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Non-Pharmacological Interventions for Middle-Aged People with Chronic Non-Specific Low Back Pain: A Systematic Review

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ABSTRACT

Non-pharmacological therapies have greater emphasis and consideration of management of chronic non-specific LBP (CNLBP) because of its safety and effectiveness without significant side effects. However, there are few studies on CLBP in the middle-aged, and the intervention effect is controversial. Objective: This review aimed to evaluate the effects of non-pharmacological therapies for management of CNLBP in the middle-aged people. Methods: Five databases namely Science Direct, Google Scholar, Pubmed, Wiley, and ProQuest Central were searched for qualitative studies published from January 2018 to December 31, 2023. The publication languages were English. Randomized controlled trials (RCTs) of non-pharmacological intervention in the middle-aged people (mean age 40-60) with CNLBP were included. Two reviewers independently extracted the data and evaluated them using the Revised Cochrane Risk of Bias Tool for Randomized Trials 2 (RoB2). The pooled effect sizes on different aspects of outcome measures were calculated. Results: Nineteen articles (19 RCTs) were included, comprising a total of 1895 participants. The quality of included studies was relatively high. The review showed that the most common outcome measurements used were pain intensity, disability, and quality of life. The most investigated interventions were from the group of exercise programs, others were multimodal intervention, manual therapy and acupuncture. Conclusion: Non-pharmacological interventions for low back pain were associated with lower pain intensity, improvement disability and better quality of life. Studies highlighted the effectiveness of exercise therapy and multimodal intervention, but there was a high heterogeneity across the studies. Hence, more high quality researches are needed in future to identify the most effective combination of multidisciplinary treatments for non-specific CLBP.

Keywords: Middle-aged people, non-specific CLBP, non-pharmacologic, systematic review, randomized control trial

1. INTRODUCTION

Low back pain (LBP) is one of the most common health problem worldwide, affecting up to 84% of adults at some point throughout their lifetime (Violante et al., 2015). In 2020, LBP affected 619 million people globally, and it is estimated that the number of cases will increase to 843 million cases by 2050 (Global Burden of Disease, 2023). In Vietnam, a study reported that back pain was the second common positions of pain, with 27.75% of the respondents (Chuong et al., 2019). LBP is known to be at high risk of becoming chronic with global prevalence of almost 20% of people with acute LBP develop chronicity (National Institutes of Health, 2020). The prevalence of LBP gradual increase with age, with the highest number of LBP cases occurs at the age of 40–50 years, and then progressively declining. Generally, the age between 35 and 64 years occupied approximately 50% of all LBP cases and disability-adjusted life years (DALYs) (Mattiuzzi et al., 2020).

Chronic LBP (CLBP) leads to increases in disability, which associated with poorer physical function, more limitations in performing major life tasks and social activities as well as more work-place absenteeism (Ge et al., 2022; Grabovac & Dorner, 2019). Consequently, it places a serious financial burden both in the family and society (Urits et al., 2019), with the national cost estimates of CLBP ranged from $259 million to $71.6 billion per year (Zemedikun et al., 2021). In addition to its physical effects, CLBP has a considerable psychological impact with an increased prevalence of depression, anxiety, insomnia and sleep disturbances on patients with CLBP (Singhal et al., 2021; Wang et al., 2023).

LBP can be classified as specific or non-specific. Specific LBP is caused by a certain disease or structural problem in the spine, or when the pain radiates from another part of the body, while non-specific LBP is defined as a condition when the pathoanatomical source cannot be identified. Non-specific LBP is the most common presentation of LBP, up to 90% of cases

(Maher et al., 2017). Because there is no precise pathoanatomical cause, management of non-specific LBP focuses on reducing pain and its consequences. There are different approaches recommended for people with chronic non-specific LBP, involving pharmacological therapy and non-pharmacological therapy (Nicol et al., 2023). However, most international guidelines do not advise opioids for chronic low back pain, because this approach provides small effect on pain and function (Maher et al., 2017). Furthermore, using nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids long term can cause significant risks and side effects, including addiction, tolerance, dependence, gastrointestinal bleeding and renal dysfunction (Alorfi, 2023).

