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Review

Effects of neural mobilization in the treatment of chronic low back pain: a systematic review

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ABSTRACT

Introduction: Low back pain appears in approximately two thirds of the population at some point in life and when it exceeds more than 12 weeks, it evolves to chronic low back pain. Chronic low back pain is considered one of the most common causes of disability and absence from work. A therapeutic technique that can be used as a treatment for chronic low back pain is neural mobilization, capable of restoring compromised neurological structures, restoring movement by improving the elasticity of neural tissue and adjacent tissues.

Objective: To verify the effects of neural mobilization in patients with chronic low back pain.

Material and methods: All articles were carefully evaluated in order to obtain concrete and reliable information. The databases used were Google Scholar, Scielo, Medline and PubMed due to the methodological quality and articles in the area of interest. The keywords “low back pain”, “chronic low back pain”, “neural mobilization” and “physiotherapeutic intervention” were combined in the most diverse possibilities, in English and Spanish translations.

Results: 86 articles were found, nine of which were included in this review. They had a score ≥ 5 on the PEDro Scale, which methodologically qualifies the articles. After analyzing the results obtained through the selected articles, all the data collected, as well as their respective results, were described in a table that contains data from the articles.

Conclusions: Neural mobilization reduces pain and improves the extensibility of tissues, causing a reduction in painful sensation and increased flexibility. Therefore, it is necessary to continue research in order to verify new results obtained through this type of intervention.

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Efectos de la movilización neural en el tratamiento del dolor lumbar crónico: una revisión sistemática

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RESUMEN

Introducción: La lumbalgia aparece en aproximadamente dos tercios de la población en algún momento de la vida y cuando supera las 12 semanas evoluciona a lumbalgia crónica. El dolor lumbar crónico se considera una de las causas más comunes de incapacidad y ausencia laboral. Una técnica terapéutica que se puede utilizar como tratamiento para el dolor lumbar crónico es la movilización neural, capaz de restaurar las estructuras neurológicas comprometidas, restaurando el movimiento al mejorar la elasticidad del tejido neural y los tejidos adyacentes.

Objetivo: Verificar los efectos de la movilización neural en pacientes con dolor lumbar crónico.

Material y métodos: Todos los artículos fueron cuidadosamente evaluados para obtener información concreta y confiable. Las bases de datos utilizadas fueron Google Scholar, Scielo, Medline y PubMed debido a la calidad metodológica y artículos del área de interés. Las palabras clave "lumbalgia", "lumbalgia crónica", "movilización neural" e "intervención fisioterapéutica" se combinaron en las más diversas posibilidades, en las traducciones al inglés y al español.

Resultados: Se encontraron 86 artículos, nueve de los cuales fueron incluidos en esta revisión. Tuvieron puntaje ≥ 5 en la Escala PEDro, que califica metodológicamente los artículos. Luego de analizar los resultados obtenidos a través de los artículos seleccionados, todos los datos recolectados, así como sus respectivos resultados, fueron descritos en una tabla que contiene los datos de los artículos.

Conclusiones: La movilización neural reduce el dolor y mejora la extensibilidad de los tejidos, provocando una reducción de la sensación dolorosa y un aumento de la flexibilidad. Por lo tanto, es necesario continuar con la investigación para verificar nuevos resultados obtenidos a través de este tipo de intervención.

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1. INTRODUCTION

Low back pain is an important public health problem that often affects the adult population in industrialized society. Its incidence is only surpassed by headaches on the scale of painful disorders affecting people, being a frequent cause [1-3].

The etiology of low back pain is difficult to identify because it manifests itself under various conditions. Studies show that the main individual and psychosocial risk factors for low back pain are sex, age, body mass index (BMI), genetics, stress, anxiety, and depression [4].

Some symptoms such as anxiety, depression, and kinesiophobia can be considered a tool that predicts the patient's psychological profile, thus contributing to the prognosis and treatment, providing a better therapeutic approach [5, 6].

In a systematic review to seek the best method of physical

intervention and rehabilitation for low back pain, comparing several physical therapy interventions, the authors concluded that therapeutic exercises promote a reduction in the intensity of pain and disability for a long period [7].

