Influence of Exercise Regimen Parameters on Low Back Pain Reduction and Disability Among Office Workers: A Systematic Review

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Received June 14, 2025
Revised February 06, 2026
Accepted February 23, 2026
Available online August 17, 2026

Abstract

Aims: This study aimed to evaluate the parameters of low back exercise intervention on pain and disability in office workers with low back pain (LBP) and explore its potential application in clinical practice.

Methods: A systematic review was conducted by systematically searching three databases: EMBASE, OVID Medline, and Web of Science. Following the PRISMA guidelines, the included reviews exploring low back pain and disability among office workers and detailed exercise programs were described. Reviewers were recruited to independently appraise and synthesize all eligible studies using the Joanna Briggs Institute critical appraisal tool.

Results: Of the 169 articles initially identified, 13 articles were included in the review, with an average article quality indicating minimal bias and trustworthy evidence. Thirteen structured and progressive exercise programs significantly influenced LBP reduction, alleviation, and disability management ($p<0.05$ to $p<0.001$). The effective programs were most commonly implemented twice weekly for five to ten weeks longer with 20- 60 minutes duration sessions of light to moderate intensity, and weekly progress with regular activities maintenance. The most commonly reported studies for pain level are the visual analog scale or numerical rating scale and disability outcome with the Oswestry Disability Index and Rolland Morris Disability Questionnaire.

Conclusion: The exercise program followed a structured parameter of frequency, intensity, time, type, volume, and progression of exercise intervention to improve LBP and disability. These findings provide a baseline integration strategy that is practical and evidence-based for managing LBP and disability in the workplace.

Keywords: disability, exercise, low back pain, office workers.

Introduction

Low back pain (LBP) affects 619 million people globally (GBD 2021 Low Back Pain Collaborators, 2023), 23 million in Southeast Asia, with the highest prevalence in China at 579 per 100.000 population (Wang et al., 2022). LBP is a symptom rather than a specific disease, typically located between the lower rib margins and the buttock creases, and may occur with or without referred pain in the leg (Hartvigsen et al., 2018). Most individuals with LBP are diagnosed with nonspecific low back pain, as a specific underlying pathology cannot usually be identified, with a global age-standardized prevalence of 70.0% (Cieza et al., 2021). Among office workers, LBP is highly prevalent, with 12-month prevalence rates ranging from 38.4% to 64.1% in different populations (Basakci Calik et al., 2020; Fanta et al., 2020). Risk factors include personal characteristics such as age, BMI, and smoking, as well as workplace factors such as prolonged sitting, poor posture, lack of rest breaks, and job stress. Psychosocial elements, such as job satisfaction, also play a crucial role (Basakci Calik et al., 2020; Fanta et al., 2020). This is supported by another study that reported that the prevalence of LBP was 49% in civil service workers with a median age of 46 years (Damba & Pilusa, 2025). In recent surveys, the prevalence of carpal tunnel syndrome was over 30% in both men and women, demonstrating the widespread nature of this condition (Liu et al., 2020).

LBP has significant public health implications, especially its impact on the working-age population. The disability-adjusted life years (DALYs) lost due to LBP are among the highest for any condition affecting worker productivity and national economic performance (GBD 2021 Low Back Pain Collaborators, 2023)). In Taiwan, LBP ranked among the top 20 diseases in terms of medical expenditure in 2020 (National Health Insurance Administration, 2026). In 2020, the prevalence of LBP among general workers was 31.0% and 32.5% for men and women, respectively (Liu et al., 2020), which recognized LBP as a major contributor to disability and predicted to exceed 840 million by 2050 (GBD 2021 Low Back Pain Collaborators, 2023).

Exercise programs effectively prevent and manage low back pain; however, the proper regimen parameters remain unclear, especially for office-based populations. In nursing settings, strategies have been effectively proven to prevent low back pain, such as back belts, shoe insoles, and ergonomic interventions with a particular regimen parameter in core exercise (Indrayani et al., 2024). Unlike nurses, office workers have particular job characteristics that weight tasks differently from dynamic workers, such as prolonged sitting, awkward positions, and repetition (Almhdawi et al., 2020). The discrepancies in working tasks would make the implementation different, and evidence from a systematic review of office workers is required to clarify the optimal frequency, intensity, time, type, volume, and progression (FITT-VP) of exercise, particularly in office-based populations.

This systematic review aimed to evaluate the existing literature on exercise programs designed for office workers with low back pain, to identify effective interventions based on FITT-VP parameters to reduce LBP and prevent disability. This approach will contribute to LBP reduction management and disability outcomes further promote workplace productivity and reduce absenteeism. Understanding the most effective exercise parameters could enable the development of cost-effective health promotion strategies at both the organizational and national levels.

Methods

Study design and search strategy

A systematic review was performed following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al. 2021). A thorough search strategy was used to identify pertinent articles. Databases such as EMBASE, OVID Medline, and Web of Science, spanning 2001 to 2023, were searched.

Additionally, the reference lists of relevant reviews were manually examined to identify additional studies that were not captured in the database search. The search terms incorporated a mix of standardized keywords from Emtree and MeSH terms and were developed iteratively using controlled vocabulary from MeSH terms and Emtree to optimize the comprehensiveness of the search strategy (Indrayani et al., 2024). The resulting keywords for each PICO component tailored to each database are presented in Table 1.

Eligibility criteria

The eligibility criteria for the databases were selected according to population, interest, comparison, and outcome (PICO) and study design selection criteria. Studies were excluded due to ineligible study design (e.g., reviews, abstracts without full text, case reports/series, qualitative, cross-sectional, or uncontrolled single-arm studies). The population (P) was restricted to office workers; interest (I) comprised all regimens of workout programs or physical exercise, including all the FITT-VP and restricted to experimental studies; comparison (C) specifically compared incomplete or non-regimen parameters of physical exercise; and the outcome (O) concerned low back or spine pain. Studies were excluded if they were review articles or failed to include any of the frequency, intensity, type, time, volume, and progress of lower back exercise or program.

