REVIEW PAPER

Physiotherapy Quarterly (ISSN 2544-4395)
2024, 32(1), 25–34

Physiotherapy versus alternative medicine for pain and quality of life in patients with lumbar spinal stenosis: a systematic review with meta-analysis

DOI: https://doi.org/10.5114/pq.2024.135419

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Abstract

Introduction. Lumbar spinal stenosis (LSS) is a prevailing condition widely affecting mobility. However, many non-invasive treatments have been proposed for LSS. Physiotherapy is reported as more commonly used with very little evidence reporting the efficacy of alternative medicine. For clinicians, there was a need to find a better mode of treatment. The purpose of this paper is to compare the effectiveness of physiotherapy interventions and alternative medicine for leg pain, back pain, and walking distance in patients with LSS.

Methods. Data sources: PubMed, Web of Science, and Scopus databases were searched for papers published in the previous 5 years (2016–2020). The systematic review and meta-analysis were conducted from September 2021 to December 2021 at the Musculoskeletal Research Lab of Maharishi Markandeshwaer Institute of Physiotherapy & Rehabilitation. Study selection and outcomes: randomised controlled trials (RCT), randomised clinical trials, randomised cross-over trials, quasi-RCTs, and non-RCTs were included if they evaluated the effects of physiotherapy or alternative medicine on pain and walking distance in patients with LSS. The Numeric Rating Scale (NRS), Visual Analogue Scale (VAS), Self-paced walk test (SPWT), and treadmill walking were used as outcome measures. All the authors independently screened and extracted data from the 8 studies retrieved through the search using a pilot-tested performa. The quality of studies was assessed using the PEDro scale and the Cochrane risk of bias criteria.

Result. Meta-analysis was performed using a fixed-effects model that showed (1) Physiotherapy was more effective than the control in improving leg pain. The Standardised mean difference (SMD) (95% CI) in the NRS score for leg pain was found to be 1.12 (0.83, 1.40); (2) Physiotherapy was more effective than the control in improving back pain. The SMD (95% CI) in the NRS score for back pain was 0.29 (–0.18, 0.76); (3) Physiotherapy was more effective than the control in improving walking distance. The SMD (95% CI) for walking distance was found to be 144.59 m (133.16 m, 159.02 m).

Conclusions. The results of the present study indicate that physiotherapy has higher significant results than alternative medicine in patients with lumbar spinal stenosis.

Key words: conservative treatment, humans, spinal canal, spinal stenosis, walking

Introduction

Lumbar Spinal Stenosis (LSS) is a progressive musculoskeletal condition that includes the compression of neural structures passing through the spine due to a decreased diameter of the lumbar spinal canal [1]. The diameter may vary in patients with normal canal diameters ranging from 15 to 27 mm, which may further reduce to 12 mm or below in LSS [2, 3]. The prevalence of relative and absolute stenosis in the age group > 50 years is 47.2% and 19.4%, respectively [4]. LSS includes symptoms of Neurogenic Claudication (NC), including pain in the posterior thigh and leg, leading to reduced distance of walking [5], which may feel relief on rest [6, 7]. The common reasons for neural compression include degenerative disc bulge, hypertrophy of a ligamentum flavum, facet joint osteoarthritis, or degenerative spondylolisthesis [8, 9]. LSS is the most common condition that leads to the requirement of surgical intervention [10, 11]. However, surgery is required for patients who repeatedly fail non-operative treatment [12, 13]. Also, such surgeries bring about creditable results, but for a limited number of patients and are usually avoided by patients [14].

Non-surgical interventions such as physiotherapy management and alternative medicine focus on improving mild-to-moderate symptoms in LSS patients. Physiotherapy, including electrotherapy, such as Transcutaneous Electrical Nerve Stimulation TENS, therapeutic ultrasound, and Repetitive Tibial Nerve Stimulation (RTNS), has been used to treat the symptoms of NC [15, 16] by reducing the release of prostaglandins and helps in reducing pain by stimulating large-diameter A-beta fibre and reducing pain through small-diameter (A-delta and C fibres) according to pain gate theory [17]. Other interventions include manual therapy consisting of spinal mobilisation and manipulation, neural mobilisation, and passive stretching of the lumbar para-spinal muscles for musculoskeletal limitations in patients with LSS [1, 18]. These physiotherapeutic treatments go along with a home exercise program, including group exercises, cat camel exercises, and spinal flexion exercises, for rehabilitation for a longer period [1, 19].

Another form of non-invasive treatment includes Alternative Medicines. These are approaches intended to improve or maintain human health that are not part of standard medical care. The various approaches of Alternative Medicine are

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Received: 12.03.2022
Accepted: 27.09.2022

Citation: Singh G, Chahal A, Singh M, Samuel AJ. Physiotherapy versus alternative medicine for pain and quality of life in patients with lumbar spinal stenosis: a systematic review with meta-analysis. Physiother Quart. 2024;32(1):25–32; doi: https://doi.org/10.5114/pq.2024.135419.

typically used in a manner that is complementary to standard medical practices or are used in place of standard medicine. Such approaches are sometimes referred to as holistic or traditional medicine [20].

Apart from physiotherapy, alternative medicine, including acupuncture, Mokhuri Chuna and herbal medicine, have also produced significant effects in the conservative management of patients with LSS [11]. Systematic reviews have been conducted to determine the efficacy of conservative management for LSS, and have also compared the results with the results of surgical procedures [21–24]. Patients suffering from LSS always seek early reduction of the symptoms. So, for clinicians, it is still a difficult matter to choose between different modes of significant treatments. To the authors' understanding, no review has been conducted to compare the efficacy of physiotherapy and alternative medicine in patients with LSS. Therefore, a systematic review with a meta-analysis has been performed.