Considering the high prevalence of low back pain, several treatment techniques have been applied to minimize the damage from these dysfunctions, among which is neural mobilization.

Neural mobilization (NM) is a manual therapy technique that aims to restore the movement and elasticity of the nervous system, generating a consequent better functioning of the musculoskeletal regions. Its execution takes place through oscillating or sustained movements, always in the direction of the peripheral nerves that present limitation in sliding. As a result, signs of neural tension appeared during region-specific neural tests [8].

NM has an influence on the axonal transport process and a consequent increase in the flexibility of rigid nerves and adjacent joint structures. Thus, it leads to greater muscle

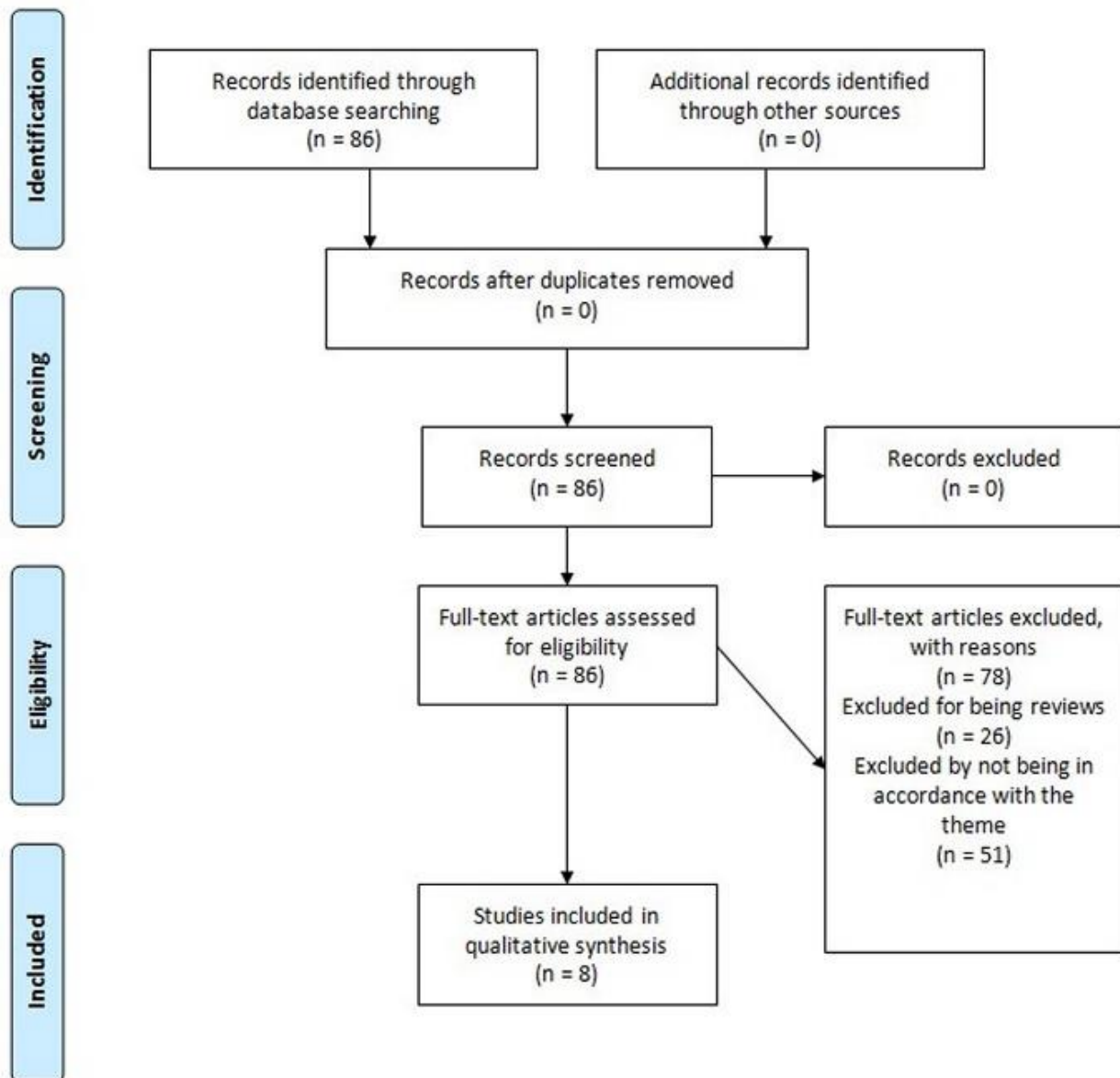


Figure 1: Flowchart of the systematic review.

strength, increased flexibility of the entire nerve, decreased mechanosensitivity of the nervous system, which in turn increases the conformity of nervous tissues [9].

