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## Review

# Scar massage for hypertrophic burns scarring—A systematic review

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## ABSTRACT

**Background:** Scar massage is used in burn units globally to improve functional and cosmetic outcomes of hypertrophic scarring following a burn, however, the evidence to support this therapy is unknown.

**Objective:** To review the literature and assess the efficacy of scar massage in hypertrophic burn scars.

**Methods:** MEDLINE, PubMed, Embase, CINAHL and the Cochrane Library were searched using the key words “burn”, “burn injury”, “thermal injury” and “scar”, “hypertrophic scar” and “massage”, “manipulation”, “soft tissue mobilisation”, “soft tissue manipulation”. The articles were scored by the assessors using the Physiotherapy Evidence Database (PEDro) scale and outcome measures on range of motion (ROM), cosmesis (vascularity, pliability, height), pain scores, pruritus, and psychological measures of depression and anxiety were extracted.

**Results:** Eight publications were included in the review with 258 human participants and 15 animal subjects who received scar massage following a thermal injury resulting in hypertrophic scarring. Outcome measures that demonstrated that scar massage was effective included scar thickness as measured with ultrasonography ( $p=0.001$ ;  $g=-0.512$ ); depression (Centre for Epidemiologic Studies — Depression [CES-D]) ( $p=0.031$ ;  $g=-0.555$ ); pain as measured with Visual Analogue Scale (VAS) ( $p=0.000$ ;  $g=-1.133$ ) and scar characteristics including vascularity ( $p=0.000$ ;  $g=-1.837$ ), pliability ( $p=0.000$ ;  $g=-1.270$ ) and scar height ( $p=0.000$ ;  $g=-2.054$ ). Outcome measures that trended towards significance included a decrease in pruritus ( $p=0.095$ ;  $g=-1.157$ ).

**Conclusions:** It appears that there is preliminary evidence to suggest that scar massage may be effective to decrease scar height, vascularity, pliability, pain, pruritus and depression in hypertrophic burns scarring. This review reflects the poor quality of evidence and lack of consistent and valid scar assessment tools. Controlled, clinical trials are needed to develop evidence-based guidelines for scar massage in hypertrophic burns scarring.

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**Abbreviations:** PEDro, physiotherapy evidence database; ROM, range of motion; CES-D, centre for epidemiologic studies - depression; VAS, visual analogue scale; RCT, randomized controlled trial; TBSA, total burn surface area; VSS, Vancouver scar scale; STAI, state-trait anxiety inventory; BSHS-B, burns specific health scale-brief; SB, superficial burn; PTB, partial thickness burn; FTB, full thickness burn; mVSAS, modified Vancouver scar assessment scale; DPTB, deep partial thickness burn; FTSG, full thickness skin graft; SSG, split skin graft.

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## 1. Introduction

Hypertrophic scar development is a common occurrence after a burn with a reported incidence of up to 77% [1,2]. The presence of hypertrophic scarring after a burn has been shown to be associated with further physical and psychological consequences such as scar contracture and limited ROM [3-5], increased pain levels [6,7], pruritus [7-9], elevated anxiety levels [10] and lowered health related quality of life [9-12].

Scar massage is a non-surgical scar management technique that has been reportedly used in an attempt to improve outcomes after hypertrophic scarring resulting from burns [13-18]. A variety of different scar massage techniques have been documented for use with hypertrophic scars (<http://journals.lww.com/burncareresearch/pages/vidoeogallery.aspx?videoId=5&autoplay=true>) [19]. Regardless of the technique used, many surveys reported in the literature have shown the popularity of the use of scar massage after burns [13,17,20,21]. Scar massage has been shown to be routinely used in 81% of burn rehabilitation units surveyed across North America, Australia and New Zealand [17] and in 100% of paediatric burn centers surveyed in the United Kingdom [21].

The reported clinical benefits of scar massage have included increased scar pliability and ROM [22], decreased pain and skin sensitivity [13,14], decreased pruritus [13,14], decreased anxiety [14] and changes to the scar characteristics such as decreased scar thickness [16]. However there has not been an objective review of the current evidence in burn survivors [13,21].

It was therefore the objective of this systematic review to examine the effectiveness of scar massage in improving physical and psychological outcomes for patients with hypertrophic scars after a burn.

## 2. Methodology

A systematic review of the published literature on the effect of massage on hypertrophic burn scarring was conducted

including meta-analyses, cohort studies, systematic reviews, case-control studies, animal research, randomized controlled trials (RCTs) and historical RCTs. The method of analysis used is outlined in Table 1.

### 2.1. Paper identification and selection

Databases (MEDLINE, PUBMED, EMBASE, CINAHL) and the Cochrane Library were searched with language restrictions (English, French and Spanish only) and using the terms *burn* OR *burn injury* OR *thermal injury* AND *scar* OR *hypertrophic scar* AND *massage* OR *manipulation* OR *soft tissue mobilisation* OR *soft tissue manipulation*. Variations of spelling and truncations were included. The database search was supplemented with citation tracking and key author searches. Three reviewers (P.A.A., A.P., and J.D.P.) independently assessed the titles and abstracts of the articles collected through the initial search strategy using the inclusion and exclusion criteria as listed in Table 1.

Full-text versions of the included articles were obtained and independently assessed and rated by the three reviewers using the PEDro scale ([http://www.pedro.fhs.usyd.edu.au/scale\\_item.html](http://www.pedro.fhs.usyd.edu.au/scale_item.html)) [23]. This scale has interobserver reliability [24] and allows evaluations of paper quality based on criteria including specification of eligibility criteria, random allocation; concealed allocation; similarity at baseline; blinding of subjects, operators and assessors; measures of at least one key outcome obtained from at least 85% of subjects initially allocated to groups; intention-to-treat principle; results between-group comparison; and reporting of point measures and measure variability. Variances between assessors regarding scoring of articles were resolved with discussion and consensus. When similarities were noted between article cohorts, the authors of one article were contacted to confirm any correlation between the data sets of two studies. No response was received.

### 2.2. Data extraction and analysis

Data extraction was completed by one reviewer for all included studies.

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