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Review article

Effectiveness of scapula-focused approaches in patients with rotator cuff related shoulder pain: A systematic review and meta-analysis

Julie Bury [a], Morgan West [b], Gema Chamorro-Moriana [c], Chris Littlewood [d, e, *]

[a] Doncaster & Bassetlaw Hospitals, NHS Foundation Trust, Physiotherapy Dept., Doncaster Royal Infirmary, Doncaster, UK
[b] Sherwood Forest, NHS Foundation Trust, Kings Mill Hospital, Mansfield, UK
[c] Physiotherapy Department, Faculty of Nursing, Physiotherapy and Podiatric, University of Seville, Spain
[d] School of Health & Related Research, University of Sheffield, Regent Court, 30 Regent Street, Sheffield S1 4DA, UK
[e] Arthritis Research UK Primary Care Centre, Primary Care Sciences, Keele University, Staffordshire ST5 5BG, UK

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ABSTRACT

Background: Rotator cuff related shoulder pain (RCSP) is common with a range of conservative treatments currently offered. Evidence supporting superiority of one approach over another is lacking. Scapula focused approaches (SFA) are frequently prescribed and warrant investigation.
Objective: To evaluate the effectiveness of SFA in RCSP.
Design: Systematic review of randomised controlled trials.
Methods: An electronic search including MEDLINE, PEDro, ENFISPO to January 2016 was supplemented by hand searching. Randomised controlled trials were included; appraised using the PEDro scale and synthesised via meta-analysis or narratively, where appropriate.
Results: Four studies (n = 190) reported on pain and three studies (n = 122) reported on disability. Regarding pain, there was statistical but not clinically significant benefit of SFA versus generalised approaches (mean difference (VAS) 0.714; 95% CI 0.402–1.026) in the short term (<6 weeks); regarding disability, there was significant benefit of SFA versus generalised approaches (mean difference 14.0; 95% CI 11.2–16.8) in the short term (<6 weeks). One study (n = 22) reported disability at 3 months, which was not statistically significant. Evidence is conflicting from four studies relating to the effect of SFA on scapula position/movement.
Conclusion: SFA for RCSP confers benefit over generalised approaches up to six weeks but this benefit is not apparent by 3 months. Early changes in pain are not clinically significant. With regards to scapula position/movement, the evidence is conflicting. These preliminary conclusions should be treated with significant caution due to limitations of the evidence base.

1. Introduction

Shoulder pain is a common musculoskeletal complaint, with a prevalence of 7–26% in the general population (Luime et al., 2004). Disorders of the rotator cuff are most frequently recorded as a source of these symptoms, reported in up to 70% of cases (Van der Windt et al., 1996; Michener et al., 2004). A range of terms including rotator cuff tendinopathy, shoulder impingement syndrome and subacromial pain are used to describe shoulder pain thought to be attributable to the rotator cuff but currently there is lack of consensus about the most appropriate terminology (Carr and Rees, 2012).

The resulting pain and loss of function secondary to rotator cuff disorders can be debilitating and impact on an individual's ability to self-care and work; posing a significant socioeconomic burden (Van der Windt et al., 1996; Harkness et al., 2003). Conservative treatment, including exercise therapy, is recommended as the primary treatment; but there is considerable uncertainty relating to the relative effectiveness of such approaches (Kuhn, 2009; Kromer et al., 2009; Hanratty et al., 2012; Littlewood et al., 2012; Ylinen et al., 2013; Hallgren et al., 2014; Dong et al., 2015), and as a

* Corresponding author. School of Health & Related Research, University of Sheffield, Regent Court, 30 Regent Street, Sheffield S1 4DA, UK. Tel.: +44 114 222 0888; fax: +44 114 272 4095.
E-mail addresses: julie.bury@nhs.net (J. Bury), Morgan.West@sfh-tr.nhs.uk (M. West), gchamorro@us.es (G. Chamorro-Moriana), c.littlewood@sheffield.ac.uk (C. Littlewood).

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result large variations in practice exist (Michener et al,, 2004; Dorrestijn et al., 2007; Kuhn, 2009; Hallgren et al., 2014; Littlewood et al., 2015a). Furthermore, there is uncertainty relating to the role that altered scapula position and movement plays, termed scapula dyskinesis; which is widely regarded as a common finding with this condition (Lukasiewicz et al., 1999; Cools et al., 2003; Ludewig and Braman, 2011; Kibler et al., 2013). As a consequence, despite popularity, confusion exists over the value of scapula-focused approaches (SFA) within rehabilitation programmes (Kibler, 1998).

In this context, the aim of this systematic review is to synthesise the evidence relating to the effectiveness of SFA for rotator cuff related shoulder pain (RCSP) with the objective of informing clinical practice.

2. Methods

These methods were pre-specified and recorded in a protocol, consistent with the PRISMA statement (Liberati et al., 2009).