By contrast, non-pharmacological therapies including exercise therapy, physical activity, physiotherapy and education have greater emphasis and consideration of management of chronic non-specific LBP (CNLBP) because of its safety and effectiveness without significant side effects (Nicol et al., 2023; Qaseem et al., 2017). Nevertheless, limited evidence is available about the effectiveness of commonly recommended treatments for middle-aged population. Due to few existing studies and uncertainty regarding its effects, interventions in CLBP of the middle-aged patients are not clear. Based on the above considerations, in this study, we aimed to evaluate the effects of non-pharmacological therapies for management of CNLBP in the middle-aged people. This review is expected to provide a better evidence-based basis for decision-makers involved in CNLBP treatment.

2. MATERIALS AND METHODS

The systematic review was developed following the standard protocol outlined in the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA)

Search strategy. Studies were identified by searching multiple data-bases, including Science Direct, Google Scholar, Pubmed, Wiley, and ProQuest Central. The retrieval period was from January 2018 to 31st December 2023, and the languages was English. Search themes included the following keywords: “chronic” “persistent” “low back pain” “lumbago” “Low Backaches” “CLBP” and “non-pharmacological therapy” or “non-invasive” or “physical therapy” or “mind-body therapy” or “exercise therapy” or “physical therapy” or “psychological therapy” or “cognitive-behavioral therapy” or “multidisciplinary rehabilitation” or “acupuncture” or “meditation” or “music therapy” or “massage” or “relaxation techniques” or “manipulation” and “middle” or “middle aged” and “randomized control trial”.

Eligibility criteria. Study inclusion criteria: The inclusion criteria of this study adhered to the "PICOS" principle. The specific inclusion criteria were as follows: (1) Participants: All middle-aged people (mean age 40-60), diagnosed with non-specific CLBP (≥ 3 months); (2) Interventions: the intervention measures included non-pharmacological management; (3) Comparison: Clinical trials comparing non-pharmacological management with no intervention (waiting-list, unaltered lifestyle, control), placebo/sham intervention, usual care or other interventions; (4) Outcomes: all outcomes used for non-specific CLBP. The outcomes were group in long-term (≥1 year) or short-term (≤6 months); (5) Study type: randomised control trials (RCTs), the article language was limited to English.

Study exclusion criteria: Exclusion criteria were as follows: (1) studies with a mean age of patients < 40 or > 60 years; (2) articles reporting pilot, feasibility or preliminary studies; (3) participants with suspected or confirmed specific spinal conditions (i.e., fracture, cancer, inflammatory or infectious diseases of the spine, cauda equina syndrome/widespread neurological disorder, radiculopathy) were excluded.

Data extraction. Data extraction was performed independently by two co-authors. Data were extracted on: (1) information of the study, including first author name, year of publication, and nationality; (2) information about included subjects: sex, number, and mean age of subjects in the experimental and control groups; (3) content of intervention and control group, follow-up; (4) outcome indexes and outcome measurements (5) results of the studies.

Risk of bias. The potential bias was estimated independently by two co-authors using Revised Cochrane Collaboration Risk of Bias Tool for Randomized Trials (RoB2). The quality of included RCT studies was structured into five domains, each domain was classified into three levels, including low risk, some concerns, or high risk. If there were any disagreements between the reviewers, it was resolved through discussion and consensus.

Data synthesis and analysis. Data was extracted to identify the outcomes and examine the effect of non-pharmacological therapies on chronic non-specific LBP. Each study was analyzed independently in their domains by the reviewers, and then the research team discussed to aggregate consistent findings. Summary tables were created to organize these findings.

3. RESULTS AND DISCUSSION

Study selection

A total of 2493 articles were identified by searching five databases, and 2315 papers were remained after duplicates removed. After screening the title and abstract based on the eligibility criteria, 2187 articles were excluded. Therefore, 128 full-text articles were assessed, and 109 were excluded for the following reasons: age not meeting the inclusion criteria, wrong setting, lack of relevant outcomes, and non-RCTs. Finally, 19 articles were included for systematic review. The selection process of the studies was showed in a flow-chart diagram based on to the PRISMA protocol (Fig.1).

