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Effects of Lumbar Manipulation Spinal in Patients with Pain Caused by a Lumbar Disc Herniation: A Systematic Review

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Abstract

Background: herniated disc usually presents pain accompanied with paresthesia and loss of muscle strength, causing limitations in the activities of daily life. Among the therapeutic strategies aimed at obtaining an improvement in the symptomatology, highlights the Osteopathic manipulation.

Methods: 11 computerized databases were consulted. Regarding the eligibility criteria, only articles of the randomized controlled clinical trial type were included. The tool for assessing the risk of bias was the one proposed by Cochrane.

Results: A total of 3 randomized controlled clinical trials were selected and considered low risk of bias. The results showed an improvement in all the variables measured in the experimental group of osteopathic manipulation. However, the improvement was greater in the study group that was underwent surgery.

Conclusions: lumbar manipulation spinal is an effective technique to improve the symptomatology of pain originating from a herniated lumbar disc. None of the participants had adverse reactions and their outcome improved significantly in the short and long term. Nevertheless, the studies obtained were limited in number.

Key words: Manipulation Osteopathic, Manipulation Chiropractic, Low Back Pain, Radiculopathy, Sciatica.

Introduction

A herniated disc is known to be a pathology in which the peripheral fibers of the annulus fibrosus rupture, causing the nucleus to protrude into the spinal canal or foramen of conjunction. The most common clinical presentation is low back pain that increases with severity and with increasing intra-abdominal pressure. It may also present paresthesias or loss of muscle strength in the sufferer, leading to disability[1]. If the nucleus comes into contact with the spinal root, it can cause radiating pain along the path of the sciatic nerve.

Research has found that the 1-year incidence of first ever low back pain episode ranges from 6.3% to 15.4%, while the 1-year incidence of recurrent low back pain episodes ranges from 24% to 80%[2]. The prevalence of low back pain during a person's life has been established at around 70-80%[3,4]. It is known

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that 10% of low back pain is caused by a herniated disc in that area[5], reaching a prevalence of 1-3% of the population with a herniated disc[6]. A lumbar disc herniation can cause radiculopathy towards the lower limb, due to the pathway of the sciatic nerve. This lumbar radicular syndrome does not exceed 5% of the population in terms of prevalence[7]. All these data show that we are dealing with a pathology that is well established in society and that presents numerous cases.

As for the triggering cause of a herniated disc, the literature is not clear, and it can be of various kinds. It is suspected to have a mechanical component produced by compression of the herniated disc, due to falls, lifting heavy weights, rotations or even produced spontaneously by a genetic predisposition[8] and it is also reported to have an inflammatory component, due to radicular edema.

There are numerous therapeutic strategies for treatment of lumbar disc herniation, both surgical and non-surgical, with variable evidence regarding their respective efficacy[9, 10]. Osteopathic manipulation has been the result of numerous studies regarding its applicability to herniated discs, low back pain and sciatica[11-13], in which its efficacy has been high and there has been an improvement in the symptoms of the subjects in the studies. In this type of techniques, there has also been controversy regarding the complications that their use may present, such as the provocation of paresthesias or cauda equina syndrome, among others[14], although the evidence is scarce in these cases.

There is controversy regarding the biological mechanisms underlying the effects of spinal manipulation. The latest studies show that spinal manipulation can have an effect on the primary afferent neurons of the paraspinal tissues, on the motor control system and on pain processing[15].

The objective of this study is to carry out a systematic review to analyze the existing evidence in the literature regarding lumbar osteopathic manipulation in people suffering from low back pain caused by a herniated disc. The existence of the possible risks involved in spinal manipulation in a subject with a herniated disc will also be verified, as well as the short and long term evolution of the participants who undergo this type of treatment.

Subjects and Methods

STUDY DESIGN

A systematic review was conducted following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) recommendations.

DOCUMENTARY SOURCES CONSULTED

Eleven computerized databases were consulted. Within the virtual platform Pubmed the Medline database, in the Virtual Health Library (VHL) the IBECS and LILACS databases, Cochrane Library was also consulted, and in the virtual platform EBSCO Host the databases CICINAHL Complete, Academic Search Complete, Food Science Complete, Health Source Nursing, and SPORT Discus. Lastly, on the Web of Science (Wos) platform, the Web of Science Core Collection and Scielo databases.

