BMJ Open

Dosage of joint mobilisation for the management of rotator cuff-related shoulder pain: protocol for a scoping review

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To cite: Wang S, Chapple CM, Quinn D, *et al*. Dosage of joint mobilisation for the management of rotator cuff-related shoulder pain: protocol for a scoping review. *BMJ Open* 2022;**12**:e056771. doi:10.1136/bmjopen-2021-056771

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2021-056771).

Received 25 August 2021
Accepted 09 May 2022

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ABSTRACT

Introduction Rotator cuff-related shoulder pain is the most common diagnosis of shoulder pain, which ranks as the third most common musculoskeletal disorder. The first-line treatment for patients with rotator cuff-related shoulder pain is physiotherapy, and joint mobilisation is widely used in conjunction with other modalities. The type and dosage of joint mobilisations could influence treatment outcomes for patients with rotator cuff-related shoulder pain, although research evidence is inconclusive.

Objectives To (1) systematically search, identify and map the reported type and dosage of joint mobilisations used in previous studies for the management of patients with rotator cuff-related shoulder pain; and (2) summarise the rationale for adopting a specific joint mobilisation dosage.

Methods and analysis We will follow the methodological framework outlined by Arksey and O'Malley and report the results as per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guideline. Two authors will independently screen and extract data from the six databases: PubMed, Scopus, Web of Science, CINAHL, Cochrane Library and SPORTDiscus, with publication date from their inceptions to 25 August 2021. A third author will be consulted if the two authors disagree about the inclusion of any study in the review. We will summarise the results using descriptive statistics and qualitative thematic analysis.

Ethics and dissemination Ethical approval is not required for this protocol. Mapping and summarising the reported type and dosage of joint mobilisations for patients with rotator cuff-related shoulder pain from previous studies will provide a foundation for further optimal selection of type and dosage of joint mobilisations for treating patients with rotator cuff-related shoulder pain. The review is part of an ongoing research that focuses on joint mobilisation for patients with rotator cuff-related shoulder pain. The results will be disseminated through presentations at academic conferences and a peer-reviewed publication.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ We have developed a comprehensive search strategy for identifying studies to be included in this scoping review.
⇒ We have consulted with experienced clinicians when developing this protocol and will consult with them when interpreting the findings.
⇒ We will include studies published in selected languages and that bias our findings.

INTRODUCTION

Shoulder pain is one of the most common musculoskeletal complaints with a point prevalence of 7%–26% and the lifetime prevalence of up to 67%.[1] Rotator cuff-related shoulder pain is the most common diagnosis of shoulder pain and accounts for approximately 50% of all cases of shoulder pain.[2] The rotator cuff-related shoulder pain is commonly localised around the acromion and often worsens during or subsequent to overhead activity.[3 4]

Non-surgical interventions are recommended as first-line management for patients with rotator cuff-related shoulder pain.[3 5] Among non-surgical treatments, joint mobilisation is widely used in conjunction with other modalities to treat patients with rotator cuff-related shoulder pain.[6–9] Examples of joint mobilisation include passive physiological joint mobilisation, passive accessory joint mobilisation and mobilisation with movement (MWM). Passive joint mobilisations are graded as per the amplitude of movement and the point in range where the movement occurs in relation to joint resistance, and the grading system (ie, grades I, II, III, IV and V) is most commonly used.[10] Grade V mobilisation, also termed manipulation, is a high-velocity and low-amplitude thrust technique.[10] There is no grading system for the force and amount of movement in MWM, and the grade of MWM technique is mainly based on patient response (ie, reduction or abolition of symptoms) during treatment.[9 11 12] Joint mobilisations may be applied

to any of the joints in shoulder complex (glenohumeral joint, acromioclavicular joint, sternoclavicular joint and scapulothoracic joint), or the cervical or thoracic spine.[13]

Passive joint mobilisation is defined by the following domains: force direction, force magnitude, force amplitude, oscillation frequency and displacement amplitude.[14 15] The force direction is the direction of applied force; force magnitude is the amount of force applied by the clinician; force amplitude is the difference between the maximum and minimum forces applied during mobilisation; the oscillation frequency is the number of repeated applications of force per unit time; and displacement amplitude is the distance between the maximum and minimum positions during an oscillatory movement.[14] The dosage of joint mobilisation is characterised by the patient position, the domains of the joint mobilisation applied, the number of mobilisation repetitions, the length of time it is applied during a treatment session, the number and frequency of treatment sessions, interval between treatment sessions (ie, rest period), and which symptom and to what extent each symptom is to be provoked during treatment.[15 16]

The optimal type and dosage of joint mobilisations for patients with rotator cuff-related shoulder pain are uncertain. Only one study with a small sample size compared the effectiveness of the following physiotherapy interventions for the treatment of patients with rotator cuff-related shoulder pain: passive joint mobilisation with exercise, MWM with exercise, exercise alone and control intervention (advice), but there were no significant differences in the improvement of pain and function between the four groups.[12] Some textbooks have determined the dosage based on reproduction or relief of the patient's symptoms.[10 16] Previous studies have assessed the effect of passive joint mobilisation on patients with rotator cuff-related shoulder pain, but not all have reported the dosage used.[17–20] Some of those studies reported better outcomes for multimodal interventions that included joint mobilisation,[20 21] while other studies reported no difference in pain and functional outcomes between multimodal interventions and control group (advice and exercise) or placebo intervention.[17–19]