Fig. 1 The PRISMA flowchart for included RCTs

Characteristics of included studies

The characteristics of the included studies is shown in the Table 1. A total of 19 articles were selected for this systematic review. Studies were published between 2019 and 2022. Based on the data of the included studies, a total of 1895 participants were treated for CLBP. Sample sizes of the trials ranged from 20 to 274 participants. Eighteen trials reported the sex of the participants (1158 out of 1810 participants were female, occupied 63.98%). One trial involved only male participants (Khodadad et al., 2020), and one article included only female (Ansari et al., 2021). The mean age of participants at the time of treatment ranged between 40.63 (In et al., 2021) and 57.9 (Ansari et al., 2021). Most of studies were conducted in European countries (9 studies), other studies were reported in Iran (4 studies), Korea (4 studies) and Brazil (2 studies).

Outcomes. Among the 19 included studies, the most common outcome measurements used were pain intensity (18 studies), disability (18 studies), and quality of life or life satisfaction (8 studies). This finding was consistent with the core outcome set for non-specific LBP by Chiarotto (Chiarotto et al., 2015). Pain intensity was measured using the Visual Analogue Scale (VAS) (11 studies), Pain Numerical Rating Scale (PNRS) (6 studies) or Short Form McGill Pain Questionnaire (SF-MPQ) (1 study). LBP disability was evaluated using the Roland Morris Disability Questionnaire (RMDQ) (9 studies), Oswestry Disability Index (ODI) (8 studies) or Quebec Back Pain Disability Scale (QBPDS) (1 study). The outcome measures used to evaluate quality of life or life satisfaction included the 36-Item Short Form Health Survey (SF-36) (2 studies), 12-Item Short Form Survey (SF-12) (3 studies), European quality of life 5dimension (EQ-5D) (2 studies), and Patient Satisfaction Questionnaire (PSQ) (1 study). Among 19 studies, only two studies reported long term outcomes which were important in monitoring chronic conditions.

Risk of bias in included studies. A total of 6 papers mentioned that the overall assessment was carried out at "high risk;" 8 had "some concerns," and 5 were at "low risk". In the included literature, 18 were assessed as having low risk in the randomization process, while 1 showed some concerns. For deviations from intended interventions, 8 had some concerns and 11 were rated as low risk. In terms of missing outcome data, 13 had low risk, 1 was at some concerns and 5 studies were classified as high risk. For the measurement of the outcome, 11 were at low risk, 7 were rated as some concerns and 1 showed high risk. The selection of the reported result showed that 16 studies had low risk, while 3 were some concerns.

Table 1. Characteristics of the included studies

Study	Country	No of participants, Mean Age	Interventions	Control	Outcomes	Instruments	Main Results
Dadarkhah et al. 2020	Iran	n = 56 M = 24, F = 32 Mean age (±SD): 49 ± 8.9	Remote exercise: core stability exercises lasting 45 min at home twice/day x 4 weeks, followed by telephone calls, 3 months follow-up	In-person exercise: at the clinic, three times a week x 4 weeks	Intensity of the low back pain; Disability	10 cm VAS; Persian version of the ODI	Pain, disability decreased in 2 groups. No statistically significant differences between 2 groups in VAS and ODI
Michalsen et al., 2021	Germany	n = 274 M = 87, F = 187 Mean age (±SD): 54.6 ± 11.3	Yoga, Eurythmy therapy and Physiotherapeutic exercises: 75-min x once/week x 8 weeks, 16 weeks follow-up.	No control group	Physical disability; Pain intensity and pain-related bothersomeness; Health-related QoL; Life satisfaction	RMDQ; 10 cm VAS; SF-12 physical score; BMLSS	Disability, pain intensity and pain-related bothersomeness decreased, while quality of life increased in all 3 groups. No significant differences between the three groups
Godfrey et al., 2019	UK	n = 248 M = 101, F =147 Mean age (±SD): 47.9 (±14.3)	PACT: 60 min face to-face x 2 weeks apart + 20 minutes telephone call 1 month later, 3 and/or 12 months of follow-up	Usual care physical therapy (UC)	Disability; Depression; Anxiety; Functioning; Life satisfaction; Pain severity	RMDQ; PHQ - 9; GAD-7; PSFS and WSAS; SF 12 physical health; PNRS	PACT participants reported better outcome for disability, functioning, SF12 physical health at 3 months, but not 12 months. No group differences for pain, mood at 3 and 12 months

