de PEDro con un valor ≥ 7 en los estudios que utilizan SMT como técnica de tratamiento

en pacientes con dolor crónico cervical.

Resultados: se incluyeron diez ensayos clínicos aleatorizados entre los años 2013 y 2023 con un total de 992 voluntarios, demostrando la efectividad de la SMT sobre el dolor crónico cervical.

Conclusión: la SMT disminuye el dolor crónico cervical, sin embargo, presenta mayor efectividad al ser parte de un protocolo de multimodal que involucre ejercicio terapéutico con múltiples intervenciones.

Palabras clave: Manipulación Espinal; Cervicalgia; Vértebras Cervicales; Dolor Crónico.

INTRODUCTION

Chronic neck pain (CNP) is characterized by being in the posterior and lateral part of the neck between the nuchal line and the first thoracic vertebra, causing loss of mobility and reduced functionality.^(1,2) Its duration is longer than twelve weeks, it is one of the most common disorders in primary care and at the same time causes a high socio-economic cost.^(3,4) The prevalence of neck pain has been estimated at 288,7 million people around the world, causing an increase in the number of years lived with disability.^(3,5,6) Factors contributing to NPC are trauma history, age, gender, smoking, low level of physical activity, among others.^(4,5,7,8) NPC is not directly related to a responsible structure, so it is generally attributed the denomination of chronic non-specific pain, definition that involves alteration of proprioception of the neck muscles, altering the position and cervical motor control.^(4,5,9)

Conservative treatment includes non-steroidal anti-inflammatory drugs (NSAIDs), rest, immobilization with an orthopedic collar and rehabilitation of function. When these treatments do not alleviate pain favorably, analgesic infiltration or surgery is chosen.^(6,10,11) Regarding physical therapy protocols, most of them have a traditional approach and do not produce the desired effects in a short period of time.^(12,13)

Several clinical trials choose physiotherapeutic treatment to treat patients with NPC, where manual therapy with spinal manipulative techniques (SMT) is the most important, aiming to reduce pain, improve proprioception, joint range, muscle balance, posture and normalize somatosensory information.^(14,15) SMT techniques involve a short amplitude mobilization at the end of the elastic resistance, between the elastic barrier and the anatomical barrier called the parapsychological space. SMT is applied at high speed to decompress the facet joint to produce mechanical, analgesic, and proprioceptive effects.^(16,17,18) The tissue is exposed to a high degree of mechanical stress that promotes range of motion and improves the functional aspects of the patient.^(19,20) SMT has been compared with medication and acupuncture, where it is indicated that the manipulation performed in CNP produces improvement for a longer period improving the disability caused by pain.⁽²¹⁾

The physiological principle of SMT is linked to the reduction of neurophysiological biomarkers such as inflammatory biomarkers, spinal decrease in excitability, modification of activity in cortical areas involved in pain processing, and excitation of the Sympathetic Nervous System (SNS).^(10,22,23) Therefore, this systematic review of randomized clinical trials aims to determine the effectiveness of spinal manipulation on chronic neck pain.

METHOD

This is a systematic review of randomized clinical trials based on five stages, following the PRISMA-P guidelines.⁽²⁴⁾ registered in the PROSPERO platform (CRD42023440084), (1) search strategy definition, (2) literature selection, (3) data extraction, (4) methodological quality assessment, (5) data synthesis and analysis. A descriptive analysis of the data was performed considering the heterogeneity of the studies, leaving out the meta-analysis option.

Search strategy

The search was conducted between December 2022 and July 2024. Randomized clinical trials in English and Spanish published from 2013 to 2024 were considered. A search was performed in databases such as WEB OF SCIENCE, SCOPUS, MEDLINE using combinations with Boléan operators in the subject, title, abstract or keywords. The algorithms used in the databases are detailed in figure 1.