No previous studies investigated the effect of different joint mobilisation dosages on shoulder pain and function in patients with rotator cuff-related shoulder pain. Few laboratory-based studies explored the effects of different dosages of shoulder joint mobilisation on physiological outcomes (eg, scapular and shoulder muscle activity levels) in asymptomatic individuals or patients with other shoulder diseases.[22–25] The findings suggest higher dosage of joint mobilisation reduced the activity levels of scapular and shoulder muscles in asymptomatic individuals, but lower dosage mobilisation did not.[22 23] In patients with frozen shoulder, the high-grade mobilisation technique was more effective than the low-grade mobilisation technique to improve shoulder mobility and reduce disability.[24] Based on these findings, it is possible that (1) different dosages will lead to different clinical outcomes, and (2) conflicting findings from previous studies are, in part, due to suboptimal dosage of joint mobilisation.[7 17 18] There is little research evidence to support the decision for any given dosage, and it is reasonable to assume that those are based on clinical experience.

Therefore, this scoping review aims to explore previous studies to (1) systematically search, identify and map the reported type and dosage of joint mobilisations used in previous studies for the management of patients with rotator cuff-related shoulder pain; and (2) summarise the rationale for adopting a specific joint mobilisation dosage.

METHODS AND ANALYSIS

Design

This scoping review will be reported as per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guideline.[26] We will follow a methodological framework outlined by Arksey and O'Malley,[27] which includes six stages: (1) identifying the research question; (2) identifying relevant studies; (3) study selection; (4) charting the data; (5) collating, summarising and reporting the results; and (6) optional consulting with relevant stakeholders.[27]

Stage 1: identifying the research questions

This stage included iterative discussion and deliberation within the research team (SW, CC and DCR) and stakeholder consultation with two physiotherapy specialists (ST and DQ) who have experience with manual therapy and managing patients with shoulder pain in New Zealand. Based on these discussions, this scoping review will address the following research questions:

1. What type and dosage of joint mobilisations have been tested by previous studies?
2. Did the authors present a rationale for adopting a specific joint mobilisation dosage?

Stage 2: identifying relevant studies

Database selection and search strategy

The search strategy was developed in collaboration with a university librarian, and the final search strategy will be reached after iterative discussion and pilot searches. The searches will be conducted by two independent researchers on 25 August 2021, and this study will be

Table 1 Keywords used in the literature search

Concept	Keywords
1	shoulder, glenohumeral joint, scapulohumeral joint, acromioclavicular joint, sternoclavicular joint, subacromial joint, sub-acromial joint
2	joint mobili*, Maitland, accessory movement, physiological movement, joint glide, joint oscillation, Kaltenborn, Mulligan, mobilization with movement, manipulation, thrust, manipulative technique

Wang S, *et al*. *BMJ Open* 2022;**12**:e056771. doi:10.1136/bmjopen-2021-056771

Table 2 Characteristics of included studies

Authors, year, study design, country and language	Participants (sample size)	Type of mobilisation	Intervention	Comparator	Outcome measures	Main findings

completed by the end of August 2022. Keywords and related subject heading terms (table 1) will be searched in the following databases: PubMed, Scopus, Web of Science, CINAHL, Cochrane Library and SPORTDiscus (online supplemental file 1). Additionally, reference lists of the studies in Mulligan concept-related books will be searched for relevant studies.

Stage 3: study selection

Inclusion and exclusion criteria

Study population

We will include both asymptomatic adults (aged 18 and over) and adults diagnosed with rotator cuff-related shoulder pain or other terms that refer to that disorder (eg, subacromial pain syndrome, subacromial impingement syndrome, subacromial bursitis, rotator cuff tendinopathy, subacromial shoulder pain, rotator cuff tears, rotator cuff tendonitis, supraspinatus and infraspinatus tendonitis). The inclusion of asymptomatic participants might help to understand the mechanisms of joint mobilisations to manage rotator cuff-related shoulder pain. For example, previous studies have reported that it is important to have a clear understanding of normal neuromuscular response to joint mobilisation in asymptomatic participants, especially when compared with patients with rotator cuff-related shoulder pain.[28 29] There may be other studies reporting joint mobilisation mechanisms.

Studies will be excluded if they included patients with frozen shoulder, shoulder fracture, dislocation, osteoarthritis, rheumatoid arthritis, and patients with shoulder pain that originated from the neck.[19] Studies will also be excluded if they included asymptomatic individuals but did not explore the mechanisms of joint mobilisation.

Concept

For this scoping review, we will consider joint mobilisation as the following techniques: passive physiological joint mobilisation, passive accessory joint mobilisation and MWM. We will include studies that used joint mobilisations to at least one of the following joints: glenohumeral joint, acromioclavicular joint, sternoclavicular joint and scapulothoracic joint. They need to have included joint mobilisation as part of treatment.