The study intended to compare the effectiveness of physiotherapy interventions and alternative medicine on leg pain, back pain, and walking distance in patients with LSS.

Research question: Which nonsurgical treatment between physiotherapy intervention and alternative medicine is the better treatment for lumbar canal stenosis?

Subjects and methods

The study was registered in Prospero with the Registration number (CRD42021229667) and can be accessed at https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021229667.

Search strategy

The databases used for the literature search were PubMed, Web of Science, and Scopus, with articles published in the years 2016–2021 as a filter. The relevant information was searched using the PICO to compare the physiotherapy treatment and the alternative medicine used in patients with lumbar canal stenosis. The keywords/search term used was [Lumbar Canal Stenosis OR Spinal stenosis] AND [Physiotherapy OR Physical Therapy OR Non-pharmacological treatment OR Non Pharmacological treatment OR Conservative treatment OR Exercise] AND [Alternative medicine OR Acupuncture OR Dry Needling OR Massage therapy OR Herbal medicine and nutrition OR Osteopathy OR chiropractic OR Craniosacral Therapy OR Myofascial Release OR Tai cha OR Yoga] AND [Randomized control Trails OR Quasi-Experimental study]

Selection of studies for review

Participants

All the studies included patients of age 50–80 years with central LSS exhibiting the symptoms of NC. From the identified literature, one article included 19–77-year-old patients with LSS.

Interventions

Studies report the effect of electrotherapy, exercise therapy, spinal manipulations, home-based exercises, acupuncture, and herbal medicine, either alone or in combination with each other.

Comparators

Active controls such as home exercises, de-tuned TENS, herbal medicine, tai chi, yoga, noninsertive sham acupuncture, and no intervention were used as a comparator in the selected studies.

Outcomes and variables

For the systematic review, leg pain, back pain, and walking distance were the outcomes used. The studies were included if they used Magnetic Resonance Imaging (MRI), treadmill walking, self-paced walking, Numeric Rating Scale or Visual Analog Scale as outcome variables to measure the pain and walking distance.

Study design

Randomised Controlled Trials (RCTs), Randomised Clinical Trials, Non-Randomised Controlled Trials, Randomised Crossover Trials, and quasi-experimental studies were considered for inclusion in this review.

Exclusion of studies: The studies including a different age group, outcomes other than those specified, surgical interventions, and pharmacological interventions were excluded from the review.

Data extraction

The process of data extraction was conducted in a way in which all the authors equally contributed. GS and ASJ selected the articles for inclusion in the study. As there was no disagreement between both reviewers, a third reviewer was not sought for the inclusion of the articles. With 100% agreement between both the reviewers, the Kappa score of the reviewers was 1. A standardised table format was used for extracting the data, including study design, population, intervention, outcome measures findings of each study, and conclusion.

Assessment of risk of bias

The Cochrane risk of bias criteria was used for assessing the included studies for internal validity. The different domains were assessed for risk of bias, including allocation concealment, blinding of participants, personnel and outcome assessors, incomplete data for outcomes, selective reporting of outcomes, and other bias sources. For each domain, 'Yes' was assigned as a judgement indicating a low risk of bias, whereas 'No' indicated a high risk of bias, and 'Unclear' indicated an unknown risk of bias. The PEDro scale was used for indicating the level of evidence in the included studies.

Data synthesis

The statistical analysis was performed using the Review Manager software (Review Manager 5.4.1). Post-intervention means and standard deviations were used to estimate the effect size. Outcomes were analysed by calculating the standardised mean difference with a 95% Confidence Interval. For the outcomes having clinical comparability, results were pooled through meta-analysis using the Fixed-effects model. For the studies where meta-analysis was not possible, narrative synthesis was performed.

Ethical approval

The conducted research is not related to either human or animal use.

Results

Characteristics of the included studies

A total of 3024 records were retrieved from the different databases (Table 1). After excluding duplicates, abstracts and study titles of 1100 articles were screened for eligibility. A total of 268 full-text articles were assessed for eligibility to be included in the systematic review. Out of those, 8 studies met the inclusion criteria. The details are presented in a PRISMA flow diagram in Figure 1.