Study	Country	No of participants, Mean Age	Interventions	Control	Outcomes	Instruments	Main Results
Rabiei et al., 2021	Iran	n = 73 M = 34 , F = 39 Mean age (±SD): G1 = 42.46±9.7, G2 = 44.19±8.79	PNE + MCE: 3 PNE sessions + 2 MCE sessions/ week x 8 weeks GE: strengthening exercises, twice/ week x 8 weeks	No control group	Pain intensity; Disability; Fear-avoidance beliefs; Self-Efficacy	10 cm VAS; RMDQ; FABQ; Persian version of PSEQ	Both groups showed significant improvements in all the outcome measures. The PNE plus MCE group showed greater improvements in VAS and RMDQ compared to the GE group.
Khodadad et al., 2019	Iran	n = 52 All male Mean age (±SD): 44.3 ± 2.46 years	CFT: 60 min x 3 days/week x 8 weeks LST: 60 min x 3 days/week x 8 weeks	Traditional physical therapy	Pain intensity; LMC	10 cm VAS; Luomajoki LMC battery tests	Both CFT and LST groups reduced VAS. There was no difference between the 2 groups
Kim et al., 2020	Korea	n = 66 M = 34 , F = 32 Mean age (±SD): 47.72	Stretch group: CSE 30 min, 3times/ week x 6 weeks + hip muscle stretching exercises 15 min Strengthen group: CSE 30 min, 3times/ week x 6 weeks + hip muscle strengthening exercises for 15 min	Sham group : CSE 30 min, 3times/ week x 6 weeks + sham treatment for 15 min	Pain intensity; Lower back instability; Hip muscle flexibility; Disability; Balance ability; Quality of life	10 cm VAS; The passive straight leg raising test; The toe-touch test; ODI; The one-leg standing test; The SF-36	There were significant within-group changes for all measurements The Stretch and Strengthen groups had greater improvements in VAS, ODI, and SF-36 than the Sham group.
Ansari et al., 2020	Iran	n = 20 All female Mean age (±SD): 57.90 ± 4.44 years	Aquatic exercise: 3 sessions/ week x 8 weeks	No intervention	Functional disability; Flexibility	Quebec Back Pain Disability Scale (QBPDS); The sit and reach test	QBPDS of participants in the experimental group significantly improved compared to the control group
de Oliveira Meirelles et al., 2020	Brazil	n = 38 M: 10, F: 28 Mean age (±SD): 48 ± 10 years	OMTG: osteopathic manipulation treatment 1 sessions/ week x 5 weeks	ACG: 2 sessions per week x 5 weeks of active control therapeutic exercises	Pain; Disability; Kinesiophobia; Depression	10 cm VAS; ODI; Tampa Scale of Kinesiophobia; Beck Depression Inventory	The treatments were effective in both groups OMTG was significantly lower than that of the ACG
Hrkać et al., 2022	Croatia	M = 66, F = 114, Mean age (±SD): 49.3 (± 11.7)	itive-behavioral therapy + group-based combined ET and education ervised group-based combined ET and education, 60 min x 2 sessions/ week x 4 weeks, 3 and 6 months follow-up	e	intensity; Functional Disability; Quality of life ; Fear of pain and activity	AS; RMDQ; SF 12; FABQ	a statistically significantly better effect in VAS, RMDQ, and SF 12 compared to SET and the control group tt 3 and 6 months of follow-up,
O'Keeffe et al., 2020	Ireland	n = 206 M = 54, F = 152 Mean age (±SD): 48.7 (± 14.1)	CFT: varied, mean=5 treatments Group- based exercise and education: 6 classes, mean=4 classes, over 6–8 weeks, 6 and 12 months follow-up	No control group	Functional disability; Pain intensity; Fear-avoidance; Coping; Pain self-efficacy; Number of pain sites; Risk of chronicity;	ODI; PNRS; FABQ; Coping strategies questionnaire; PSEQ; Nordic musculoskeletal questionnaire; 10-item short form Orebro musculoskeletal; Subjective health complaints	CFT reduced disability, more than the group-based intervention, but not pain, at 6 and 12 months