To search for articles, the keywords: Osteopathic Manipulation, Chiropractic Manipulation, Spinal Manipulation, High-Velocity Low-Amplitude Spinal Manipulation, Intervertebral Disc Displacement, Lumbar Herniated Disk, Disc Protrusion, Lumbar Sciatica, Low Back Pain, Pain, Sciatica and Radiculopathy.

The dates on which the documentation search was carried out were in the period established between December 2018 and September 2021.

INCLUSION CRITERIA

Subjects with low back pain radiating to the lower limb caused by previously diagnosed lumbar disc herniation were included.

The intervention required in one of the groups was high-velocity, low-amplitude (HVLA) techniques. Articles that included other techniques in the experimental group were also accepted, as long as the control group received them in the same way. The control group to be compared had to use another hernia treatment technique in order to be compared.

The studies included in this systematic review are randomized controlled clinical trials published in international peer-reviewed journals.

EXCLUSION CRITERIA

Participants who presented hernias of the sequestered type were excluded.

In terms of intervention type, those studies that included a drug that could intervene in the results were excluded.

In terms of language, Chinese was established as the language of publication as a limit.

Results

PROCESS OF IDENTIFICATION AND SELECTION OF STUDIES

A total of 206 results were obtained in the literature search. Of these, 103 were duplicates, so they were eliminated. Of the other 103, with our inclusion criteria, a selection was made after reading their titles and abstracts, resulting in a total of 60 studies. Of these 60 studies, exclusion criteria were applied, leaving a total of 16 items.

Finally, after reading the 16 full-text articles, it was decided to select only articles of the randomized controlled clinical trial type, leaving a total of 3 articles to analyze, all of them were published in this century, from the year 2000 to 2010.

RISK OF BIAS OF INCLUDED STUDIES

Risk of bias assessment was performed at the level of individual studies. The tool used for this assessment was the one proposed by the Cochrane Collaboration.

Table 1 shows the risks of bias for each article in a structured manner

Table 1. Risk of bias of included studies

Author	Sequence generation	Sequence concealment	Blinding of participants and staff	Blinding of performance evaluators	Incomplete results data	Selective notification of results	Other sources of bias
Burton et al.[16]	LR	LR	HR	LR	HR	LR	LR
Santilli et al.[17]	LR	LR	HR	LR	LR	UR	LR
McMorland et al.[18]	LR	LR	HR	LR	LR	UR	LR

Note: LR: Low Risk. HR: High Risk. UR: Unclear Risk

GENERAL CHARACTERISTICS OF THE INTERVENTION

Table 2 shows the type of treatment, time, duration and dose of both the control group and the experimental group of the included articles.

Table 2. General characteristics of the intervention

Author	Gruops	Treatment	Time	Duration	Dose
Burton et al.[16]	EG	Osteopathic Manipulation	15 min/sess	6-18 sessions	–
	CG	Chemonucleolysis	–	1 day	1 (2ml of Chimopapain and 10ml of 0.25% Bupivacaine)
Santilli et al.[17]	EG	Osteopathic Manipulation	5min/sess 5 sess/wk	Max 20 sessions	–
	CG	Simulated manipulation	5min/sess 5 sess/wk	Max 20 sessions	–

Author	Gruops	Treatment	Time	Duration	Dose
McMorland et al.[18]	EG	Osteopathic Manipulation and Supervised Rehabilitation	2-3sess/4wk 1-2sess/4wk	Average 21 sessions	–
	CG	Microdistectomy and Supervised Rehabilitation	–	1 day and 1-2 days of hospitalisation	–

Note: EG: Experimental Group. CG: Control Group. Min: Minute. Sess: Sessions. Wk: week.

Specifically with regard to pain, evaluated by the 7 point score in the study by Burton et al.[16], they demonstrated how the experimental group reduced pain radiating to the leg by 20% in the second week, reaching 46.75% at 12 months post-treatment, while lumbar pain decreased by 16.62% in the second week and decreased by 40% one year post-treatment. It was also observed that in all the assessments, the experimental group improved more than the control group, which included chemionucleolysis treatment. The pain assessed by VAS in the study by Santilli et al.[17], showed how many people completely improved in terms of their pain, with a total of 15 out of 48 (28%) in back pain and 29 out of 48 (55%) with regard to pain radiating to the leg, who had a full recovery at 6 months. The improvements in pain were also clear during all the evaluations made with the McGill Pain Questionnaire and the Aberdeen Back Pain Scale in the study by McMorland et al.[18] to the osteopathic manipulation group, reaching decreases of more than 9 points in both scales 3 months after starting therapy.