Selection of literature

Inclusion criteria were established: (1) randomized clinical trial type studies, performed in people with chronic neck pain; (2) with experimental design; (3) that included SMT as the only treatment technique or within a multimodal protocol; (4) that the intervention protocol was performed by physicians or physical therapists; (5) that measured pain. Studies focused on acute or subacute pain that did not specify the duration

of pain were excluded, as were studies involving pathology such as cancer, herniations, spinal stenosis, migraine, or vestibular syndromes.

Data extraction

The principal investigator developed a form in which information was collected for each clinical trial such as the title, author, year, intervention protocol, number of participants, rating scales to measure pain and the value of the methodological quality according to the PEDro scale. The search was performed independently by two of the authors in the different databases, according to the title of the research, the potential to be included was considered, then a reading of the abstract was performed to identify the inclusion criteria and the results analyzed. The selected articles were read in their entirety to be included in this research work. In the case of inconsistencies, the third author specialized in methodological aspects was consulted.

Evaluation of methodological quality

The clinical studies found were analyzed by means of the Physiotherapy Evidence Database ⁽²⁵⁾ abbreviated PEDro, which evaluates the methodological quality of the studies. It considers criteria such as study design, quality of the information and validity of the results. For the present review, only studies with scores ≥ 7 were considered.

Data synthesis and analysis

The randomized clinical trials were ordered in three groups: (1) effects of spinal manipulation (SMT) with therapeutic exercise, (2) effects of SMT with myofascial induction, (3) effects of SMT vs Sham. Excel format matrices were designed for data extraction, with the aim of compiling relevant information: year of publication, sample, intervention protocol, pain assessment scale, methodological quality, results, and conclusions.

WEB OF SCIENCE

1 TS = "Chronic neck pain" OR "Chronic cervical pain" OR "Chronic cervicgia"

2 TS = "Spinal manipulation" OR "Manual therapy" OR "Chiropractic" OR "Osteopathy"

3 #1 AND #2

SCOPUS

"Chronic neck pain" (Article title, Abstract, Keywords) OR "Chronic cervical pain" (Article title, Abstract, Keywords) OR "Chronic cervicgia" (Article title, Abstract, Keywords) AND "Spinal manipulation" (Article title, Abstract, Keywords) OR "Manual therapy" (Article title, Abstract, Keywords) OR "Chiropractic" (Article title, Abstract, Keywords) OR "Osteopathy" (Article title, Abstract, Keywords)

MEDLINE/PUBMED

1. "Chronic neck pain" (Title/abstract) OR "Chronic cervical pain" OR "Chronic cervicgia"

2. "Spinal manipulation" (Title/abstract) OR "Manual therapy" (Title/abstract) OR "Chiropractic" (Title/abstract) OR "Osteopathy" (Title/abstract).

3. #1 AND #2

Figure 1. Database search strategy

RESULTS

Selection of studies

A total of 231 articles were identified; after review by the authors and application of inclusion and exclusion criteria, 10 articles were selected for this review. The flow chart indicates the selection process.