Data selection and extraction

All retrieved studies were imported into EndNote X9 software to efficiently remove duplicates. Three reviewers were invited to independently screen the titles and abstracts of irrelevant studies. In the case of disagreement between the reviewers, a third reviewer was selected. NLDI, WLH, and WCT independently assessed the quality of the included articles. Any discrepancies in the study quality were resolved through discussions. If the intensity or duration included more than one in a study, the most frequent tools were chosen. Data extraction from the selected studies was performed independently by the reviewers. The extracted data were tabulated, including the study subjects, grouping, and results.

Quality of evidence

The current review employed the JBI critical appraisal checklist to assess the risk of bias and quality of evidence, hence eliminating the potential bias. The instrument used comprised the JBI critical appraisal checklist for experimental studies (Barker et al., 2024). All nine questions were examined (Table 2). Overall, most studies indicated minimal bias and trustworthy evidence, clearly reported pre- or post-outcome measurements, and used appropriate statistical analyses. Items related to comparability, co-interventions, and follow-up were the most common sources of “Unclear” ratings; however, these were still considered acceptable.

Table 1. Search terms and the algorithm to database searching

Database	PICO (MeSH and Emtree search term)	Search syntax strategy	Initial result
Embase	P: "office work*" OR "office employ*" OR "white collar work*" OR "clerical work" OR "pencil push*" OR "low back pain" I: biometric exercise effort OR exercise capacity, OR exercise performance OR exercise training OR exertion OR physical exercise OR muscle stretching exercise OR static exercise OR dynamic stretching OR relaxed stretching OR load lifting exercise OR aerobic exercise C: control group OR standardized O: back pain OR backache* OR low back pain OR lower back pain OR spine pain OR spine ache*) OR lumbago* OR dorsalgi*	((“office work*” OR “office employ* OR “office personnel” OR “white collar work*” OR “clerical work*” OR “pencil push*”):ti,ab,kw,de OR “low back pain”/exp)) AND ("biometric exercise effort" OR "exercise capacity", OR "exercise performance" OR "exercise training" OR exertion OR "physical exercise"): ti,ab,kw,de OR ("muscle stretching exercise" OR "static exercise" OR "dynamic stretching" OR "relaxed stretching" OR "load lifting exercise" OR "aerobic exercise")/exp)) AND ("control group OR standard*: ti,ab,kw,de OR "control group"/exp))) AND ("back pain" OR backache*) OR "low back pain" OR "lower back pain" OR “spine pain” OR “spine ache*) OR lumbago* OR dorsalgi*):ti,ab,kw,de OR "low back pain"/exp))	41
Ovid Medline	P: "office work*" OR "office employ*" OR "white collar work*" OR "clerical work" OR "pencil push*" OR "low back pain" I: biometric exercise effort OR exercise capacity, OR exercise performance OR exercise training OR exertion OR physical exercise OR muscle stretching exercise OR static exercise OR dynamic stretching OR relaxed stretching OR load lifting exercise OR aerobic exercise C: control group OR standardized O: back pain OR backache* OR low back pain OR lower back pain OR spine pain OR spine ache*) OR lumbago* OR dorsalgi*	(("office work*" OR "office employ* OR "office personnel" OR "white collar work*" OR "clerical work*" OR "pencil push*").mp OR "low back pain")) AND ("biometric exercise effort" OR "exercise capacity" OR "exercise performance" OR "exercise training" OR exertion OR "fitness training" OR "physical exercise").mp OR ("muscle stretching exercise" OR "static exercise" OR "dynamic stretching" OR "relaxed stretching" OR "load lifting exercise" OR "aerobic exercise")) AND ("control group OR standard).mp OR "control group")) AND ("back pain" OR backache*) OR "low back pain" OR "lower back pain" OR "spine pain" OR "spine ache*") OR lumbago* OR dorsalgi*).mp OR “low back pain"))	57
Web of Science	P: "office work*" OR "office employ*" OR "white collar work*" OR "clerical work" OR "pencil push*" OR "low back pain"	(ts="office work*" OR "office employ* OR "office personnel" OR "white collar work*" OR "clerical work*" OR "pencil push*" OR "low back pain"))	69

I: biometric exercise effort OR exercise capacity, OR exercise performance OR exercise training OR exertion OR physical exercise OR muscle stretching exercise OR static exercise OR dynamic stretching OR relaxed stretching OR load lifting exercise OR aerobic exercise C: control group OR standardized O: back pain OR backache* OR low back pain OR lower back pain OR spine pain OR spine ache*) OR lumbago* OR dorsalgi*	AND (ts="biometric exercise effort" OR "exercise capacity" OR "exercise performance" OR "exercise training" OR exertion OR "fitness training" OR "physical exercise") OR ("muscle stretching exercise" OR "static exercise" OR "dynamic stretching" OR "relaxed stretching" OR "load lifting exercise" OR "aerobic exercise")) AND (ts="control group OR standard) OR "control group")) AND (ts="back pain" OR backache*) OR "low back pain" OR "lower back pain" OR "spine pain" OR "spine ache*") OR lumbago* OR dorsalgi* OR "low back pain")

Note: The search terms and database search algorithm were developed and applied in 2024

