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## Literature review

# The efficacy of therapeutic ultrasound for rotator cuff tendinopathy: A systematic review and meta-analysis



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## ABSTRACT

A systematic review and meta-analysis on the efficacy of therapeutic ultrasound (US) in adults suffering from rotator cuff tendinopathy. A literature search was conducted in four databases for randomized controlled trials (RCT) published until 12/2013, comparing the efficacy of US to any other interventions in adults suffering from rotator cuff tendinopathy. The Cochrane Risk of Bias tool was used to evaluate the risk of bias of included studies. Data were summarized qualitatively or quantitatively. Eleven RCTs with a low mean methodological score ( $50.0\% \pm 15.6\%$ ) were included. Therapeutic US did not provide greater benefits than a placebo intervention or advice in terms of pain reduction and functional improvement. When provided in conjunction with exercise, US therapy is not superior to exercise alone in terms of pain reduction and functional improvement (pooled mean difference of the Constant-Murley score:  $-0.26$  with 95% confidence interval of  $-3.84$  to  $3.32$ ). Laser therapy was found superior to therapeutic US in terms of pain reduction. Based on low to moderate level evidence, therapeutic US does not provide any benefit compared to a placebo or advice, to laser therapy or when combined to exercise. More methodologically sound studies on the efficacy of therapeutic US are warranted.

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Prevalence of shoulder pain has been estimated to range from 7 to 36% in the general population (Tekavec et al., 2012). Rotator cuff (RC) tendinopathy represents the most frequent cause of shoulder pain (Alquanae, Galvin, & Fahey, 2012). RC tendinopathy is a broad term including several related diagnoses, such as subacromial impingement syndrome (SIS), tendinitis, tendinosis or partial thickness tear of the rotator cuff, long head bicep tendinitis/tendinosis and subdeltoid bursitis (Hanratty et al., 2012) but exclude capsulitis and full thickness tears. RC tendinopathy may result in

important functional limitations and poor health-related quality of life. Workers are at high risk of developing RC tendinopathy, especially those who work overhead or perform repetitive tasks (Bodin et al., 2012).

Clinical signs of RC tendinopathy include painful arc in elevation, decreased shoulder range of motion (ROM) and decreased shoulder and arm strength (de Witte, Nagels, van Arkel, Visser, Nelissen, & de Groot, 2011). Patients often seek physiotherapy treatments when they suffer from RC tendinopathy. Most typically, rehabilitation include active intervention such as exercise, as well as electrophysical modalities. One of the electrophysical agent often used to rehabilitate RC tendinopathy is therapeutic ultrasound (US), which is commonly delivered at a high frequency of 1–3 MHz and an intensity of 0.10–3.0 W/cm<sup>2</sup>. The therapeutic US effects are believed to promote soft tissue healing and improve soft tissue extensibility (Baker, Robertson, & Duck, 2001). Other authors report that the US energy transmitted to tissue enhances the inflammatory response and tissue repair, and is absorbed mostly in tissues

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with high collagen content (Johns, 2002). However, physiological effects of therapeutic US have been mostly examined through *in vitro* studies and the clinical effectiveness in humans remains uncertain (Baker et al., 2001).

Inconclusive evidence has been published on the efficacy of therapeutic US for RC tendinopathy or other shoulder disorders. A systematic review (SR) published in 2003 by the Cochrane Collaboration on US therapy for shoulder pain concluded that US was not effective in treating shoulder pain or RC tendinopathy, but could be effective for patients suffering from calcified tendinopathy (Green, Buchbinder, & Hetrick, 2003). A more recent SR was published in 2009 on the efficacy of various rehabilitation interventions in patients with SIS (Kromer, Tautenhahn, de Bie, Staal, & Bastiaenen, 2009). As they only included one RCT evaluating US, the authors did not make any specific recommendation on US use. Another SR, again on the efficacy of various physiotherapy interventions in patients with SIS, included two RCTs that assessed the efficacy of US (Michener, Walsworth, & Burnet, 2004). These authors conducted a narrative synthesis of the literature (no meta-analysis) and concluded that therapeutic US is of no benefit for RC tendinopathy.