Table 1. Number of articles extracted from each database

Database	Number of articles extracted
PubMed	1891
Scopus	835
Web of Science	298

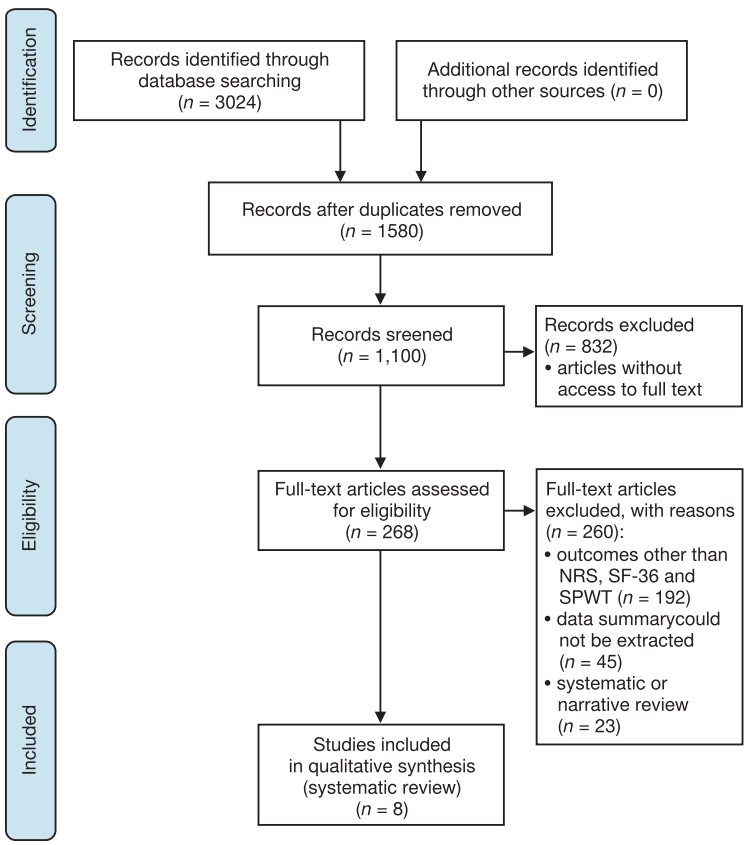

Figure 1. PRISMA flow diagram

Risk of bias and Grading of Recommendations, Assessment, Development, and Evaluations (GRADE)

Figure 2 and Figure 3 represent a summary of the risk of bias of the included RCTs. Seven out of 10 included studies had randomised sequence generation and allocation concealment [11, 15, 18, 19, 25–27]. Four studies failed to perform the blinding of participants [11, 16, 19, 25]. Similarly, three studies did not blind the outcome assessor [11, 19, 25]. All eight included studies eliminated the reporting bias by selective reporting. Table 2 shows the evidence of the methodological quality score of all the included studies. The mean PEDro score was 6.5/10. Two of the studies show a score of less than 5. In the GRADE certainty ratings for the outcomes, leg pain, back pain, and walking distance, two studies were found to have high certainty [18, 27]. Two studies were found to have moderate certainty [19, 25], three studies were found to have low certainty [11, 15, 26], and one study was found to have very low certainty [16]. There was no publication bias in the studies.

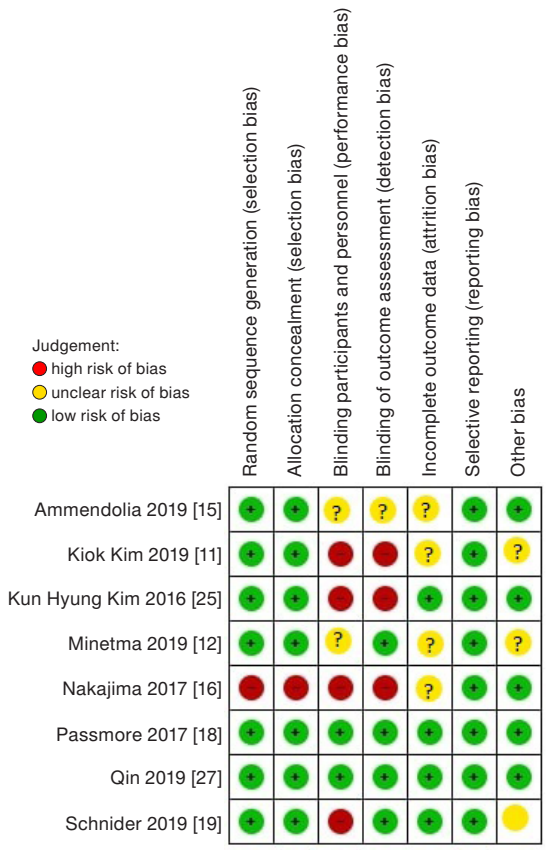

Figure 2. Risk of bias summary for the included studies

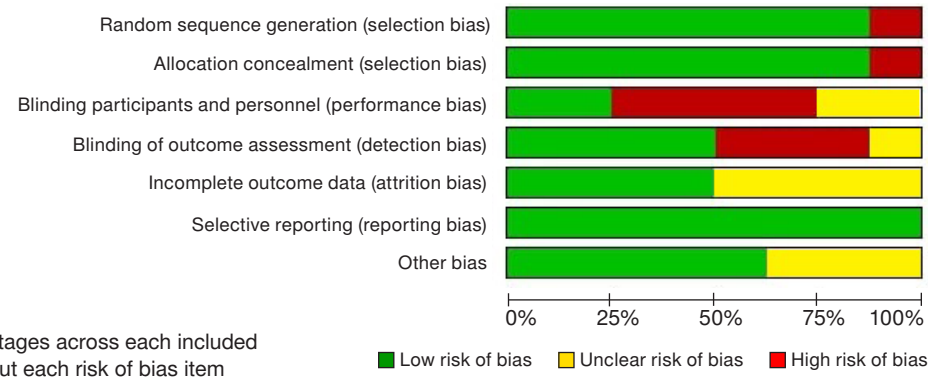

Figure 3. Risk of bias graph: percentages across each included study of authors' judgement about each risk of bias item

Table 2. Showing the level of evidence (PEDro Checklist)

Study	2	3	4	5	6	7	8	9	10	11	Total yes score
Ammendolia et al. (2019) [15]	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	9
Minetama et al. (2020) [12]	Y	Y	Y	N	N	N	Y	N	Y	Y	6
Schneider et al. (2019) [19]	Y	Y	Y	N	N	N	Y	N	Y	Y	6
Passmore et al. (2019) [18]	Y	Y	Y	N	N	N	N	N	Y	Y	5
Nakajima et al. (2019) [16]	Y	Y	Y	N	N	Y	N	Y	Y	Y	7
Qin et al. (2016) [27]	N	N	Y	N	N	N	Y	Y	Y	Y	5
Kim et al. (2016) [25]	Y	Y	Y	N	N	N	Y	Y	Y	Y	7
Kim et al. (2019) [11]	Y	Y	Y	N	N	N	Y	Y	Y	Y	7