The purpose of this review is to assess the consensus of the available evidence about the benefits of neural mobilization in the treatment of patients with chronic low back pain.

2. MATERIAL AND METHODS

This study is a systematic review of the literature, characterized as an exploratory research. This type of research allows greater flexibility in planning, which makes it possible to make more diverse considerations of the

research theme [10, 11].

Regarding the type of intervention, all studies should include NM as an intervention, which may or may not be associated with other physiotherapeutic interventions, provided that the main objective of the study was NM as a form of treatment. The participants had chronic low back pain and were treated with the NM technique, selected according to the criteria of each author of the included articles (individuals diagnosed with chronic low back pain, not submitted to lumbar spine surgery, without systemic pathologies, cognitive alterations, and absolute contraindications for the proposed technique).

Data collection articles and case studies, published in Portuguese, Spanish, and English, with a score equal to or

greater than 5 on the PEDro scale, which included neural NM as a form of physical therapy intervention for chronic low back pain were included. Works excluded from books, abstracts, and congress proceedings were excluded; dissertations, pilot studies, course conclusion papers (TCC), and literature reviews.

3. RESULTS

The nine articles included in this qualitative synthesis were evaluated based on the PEDro scale to verify their statistical suitability and methodological relevance. Studies that achieved a score greater than or equal to five on this scale

Table 1: Evaluation of potential articles based on the PEDro scale.

Article	PEDro scale criteria										
	1	2	3	4	5	6	7	8	9	10	11
Júnior et al., 2015 [12]	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y
Schmit et al., 2016 [13]	N	N	Y	Y	N	N	N	N	Y	Y	Y
Arêas et al., 2017 [14]	NF	N	Y	Y	N	N	N	N	Y	Y	Y
Machado et al., 2010 [15]	Y	N	Y	Y	N	N	N	N	Y	Y	Y
Ali et al., 2015 [16]	Y	Y	Y	N	N	N	N	N	Y	Y	Y
Borges et al., 2019 [17]	Y	N	N	Y	N	N	N	N	Y	Y	Y
Paeslandim et al., 2014 [18]	Y	N	N	Y	N	N	N	Y	Y	Y	Y
Freitas et al., 2015 [19]	Y	N	Y	Y	N	N	N	Y	Y	Y	Y

Y: Yes; N: No; NF: Not found.

All included articles (Figure 1) were evaluated using the PEDro scale (Physiotherapy Evidence Database), described in Table 1. After analyzing the results obtained through the selected articles, all the data collected, as well as their respective results, were described in Table 2.

Table 1: Main interventions performed

Intervention	% found
Muscle Stretches	5.3
Short Wave Diathermy	5.3
Stabilization	10.5
Muscle strengthening	5.3
Cyriax Disc Manipulation	5.3
Myofascial Release	10.5
Neural Mobilization	42.1
Postural Orientations	10.5
Lumbar Traction	5.3

The search strategy was carried out in the Google Scholar, Scielo (Scientific Electronic Library Online), Medline (Medical Literature Analysis and Retrieval System Online) / PubMed databases. Searches were carried out in the last 10 years (2010-2020), considering the Portuguese, English and Spanish languages. The keywords and their translations were used: “low back pain”, “chronic low back pain”, “neural mobilization” and “physical therapy intervention”, combined in the most diverse possibilities.

Initially, the articles were analyzed through the title and the abstract and, later, in a judicious manner, the articles were evaluated through critical reading, with the objective of electing those that fit the required criteria. Therefore, the articles included in the systematic review were selected, verifying the positive and negative aspects of each treatment.

were considered adequate, as described in Table 1.