Since these publications, no systematic reviews have been performed to update recommendations regarding the efficacy of therapeutic US for RC tendinopathy. The aim of the current study was therefore to perform a systematic review and meta-analysis on

the efficacy of therapeutic ultrasound (US) in adults suffering from RC tendinopathy.

## 1. Methods

### 1.1. Literature search and study identification

A literature search was performed using a combination of keywords and MESH terms (Fig. 1). We searched four bibliographical databases: PubMed, PeDRO, CINAHL, EMBASE, from their date of inception to December 2013. Reference lists of retrieved studies and previous systematic reviews were also searched to identify additional relevant publications.

### 1.2. Data extraction and quality assessment

#### 1.2.1. Study selection

Two authors reviewed each of the articles (title and abstract) to determine whether it met the following inclusion criteria: 1 – adults participants ( $\geq 18$  years) suffering from RC tendinopathy; 2 – US therapy either alone or in conjunction with other interventions was compared to a placebo or to any other therapeutic modality including US; 3 – study design was a randomized controlled trial (RCT); 4 – the language of articles was either English or French. Studies including participants suffering from shoulder pain were

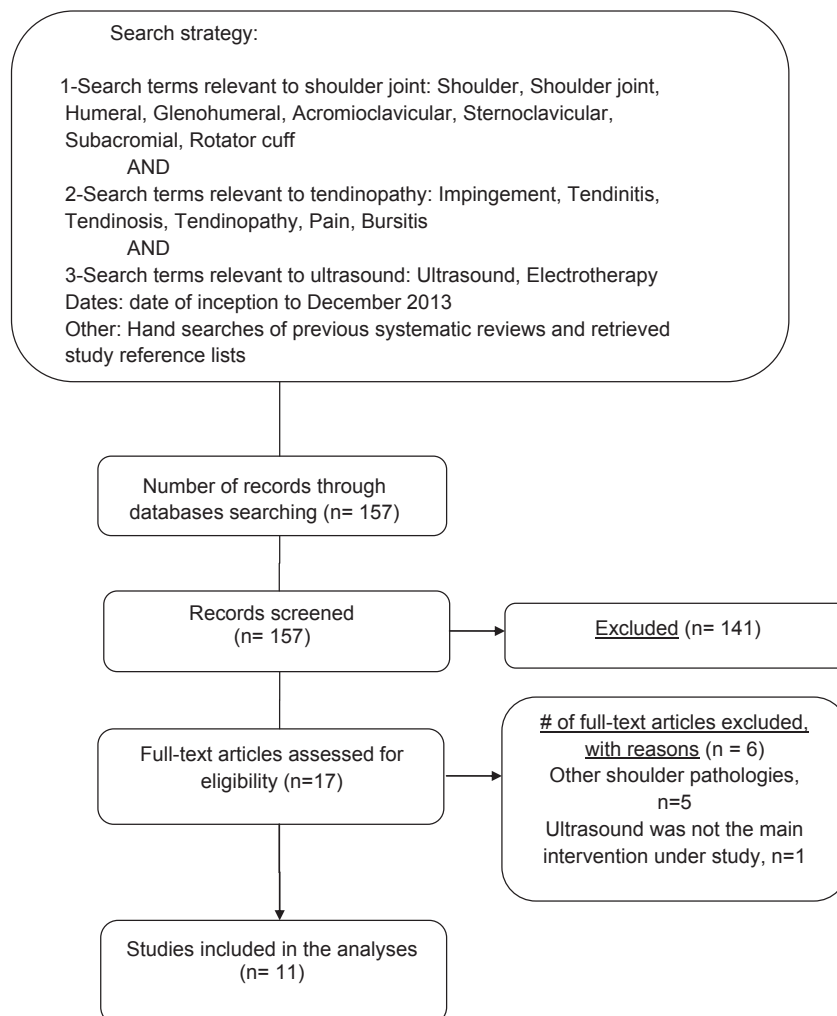


Fig. 1. Flow chart of RCTs included in the present systematic review.

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