Y – yes, N – no

Intervention

The physiotherapy and alternative medicine interventions are explained in detail in Table 3. Five studies assessed the effect of physiotherapy on leg pain and back pain in patients with LSS, whereas only three studies assessed the effect of alternative medicine for the same. The physiotherapy interventions included manual therapy, manipulations, stretching, supervised physical therapy in comparison with conservative management, and home exercises in the control group. It also included electrotherapeutic interventions such as TENS and RTNS. Studies involving alternative medicine included acupuncture, herbal medicine, and Mokhuri Chuna.

Outcomes

The characteristics of the experimental and control groups in all the studies were comparable at baseline. Leg pain and back pain were assessed using the 11-point Numeric Rating Scale (NRS) with 0 as no pain and 10 as the most severe intensity of pain. SPWT was used to assess the pain-free distance of walking. Some of the studies also included VAS and Treadmill walking as an outcome for the assessment of pain and walking distance, respectively.

Effectiveness of physiotherapy treatment versus control on study outcomes

A total of 5 studies reported the effect of physiotherapy on different outcomes, such as leg pain, back pain, and walking distance [12, 15, 16, 18, 26]. All the 5 RCTs were considered appropriate for the meta-analysis. Depending on the different types of outcomes, three comparisons were made. Comparison 1: Effect of physiotherapy on leg pain in patients with LSS. Comparison 2: Effect of physiotherapy on back pain in patients with LSS. Comparison 3: Effect of physiotherapy on walking distance in patients with LSS.

Comparison 1: Effect of physiotherapy on leg pain in patients with LSS

Two RCTs were included in this comparison for the meta-analysis [18, 26] (Figure 4). Both the studies included patients with LSS with pain and difficulty in walking reported as the primary complaints of the patients. The studies reported the efficacy of spinal manipulation and supervised physical therapy on the severity of leg pain using NRS. In the 2 studies including 98 patients, the physiotherapy intervention was found to be significant (p-value < 0.001) as compared to the control group. The mean difference (95% CI) in the NRS score for leg pain was found to be 1.12 (0.83, 1.40). There was considerable heterogeneity in both studies (I^2 = 92%).

Comparison 2: Effect of physiotherapy on back pain in patients with LSS

The RCTs undertaken by Passmore et al. [18] and Masakazu et al. [26] also reported the effect of physiotherapy on back pain in patients with LSS [18, 26] (Figure 5). The studies reported the physiotherapy interventions to have a significant improvement in back pain as compared to the control group (p-value < 0.001). The mean difference (95% CI) in the NRS score for back pain was found to be 0.29 (–0.18, 0.76). Both studies were considerably heterogeneous (I^2 = 95%).

Comparison 3: Effect of physiotherapy on walking distance in patients with LSS

A total of four studies were included in the meta-analysis of walking distance in patients with LSS [15, 16, 19, 26] (Figure 6). The studies reported the effect of manual therapy, tibial nerve stimulation, supervised physical therapy, and Transcutaneous Electrical Nerve Stimulation (TENS) on the distance of walking. In the 4 studies including 385 patients with LSS, the distance of walking improved significantly in the experimental group as compared to the control group (p-value < 0.001). The mean difference (95% CI) for walking distance was found to be 144.59 m (130.16 m, 159.02 m). The heterogeneity of all the studies was found to be considerable (I^2 = 99%).

Effectiveness of alternative medicine versus control treatment on study outcomes

Three studies reported the effect of alternative medicine on different outcomes. Meta-analysis was not possible due to differences in study designs or different study outcomes. Out of three studies, only Qin et al. [27] included 80 patients in reporting the effect of Alternative Medicine on leg pain and back pain as compared to the control group. They compared acupuncture with noninsertive sham acupuncture in patients with LSS. The study reported significant results in improving leg pain with a mean difference (*SD*) of 3.9 (1.7) in the experimental group as compared to the control group with a mean difference (SD) of 0.3 (0.11). The study also reported a significant improvement in back pain with a mean difference (*SD*) of 2 (0.34) in the experimental group as compared to the control group with a mean difference (SD) of 0.3 (0.61).