According to the PEDro scale, 4 of the articles included received a score of 5, 3 received a score of 6, 1 received a score of 7 and another received a score of 8, demonstrating an elevated methodological quality of the articles included. The number of participants involved in all studies totals 123 people. The data show us that the majority of participants were female (62.6%) and relatively young (average age 38.8 ± 8.4 years). Table 2 shows the main interventions carried out in the studies.

In several studies, NM has been associated with some other type of intervention, such as myofascial maneuvers, Cyriax disc manipulation, muscle strengthening, lumbar traction, short wave diathermy, stretching, and postural orientations. In these cases, the results were more expressive concerning the benefit for patients.

Figure 2 shows the main results observed with the neural mobilization technique in patients with chronic low back pain, pointing out the decrease in pain as being the most relevant (70% of the studies).

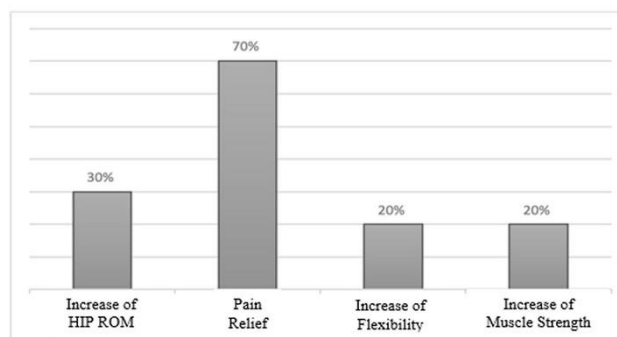


Figure 2: Main results observed with the neural mobilization technique.

Table 3: Evaluation of potential articles based on the PEDro scale.

Study	Country	Participants	Intervention	Results
Júnior et al., 2015 [12]	Brazil	11 patients with clinical diagnosis of low back pain, between 30 and 50 years old.	Neural mobilization technique with extended leg elevation (SLR), twice a week, for 4 weeks.	After treatment, neural mobilization improved hip ROM
Schmit et al., 2016 [13]	Brazil	19 individuals (4 men and 15 women) with nonspecific chronic lumbar pain (CLP).	10 sessions, with myofascial maneuvers, lumbar traction, disc manipulation, neural mobilization, muscle activation exercises and postural orientations.	Reduced pain, without changing the strength pattern.
Arêas et al., 2017 [14]	Brazil	14 healthy and sedentary men.	Neural mobilization in the region of nerve roots L4 and L5, bilaterally. Only one intervention was performed (around 40 mobilizations).	There was an increase in strength of the knee flexor muscles, an increase in flexibility and a reduction in pain.
Machado et al., 2010 [15]	Brazil	9 individuals.	One group was submitted to a neural mobilization program and another group to a muscle stretching program (20 sessions).	Both interventions reduced pain and increased flexibility, but only neural mobilization achieved a statistically significant improvement.
Ali et al., 2015 [16]	Pakistan	40 patients with root CLP.	Group A: neural mobilization; Group B: stabilization exercises and short-wave diathermy.	Neural mobilization, along with other techniques, improves pain and function more beneficially than when done separately.
Borges et al., 2019 [17]	Brazil	8 individuals with symptoms of low back pain.	10 sessions (1 hour, three times a week) of myofascial release, joint mobilization, neural mobilization and segmental stabilization.	There was pain control and improvement in functional capacity.
Paeslandim et al., 2014 [18]	Brazil	6 participants.	12 sessions, twice a week, with the techniques: Pompage, neural mobilization, stabilization and global postural rehabilitation (RPG).	There was a reduction in pain.
Freitas et al., 2015 [19]	Brazil	8 individuals with low back pain.	Group 1: strengthening and awareness of the transverse abdomen muscle; Group 2: strengthening, awareness of the transverse abdomen muscle and neural mobilization of the sciatic nerve (Slump, sliding).	There was an increase in strength and a reduction in pain in the group that received neural mobilization as an intervention.

4. DISCUSSION

Given the analyzed articles, it is possible to observe that in most interventions aimed at chronic low back pain where NM was used, there were significant results. In all cases, this type of treatment reduced the intensity of pain, in addition to improving the flexibility of neural tissue.