Table 2. Quality assessment for Quasi-experimental studies

Authors, Year	Checklist criteria for Experimental studies								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Passos et al., 2024	Y	Y	Y	Y	Y	Y	Y	Y	Y
Masroor et al., 2023	Y	Y	Y	Y	Y	Y	Y	Y	Y
Almhdawi, et al., 2020	Y	Y	Y	U	Y	Y	Y	Y	Y
Johnston et al., 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y
Phattharasupharerk et al., 2019	Y	Y	U	Y	Y	Y	Y	Y	Y
Shariat et al., 2018	Y	Y	U	Y	Y	Y	Y	Y	Y
Sihawong, et al., 2014	Y	Y	U	U	Y	Y	U	Y	Y
Pedersen, et al., 2013	Y	Y	U	U	Y	Y	Y	Y	Y
Sj¨ogren, et al., 2006	Y	Y	Y	U	Y	Y	U	Y	Y
Shariat, et al., 2017	Y	Y	Y	Y	Y	Y	Y	U	Y
Suni, et al., 2017	Y	Y	U	U	Y	Y	Y	U	Y
Shariat et al., 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y
del Pozo-Cruz, et al., 2012	Y	Y	U	Y	Y	Y	Y	Y	Y

*Y=yes; N=no; U=unclear.

Results

Study characteristics

Among the 167 articles initially identified, 13 articles met the criteria following searches across three databases and two additional studies were derived from the reference lists. Before screening, duplicate records were removed, and 120 articles were screened for eligibility. Fifty studies were excluded due to ineligibility for four reasons. After excluding the studies, 13 studies were included in the current systematic review (Figure 1) and passed the critical appraisal. Thirteen outcome studies measured exercise programs for LBP alleviation and impact on disability prevention with regular sessions of lumbar stability, muscular strength, flexibility, cooling down, endurance training, Qigong, meditation, dumbbell exercises, and mobility-focused routines (Passon et al., 2024; Masroor et al., 2023; Almhdawi et al., 2020; Johnston et al., 2019; Phattharasupharerk et al., 2019; Shariat et al., 2019; Shariat et al., 2018; Suni, et al., 2017; Shariat, et al., 2017; Sihawong, et al., 2014; Pedersen, et al., 2013; del Pozo-Cruz et al., 2012; Sj¨ogren, et al., 2006).

FITT-VP parameters in exercise program

The current review investigated the FITT-VP to be used in related cases (Table 3). Most studies demonstrated a frequency of exercise twice a week within five to ten weeks, more than three times per week (Passos et al., 2024; Shariat et al., 2018; Johnston et al., 2019; del Pozo-Cruz et al., 2012). Intensity, including light to moderate with resistance training weights (Johnston et al., 2019; Passos et al., 2024), prescribed stabilization exercise (Masroor et al., 2023), body weight (Suni et al., 2017; Sihawong et al., 2014; Shariat et al., 2018; Phattharasupharerk et al., 2019; Alhmdawi et al., 2020), resistance and stretching, 30% RM (Sj¨ogren, et al., 2006), and moderate intensity (Shariat et al., 2017; Pedersen et al., 2013; del Pozo-Cruz et al., 2012). Twenty to sixty minutes are The average duration of the exercise program in each session among the reviewed articles (Almhdawi et al., 2020; Johnston et al., 2019; Masroor et al., 2023; Passos et al., 2024; Pedersen et al., 2013; Phattharasupharerk et al., 2019; Suni et al., 2017; Shariat et al., 2019). The types of exercises included resistance training, stretching exercises, core stabilization (Passos et al., 2024; Masroor et al., 2023), diaphragmatic breathing exercises (Masroor et al., 2023), core strengthening (Almhdawi et al., 2020), resistance in bridging wall squat, hip abduction (Johnston et al., 2029), qigong exercises including meditation, breathing technique, and acupressure (Phattharasupharerk et al., 2019), office-based stretching exercises adapting William McKenzie and American Colleges of Sports Medicine guideline modification exercises (Shariat et al., 2018; Shariat et al., 2017), stretching endurance training (Sihawong et al., 2014), dumbbell exercises including static neck exercise, high-speed power (Pedersen et al., 2013), light resistance training upper extremity trunk rotation and knee extension (Sjogren et al., 2006), flexibility exercise, muscular endurance, core stability exercise (Suni et al., 2017), 13 simple exercise dynamic stretching and strengthening (Shariat et al., 2019), and a web-based program with postural and physical exercise strengthening, flexibility, stretching abdominal, lumbar, hip, and thigh (del Pozo-Cruz et al., 2012). Meanwhile, the volume was a minimum of twice per week (Passos et al., 2024; Sihawong et al., 2014); strengthening 3-4 sessions and stretching for 30 min at work (Masroor et al., 2023), 2 sets of 20 repetitions per exercise, and three times per week standing 2-4 hours (Jonhston et al., 2019); 1-hour session per week with self-reported home (Phattharasupharerk et al., 2019; Shariat et al., 2018); combination by multiplying the load, sets, and repetition (Pedersen et al., 2013); five to eight sessions per week (Sjogren et al., 2006); 2-4 hours per day, 20 sessions for 10 weeks, 3 sessions per week for 11 weeks (Shariat et al., 2017); 20 sessions comprising two sessions per week (Suni et al., 2017); 120-135 minutes per week (Shariat et al., 2019), daily engagement, and postural interventions design for 9 months (del Pozo-Cruz et al., 2012). In these articles, regarding the progress, weekly progress was assessed to determine the adherence and improvement of pain ($p<0.05$ OR 4.55 (95%CI −7.01 to −2.09]) (Shariat et al., 2017; Sjogren et al., 2006; Pederson et al., 2013; Sihawong et al., 2014; Shariat et al., 2018; Phattharasupharerk et al., 2019; Johnston et al., 2019; Passos et al., 2019) with daily reminders, load adjusted every 5 interval weeks, supervised session with video instruction to track the adherence) increasing exercise and muscle endurance, and avoiding fatigue under tolerance.