Table 3. Characteristics of the included studies

Author/s	Title	Participants	Intervention	Outcome measures	Findings (p-values) OR others as given	Conclusion
Studies evaluating the effect of physiotherapy in patients with LSS						
Ammendolia et al. (2019) [15]	Effect of active TENS versus de-tuned TENS on walking capacity in patients with lumbar spinal stenosis: a randomized controlled trial	104 patients of LSS with neurogenic claudication (NC)	TENS and de-tuned TENS	Primary outcome: self-paced walking test (SPWT)	Mean difference between active and de-tuned TENS groups was 46.9 m; 95% CI (–118.4 to 212.1); $p = 0.57$	Active TENS while walking is not better than de-tuned TENS in improving walking distance in patients with LSS
Masakazu Minetama et al. (2020) [12]	Supervised physical therapy vs. home exercise for patients with lumbar spinal stenosis: a randomized controlled trial	In study one, 38 consecutive patients with LSS In study two, 86 patients in the physical therapy or home exercise group	Manual therapy, flexion and strengthening exercises for lumbar, abdominal, and leg muscles, and body weight-supported treadmill walking. In addition to the physical therapy sessions, patients performed a home exercise program consisting of walking and flexion and strengthening exercises	Primary outcome: Magnetic Resonance Imaging (MRI) Secondary outcome: Zurich Claudication Questionnaire (ZCQ), numerical rating scale (NRS), Japanese Orthopedic Association Back Pain Evaluation Questionnaire (JOABPEQ), 36-item Short-Form General Health Survey (SF-36), Hospital Anxiety and Depression Scale (HADS), Pain Catastrophizing Scale (PCS), and Pain Anxiety Symptoms Scale (PASS-20)	At 6 weeks, the P2 group showed significant improvements in ZCQ physical function, back and leg pain on the NRS compared with the P1 group ($p < 0.05$). Compared with the HE group, the P2 group showed significant improvements in ZCQ symptom severity and physical function, back and leg pain on the NRS, and JOABPEQ gait disturbance ($p < 0.05$)	Six weeks of supervised PT twice a week resulted in significant short-term improvements in symptom severity, physical function, back and leg pain, and gait disturbance compared with once a week and/or home exercise alone
Schneideret et al. (2019) [19]	Comparative clinical effectiveness of nonsurgical treatment methods in patients with lumbar spinal stenosis: a randomized clinical trial	259 patients with LSS with age ≤ 60 years	Medical care, group exercise, and manual therapy/individualised exercise	Primary outcome: Swiss Spinal Stenosis questionnaire and self-paced walking test	Between-group analyses at 2 months showed manual therapy/individualised exercise had greater improvement in symptoms and physical function compared with medical care (–2.0; 95%CI, –3.6 to –0.4) or group exercise (–2.4; 95%CI, –4.1 to –0.8). Manual therapy/individualised exercise had a greater proportion of responders (30% improvement) in symptoms and physical function (20%) and walking capacity (65.3%) at 2 months compared with medical care (7.6% and 48.7%, respectively) or group exercise (3.0% and 46.2%, respectively). At 6 months, there were no between-group differences in mean outcome scores or responder rates	A combination of manual therapy/individualised exercise provides greater short-term improvement in symptoms and physical function and walking capacity than medical care or group exercises. All the three interventions improve long-term walking capacity
Passmore et al. (2019) [18]	Impact of spinal manipulation on lower extremity motor control in lumbar spinal stenosis patients: a small--scale assessor-blind randomized clinical trial	14 patients with lumbar spinal stenosis	Patients in the experimental group received spinal manipulation	Primary outcome: titt's law pointing task Secondary outcome: 3 quadruple numeric rating scales (1 for low back pain, 1 for each left and right leg pain), the Swiss Spinal Stenosis scale, Waterloo Footedness Questionnaire–Revised	Primary outcome movement time, there was no significant difference between groups. As predicted by Fitts' Law, all participants had longer movement times as task difficulty increased. Secondary kinematic outcomes yielded no significant between-group differences. Consistent with Fitts' Law, kinematic measures changed significantly with task difficulty. Pairwise comparisons revealed that kinematic variables were more adversely affected by greater movement amplitudes than target size changes. No exploratory differences in pain or lumbar range of motion were observed	No changes in motor performance and pain were recorded after a single manipulation in the experimental group