Pereira Junior et al., 2015, used only the NM technique as a form of treatment for patients with chronic low back pain. Both showed that the NM increased the range of motion of trunk flexion, which was confirmed by the goniometry tests and the Wells bench. Regarding pain, Pereira Junior et al., 2015, concluded that NM had limited effects [12].

Arêas et al., 2017, also evaluated the effects of NM in isolation and concluded that the mobilization promoted an

increase in knee flexor muscle strength, increased flexibility in knee flexion and extension movements. However, they did not evaluate the effects of the technique on pain pictures [16].

Of the articles included in this review, six brought NM associated with other physical therapy techniques, such as strengthening, stabilization, stretching, and pompage, among other techniques used in clinical practice in the treatment of chronic low back pain. Ali et al., 2015, and Borges et al., 2019, associated mobilization with segmental stabilization and concluded that these techniques performed in the association were effective in controlling pain and improving functional capacity, but did not know whether these techniques performed in isolation would have the same results [15, 17].

The stretching technique associated with NM has shown satisfactory results, with increased flexibility of the posterior chain and reduced pain, but it is also unknown whether these techniques performed in isolation would bring the same benefits [15].

Paeslandim et al., 2014, and Schimit et al., 2016, associated NM with more than one physiotherapeutic technique and were able to assess the level of pain and degree of muscle strength. Regarding the pain, both showed a reduction in pain levels but presented different results about the increase in the strength pattern [13, 18].

The decrease in pain, which was the main objective of the interventions in the selected articles, was reported in 70% of the studies. This percentage is in line with the results obtained in the studies by Kurt, Aras, and Buker, 2020, and Neto et al., 2017[19,20]. The Visual Analog Pain Scale (EVAD) was the most used assessment, characterized by a validated method that quantitatively appreciates the presence and intensity of the individual's pain. Recently, Ramos et al., 2020, demonstrated that individuals treated with NM had an average 70% reduction in pain after the treatment, which was assessed by EVAD, in addition to increasing lumbar mobility. This shows that NM relieves pain and accelerates the functional recovery process, in addition to optimizing the return of participants to activities of daily living [21].

Regarding the frequency of intervention, the authors used it 2 to 3 times a week, for a period of 4 to 8 weeks. In 2012, Monerrat et al., demonstrated that the use of 4 weeks of treatment in different disorders with variations in the number of sessions was sufficient to obtain satisfactory results. In contrast, Machado and Bigolin, 2010, used 20 sessions, held twice a week, and obtained results that are even more significant when it was compared to other studies [22].

The age range of the samples from the studies included in the present review ranged between 30 and 70 years. Regarding gender, the majority were female. This fact is supported by what is already being shown in some studies, which show that the overload of occupational and domestic tasks and the accumulation of roles making women more likely to develop musculoskeletal pathologies, such as low back pain [23].

In addition, it is worth mentioning that a biopsychosocial perspective of chronic pain suggests the existence of a dynamic relationship between biological changes, psychological status, and social context, emphasizing that these factors have different roles in chronic pain, disability, and emotional maladjustment, which makes individuals even more susceptible to chronification [24].

Although the articles included in this review have shown satisfactory results of NM as a treatment for chronic low back pain, either in isolation or in association with other techniques, these studies had limitations in the composition of their samples, as they are small and quite heterogeneous samples. Therefore, it is essential to reinforce that the objective of the sample calculation is to determine the elements that are necessary to compose the sample, obtaining valid results. Besides, the methodology must be carried out properly so that the sample results can be generalized to the population. It is necessary to ensure that the sample is representative, that is, it must present general characteristics of the population.

Regarding the number of articles, the quantity on the topic is still quite limited in the scientific literature, making it necessary to conduct further research to prove its effectiveness, as in randomized clinical trials. Thus, the importance of further studies to perceive NM as a form of treatment for chronic low back pain is perceived, since this technique has shown satisfactory results, in addition to presenting low cost, being easy to apply, and without side effects.

5. CONCLUSIONS

Considering the quality of the articles and their results presented, it is concluded that neural mobilization is an effective technique in reducing pain intensity and stiffness, in addition to increasing ROM, improving tissue extensibility in the treatment of patients with chronic low back pain.

6. CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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