Exercise regimen parameters for low back pain reduction

Across thirteen included studies, pain level outcomes were commonly assessed after exercise intervention using self-reported pain scales (e.g., Visual Analogue Scale [VAS] (Almhdawi et al., 2020; Pattharasupharerk et al., 2019; Sihawong et al., 2014; Suni et al., 2017; del Pozo-Cruz et al., 2012) and Numerical Pain Rating Scale [NPRS] (Passos et al., 2024; Masroor et al., 2023; Johnston et al., 2019) (Table 3). Overall, the majority of interventions reported pain improvement following structured exercise exposure at a baseline of $p<0.05$ (Johnston et al., 2019; Masroor et al., 2023; Pederson et al., 2013; Passos et al., 2024; Sjogren et al., 2006; Shariat et al., 2017; Shariat et al., 2019), $p<0.01$ (Shariat et al., 2018; Shariat et al., 2017; Suni et al., 2017;), and $p<0.001$ (Almhdawi et al., 2020; Phattharasupharerk et al., 2019).

Following the exercise regimen, pain reduction was reported in a Qigong intervention study after a six-week program (Phattharasupharerk et al., 2019). A long-term stretching routine (13-movement) demonstrated improvements in lower back discomfort after consistent practice for six months (Shariat et al., 2018), while combining strengthening (Pedersen et al., 2013) and stretching twice a week (Passos et al., 2024), core strengthening (Almhdawi et al., 2020), endurance (Sihawong et al., 2014), and core stabilization exercise with diaphragmatic breathing exercise (Masroor et al., 2023) could reduce pain. Resistance training (Sjogren et al., 2006), desk exercise (Johnston et al., 2019), and neck back exercise program (Suni et al., 2017) showed an improvement in pain level. A web-based workplace program has been reported to improve back pain–related outcomes (del Pozo-Cruz et al., 2012).

Exercise regimen parameters for disability management

Disability was frequently evaluated using standardized questionnaires such as the Oswestry Disability Index [ODI] (Masroor et al., 2023; Almhdawi et al., 2020; del-Pozo-Cruz et al., 2012) and/or the Roland-Morris Disability Questionnaire [RMDQ] (Passos et al., 2024; Phattharasupharerk et al., 2019) (Table 3). Resistance training on the shoulder, upper and lower limbs, core, and stretching exercises as weeks progress repetition sets affects disability rate reduction ($p<0.01$) with a mean reduction of 4.45 (95% CI −8.89 to 0.02) (Passos et al., 2024). Interventions that combined structured exercise with ongoing delivery supports (e.g., web-based or postural exercise programs, app-supported exercise plus education, progressive strengthening, core programs (del Pozo-Cruz et al., 2012), core strengthening at work including in daily reminders (Almhdawi et al., 2020), and diaphragmatic breathing exercise in six repetitions and two sets per week (Masroor et al., 2023) generally reported improvements in disability outcomes relative to comparison conditions. Additionally, video-based delivery may support adherence by facilitating access to exercise demonstrations, and participation tracking has been implemented in at least one web-based program (del Pozo-Cruz et al., 2012). In another exercise intervention, video instructions and monitoring were used to support the correct execution of exercises (Shariat et al., 2018).