Study	Country	No of participants, Mean Age	Interventions	Control	Outcomes	Instruments	Main Results
					Sleep, depression and anxiety; Stress, Satisfaction	inventory; 7- item stress subscale of the depression, anxiety and stress scale; PSQ	
Verbrugghe et al., 2019	BELGIUM	n = 38 M = 12, F = 36 Mean age (±SD): 44.1 (±9.8).	High-intensity training (HIT): exercise therapy program twice sessions/ week x 12-week	Moderate-intensity training (MIT)	Disability; Pain severity; Function; Exercise capacity; Abdominal/ back muscle strength	Modified OD; PNRS; Patient Specific Functioning Scale; Cardiopulmonary exercise test; Maximum isometric muscle strength test	HIT shows greater improvements on disability and exercise capacity than MIT.
Calatayud, et al., 2020	Spain	n = 85 Mean age (±SD): Intervention: 52 ± 11 years Control group: 50 ± 12 years	Group-based progressive strength training program: 3 days/ week x 8 weeks	Back School program: core strengthening exercise 2 times/week x 3 weeks in group + daily x 5 weeks at home	Pain exacerbation episode; Pain intensity; Widespread Pain Sites; Analgesics; Disability; Isometric Lumbar Extension; Handgrip Strength	Episode in primary care; PNRS; Nordic; The number of days used analgesics; RMDQ; Biering-Sorensen test; TKK digital hand dynamometer	The intervention group showed a lower recurrence rate, increased lumbar extensor strength, left-hand handgrip strength, and reduced the number of pain sites, reducing pain intensity and disability than control group
Matarán-Peñarrocha et al., 2020	Spain	n = 64 M = 32, F = 32 Mean age (±SD): 54 (± 7.88)	Supervised exercise group: stability and control motor pelvic exercise + trunk muscle strengthening and stretching, 3 sessions/week x 8 weeks, six months of follow-up	Non-supervised group: informative session of the exercises at home without supervised, 3 sessions/week x 8 weeks.	Disability; Daily life activity limitations; Intensity of pain; Fear of movement; Health-related quality of life.	RMDQ; ODI; 10 cm VAS; Tampa Scale; SF-36	There were statistically significant differences between groups for pain, and disability at 8 weeks immediately post treatment No differences between the groups in patient-rated pain, functionality, fear of movement and quality of life at six months of follow-up
Suh et al., 2019	Korea	n = 48 M = 15, F = 33 Mean age (±SD): 54.81 (±14.66)	Flexibility exercise (FE): stretching exercise Walking exercise (WE): fast walking Stabilization exercise (SE): individualized graded lumbar stabilization exercise (IGLSE) Stabilization with WE (SWE): IGSE + WE Frequency: 5 times/ week x 6 weeks, 6-weeks follow-up.	No control group	VAS during rest and physical activity; VAS of radiating pain; Frequency of medication; Endurances of specific posture; Strength of lumbar extensor muscles; Disability; Psychosocial aspects	VAS; VAS of radiating pain; Number of taking medications/day; 3 postures (supine, side-lying, and prone); Manual muscle tester; ODI; Beck depression inventory	SE and WE significantly improved chronic LBP. The SE and WE groups showed more continuous improvement in LBP during rest and physical activity than the FE group
Arguisu	Spain	n = 36	Myofascial release	Sham MFR	Electromyogr	Bipolar Ag/AgCl	There was a significant

