



Systematic review

Analgesic effects of manual therapy in patients with musculoskeletal pain: A systematic review



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ABSTRACT

Background: Current evidence shows that manual therapy elicits analgesic effect in different populations (healthy, pain inflicted and patients with musculoskeletal pain) when carried out at the spinal column, although the clinical significance of these effects remains unclear. Also the analgesic effects of manual therapy on peripheral joints have not been systematically reviewed.

Methods: A systematic review was carried out following the PRISMA-guidelines. Manual therapy was defined as any manual induced articular motion with the aim of inducing analgesic effects. Outcome measure was pain threshold.

Results: A total of 13 randomized trials were included in the review. In 10 studies a significant effect was found. Pressure pain thresholds increased following spinal or peripheral manual techniques. In three studies both a local and widespread analgesic effect was found. No significant effect was found on thermal pain threshold.

Discussion: Moderate evidence indicated that manual therapy increased local pressure pain thresholds in musculoskeletal pain, immediately following the intervention. No consistent result was found on remote pressure pain threshold. No significant changes occurred on thermal pain threshold values. The clinical relevance of these effects remains contradictory and therefore unclear.

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1. Introduction

Manual therapy has shown a positive effect in patients with musculoskeletal pain, although discussion exists on the strength of this effect and on the indicated patient groups (Kent et al., 2010; Miller et al., 2010; Slater et al., 2012). Insight, in the mechanical and/or physiological mechanisms on which manual therapy is based, can contribute to its use in clinical practice.

Although the effects of manual therapy are classically explained within a biomechanical paradigm, research now points to the important role of neurophysiological processes at both spinal and

supraspinal levels in the modulation of nociceptive information (Bialosky et al., 2009). Pain modulation is an attribute of the nervous system and is conceptualized as the net result of complex neural interactions in which physiological and psychological information is integrated into a concrete and individual pain experience (Ossipov et al., 2010; Garland, 2012). Manual therapy techniques can play a role in these interactions as they trigger a cascade of neurophysiological events starting from some form of mechanical (manual) stimulation of the body (Bialosky et al., 2009). Evidence for these neurophysiological events comes from clinical research which show increases in pain thresholds (PTs) directly after spinal manual therapy interventions in healthy participants, in participants subjected to experimentally induced pain, and in patients with musculoskeletal pain (Coronado et al., 2012; Millan et al., 2012). In the reviews of Millan et al. (2012) and Coronado et al. (2012), it was concluded that manual therapy techniques carried out at the spinal column have significant pain modulating

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effects, although the clinical relevance of these effects remain unclear. No studies on the effects of manual therapy techniques on peripheral joints were included in these studies.

To add to the ongoing debate it is important to fill this gap and to reflect on the analgesic effect of manual therapy interventions, including the clinical relevant effects on pain modulation of both spinal and peripheral joint techniques (Bialosky et al., 2009). This can provide a sound rationale for manual therapy praxis and can therefore contribute to the acceptance of manual therapy as a legitimate therapy of choice for the treatment of musculoskeletal pain.

To summarize the specific pain modulatory effects of manual therapy in this review, PTs are selected as outcome criteria. PTs are defined as the minimal amount of pressure, temperature or chemical stimulation, which participants perceive as painful (Chesterton et al., 2007). The measurement of PTs is reliable and valid, and is widely used in the clinic as well as scientific research to evaluate the effect of different therapeutic interventions (Persson et al., 2004; Prushansky et al., 2004; Chesterton et al., 2007) and to evaluate the pain modulating system (Walton et al., 2014).

The present systematic review aims to add to the current knowledge, by studying the effects of manual therapy interventions directed to both spinal and peripheral joints on pain thresholds of patients with musculoskeletal pain. In addition, this review aims to give an interpretation of the clinical significance of these effects. To date contradictory results of manual therapy on pain thresholds are reported on populations with various forms of spinal and peripheral musculoskeletal pain, and a systematic overview of the effect of manual therapy techniques on pain thresholds in patients with musculoskeletal pain is to the best of our knowledge still lacking.

2. Methods

This systematic review is reported following the PRISMA-guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) (Moher et al., 2009). Methods of the analysis and inclusion criteria were specified in advance and not changed post hoc.

2.1. Eligibility criteria

Eligibility criteria were framed by the PI(C)O (Patient-Intervention-Comparison-Outcome) methodology. To be included in the present systematic review, articles had to report the results of clinical studies on pain thresholds effects (O) of manual therapy techniques (I) in patients with musculoskeletal pain (P).