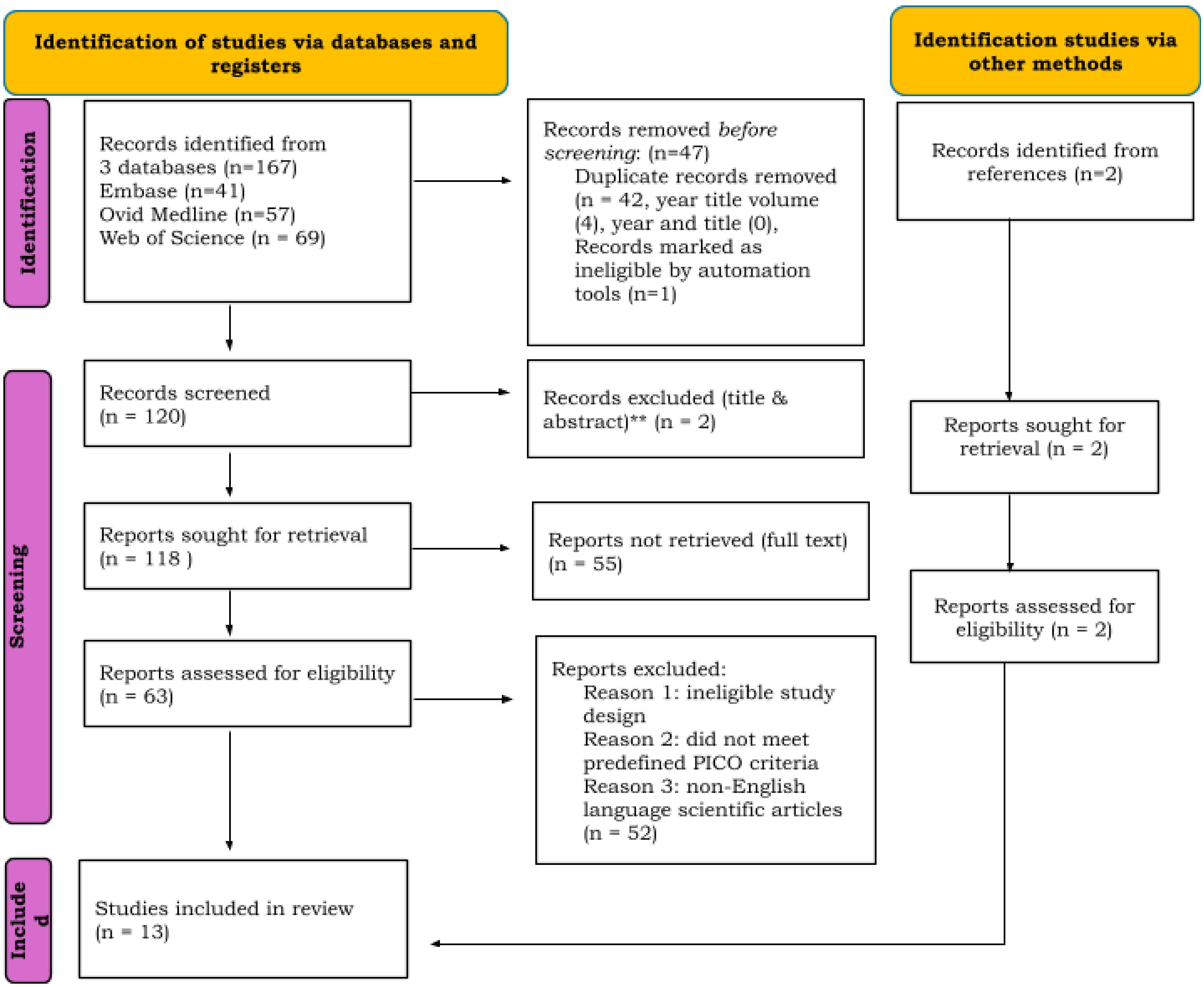

Figure 1. PRISMA flowchart

Table 3. Main included study characteristics

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention	
			Exp group	Control group		LBP	Disability
(Passos et al., 2024)	n=44 Experimental group (n=22) Control group (n=22) Type of occupation: Office administrator in the fruit industry.	Exercise training	F: Twice a week (every Tuesday and Thursday) I: resistance training using elastic bands and weights (5-10kg) T: Each session lasts 20-28 mins, divided into three parts: 1. Stretching and warm-up (2 × 30 s); 2. Strength training (10-15 mins); 3. Core stabilization exercises (3-5 mins) T: resistance training (shoulders, upper and lower limbs, core), and stretching exercises V: progressive increase sets and repetitions: week 1-2 (2 sets of 12-15 repetitions); week 3-5 (2 sets of 10-12 reps; week 6-8 (3 sets of 8-10 reps) P: as weeks progress, reps decrease while sets increase, higher resistance (elastics bands, weights)	F: Twice a week (recommended) I: no resistance, only stretching exercises T: each stretching exercise held for 30 sec, repeated twice T: stretching exercises (neck, shoulders, chest, arms, and trunk) V: fixed duration: each exercise held for 30 secs, repeated twice P: as weeks progress, reps decrease while sets increase, higher resistance (elastics bands, weights)	To measure pain level, the author used numerical rating pain scale (NPRS) (0-10, no pain to worst possible pain); Rolland Morris Disability Questionnaire was used to assessed disability associated LBP (0-24, higher values indicate greater disability	Pain reduction** $p<0.05$ Mean reduction 4.55 (95%CI −7.01 to −2.09)	Disability rate reduction $p<0.01$ Mean reduction 4.45 (95% CI −8.89 to 0.02)
Masroor et al., 2023	n= 25 Type of occupation: participants were working individuals	Core stabilization exercise and Diaphragmatic breathing	F: 3 sessions per week (non-consecutive days) I: core stabilization exercise with prescribed repetition/time targets (e.g., 10 seconds hold and 10 repetition, 3-4 sec rest with 3	F: 3 sessions per week (non-consecutive days) I: core stabilization exercise with prescribed repetition/time targets T: 30 minutes 4-week	The 11-numerical rating pain scale (NPRS) was used to scale the pain (0-11, no pain to worst pain that makes unable to	Pain scale with combination of DBE and CSE Through muscle	Disability rate Mean 8.17 (10.2) main effect $p<0.01$

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention	
	receiving treatment at an outpatient physiotherapy clinic	exercise	sets), while diaphragmatic breathing exercise 6 repetition, 2 sets T: 35 minutes 4-week program with two sessions per week T: core stabilization exercise (CSE) and diaphragmatic breathing exercise (DBE) V: prescribed exercise regimen with progression tracking P: progressive does not quantified in detail, only when patient can do the activities with not much fatigue	program with two sessions per week T: core stabilization exercise (CSE) V: no structured volume were noted P: no progression in DBE, focus on CSE	perform ADLs); Oswestry Disability Index (ODI) was used to assess disability associated with LBP, with 2%-20% indicates minimal disability and 100% indicating bed-bound clients.	activation main effect p<0.05, effect size 0.289	
Almhdawi, et al., 2020	n=40 non-specific LBP Type of occupation: office workers working at laboratories	Back exercise	F: stretching every 30 mins at work and strengthening 3-4 sessions per week I: body weight exercise for back and core strengthening T: strengthening: 20 mins per session T: evidence-based back and core strengthening exercises; stretching at work V: strengthening: 3-4 sessions per week, 20 mins per session Stretching: advised every 30 mins at work P: no specific progression mentioned, but includes daily reminders for posture, movement, and exercise	F: no structured physical activity I: no exercise component T: no structured exercise time T: educational posts on nutrition V: only 5 educational posts P: no progression, only static nutritional advice	The visual analog scale (VAS) was used to scale the pain (0-10, no pain to intense pain); the Oswestry Disability Index (ODI) was used to assess disability associated with LBP, with 2%-20% indicates minimal disability and 100% indicating bed-bound clients.	Pain reduction** Mean 5.62±2.06 P<0.001	Potential disability reduction ODI** 10.95±9.31 p<0.01

