

REVIEW ARTICLE (META-ANALYSIS)

Walking Exercise for Chronic Musculoskeletal Pain: Systematic Review and Meta-Analysis



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Abstract

Objective: To systematically review the evidence examining effects of walking interventions on pain and self-reported function in individuals with chronic musculoskeletal pain.

Data Sources: Six electronic databases (MEDLINE, CINAHL, PsychINFO, PEDro, Sport Discus, and the Cochrane Central Register of Controlled Trials) were searched from January 1980 to March 2014.

Study Selection: Randomized and quasi-randomized controlled trials in adults with chronic low back pain, osteoarthritis, or fibromyalgia comparing walking interventions to a nonexercise or nonwalking exercise control group.

Data Extraction: Data were independently extracted using a standardized form. Methodological quality was assessed using the U.S. Preventive Services Task Force system.

Data Synthesis: Twenty-six studies (2384 participants) were included, and suitable data from 17 studies were pooled for meta-analysis, with a random effects model used to calculate between-group mean differences and 95% confidence intervals (CIs). Data were analyzed according to the duration of follow-up (short-term, ≤ 8 wk postrandomization; medium-term, >2 mo to 12mo; long-term, >12 mo). Interventions were associated with small to moderate improvements in pain at short-term (mean difference, -5.31 ; 95% CI, -8.06 to -2.56) and medium-term (mean difference, -7.92 ; 95% CI, -12.37 to -3.48) follow-up. Improvements in function were observed at short-term (mean difference, -6.47 ; 95% CI, -12.00 to -0.95), medium-term (mean difference, -9.31 ; 95% CI, -14.00 to -4.61), and long-term (mean difference, -5.22 ; 95% CI, -7.21 to -3.23) follow-up.

Conclusions: Evidence of fair methodological quality suggests that walking is associated with significant improvements in outcome compared with control interventions but longer-term effectiveness is uncertain. With the use of the U.S. Preventive Services Task Force system, walking can be recommended as an effective form of exercise or activity for individuals with chronic musculoskeletal pain but should be supplemented with strategies aimed at maintaining participation. Further work is required for examining effects on important health-related outcomes in this population in robustly designed studies.

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Chronic musculoskeletal pain (CMP) is a major cause of morbidity.¹ Given the changing age profile of the population, it is possible that its prevalence and associated costs will continue to rise.^{1,2} Chronic low back pain (CLBP), osteoarthritis (OA), and

fibromyalgia syndrome are reported as being among the most common types of musculoskeletal disorder. These conditions may be associated with significant functional limitations.² There is also evidence that they can exert a substantial influence on long-term health status and overall quality of life.^{1,3}

Current treatment recommendations support various non-pharmacological interventions, including aerobic exercise, to reduce pain and maintain or increase functional status.⁴⁻⁶

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However, randomized controlled trials have tended to report only short-term improvements in outcome with relatively small effect sizes.^{7,8} This may be due to a number of factors, including heterogeneity of interventions.⁹

Walking may represent an ideal form of aerobic activity owing to its ease of accessibility and relatively low impact. It has a low risk of musculoskeletal injury,¹⁰ and is considered safe to recommend for previously sedentary individuals.¹¹ Low to moderate intensity walking (described as exercising at a metabolic equivalent task value between 3 and 4¹² or a pace that results in an increased respiratory and heart rate, but where the individual can still carry out a conversation) has been shown to lead to improvements in aerobic capacity, body mass index, systolic/diastolic blood pressure, triglyceride levels, and high-density lipoprotein cholesterol levels in not only healthy sedentary individuals^{13,14} but also those with established cardiovascular disease¹⁵ and type 2 diabetes.¹⁶

Although it is widely recommended, there is currently limited evidence relating to the effectiveness of walking exercise for the management of musculoskeletal disorders.¹⁷

The aim of this systematic review was to examine the effects of walking interventions on pain and self-reported function in adults with CMP.