Nakajima et al. (2019) [16]	Effects of pre-surgery physiotherapy on walking ability and lower extremity strength in patients with degenerative lumbar spine disorder: secondary outcomes of the PREPARE randomised controlled trial	197 patients with degenerative lumbar spine disorder	Active physiotherapy, tailor-made exercises, including strength cardiovascular, and mobility exercises. Daily physical activity for at least 30 min/day	Primary outcome: timed 10-metre walk test, Oswestry Disability Index (ODI), dynamometer	Patients who received pre-surgery physiotherapy significantly improved in all variables from baseline to follow-up ($p < 0.001 – p < 0.05$) and in comparison to waiting-list controls ($p < 0.001 – p < 0.028$). Patients adhering to ≥12 treatment sessions significantly improved in all variables ($p < 0.001 – p < 0.032$) over those receiving 0–11 treatment sessions at only normal walking speed ($p = 0.035$) but there were no significant differences when comparing dosages	Pre-surgery physiotherapy increased walking ability and lower extremity strength in patients with degenerative lumbar spine disorders compared to waiting-list controls. These results imply that pre-surgery physiotherapy can influence functional capacity before surgical treatment and has moderate associations with maintained postoperative physical activity levels, mostly explained by the physical activity level pre-surgery
Studies evaluating the effect of alternative medicine in patients with LSS						
Qin et al. (2016) [27]	Efficacy of acupuncture for degenerative lumbar spinal stenosis: protocol for a randomised sham acupuncture-controlled trial	80 patients < 50 years were assigned randomly to the acupuncture group or the noninsertive sham acupuncture group for 24 treatments over an eight-week period	Acupoints of Shenshu (BL23), Dachangshu (BL25), Weizhong (BL40), Chengshan (BL57), and Taixi (KI3) were used. Participants underwent three treatments weekly over 8 weeks, and each session lasted 30 min. To maintain 'De qi', a sensation of numbness and soreness, acupuncture manipulation (twirling, lifting, and thrusting on needles) was performed every 10 min during the treatment. Participants in the sham group had a pragmatic placebo needle used on the same acupoints, which is similar to the Streitberger needle design. Acupuncturists pretended to manipulate the needle every 10 min, but 'De qi' was not sought	Primary outcome: Roland Morris Disability Questionnaire (RMDQ) scores Secondary outcome: Numeric Rating Scale, Swiss Spinal Stenosis Questionnaire (SSSQ)	Mean changes of RMDQ were –4.1 (95% CI, –4.9 to –3.3) in the acupuncture group and –1.5 (95% CI, –2.3 to –0.7) in the sham group, with a statistically significant between-group difference: –2.6 (95% CI, –3.7 to –1.4). Acupuncture was superior to sham acupuncture in reducing pain intensity (between-group difference: –2.9 [95% CI, –3.8 to –2.0] in leg and buttock pain vs. –2.3 [95% CI, –3.0 to –1.5] in back pain), symptoms and dysfunction (between group difference: –0.9 [95% CI, –1.2 to –0.6] in symptom subscale, and –0.8 [95% CI, –1.1 to –0.5] in dysfunction subscale)	Acupuncture provides immediate functional recovery and pain relief for degenerative lumbar spinal stenosis
Kim et al. (2016) [25]	Acupuncture for patients with lumbar spinal stenosis: a randomised pilot trial	50 participants with a clinical and radiological diagnosis of lumbar canal stenosis	Participants in the acupuncture group underwent 12–16 sessions of manual acupuncture and electro acupuncture over 6 weeks and maintained their usual self-management. The control group was provided with physical therapy as required and maintained their usual self-management	Primary outcome: Oswestry Disability Index (ODI) Secondary outcome: Short Form Health Survey (SF-36), self-reported pain-free walking capacity	39 participants (78%) completed the trial with 524 treatment visits. There were no significant differences between the two groups in back-specific function (ODI: mean difference –2.5, 95% CI –8.9 to 3.8). Pain in the back and/or leg showed small improvements at 3 months, while there were no significant differences in other secondary outcomes	Acupuncture combined with the usual care did not confer significant functional improvements over the usual care alone
Kim et al. (2019) [11]	Nonsurgical integrative inpatient treatments for symptomatic lumbar spinal stenosis: a multi-arm randomized controlled pilot trial	36 patients of LSS allocated equally and randomly into three groups, Mokhuri Chuna treatment 1 (MT1) group, Mokhuri Chuna treatment 2 (MT2) group, or conventional management treatment (CMT) group	MT1 patients were treated with herbal medication, Mokhuri Chuna, and acupuncture, and received a daily physician consultation; MT2 patients were treated with Mokhuri Chuna and acupuncture without any herbal medication, and received a daily physician consultation; and CMT patients received conventional pain management therapy along with daily physiotherapy	Primary outcome: safety as measured by the type and incidence of adverse events (AEs) Secondary outcome: VAS score for low back pain and leg pain, Oswestry Disability Index (ODI), Oxford Claudication Score (OCS), walking capacity on a 50 m flat track and treadmill, and EuroQol-5D score	Compared to the CMT group, the MT1 and MT2 groups showed significant improvement at 3 and 6 months in various domains, including pain (VAS score for leg and back pain) and function (OCS and treadmill walking)	The given novel multimodal integrative treatments for LSS were clinically safe and logistically feasible

Kim et al. [11] conducted a study on 36 patients of LSS randomly allocated into MT1, MT2, and CMT groups. MT1 received Mokhuri Chuna and acupuncture with herbal medicine, MT2 received Mokhuri Chuna and acupuncture without herbal medicine and the CMT group received conventional management of LSS. The only statistically important intergroup difference in terms of symptoms of NC was found between the MT1 (18.75 ± 6.52) and CMT (25.82 ± 6.24) groups at three months, as per the Oxford Claudication Scoring (p = 0.02). Walking distance without pain was found to have a statistically significant difference between the MT1 and CMT groups at both three (p = 0.03) and six months (p = 0.01) following treatment. Walking tolerance on the treadmill was found to have a significant difference at 6 months between the MT1 and CMT teams (p = 0.02) and between the MT2 and CMT groups (p = 0.04).

In three studies on the effectiveness of Alternative Medicine, Kim et al. [11] conducted a study on 50 patients with LSS. Out of 50 patients, only 39 patients completed the trial. The study compared acupuncture with a control group and the outcomes included the Oswestry Disability Index (ODI) and self-reported walking distance. The study reported a mean difference (95% CI) of –5.1 (–15.5 to 5.3) between the treatment and control groups for leg pain intensity, whereas, for back pain, the mean difference (95% CI) was found to be –11.5 (–0.9 to –22). For both the leg pain and back pain intensity, the acupuncture group reported better efficiency. Walking distance was also found to be better in the experimental group as compared to the control group, with a mean difference (95% CI) of 75 (0 to 800) and 0 (–100 to 500), respectively.