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention	
Johnston et al., 2019	n=29 LBP Type of occupations: office staff work with sedentary sit-stand workstation	Desk exercise	F: Exercises: 3x per week Standing: Interrupt sitting every 30 min; aim for 2-4 hours total per day I: Body weight resistance exercises with progressive difficulty T: Exercise: ~20 min per session (1 hour per week) Standing: max 1 hour per bout T: Resistance exercises: bridging, wall squats, hip abduction, arm/leg extensions V: Exercise: 2 sets of 20 reps per exercise, 3x per week Standing: 2-4 hours per day P: Exercise difficulty increased weekly (e.g., from double-leg to single-leg bridging)	F: Standing: Interrupt sitting every 30 min; aim for 2-4 hours total per day I: Not applicable (focus on posture changes) T: Standing: max 1 hour per bout T: Sit-stand workstation usage V: Standing: 2-4 hours per day P: Increase standing duration gradually	To measure pain level among sit-stand workers, the author used numerical rating pain scale (NPRS)	Pain reduction $p<0.05$**Mean-1.3 (-2.0 to -0.6, sit-stand desk and exercise reduced LBP at the same level.	
Phattharasupharerk et al., 2019	n=722 chronic nonspecific LBP Type of occupation: office staff working at Asia companies	Qigong group	F: 1x per week (supervised session) for 6 weeks Encouraged to practice daily at home I: Body weight exercises, static and dynamic postures, meditation, breathing exercises, and acupressure T: 1-hour supervised session per week Home practice duration not specified T: Qigong exercises: static/dynamic postures, meditation, breathing	F: No supervised sessions Encouraged to stay active I: Not applicable T: Not applicable T: General advice on low back pain management V: Not applicable P: Not applicable	Visual analog scale (VAS) was used to scale the pain in 100 millimeters long, from no pain to severe pain); Rolland Morris Disability Questionnaire was used to assessed disability	Pain intensity reduction in Qigong exercise $P<0.001$ Mean baseline[#] 49.01 (15.8) 95% CI	Lower potential disability started from week 4, $p<0.05$** Mean 2.2 (3.6) 95% CI -2.4 (5.1 to 0.3)

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention
			techniques, and acupressure V: 1-hour session per week + self-reported home practice P: Participants encouraged to practice daily and track adherence			
Shariat et al., 2018	n=142 LBP Type of occupation: shift workers working at Asia industry	Exercise group	F: 3x per week I: Body weight stretching exercises, performed with slow, controlled movement until mild discomfort T: 10–15 min per session T: Office-based stretching exercises (McKenzie, Williams, ACSM guidelines) V: 10–15 min per session, 3x per week P: Supervised sessions, video instructions, and monitoring to ensure proper execution	F: No intervention I: No intervention T: No intervention T: No intervention V: No intervention P: No intervention	Cornell Musculoskeletal Disor-ders Questionnaire (CMDQ) was used to measure pain intensity in body part	Pain during mon. 4 to 6: =CG; =EgG;↑EG*; =combined p<0.05 -1.08 95%Ci (-4.32 to 2.05) After 6 mons : Pain: =CG:↑EG*;** Pain: =CG:↑combined*;** p<0.01 Mean -1.62 95%CI -4.78 to 1.54)
Sihawong, et al., 2014	n=563 LBP Type of occupation: full time office staff workers	Exercise program	F: Stretching: 2x per workday (10 a.m. & 2 p.m.) Endurance training: 2x per week (Wednesday & Sunday) I: Body weight exercises T: Stretching: 30 sec per muscle (1 repetition) Endurance training: 10 repetitions per muscle, 60 sec rest between muscles T: Stretching	F: No intervention I: No intervention T: No intervention T: No intervention V: No intervention P: No intervention	Visual analog scale (VAS) was used to scale the pain in 100 millimeters long, from no pain to greater than 30 mm indicate greater intensity); Rolland Morris Disability	Hazard rate ratios showed a protective effect of the exercise program for LBP (HR =0.37, 95 % CI 0.22–0.64)

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention
			(iliopsoas)Endurance training (erector spinae, multifidus, quadratus lumborum, transversus abdominis) V: Stretching: Twice per workday Endurance training: Twice per week P: Daily mobile reminders for the first 3 months		Questionnaire was used to assessed disability	
Pedersen, et al., 2013	n=616 Type of workers: office staff in public administration authority	Strength training group	F: 3 times per week I: Moderate intensity (10–15 RM), increasing load as strength improves T: 20 min per session (2–3 sets of 10–15 reps per exercise) T: Dumbbell exercises (shoulder & neck strengthening), static neck exercises, high-speed power exercise (kayaking/rowing) V: Training dose = load × sets × reps P: Add weight when 15 reps are reached	F: No structured exercise, focus on workplace improvements I: No structured exercise T: No specific duration T: Workplace ergonomics, stress management, organization, cafeteria food quality V: No training volume P: Not applicable	Musculoskeletal pain index was measured using the Nordic Musculoskeletal Questionnaires (NMQ) with 10-point Likert scale ranging from 0 to 9 correspond no complaint to pain as bad as it could be	Pain Reduction of specific training program (SRT) and all-round physical exercise (APE) $p<0.05$ ($\beta=20.16$, $p=0.045$),
Sj¨ogren, et al., 2006	n=36 Type of occupation: office staff in four departments	Physical Exercise intervention	F: First 5 weeks: 1x/day (5x/week) Weeks 6–15: 1–2x/day (7–8x/week I: 30% of 1RM, estimated every 5 weeks using a 5RM submaximal test T: Each session: 6 exercises × 20 reps 30-second pause between movements 1.8 seconds per repetition	F: No training conducted I: Not applicable T: Not applicable T: No exercise, only participated in measurements V: Not applicable P: Not applicable	Musculoskeletal pain index was measured using the Nordic Musculoskeletal Questionnaires (NMQ) with yes/no self-reported answer	Pain reduction in experimental group in light resistance training $p<0.05$ ($p=0.020$ 0.42 95% Ci 0.07-0.77).