In reference to the improvements in physical disability in the experimental group, assessed by the RDQ in the studies of Burton et al.[16] and McMorland et al.[18], improvements were seen which oscillated around 13% in the first 2-3 weeks and which reached 25% at 3 months and even 50% at 12 months.

Regarding the SF-36 Questionnaire to assess quality of life in the studies of Santilli et al.[17] and McMorland et al.[18], it was observed that at 3 weeks the osteopathic manipulation group improved their scores in this test by 12.37% and even reached an improvement of 27% at 3 months.

Finally, the article by Santilli et al.[17] used the Symptom Questionnaire (SQ) to assess the psychological profile of the osteopathic manipulation group versus the sham manipulation group at 6 weeks after treatment, the results showed clear improvements in psychological aspects in the experimental group versus the control group.

Discussion

In general, in the articles analysed in this review, short-term data (2-3 weeks) showed significant decreases in low back pain scale scores by more than 15% and pain radiating to the leg by 20%. Whereas in the long term (1 year) the subjects' low back pain and radiating pain decreased by more than half from the first assessment, 40% and 46% respectively.

In terms of the treatments against which the manipulation groups were compared, the evidence shows that chemonucleolysis is an effective treatment for lumbar disc herniation[19]. Several authors have also shown that microdistectomy is effective for lumbar disc herniation[20, 21]. There is between 80 and 95% good results with these interventions[22]. However, microdistectomy is a surgical operation in which the interruption of the anatomical planes can be a more technically complicated operation, leading to possible secondary complications[23]. Reviews show that patients undergoing surgery required a new operation in 6% of cases, as well as lumbar pain 2 years later between 15% and 25% of subjects[24].

It should be taken into account that the application of the spinal manipulative technique at lumbar level is painless, without side effects for the patient and with costs that can be considerably reduced. Burton et al.[16] established calculations indicating that manipulative treatment saves the patient £300 per year compared to chemionucleolysis treatment. This is why osteopathic manipulation can be considered as a first choice resource for the

population with symptomatic lumbar disc herniation. In cases where there is no improvement inoutcome, other more invasive but also effective techniques should be considered as a second option, such as chemionucleolysis or microdistectomy.

According to the analysis of the results provided by the studies included in this study, an adequate manipulative treatment for a herniated disc with lumbar symptomatology and/or radiating to the lower limb, a consultation should last around 10 minutes, 3 sessions spaced per week, with an average duration of 13 to 20 sessions in total.

LIMITATIONS OF THE STUDY

This work has several limitations. One of them is the limited number of studies to be analysed. When choosing the selection of these articles, we opted for randomised controlled clinical trials, which are those with the highest scientific quality, leaving other types of studies by the wayside which, despite being able to report useful information to the study, could reduce the overall validity of this work.

Another limitation is that the sample sizes of the included studies were small, none of them barely reaching 100 participants. This means that the conclusions obtained may be less robust and less extrapolable to the general population.

A final limitation found in the included studies was the lack of precision with which the application of the manipulative technique was described.

Conclusions

Osteopathic manipulation at the lumbar level is an effective technique and improves the clinical outcome of people with pain caused by lumbar disc herniation. However, due to the lack of a correct explanation of how the manipulative techniques are performed, as well as the times used in the treatment, future studies are needed to present concise data on these aspects.

According to the data provided by the studies analysed, none of the participants had adverse reactions to osteopathic manipulation and none dropped out of the study due to worsening symptoms. It should be pointed out that the sample that participated in the studies was small, but nevertheless relevant to rule out the side effects that are wrongly assumed to be associated with these techniques.

The clinical outcome of people with lumbar disc herniation improves significantly in the short and long term. This is why it is considered an effective and safe technique for these patients; however, it would be advisable to extend the follow-up of the subjects to more than one year in order to evaluate possible modifications.

CONFLICT OF INTEREST: Authors state no conflict of interest.

DISCLOSURE STATEMENT: No author has any financial interest or received any financial benefit from this research.

ETHICAL CLEARANCE: Taken from The Ethics Committee for Research related to Human Beings of the centers where the investigations were conducted. Ethical and deontological principles in relation to the people taking part in the study and handling the data obtained were complied.

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