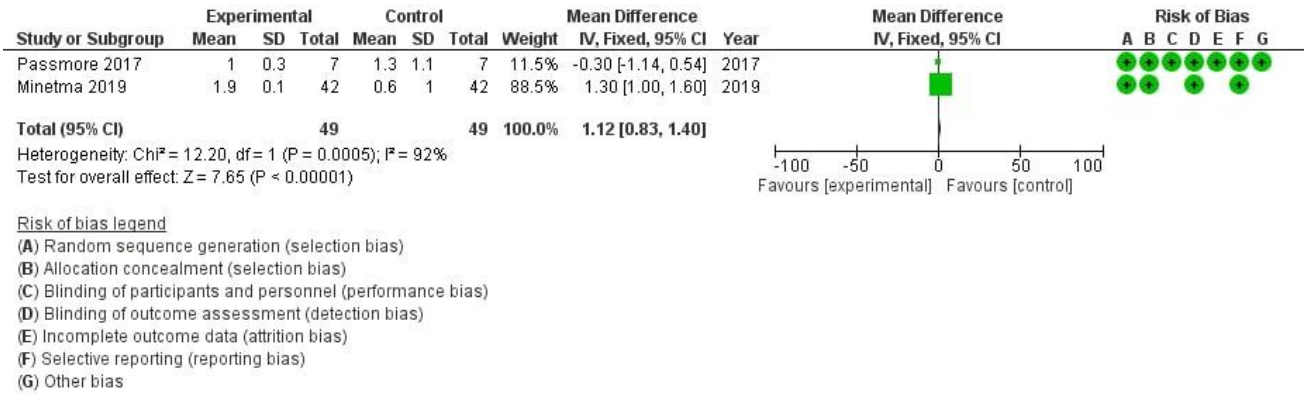

Figure 4. Forest plot comparing the effectiveness of physiotherapy on leg pain in patients with LSS

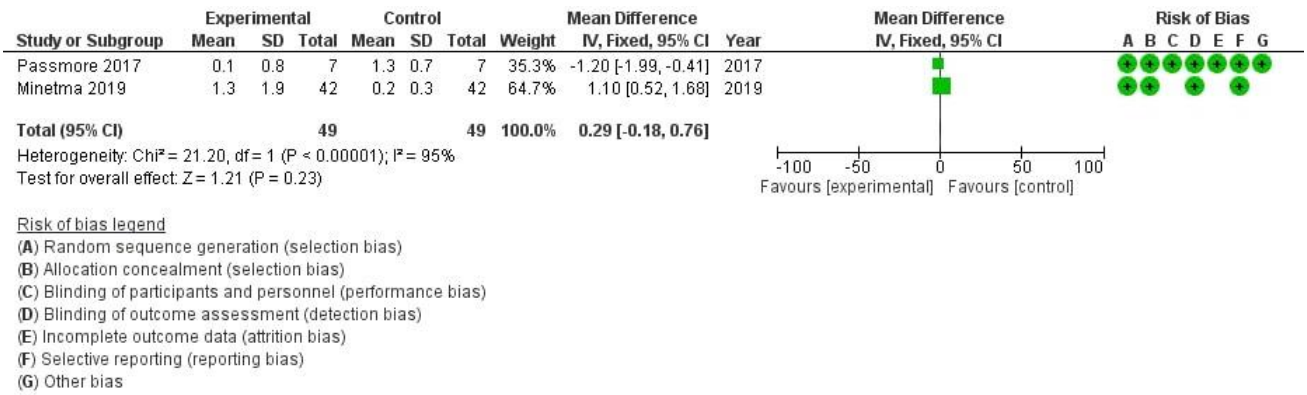

Figure 5. Forest plot comparing the effectiveness of physiotherapy on back pain in patients with LSS

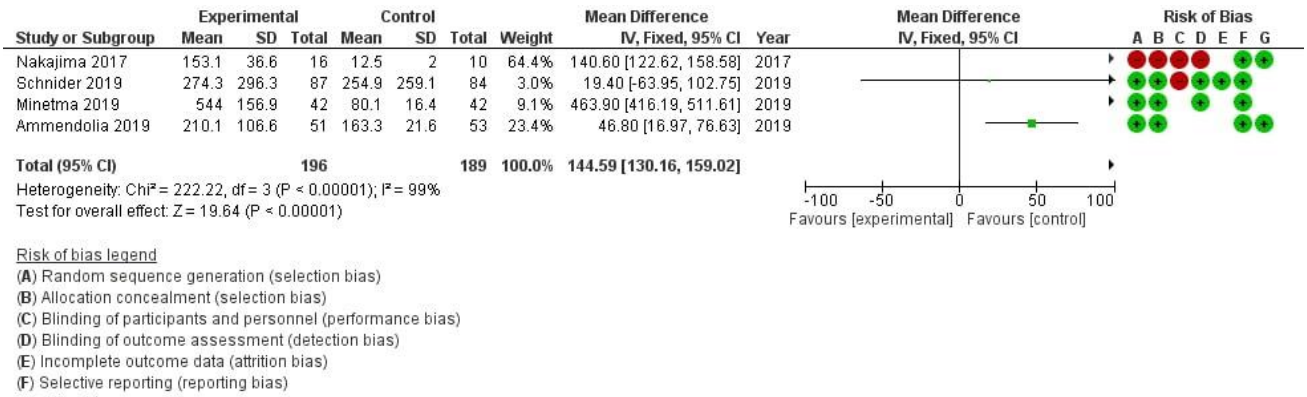

Figure 6. Forest plot comparing the effectiveness of physiotherapy on walking distance in patients with LSS

Discussion

To the best of our knowledge, this is the first systematic review with meta-analysis on the effect of physiotherapy interventions on LSS as compared to alternative medicine. The review intended to directly compare physiotherapy with alternative medicine in patients with LSS. However, direct comparison was not possible between physiotherapy and alternative medicines due to the scarce literature comparing the effects directly. That is why inferential comparison was performed, as per the results of the study.

Overall, eight studies were included in the systematic review, but the meta-analysis was possible for only five studies. All the studies that underwent meta-analysis were addressing the effect of physiotherapy. Less literature was found on the effectiveness of alternative medicine for patients with LSS. Only one study was found to address the outcomes of choice for this systematic review and meta-analysis, due to which the meta-analysis was not possible [27].