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention
			T: Light resistance training: - Upper extremity extension & flexion - Trunk rotation (right & left) - Knee extension & flexion V: Progressively increased from 5 to 8 sessions/week P: Load adjusted every 5 weeks using 5RM test Physiotherapist provided guidance at 5-week intervals			
Shariat, et al., 2017	n= 40 Type of occupation: two-year full time office workers	Exercise program	F: 3 times per week Each session: 3 sets per day I: Mild discomfort (gradual tension applied to muscles toward ROM) T: First 2 weeks: learning phase Weeks 3–5: 10 sec per exercise Weeks 6–8: 20 sec per exercise Weeks 9–11: 30 sec per exercise Rest: 60–90 sec between sets T: 13 exercises modified from McKenzie & Williams Focus: pain reduction & flexibility Slow, controlled movements V: 3 sessions per week × 3 sets per day × 11 weeks P: Increased exercise duration over time (10s → 20s → 30s) Researchers monitored adherence & answered questions	F: No exercise, instructed to maintain normal daily activities I: Not applicable T: Not applicable T: Not applicable V: Not applicable P: Not applicable	Cornell Musculoskeletal Disorders Questionnaire (CMDQ) was used to measure pain intensity in body part within 11-week program	Pain reduction in experimental group** ($p<0.05$) with mean before (3.45±1.47) and after (1.50±0.61)

Study	Participants	Program name	FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)		Outcome Measures	Outcome: Improvement result after intervention
Suni, et al., 2017	n=170 Type of occupation: workers over commercial fitness clubs	Fustra20 Neck & Back program	F: 2 times per week for 10 weeks (total 20 sessions I: Bodyweight exercises T: 1-hour sessions including: - 10 min aerobic warm-up (cross trainer) - 10 functional flexibility exercises - 4 muscular endurance exercises - 5 core stability exercises - 10 min cool down with assisted stretching T: functional flexibility exercises, muscular endurance exercises, core stability exercises V: 2 sessions per week × 10 weeks = 20 total sessions P: Muscular endurance and core stability exercises were adjusted individually and performed for 30–90 seconds based on personal conditions	F: No structured exercise program; continued usual activities I: Not applicable T: Not applicable T: Not applicable V: Not applicable P: Not applicable	Visual analog scale (VAS) was used to scale the pain in 100 millimeters long, from no pain to greater pain	Pain and work-induced local strain in particular neck and shoulder area, ($p<0.01$) with 23mm pain reduction at 12 months
Shariat, et al. 2019	n= 76 chronic LBP Type of occupation: office workers	Exercise therapy	F: 3 times per week I: Moderate intensity (adjusted according to tolerance) T: 40-45 minutes per session T: 13 simple exercises (dynamic stretches and strengthening exercises focused on lower back and core) The exercises were	F: No intervention I: No intervention T: No exercise T: No exercise V: No exercise volume P: No progression, participants maintain regular activities without any intervention	The pain intensity was measured by Functional Rating Index test, the higher score the greater functionality and pain intensity	Pain reduction [1]:[2, 3, 4] ** $p<0.05$, Mean 3±2 within 12 weeks of exercise therapy

Study	**Participants**	**Program name**	**FITT-VP Grouping (Frequency-Intensity-Time-Type-Volume-Progression)**		**Outcome Measures**	**Outcome: Improvement result after intervention**	
			derived from Williams and McKenzie V: 120-135 minutes per week P: No significant progression, training content remains consistent, adjusted according to pain levels				
del Pozo-Cruz, et al., 2012	n= 90 (12 M; 78 F) non-specific subacute low back Type of occupation: University administrative office workers	Exercise intervention	F: Daily (Monday through Friday) I: Moderate (exercise and posture interventions) T: 9-month study period, with daily sessions (2-minute postural intervention + 7-minute exercise) T: Web-based program: postural interventions + physical exercises (strength, flexibility, mobility, stretching for abdominal, lumbar, hip, and thigh muscles) V: Daily engagement with exercises + postural interventions over 9 months P: No explicit progression, though exercises include various ratios for speed-motion stretching	F: No intervention I: No intervention T: No time commitment (only standard care) T: Standard care (annual patient visits, self-care web-based information) V: No exercise volume P: No progression, only standard care	The visual analog scale (VAS) was used to scale the pain (0-10, no pain to intense pain); the Oswestry Disability Index (ODI) was used to assess disability associated with LBP, with 2%-20% indicates minimal disability and 100% indicating bed-bound clients.	Pain reduction **: OR=2.73 (1.75 to 4.27)	Reduction potential disability ODI **: OR=5.42 (1.71 to 17.22)

*intra-group difference; ** between group difference; # significant difference at baseline; ↑improvement; ↓worsening; = no change; APE: all-round physical exercise; CG: control group; EG: exercise group; EgG: ergonomic group; SRT: specific strength training; SSW: Sit-stand workstation; RMDQ: Roland-Morris Disability Questionnaire; ODI: Oswestry Disability Index

Discussion

The current systematic reviews reported that exercise programs based on the FITT-VP approach significantly alleviated LBP and disability in office workers across the included studies. The current findings support a previous study showing that an exercise program relieved LBP, particularly in higher-functioning adults (Hortobágyi et al., 2023). Participant self-determination may explain the results of the 13 reviewed articles, which showed that structured exercise following specific procedure regimen parameters resulted in higher adherence and engagement, thereby contributing to more effective LBP management (Navas-Otero et al., 2024). In addition, workers who demonstrate higher adherence to the protocol or guidance are supported by interactive technology, particularly when the practice is linked to health results (del Pozo-Cruz et al., 2012), thereby increasing the significance of LBP and disability management in the workplace.