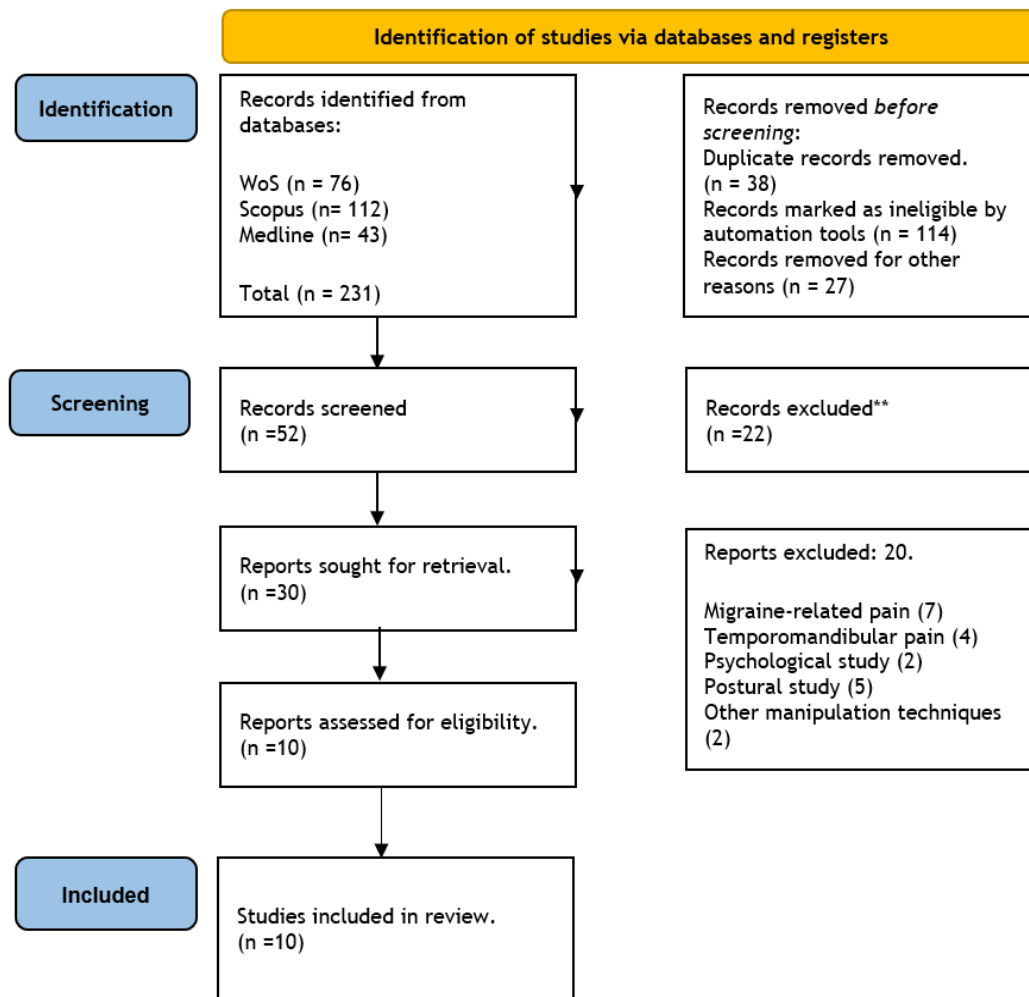


Figure 2. Flow chart for search strategy of article

Characteristics of the results

The analyzed randomized clinical trials gathered a total of 992 volunteers, with a sample size ranging from 13 to 93. Protocols involving SMT were conducted over a maximum of 12 weeks. The characteristics of each randomized clinical trial are described in table 1.

Evaluation measures

The randomized clinical trials included in this systematic review measured pain using the visual analog scale (VAS) and the numerical pain scale (NPRS).

DISCUSSION

This study was conducted to determine the effectiveness of SMT on chronic neck pain by comparing the results of protocols from each study using SMT as the sole treatment technique or as part of a multimodal pain reduction protocol.

Randomized clinical trials using SMT demonstrate changes in chronic neck pain, however, these effects vary according to the protocol and the time of intervention:

Intervention protocols using SMT as the sole treatment technique.

Five randomized clinical trials were included that demonstrated significance when applied as the sole treatment technique. SMT when compared to other interventional modalities such as spinal mobilization, home exercise, and home exercise.^(19,26) home exercise⁽⁵⁾ therapeutic exercise⁽²⁷⁾ shows similar results on the reduction of chronic neck pain. However, when compared with a simulated SMT, it shows greater effectiveness.⁽²⁸⁾

Intervention protocols using SMT as part of combined treatment.

We included five randomized clinical trials demonstrating the effectiveness of using SMT within a multimodal treatment protocol that could include home-based exercise, therapeutic exercise, therapeutic exercise, and exercise therapy.^(29,30) therapeutic exercise^(31,32) and instrumental suboccipital inhibition⁽³³⁾.

