

Proper manual handling techniques to prevent low back pain, a Cochrane Systematic Review

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Abstract. Training and provision of assistive devices are considered major interventions to prevent and treat low back pain (LBP) among workers exposed to manual material handling (MMH). To establish the effectiveness of training and provision of assistive devices in preventing and treating LBP an update of a Cochrane literature review was performed to November 2010. Randomised controlled trials (RCTs) and cohort studies with a concurrent control group (CCTs) were included. Nine RCTs (20.101 employees) and nine CCTs (1280 employees) were included for prevention: six more than in the previous version. No study on treatment was found. None of the included RCTs and CCTs provided evidence that training and provision of assistive devices prevented LBP when compared to no intervention or another intervention.

Keywords: prevention, musculoskeletal, lifting, carrying, training.

1. Introduction

Manual material handling (MMH), especially lifting, leads to an increased risk of low back pain (LBP) [1-3]. In many occupations, it is difficult to avoid lifting of loads. For instance, European workers remain as exposed to MMH as they did 20 years ago: 33% of workers carry heavy loads at least a quarter of their working time [4]. Therefore, it is not surprising that emphasis has been given to optimise lifting techniques to prevent LBP [5,6]. Several lifting techniques have been advocated to reduce the load on the back. Probably the best known is the so-called 'leg lift' (lifting using a squat position). It has been questioned whether there are valid arguments for this technique from a biomechanical point of view [7]. In addition to advice on lifting techniques, assistive devices are often advocated to support the worker

while lifting. This paper presents the results of the updated Cochrane review focusing on the effectiveness of MMH training and provision of assistive devices in preventing and treating LBP in workers [8]. Studies published since 2005 were included [9, 10].

2. Methods

An update of a Cochrane literature review [10] was performed using MEDLINE, EMBASE, CENTRAL, CINAHL, Nioshtic, CISdoc, Science Citation Index, and PsychLIT to November 2010. RCTs and CCTs were included.

2.1. Participants and jobs

Participants were working age adults (16 to 70 years, male or female) who were engaged in jobs

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with MMH to the extent that their risk for LBP was increased. The studies were supposed to include a description of the exposure. We had originally intended to only include studies with workers without LBP for the prevention studies. However, this proved to be too impractical because in many studies, some workers did have LBP, and it was too arbitrary a decision to define the maximum percentage of them that could be included for a study to still qualify as one of prevention. Therefore, we changed this inclusion criterion to workers who were not actively seeking treatment for current LBP. There were no restrictions on previous episodes of LBP.

2.2. *Types of interventions*

All interventions aimed at changing human behaviour in MMH or using MMH assistive devices were included. The interventions were divided into two groups according to the target of the intervention:

- a) MMH techniques to decrease the mechanical load of MMH on the back,
- b) the use of assistive devices to decrease the mechanical load of MMH on the back.

All interventions were included, regardless of the content, as long as the focus was on MMH techniques and the use of assistive devices, such as educational classes, individual training and instructions, posters, leaflets, videos, audiotapes, on the spot or on the job training, and combinations of several interventions. Any MMH assistive device could qualify as such, for example, hoists and other lifting aids, or sliding boards and other patient transfer aids.

Studies on interventions aimed at workplace adaptations were excluded because they go beyond advising workers about MMH techniques.

A broad range of MMH exposures were included (e.g. lifting, lowering, pulling and pushing), even though the amount of evidence on the relationship with back pain varies for the different exposures, e.g. the relationship with pushing and pulling, is not very clear. We dealt with this problem by classifying the interventions by the type of MMH exposure.

3. Results

Nine RCTs (20,101 employees) and nine CCTs (1280 employees) on prevention of LBP were included in this updated review: six more than in the previous version. All included studies focus on prevention of LBP; none on treatment. The studies were

carried out in the time period between 1981 and 2010 with 11 of the 18 studies published in the past ten years. The studies were conducted in various geographical regions, with six studies from the US, three from Denmark, two from the Netherlands, and one each from Canada, China, France, Germany, Australia, Japan and Sweden.

3.1. *Participants and jobs*

Studies were conducted among the following occupations with exposure to back load: participants who lifted and moved patients (four RCTs and eight cohort studies), baggage handlers (two RCTs), construction workers (one RCT and one cohort study), postal workers who handled mail (one RCT) and workers in a distribution centre (one RCT). The number of participants varied from 131 to 12,772 in RCTs, and from 41 to 345 in cohort studies.

3.2. *Types of interventions*

The interventions varied from one session of simple advice on lifting to training once a week for two years. In some of the studies, traditional training was supported by follow-up and feedback at the workplace. The advocated lifting technique was usually not described in detail. One study measured the load on the back in real time and fed this back to the participant via a high pitched tone if the back was assessed to be overloaded. Another study gave nurses specific instructions about patient transfer techniques. Involvement of the supervisors in the intervention was clearly articulated in only a few studies, as was the encouragement to use available lifting aids. If reported, the number of participants in the training group was fewer than 15 employees. In four studies, the instructor was a trained colleague, in the other studies, the instructor was usually a professional in ergonomics. All interventions used an educational model that assumed that the information provided in the intervention would lead to a change in knowledge, attitude or skills. In addition to information, all interventions included the opportunity to practice the skills to some extent in either the educational setting or at follow-up in practice. None of the studies used a more elaborate model of change of health behaviour, such as the stages-of-change model, the protection-motivation theory or the theory of reasoned action and planned behavior.

Studies compared training to no intervention (n=4), professional education (n=2), a video (n=3),

back belt use (n=3) or exercise (n=2). Other studies compared training plus lifting aids to no intervention (n=3) and to training only (n=1). The intensity of training ranged from a single educational session to very extensive personal biofeedback. Six RCTs and none of the CCTs had a high risk of bias.

3.3. Effect on LBP

There was moderate quality evidence in seven RCTs that training resulted in similar LBP as no intervention with an odds ratio of 1.17 (95% Confidence Interval 0.68 to 2.02) and as minor advice with an odds ratio of 0.93 (95% Confidence Interval 0.69 to 1.25). Also none of the other comparisons showed evidence of a preventive effect of training and provision of assistive devices on LBP.

4. Discussion

This review shows that training workers in proper MMH techniques and providing them with assistive devices are not effective interventions by themselves in preventing LBP. The strength of our review is that we only included studies with designs that are least susceptible to bias. In addition, we were able to compare the results to studies with less valid study designs. There were no differences in conclusions between the analyses from the RCTs and the cohort studies.

A possible explanation for not finding a result may be that the exposure to MMH is not high enough in the included jobs to be at risk for work-related LBP. In four of the included RCTs, the MMH exposure was related to lifting patients, four RCTs studied handling of mail or luggage and one RCT evaluated construction workers. Even though the nature of MMH exposure varied, the results of the studies were not different with respect to biomechanical exposures. All jobs studied had more than sufficient exposure to biomechanical strain to the back to leave ample room for alleviation by effective interventions.

Another possible explanation for not finding an effect is that the risk of LBP might be related, not to incorrect MMH techniques, but to other work-related factors inherent in the studied populations (e.g. non-neutral, bent or rotated trunk postures without manual handling, or psychosocial strain).

In order to be able to devise new and innovative ways to prevent work-related LBP, researchers need a better understanding of the causal chain between exposure to MMH at work and the development of LBP.

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