In this review, various types of exercise programs were found and performed at a frequency of at least twice a week for 20-60 minutes over six weeks and above. The types of exercise programs included lumbar stabilization, resistance training, stretching, strengthening, endurance, mobility routines, and web-based video-supported programs, which have also been proven effective in LBP (Indrayani et al., 2024). This finding supports a previous study showing the effectiveness of a six-week exercise duration for LBP management (Hortobágyi et al., 2023). Contrary to another study, a minimum frequency of four sessions with gradual progression has been reported to improve disability (Navas-Otero et al., 2024). This may be related to job demands in different types of occupations. Therefore, the selected plan for intervention design and frequency should be determined in accordance with workplace regulations and job demands. For example, office workplaces characterized by predominantly sedentary work may benefit from structured workplace exercise programs.

Exercise intensity ranges from light to high levels, with varying physical demands and health benefits. Exercise intensity includes light-intensity activities that require minimal effort, such as leisurely walking or light stretching. Moderate intensity is noticeable when the heart rate and breathing increase but still allow the individual to maintain a conversation, such as brisk walking, moderate cycling, or dancing (Thompson, 2017). These exercises are typically sustainable for long periods and are often suitable for beginners or individuals with specific self-determination regarding health concerns (Navas-Otero et al., 2024). High Intensity is described as activities that significantly elevate the heart rate and breathing, often involving short bursts of maximal effort. Examples include running, vigorous cycling, and high-intensity interval training (HIIT). These exercises provide a greater challenge and are typically performed for shorter durations (Thompson 2017). In the current study, the intensity ranged from light and rarely reached moderate intensity (10–30 seconds per motion, with up to 90 seconds rest) to resistance training at 10–15 repetitions maximum. The session duration ranged from 10 to 45 minutes, and the exercise types included aerobic activity, Qigong, progressive resistance, core training, flexibility, relaxation, and mobility exercises (Passos et al., 2024; Masroor et al., 2023; Almhdawi et al., 2020; Johnston et al., 2019). Light-to moderate-intensity bodyweight-based exercises of approximately 20 min were identified in stretching and office-based physical activities (Almhdawi et al., 2020). This probably depends on the worker’s daily activity; office workers tend to compensate for a minimum performance to be maintained. In addition to all studies on exercise, there is a study on Qigong practice, which supports a previous study (Gobbo et al., 2019) that reduced lower back pain (p<0.001) between groups. One prospective study that was divided into different papers used video support as an exercise training program and found its effectiveness (Shariat et al., 2018). Hence, for safety and sustainability of LBP management and functional performance, light to moderate intensity exercise is recommended for office workers.

Progression, volume LBP reduction, and disability prevention are derived from specific exercise programs. In the current review, several studies highlighted that core training, resistance training, and repeated weekly stretching sessions significantly contributed to the progression and effectiveness of exercise interventions for low back pain (Passos et al., 2024; Masroor et al., 2023; Johnston et al., 2019). These modalities help improve lumbar stability, muscular strength, flexibility, and cooling, which are key components in both the prevention and management of low back pain, particularly among sedentary office workers whose main duties involve prolonged sitting and repetitive awkward postures (Marins et al., 2023). Furthermore, the literature recommends incorporating various complementary exercises to enhance outcomes. Endurance training, Qigong, meditation, dumbbell exercises, and mobility-focused routines, especially when delivered through web-based platforms, have shown promising results in reducing pain intensity and disability levels (Phattharasupharerk et al. 2019; Shariat et al. 2018; Sihawong et al. 2014; Pedersen et al. 2013; Suni et al. 2017; del Pozo-Cruz et al. 2012). These approaches not only address the physical aspects of lower back pain but also target psychosocial factors, such as stress and inactivity, offering a holistic strategy that is accessible and scalable in workplace health promotion programs. Exercise programs for office workers should gradually progress toward at least moderate-intensity activities while remaining adaptable to daily work demands. Incorporating low-intensity and alternative practices could be beneficial for improving musculoskeletal pain and adherence.

Limitations

Heterogeneity in the intensity and progression reporting parameters limited cross-study comparability. This review included various exercise interventions described using the FITT-VP framework; however, in three of the 13 studies, exercise intensity was not clearly defined, limiting comparability. Additionally, the findings are specific to office workers; therefore, applying these results to other populations or settings would require careful adjustment of the FITT-VP components. In one study, participants did not adhere to the assigned FITT-VP parameters, and the frequency of sessions was insufficient to produce results. In the other, limitations included inadequate exercise counselling and a lack of functional exercises, such as squats, side bridges, and activities mimicking daily movements like sit-ups, which are crucial for targeting muscles like the quadratus lumborum, vital for lumbar stability.

Contribution to global nursing practice

This systematic literature review provides evidence-based guidance for occupational health nurses worldwide in designing FITT-VP-based exercise parameters for managing low back pain (LBP) and disabilities among office workers. This result reflects the essential need for designing structured and replicable exercise interventions for office workers by translating the FITT-VP principle according to the worker’s demands and job analysis into a practical work-related injury program in the workplace, thereby supporting programs preventing serious illness due to work-related injury and strengthening the role of occupational health nurses in continuously monitoring the workers conditions and developing innovative solutions that contribute to workers' functional improvements and diminish absenteeism in occupational health practices.

Conclusion

In conclusion, this systematic review demonstrated that structured exercise programs generally improve low back pain (LBP) and disability outcomes among office workers. The implementation of the FITT-VP approach enables detailed and accurate regimen parameters for a particular exercise. The most frequent outcome measurements have been investigated to optimize feasibility in targeted settings based on the FITT-VP. This can contribute to reducing LBP prevalence and related absenteeism, enhancing workplace productivity, and supporting the implementation of targeted health promotion initiatives. Moreover, implementing such interventions has the potential to contribute to long-term cost-effectiveness across workplaces and serve as a foundational step toward shaping future health policies aimed at improving occupational health.

Author Contribution

All authors accept responsibility for the entire content of this manuscript and approve its submission.

Conflict of interest

The authors declare no conflicts of interest.

Acknowledgment

The researchers would like to express their sincere gratitude to all cross-disciplinary colleagues who supported the search for articles in international databases.

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