Methods

Data sources, searches, and extraction

Comprehensive search strategies were carried out by at least 2 independent reviewers according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses recommendations and those of the Cochrane Musculoskeletal Review Group.^{18,19} A review protocol was developed “a priori” using the Population, Interventions, Comparisons, Outcomes and Setting framework to define the research question and inclusion criteria. Six electronic databases (MEDLINE, CINAHL, PsychINFO, PEDro, Sport Discus, and the Cochrane Central Register of Controlled Trials) were searched for relevant articles published between January 1980 and March 2014 using combinations of key terms, which included “walking,” “aerobic exercise,” “musculoskeletal pain,” “low back pain,” “arthritis,” and “fibromyalgia.” (A full list of Medical Subject Heading terms used is included in [supplemental appendix S1](#), available online only at <http://www.archives-pmr.org/>.) Reference lists of included articles and key systematic reviews were also checked manually.

All randomized or quasi-randomized studies published in full were considered for inclusion. No language restrictions were applied. Studies were required to include adults 18 years or older, with a diagnosis of CLBP, OA, or fibromyalgia syndrome made according to clinical judgment or accepted diagnostic criteria.^{6,20,21}

All land- or treadmill-based walking interventions were considered for inclusion. Studies were required to include a comparative nonexercise or nonwalking exercise control group. Those including any form of assisted walking were excluded.

List of abbreviations:

CI	confidence interval
CLBP	chronic low back pain
CMP	chronic musculoskeletal pain
OA	osteoarthritis
USPSTF	U.S. Preventive Services Task Force

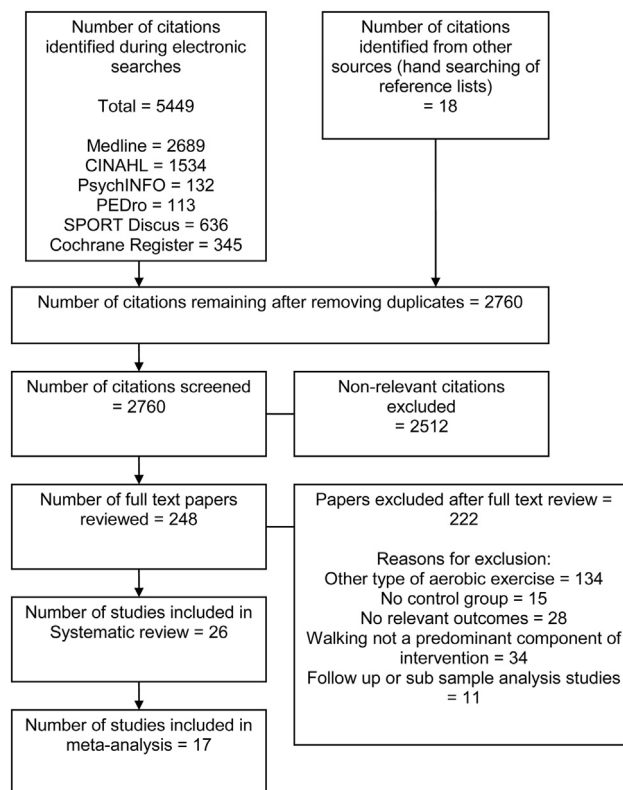


Fig 1 Flow diagram of Preferred Reporting Items for Systematic Reviews and Meta-Analyses, showing the process of selection for systematic review.⁸

Studies were also excluded if they involved perioperative or postoperative interventions. Primary outcomes of interest were pain and self-reported function.

At least 2 reviewers independently examined titles and abstracts of identified studies. Full-text copies of potentially eligible studies were assessed to determine whether walking formed at least half of the overall intervention. Final inclusion was determined by consensus between review authors. Data were extracted independently using a standardized form. Disagreements were resolved by consensus and involved a third author if required. The sample size of intervention and control groups and mean and SD values for pain and function were extracted. Where the SD was not provided, it was calculated from the standard error or 95% confidence intervals (CIs). Where tabulated results were not presented, an attempt was made to extract data from graphs. All data were cross-checked by a second author. For the purposes of comparability, outcomes were converted to a 0 to 100 scale (with higher scores indicating greater pain or functional limitation).

Assessment of methodological quality and adequacy of exercise interventions

The U.S. Preventive Services Task Force (USPSTF) system was used to assess methodological quality and form treatment recommendations on the basis of an estimate of net benefit and the overall strength of evidence.²² Internal validity and external validity were rated as “good,” “fair,” or “poor” according to predefined criteria specific to the study design²³ ([supplemental appendix S2](#), available online only at <http://www.archives-pmr.org/>). Studies

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