Table 1. Articles included in the systematic review “Effectiveness of spinal manipulation on chronic neck pain: a systematic review of randomized clinical trials”

N°	Author, Year	Groups (N)	Rating Scale	Intervention Period	Result	Conclusion	Pedro Scale
1	Alshami et al., 2021	SMT: 14 Sham SMT: 14	NPRS	5 weeks	The experimental group showed improvement in all parameters, with a mean of P(2,6) for pain up to the sixth intervention session.	SMT reduces pain, hypersensitivity and improves ROM, patient disability, however, there was no change in thermal pain sensitivity.	8
2	Arjona et al., 2021	MSIT: 31 INYBI: 31 INYBI + SMT: 34	VAS	3 weeks	There was less improvement in the MSIT group in left rotation, the combination of INYBI + UCMT obtained the best results.	All the techniques described are effective in improving ROM, disability, and VAS, but the combination of INYBI + UCMT is superior to the others.	7
3	Bakken et al., 2021	SMT + HE: 66 SMT: 65	NPRS	2 weeks	Both groups improved with treatment; no statistical differences were found in any of the measures.	Stretching exercises with and without additional SMT are associated with clinical improvement when performed for two weeks, but no significant differences are observed.	8
4	Bernal et al., 2020	SMT: 22 TE: 23 Sham MSIT: 20	VAS	12 weeks	Both experimental groups show significant differences with respect to the control with a value of P(0,072).	The exercise group reduces disability earlier than manual therapy, but SMT reduces pain perception earlier than ET.	7
5	Galíndez et al., 2018	SMT: 13 HE: 14	VAS	1 week	Changes were observed with respect to pre and post in both groups, but no differences were found between groups p(0,90).	Both interventions reduce disability and pain, improving flexion and rotation in only one week of intervention.	7
6	Lytras et al., 2023	TE: 19 TE+INIT: 20 TE+SMT: 20 Control: 18	VAS	10 weeks	Significant differences were found between the intervention groups at the second, fourth, sixth and tenth week p(0,05).	Both INIT and SMT combined with exercise are effective in improving pain, however INIT improves sensation and SMT improves mobility.	7
7	Maiers et al., 2014	SMT+HE: 80 SER+HE: 82 HE: 79	NPRS	12 weeks	There were significant differences between the groups with respect to pain at 12 weeks in favor of the SMT + HE group.	The SMT+ HE group showed greater adherence to treatment and was superior in pain reduction relative to the exercise-only group.	8
8	Rodriguez et al., 2021	SMT+ TE: 29 TE: 29	VAS	4 weeks	According to the intergroup analysis, the SMT+TE group improved VAS, cervical disability index, and pain threshold variables.	Adding SMT to the exercise protocol is more effective than exercise alone in reducing neck pain and disability.	8
9	Romero del Rey et al., 2020	SMT: 93 CTS: 93	NPRS	4 weeks	A reduction in pain was observed, with significant results for both groups.	Both interventions are equally effective in reducing chronic neck pain.	9
10	Valera et al., 2019	SMT: 28 MOB 28 SHAM SMT: 27	VAS	1 week	The SMT group decreased its values according to VAS compared to the SHAM SMT (p 0,05).	By applying a single intervention both SMT or MOB increasing cortisol levels, therefore, manipulation does not produce stress, improves disability.	9

Legend: SMT: Spinal Manipulative Therapy; Sham SMT: Simulated Manual Therapy; MSIT: Manual Suboccipital Inhibition Technique; INYBI: Instrumental Suboccipital Inhibition Technique; UCMT: Upper cervical manipulation technique; HE: Home exercise; TE: Therapeutic exercise; INIT: Integrated neuromuscular inhibition technique; SER: Supervised rehabilitation exercise; CTS: Cervicothoracic spine manipulation; MOB: Cervical mobilization.

CONCLUSION

SMT demonstrates effectiveness as a single treatment technique and as part of a multimodal protocol for chronic neck pain. However, SMT shows better results when complemented with therapeutic exercise because it enhances the analgesic effect, increases range of motion and improves activities of daily living.

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The authors declare that there is no conflict of interest.

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