Study	Country	No of participants, Mean Age	Interventions	Control	Outcomes	Instruments	Main Results
elas, et al., 2019		M = 12, F = 24 Mean age (±SD): G1= 47.2 (±9.8) G2 = 48.6 (±10.1)	(MFR): twice/ week x two weeks	treatment	aphic (EMG); Kinematic; P ain intensity; Disability	surface lectrodes; a 3-Space Fastrak motion-analysis system; SF-MPQ; RMDQ	reduction in pain in the myofascial release group and disability, compared with control group No differences between groups for the kinematic variables
de Oliveira et al., 2020	Brazil	n = 148 M = 33, F = 115 Mean age (±SD): G1= 45 (±13), G2 = 45 (±14)	Directed manipulation at the vertebral level: 3 sessions/ week x 2 weeks + 2 sessions/ week x 2 weeks, 12 and 26 week follow up	Generic manipulation in the middle thoracic region: 3 sessions/ week x 2 weeks + 2 sessions/ week x 2 weeks, 12 and 26 week follow up	Pain intensity; Disability; Global perceived change; Pressure pain threshold	PNRS; RMDQ; Global Perceived Effect Scale; Pressure algometer	No clinically important between-group differences for PNRS, RMDQ or global perceived effect at any time point
Schmidt et al., 2020	Denmark	n = 165 M = 45, F = 120 Mean age (±SD): 50 (± 13) years	Integrated rehabilitation program: 8-10h/ day x 3 weeks of inpatient stay + 12 weeks of home-based activities, 26-week follow-up	Existing rehabilitation program: four weeks of inpatient stay, 26-week follow-up	Disability; Pa in intensity; Pain self-efficacy; Health-related quality of life; Depression	ODI; PNRS; PSEQ; EQ-5D; Major Depression Inventory	Both arms of the trial improved from baseline to the 26-week follow-up on all outcomes No significant between-group differences were found in all outcomes.
Sung, et al., 2020	Korea	n = 38 M = 13, F = 25 Mean age (±SD): G1: 45.6 (±14.6) G2: 44.1 (± 14.1)	Combine acupuncture (AT) 20 min twice/ week x 8 weeks + thread embedding acupuncture (TEA) once/week x 8 weeks, 12 weeks follow up.	Only AT 20 min twice/ week x 8 weeks	Pain intensity; Clinically relevant improvement; Disability level; Quality of life; Global assessment	10cm VAS; Minimal clinical important difference (MCID); Korean version of RMDQ; Korean version of EQ-5D; Patient global impression of change	The treatment group showed a significant reduction in VAS scores when compared with the control group No significant differences were found in disability and quality of life
In, et al., 2021	Korea	n = 60 M = 38, F = 22 Mean age (±SD): G1: 41.13 (±11.49) G2: 40.63 (±11.3)	Multidimensional treatment (MT): core stability exercise 40 min/session x 2 sessions /day x 2days/ week x 12 weeks + additional education 4h x 2 sessions, 3-	No control group	Pain intensity; Disability; Thoracolumbar kyphosis (TK) and lumbar lordosis (LL)	10 cm VAS; ODI; Motion capture system	The pain, disability and thoraco lumbar kyphosis and lumbar lordosis in the MT group improved significantly greater than the UT group. The pain relief effect in the MT group persisted 3 months after the end of training.

Study	Country	No of participants, Mean Age	Interventions	Control	Outcomes	Instruments	Main Results
			month follow-up Unimodal treatment (UT): core stability exercise twice a day				

Note: Visual Analogue Scale (VAS), Oswestry Disability Index (ODI), Roland-Morris Disability Questionnaire (RMDQ), Quality of Life (QoL), Short Form-12 (SF-12), Short Form-36 (SF-36), Brief Multidimensional Life Satisfaction Scale (BMLSS), Physical therapy informed by Acceptance and Commitment Therapy (PACT), Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), Patient Specific Functional Scale (PSFS), Work and Social Adjustment Scale (WSAS), Pain Neuroscience Education (PNE), Motor Control Exercise (MCE), Group-Based Exercise (GE), Fear-Avoidance Beliefs (FAB), Pain Self-Efficacy Questionnaire (PSEQ), Pain Numeric Rating Scale (PNRS), Cognitive functional treatment (CFT), Patient Satisfaction Questionnaire (PSQ), lumbar stabilization treatment (LST), Lumbar Movement Control (LMC), Core Stability Exercise (CSE), Osteopathic Manipulation Treatment Group (OMTG), Active Control Group (ACG), Graded Activity (GA), Supervised Exercise Therapy (SET), Short Form McGill Pain Questionnaire (SF-MPQ), Quebec Back Pain Disability Scale (QBPDS), EuroQol-5 Domain 5-level (EQ-5D).

