Hong Kong Journal of Occupational Therapy (2016) 27, 7–17

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.hkjot-online.com

Hong Kong Journal of Occupational Therapy (HKJOT)

REVIEW ARTICLE

# Rehabilitation Interventions for Poststroke Hand Oedema: A Systematic Review

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Received 28 January 2016; accepted 14 March 2016
Available online 7 June 2016

**KEYWORDS**
hand oedema;
stroke;
upper extremity;
occupational therapy;
rehabilitation

**Summary** *Objective/Background:* To review the evidence of rehabilitation interventions for the management of poststroke hand oedema.
*Methods:* We conducted a systematic review of research articles in electronic databases published in English between 1999 and 2015. Two investigators working independently retrieved articles from the Cochrane Central Register of Controlled Trials, SCOPUS, Taylor & Francis Online, Wiley Online Library, CINAHL, Springer (MetaPress), ScienceDirect, PubMed, SAGE Journals Online, EBSCO, and Web of Science. Only controlled trials with outcome measures and interventions for poststroke hand oedema were included. Three investigators critically appraised the selected studies using the Physiotherapy Evidence Database Scale.
*Results:* Of the 189 articles identified, nine (5 randomized controlled trials, 3 nonrandomized controlled trials, and 1 crossover controlled trial) were selected. These studies are heterogeneous in terms of design and types of intervention for poststroke hand oedema. The interventions reducing hand oedema are Lycra pressure garments with glove splints, bilateral passive motion upper-limb exercises, laser therapy, and acupressure. However, due to these studies' short intervention periods and the fact that hand oedema is not their primary outcome measure, it is not possible to draw a firm conclusion on their clinical significance for managing poststroke hand oedema.

Funding/support: No funding and financial disclosures were reported by the authors of this paper.
Conflicts of interest: All contributing authors declare that they have no conflicts of interest.
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http://dx.doi.org/10.1016/j.hkjot.2016.03.002

*Conclusion:* Further study needs to focus solely on interventions for poststroke hand oedema and their long-term effects. No conclusion can be made on the most effective management of poststroke hand oedema until much more evidence is available.


## Introduction

Poststroke hand oedema occurs in 37% of individuals who experience a chronic stroke and in up to 18.5% of individuals with acute stroke (Gebruers, Truijen, Engelborghs, & De Deyn, 2011; Leibovitz et al., 2007). Although the exact aetiology of poststroke hand oedema is still inconclusive, a few possible causes have been identified, including sympathetic vasomotor dysfunction and dysregulation of the autonomic nervous system caused by stroke (Artzberger & White, 2011; Hesse, Jahnke, Ehret, & Mauritz, 1995), venous congestion due to immobility, and dependent positioning (Artzberger & White, 2011; Geurts, Visschers, van Limbeek, & Ribbers, 2000). Vascular changes after stroke might also alter the mechanism of filtration and reabsorption of excessive amount of interstitial fluid in the vessels, which may also lead to hand oedema (Wang, Chen, Lan, Wong, & Lai, 2004; Wang, Yang, Liaw, & Wong, 2002). Persistent hand oedema is correlated with pain and fibrosis of the tissue, which have negative effects on hand functions (Boomkamp-Koppen, Visser-Meily, Post, & Prevo, 2005; Geurts et al., 2000). The two most common outcome measures of hand oedema are circumferential measurements and volumetric measurement (Artzberger & White, 2011). The rehabilitation management of poststroke hand oedema includes electrical stimulation (Faghri, 1997; Pandyan, Powell, Futter, Granat, & Stott, 1996), compression therapy (Bell & Muller, 2013; Gustafsson, Walter, Bower, Slaughter, & Hoyle, 2014; Roper, Redford, & Tallis, 1999), orthosis (Bürge et al., 2008; Gracies et al., 2000; Kuppens, Pijlman, Hitters, & van Heugten, 2014), and mobilization (Dirette & Hinojosa, 1994; Giudice, 1990; Kim, Lee, & Sohng, 2014). The effectiveness of contemporary therapies, such as laser therapy and acupressure, for poststroke hand oedema have also been investigated (Kang, Sok, & Kang, 2009; Karabegović, Kapidzić-Duraković, & Ljuca, 2009). However, there is no consensus on the most effective rehabilitation intervention, and very few practical guidelines are available to occupational therapists for managing poststroke hand oedema. This systematic review therefore set out to review the evidence relating to rehabilitation interventions to manage poststroke hand oedema.

## Methods

### Search strategy

This systematic review included articles from 1999 to 2015 found on the following electronic databases/data sources: the Cochrane Central Register of Controlled Trials, OneSearch—a central electronic search engine covering 10 databases including SCOPUS (Elsevier API), Taylor & Francis Online, Wiley Online Library, CINAHL, Springer (MetaPress), ScienceDirect, PubMed, SAGE Journals Online, EBSCO, and Web of Science. The titles and abstracts of the articles among the search results were assessed for relevance by two independent investigators. Additional search methods included using Google Scholar and manually searching the reference lists of full copies of all relevant articles identified. The keywords used were *stroke*, *hand oedema*, and *hand swelling*.

### Selection criteria

Strict inclusion criteria were applied as follows. Only controlled trial studies (i.e., randomized controlled trials [RCTs], non-RCTs, crossover controlled trials) whose full text was available and published in English, and which included outcome measures for poststroke hand oedema and interventions to manage it were included in this review. The study population included adults at all stages of stroke. Studies on the prevalence, aetiology, and assessment of poststroke hand oedema and systematic reviews were excluded.

### Assessment of methodological quality

The selected studies were classified based on the Oxford Centre for Evidence-Based Medicine level of evidence (Oxford Centre for Evidence-Based Medicine, 2009). The methodological quality of studies was further appraised by three investigators using the Physiotherapy Evidence Database (PEDro) scale (Maher, Sherrington, Herbert, Moseley, & Elkins, 2003). Studies with scores of 6 and above were classified as *high quality*, whereas scores of 4 and 5 were classified as *fair quality*, and scores below 3 were considered *poor quality* (McGill, 2015).

## Results

### Study selection

The initial search strategy identified 189 articles on the Cochrane Central Register of Controlled Trials ($n = 21$), OneSearch ($n = 166$), Google Scholar ($n = 1$), and by manual search ($n = 1$). Two independent researchers reviewed the titles and abstracts of these articles and excluded 180. The main reasons for exclusion were that the studies focused on the prevalence, aetiology, and assessment of poststroke hand oedema; were duplicates; or were not relevant to the management of poststroke hand oedema. Both reviewers agreed that nine of the articles satisfied the criteria and were suitable for full review. A Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram showing details of the search process can be found in Figure 1.