2.1. Data sources and search strategy

An electronic search of MEDLINE, CINAHL, PEDro, ENFISPO, LILIACS, IBECS and DIALNET was carried out from inception to January 2016. In addition to this, reference list checking of included studies was employed and consultation with experts was also utilised to verify any additional published or unpublished sources. Two examples of the search terms and keywords used for MEDLINE (Mesh terms, Medical Subject Headings) and for ENFISPO (DeCS terms, "Descriptores en Ciencias de la Salud"); are shown in Tables 1 and 2, respectively.

2.2. Study selection and inclusion criteria

For a study to be included in this review, the following criteria had to be met:

Population – Adults with signs & symptoms of RCSP (inclusive of terms such as rotator cuff tendinopathy, shoulder impingement syndrome), commonly described as unilateral shoulder pain, localised around the acromion; worse with overhead activity; usually full range of shoulder movement; a combination of positive impingement tests; presence of a painful arc; reproduction or worsening of pain on resisted muscle testing; and no cervical spine involvement (Carr and Rees, 2012; Littlewood et al., 2012; Diercks et al., 2014).

Interventions – SFA (including exercise therapy, stretches and/or manual therapy) with the aim to address the pain and disability found with RCSP and/or with the intention of changing scapula biomechanics, including position, movement, strength, motor control, and/or muscle length.

Comparison – Any comparison that adopts a general or non-scapula approach, such as usual care or an alternative exercise therapy/intervention that is not focused specifically on scapula biomechanics.

Outcomes – Any validated measures of patient-reported pain and/or disability; plus biomechanical outcomes relating to the scapula.

Study design – Randomised controlled trials (RCTs).

Language – Restricted to studies reported in English and Spanish.

Setting – Not limited to a particular setting.

The titles and abstracts of the search results were screened to determine if a study met the pre-specified inclusion criteria. Of these identified studies, and any with questions over their relevance, the full text article was sourced; the reasons for any exclusions at this stage were documented.

Table 1
MEDLINE search strategy.

Search terms			
1	shoulder pain/OR shoulder joint/OR shoulder impingement syndrome/OR subacromial pain syndrome*.mp. OR rotator cuff/	11	(scapula* adj2 rehabili*).mp.
2	subacromial impingement syndrome*.mp.	12	(scapula* adj2 treatment*).mp.
3	supraspinatus tend*.mp.	13	scapula* focused.mp.
4	shoulder burs*.mp.	14	scapula* approach*.mp.
5	shoulder tend*.mp.	15	(scapula* adj2 strength*).mp.
6	painful arc*.mp.	16	motor control exercise*.mp.
7	1 OR 2 OR 3 OR 4 OR 5 OR 6	17	8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16
8	scapula/OR scapula*.mp.	18	7 and 17
9	scapula* stabil*.mp.	19	limit 18 to ("all adult (19 plus years)" and humans and (clinical trial or controlled clinical trial or randomized controlled trial))
10	(scapula* adj2 exercise*).mp.	20	limit 19 to English language

2.3. Data extraction

Data extraction was performed by one reviewer (JB) and checked for accuracy by a second reviewer (GCM) using a pre-designed table to detail information on study characteristics, participant characteristics, interventions, outcome measures and results.

2.4. Quality appraisal

Eligible studies were assessed on methodological quality using the Physiotherapy Evidence Database (PEDro) critical appraisal tool (Physiotherapy Evidence Database (PEDro), 2016), which has been found to be valid and reliable for evaluating both the internal validity of a study (criteria 2–9), as well as the adequacy of the statistical information to interpret the results (criteria 10–11) (Sherrington et al., 2000; Maher et al., 2003; de Morton, 2009). It consists of 11 criteria overall; although criterion 1 refers to the external validity of the trial and is not included in the final score (Sherrington et al., 2000). Each criterion is rated as Yes (1 point) or No (0 points), with a maximum score out of 10; a PEDro score $\geq$ 6/10 is classed as a high quality study (Moseley et al., 2002). Out of the 4 studies, 3 had already been scored on the PEDro database and this data was extracted. The remaining study (Shah et al., 2014) was appraised by one reviewer (JB) and verified by a second reviewer (CL).

2.5. Data synthesis

Meta-analysis was conducted using OpenMetaAnalyst software (Wallace et al., 2012). Due to the inherent heterogeneity within the literature, the DerSimonian and Laird random effects model was used (DerSimonian and Laird, 1986). Statistical between study heterogeneity was assessed with the I^2 statistic, and this review considered 25% low, 50% moderate and 75% high (Higgins et al., 2003). Pain scores were measured on the same tool, the visual analogue scale (VAS), so mean pain scores along with their respective standard deviations (SD) were extracted and pooled. Disability scores were measured on different tools but these tools used the same scales (0–100) and it was felt that they measured similar constructs of shoulder related disability so, similar to pain