Effects of non-pharmacological therapies in middle-aged people with CNLBP

The type of intervention varied substantially across the studies (Table 1). We categorized four types of non-pharmacology interventions in this study, including exercise program, multimodal intervention, manual therapy approach and acupuncture. Our findings were generally consistent with the prior review (Chou et al., 2017). In particular, there remains evidence supporting the effectiveness of exercise therapy, multidisciplinary rehabilitation, spinal manipulation, massage, and acupuncture for individuals with chronic low back pain.

The most investigated interventions were from the group of exercise programs (8 studies). Six studies indicated that exercise had a greater improvement in pain, functioning and health-related quality of life than sham or control group (Ansari et al., 2021; Calatayud et al., 2020; Dadarkhah et al., 2021; Kim & Yim, 2020; Michalsen et al., 2021; Verbrugghe et al., 2019). Otherwise, two study reported an improvement in pain, reduction of disability and increasing quality of life, but not statistically significant if compared with different types of excises, as well as compared between exercise at home and at the clinic (Godfrey et al., 2020; Mataran-Penarrocha et al., 2020). The existing literature suggests that physical activity tends to improve pain and disability in people with CNLBP (Vadala et al., 2020; Zhang et al., 2023). However, no type of activity seems to be superior to another, and heterogeneity among studies may result in an overestimation of these positive outcomes (Nicol et al., 2023; Vadala et al., 2020).

For multimodal intervention, seven RCT studies presented multimodal therapy including six studies with short-term outcomes and 1 long-term outcome study. All seven studies presented a combination of two or more components such as exercises, education program, and cognitive behavioural therapy. We found a significant reduction of disability ad pain intensity, while improving quality of life. However, the statistically significant differences between modality interventions was not clear. There were four studies reported statistically significant improvement in patients treated by different types of multimodal intervention (Hrkac et al., 2022; In et al., 2021; O'Keeffe et al., 2020; Rabiei et al., 2021), while no difference was found in other three studies (Khodadad et al., 2020; Schmidt et al., 2020; Suh et al., 2019). Along with this, the extreme variability of type, duration, intensity, and execution modality of the proposed multimodal intervention made it impossible to recommend a specific treatment for the middle-aged people. Similarly, a systematic review by Nicol et al. showed that there is inconsistency in the content of multimodal program, which differs from one country to another (Nicol et al., 2023).

Spinal manipulation was evaluated in 3 trials and acupuncture was presented in one study. Result indicated that manipulation was associated with better short-term pain relief and improvement in function compared with sham manipulation (Arguisuelas et al., 2019), which was consistent with prior review (Chou et al., 2017). However, compared between different type of manipulation, and manipulation with other active interventions like therapeutic exercises, there was no significant differences in pain and disability (de Oliveira Meirelles et al., 2020; de Oliveira et al., 2020). Furthermore, study found that acupuncture combined with thread embedding acupuncture had greater effect on pain, but not disability and quality of life compared with acupuncture alone (Sung et al., 2020). In general, there was limited evidence about the effect of acupuncture in this review.

4. CONCLUSION

In conclusion, several non-pharmacological treatments for CNLBP have shown small to moderate benefits, mainly providing short-term relief from pain, improvements in physical function, and better quality of life. Studies highlighted the effectiveness of exercise therapy and multimodal intervention, but there was a high heterogeneity in terms of follow-up, type of intervention, and standardization of protocols, which make the estimate of the effect of intervention extremely challenging. Therefore, further research is needed to determine the incremental benefits of combining interventions, as well as the most effective treatment combinations and sequences.

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