The result of the meta-analysis suggests that the physiotherapy interventions of supervised physical therapy exercises, spinal manipulations, mobilisations, stretching, TENS, and repetitive tibial nerve stimulation have a significant effect on reducing leg pain, back pain, and increasing pain-free distance of walking in patients with LSS. Most of the studies evaluated the effectiveness of physiotherapy interventions on a change in walking distance, representing the quality of life. The underlying hypothesis for the result is that physiotherapy interventions reduce the muscular tightness and compression of the neural structures.

Lumbar distraction mobilisation, hip mobilisation, sacroiliac joint mobilisation, and neural mobilisation given twice a week for six weeks, in comparison to group exercises, had a significant effect on improving walking capacity [19]. Also, a similar duration protocol was used, including supervised physical therapy compared to home exercises given for 6 weeks, twice a week [26]. The interventions involved manual therapy, tailored stretching, cycling, and strengthening exercises. These interventions brought about short-term improvements. However, long-term benefits were not reported.

The results of these studies are well supported by another two studies on patients with LSS, which included electrotherapy as the treatment of choice for their effect on the improvement of walking capacity [15, 16]. Electrotherapy included active TENS compared to de-tuned TENS over the paraspinal muscles from L3 to S1 with a frequency of 65–100 Hz and a pulse width of 100–200 μs [15]. Another study used repetitive tibial nerve stimulation at the ankle with a 0.3 ms duration and intensity of 20% above the motor threshold, delivered for 5 min at a rate of 5 Hz. Both studies achieved significant results as compared to the control group [16].

The studies addressing pain improvement using physiotherapy interventions as compared to the control group also found significant results. All the literature presented the physiotherapy interventions as an efficient non-surgical method for improving the pain-free walking distance in patients with LSS. However, the interventions produced short-term benefits only and indicated the need to evaluate a long-term follow-up for the patients.

In comparison to the physiotherapy interventions, the literature was scarce on the effect of alternative medicine in patients with LSS. Among the literature found, only three studies addressed the condition. Two studies included acupuncture while another study included a Korean manipulation, Mokhuri Chuna, and herbal medicines. Mokhuri Chuna was given for 4 weeks and got significant results in improving pain and walking over 3 and 6 months [11]. A pilot randomised controlled trial reported that acupuncture compared to the usual care given for 6 weeks with 12–16 sessions may have some short-term benefits on pain, but any long-term benefits are unknown.

Another study included 24 sessions of acupuncture given for 8 weeks to patients with LSS as compared to noninsertive sham acupuncture. This study also concluded that acupuncture provides immediate pain relief, but it did not provide sufficient evidence to support that acupuncture could offer clinical benefits as compared to noninsertive sham acupuncture for degenerative LSS. Alternative medicine does not present a promising result in patients with LSS. This might be due to the lack of clinical findings. Also, due to the high heterogeneity of the studies, results obtained by the meta-analysis could be biased. Over a period of time, more clinical trials need to be conducted that may give some direction to the noninvasive methods in LSS. There is a need for exploration of other interventions, including cupping therapy, which may prove to be more efficient in providing short-term and long-term benefits.

Limitations

The review focused on the comparison between physiotherapy and alternative medicine in patients with LSS. However, the meta-analysis was not possible for the studies involving alternative medicine as there was not enough literature on this subject. Also, the outcomes were limited to pain and distance of walking. Quality of life was not assessed as the different studies used different outcome variables to evaluate the quality of life of patients with LSS. The mean difference found in the effectiveness of physiotherapy on pain bordered on no effect due to a minute difference in value.

Strength of the study

This review and meta-analysis compared physiotherapy and alternative medicine for different symptoms of LSS. The authors found physiotherapy interventions to be better and the treatment of choice for the conservative management of LSS. With the results of this study, clinicians may plan a collaborative treatment protocol or may include treatment with a long-term follow-up to determine the long-term effects of the interventions.

Clinical significance

This systematic review may help clinicians in providing evidence for the use of different non-surgical interventions for patients with LSS. Physiotherapy interventions may help in providing symptomatic relief and may reduce the likelihood of surgery.

Recommendations

Further studies on the efficacy of physiotherapy in LSS should assess the long-term benefits of the interventions. The physiotherapy exercises may be combined with a long-term at-home protocol and a follow-up for the same. However, there is a need to assess the role of other forms of alternative medicine on pain and walking distance in patients with LSS.

Conclusions

With the data drawn from the reports, it is concluded that physiotherapy interventions are more efficient for leg pain, back pain, and walking distance in patients with LSS. But, a clear conclusion cannot be drawn due to the high heterogeneity of the study articles. However, as per the results of the study, alternative medicine was found to have a high certainty of evidence of a moderate effect in patients with LSS. While physiotherapy interventions have moderate evidence with a large effect and likely result in a large reduction in the outcome. If the available literature and results are to be believed, physiotherapy interventions produce significant results as compared to alternative medicine. However, the clear comparison of physiotherapy and alternative medicine remains inconclusive due to the limited literature. There is a recommendation for high-quality, sufficiently powered RCTs to substantiate the above findings.

Acknowledgements

This study forms a part of requirements for the submission of a Ph.D. thesis by the first author with Regn. No. 11-PCM-002 and Roll Number 202002.

Disclosure statement

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

Conflict of interest

The authors state no conflict of interest.

Funding

This research received no external funding.

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