The included studies must report at least one of the following joint mobilisation parameters: (1) the types of joint mobilisation (passive physiological mobilisation, passive accessory joint mobilisation and MWM) tested; (2) dosages of joint mobilisation reported, including participant position, force magnitude (grade of mobilisation), force amplitude, force direction, oscillation frequency, displacement amplitude, the number of mobilisation repetitions, the length of time it is applied during a treatment session, the number and frequency of treatment sessions and symptom response.

Context

This scoping review will consider studies that have been conducted in any setting (eg, hospital and healthcare settings) where interventions are provided by or under the supervision of clinicians, for example, physiotherapists, chiropractors and osteopaths.

Types of sources of evidence

All study designs, such as randomised controlled trial, cross-over trial, case–control study and observational study, will be included, but reviews, practice guidelines, expert opinions, books or book chapters, editorial letters and conference proceedings will be excluded. The included studies must be published in full-text manuscripts and written in English, Portuguese or Chinese.

Screening

Initially, two independent reviewers (SW and TBC) will screen titles and abstracts before completing full-text reviews. We will use the online Rayyan software (http://rayyan.qcri.org)[30] to read the titles and abstracts, remove duplicate articles and read the full texts to manage references. Studies will be classified as 'included', 'excluded' or 'maybe' in the Rayyan application. If the two researchers disagree about the inclusion of any study in the review, a third researcher (DCR) will be consulted.

Stage 4: data extraction

The data from all included studies will be extracted independently by two reviewers (SW and TBC), and discrepancies will be discussed by the reviewers. A third reviewer

Table 3 Dosage of joint mobilisation

Author and year	Participant's position	Duration	Force/grade parameter	Session	Set	Repetition	Frequency	Symptom response	Follow-up

(DCR) will be consulted if consensus cannot be reached. If the data of interest are missing, the corresponding authors of those studies will be contacted by email for the missing information. The following data will be extracted from each included study using two customised preliminary data extraction forms (tables 2 and 3), which could be modified if necessary: (1) study characteristics—author(s), publication year, study location and publication language; (2) methods—study design; (3) participants—participant inclusion and exclusion criteria and sample size; (4) interventions and comparators—the type of joint mobilisation and dosage of joint mobilisation; (5) outcome measures—important outcome parameters; and (6) main findings—important results. Additionally, we will extract the rationale presented for justifying the joint mobilisation technique dosage used by each study if studies report it.

Stage 5: collating, summarising and reporting the results

We will summarise the results using descriptive statistics and qualitative thematic analysis. Results of the literature search and study screening process will be presented using the PRISMA-ScR flow diagram, and findings will be summarised using tables, charts or visual maps. Results for individuals with and without rotator cuff-related shoulder pain will be summarised together, with a separate column reporting whether there were (or not) clinical benefits or physiological responses.

Stage 6: consultation

This scoping review is the initial part of a research programme in the development and research of treatment for rotator cuff-related shoulder pain. To identify potential missing or relevant studies or interventions that do not figure in the review, we will consult with two physiotherapy specialists who have experience in managing patients with shoulder pain in New Zealand. The stakeholder consultation will occur in two phases during this scoping review. During phase I, we consulted with two physiotherapy specialists (ST and DQ) to obtain their feedback on the protocol of the review. This ensures our scoping review covers all domains regarding type and dosage that are considered important by clinicians. During phase II, we will share the preliminary findings with two physiotherapy specialists and request their feedback on the findings. They will draw on their clinical experience to assist interpretation of the preliminary findings and offer meaningful and constructive information for our scoping review.

ETHICS AND DISSEMINATION

Ethical approval is not required for this protocol. This scoping review will systematically map and summarise the reported type and dosage of joint mobilisations and their effect on the clinical outcomes in patients with rotator cuff-related shoulder pain from previous studies. Additionally, the rationale for joint mobilisation dosage selection will also be summarised. The findings will provide an evidence-based selection of the type and dosage of joint mobilisations for clinicians when treating patients with rotator cuff-related shoulder pain. The review is part of ongoing research that focuses on joint mobilisation for patients with rotator cuff-related shoulder pain. The results will be disseminated through presentations at academic conferences and a peer-reviewed publication.

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Acknowledgements We thank the librarian, Thelma Fisher, at the Health Sciences Library, University of Otago, for her valuable advice.

Contributors SW and DCR conceived the research question. SW, CMC and DCR were responsible for the design of the scoping review. ST and DQ contributed to the stakeholder consultation. SW, CC and DCR were involved in writing the manuscript draft. All authors contributed, edited and approved the final manuscript.

Funding Part of this work was conducted during the Sir Charles Hercus Health Research Fellowship (18/111) awarded to DCR. SW was supported by the University of Otago Doctoral Scholarship. CC and DCR are supported by the Stanley Paris Research Fellowship.

Competing interests DQ is a private physiotherapist and works at Back in Motion. The other authors do not have competing interests.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

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