2.2. Information sources and search strategy

To identify relevant articles, Embase, Medline OvidSP, Web-of-Science, Cochrane and Google scholar were searched until July 2013. Key words were derived from the PI(C)O-question and were converted to possible Mesh-terms if available. The search strategy in Embase was based on the following combination of terms:

Embase

('manipulative medicine'/exp OR kinesiotherapy/exp OR physiotherapy/exp OR physiotherapist/de OR (((manipulat* OR manual OR physical OR physio) NEAR/3 (medicine* OR therap* OR treat* OR musculoskelet*)) OR kinesiotherap* OR kinesiotherap* OR physiotherap* OR ((joint* OR cervical OR lumbar OR shoulder OR musculoskelet* OR skelet* OR muscul* OR muscle* OR arm* OR forearm* OR back OR hand* OR leg* OR limb* OR neck OR pelvi* OR spinal OR spine OR wrist OR vertebra* OR

elbow) NEAR/3 (mobili* OR manipul*)):ab,ti) AND ('pain parameters'/exp OR (((pain OR Nocicept*) NEAR/3 (modulat* OR parameter* OR threshold* OR control* OR inhibit* OR facilitat* OR toleran*)) OR (Endogen* NEAR/3 analges*)):ab,ti) AND ('musculoskeletal pain'/de OR 'arm pain'/de OR 'backache'/exp OR 'chronic pain'/de OR 'hand pain'/de OR 'postural headache'/de OR 'leg pain'/exp OR 'limb pain'/de OR 'musculoskeletal chest pain'/de OR 'neck pain'/de OR 'nociceptive pain'/de OR 'pelvic girdle pain'/de OR 'pelvis pain syndrome'/de OR 'referred pain'/de OR 'shoulder pain'/de OR 'spinal pain'/de OR 'wrist pain'/de OR (('musculoskeletal system'/exp OR limb/exp OR back/exp OR buttock/de OR neck/exp OR trunk/de OR pelvis/exp) AND pain/exp) OR (musculoskelet* OR skelet* OR muscul* OR muscle* OR arm* OR forearm* OR back OR hand* OR leg* OR knee* OR ankle* OR hip OR thigh OR foot OR feet OR limb* OR buttock* OR Gluteal OR extremi* OR neck OR pelvi* OR shoulder* OR spinal OR wrist OR vertebra* OR elbow OR cervical OR lumbar OR Lumbosacral OR ((chronic OR nocicept* OR referred OR somatic OR tissue) NEAR/3 (pain)) OR backache OR ((postural OR othostat* OR position*) NEAR/3 headache*)):ab,ti) AND ('clinical study'/exp OR (clinical OR patient* OR trial):ab,ti) NOT ([animals]/lim NOT [humans]/lim)

Reference lists were hand-searched and relevant articles were included to make the search as complete as possible (two studies).

2.3. Study selection

To be included in the review, articles had to meet the following criteria: 1) the study involves humans with musculoskeletal pain; 2) the topic of interest is the effect of manual therapy techniques on the function of pain thresholds; 3) written in English, German or Dutch; 4) full text reports of original research. If any of these four inclusion criteria were not met, the article was excluded. For the 2nd criterion, function of neurophysiological pain modulation mechanisms was operationalized as changes in (pressure or thermal) pain threshold. Manual therapy techniques included any manual technique used to move a spinal or peripheral joint with the aim to bring about an analgesic effect. Literature was searched and screened by the first author.

2.4. Risk of bias in individual studies

In order to determine the validity of the included studies, a quality assessment was carried out by two independent researchers (LV & JdV). LV obtained a PhD in the field of chronic pain. JdV is currently working as a PhD-researcher in the field of pain-motor interactions in patients with chronic non-specific neck pain. During the initial state of this process both researchers were unaware of each other results. After individual rating, results were compared and differences were discussed. If consensus could not be met, a definitive third opinion was provided by the last author (JN).

Quality appraising was carried out with use of checklists of the Scottish Intercollegiate Guidelines Network (SIGN) (www.sign.ac.uk). The SIGN-group develops evidence based clinical practice guidelines in order to accelerate the translation of new knowledge into clinical action to improve patient-important outcomes. One aspect of the work of this group is the development of critical appraisal checklists. Articles were scored on a clearly focused research question, randomisation, concealment method, blinding of patients, therapists and/or data-analysts, differences between groups and the standardization, reliability and validity of outcome measurement. After pooling the results, the overall quality of

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