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The Effectiveness of Desensitization Therapy for Individuals with Complex Regional Pain Syndrome: A Systematic Review

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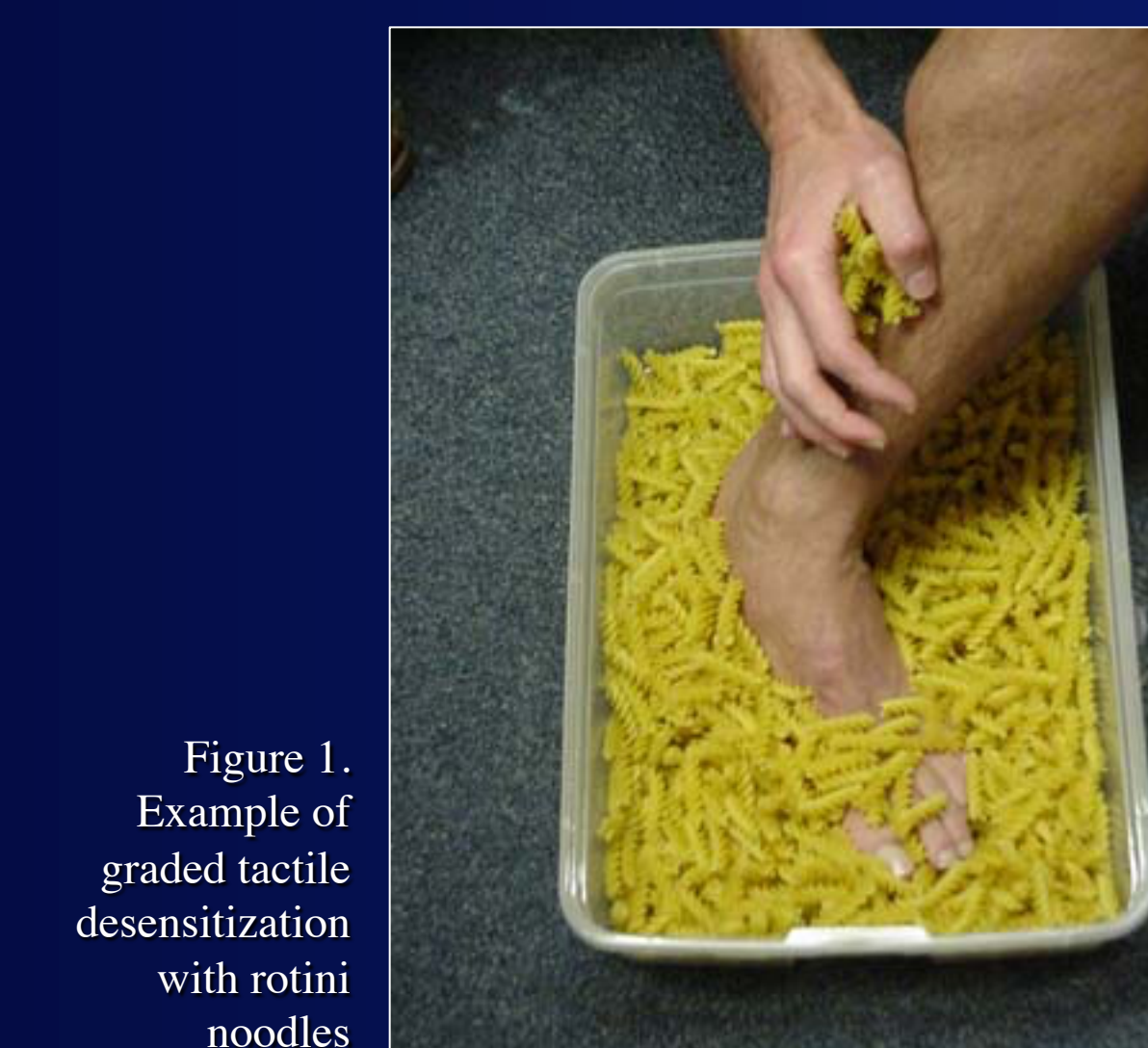
INTRODUCTION

Complex Regional Pain Syndrome (CRPS) is a severe chronic pain disorder that can develop spontaneously after injury or surgery. Patients with CRPS display a heightened nervous system response to injury, usually to a limb, resulting in pain and an autonomic nervous system response that is disproportionate in degree to the inciting trauma. Hallmarks of CRPS are hypersensitivity to pain, a prolonged and exaggerated pain response, and allodynia (a painful response to non-noxious stimuli).¹ A diagnosis of CRPS is usually accompanied by severe functional and psychological deficits, including an aversion or hatred toward the affected limb,² fear of movement, diminished quality of life, profound disability, and an increased risk of depression and suicide.³

Though there is no cure for CRPS, current best practice guidelines recommend the early utilization of desensitization therapy, a treatment that emphasizes the graded introduction of noxious stimulus as a means of decreasing allodynia.^{4,5,6,7} Despite the prevalence of desensitization as first-line clinical treatment for pain and allodynia associated with CRPS, its effectiveness has not been verified in the literature.

PURPOSE

The purpose of this study is to systematically review the current literature supporting the use of desensitization therapy to treat complex regional pain syndrome.



Research Article	Desensitization Treatments	Isolated Treatment?	Outcome Measure Focus	Results
TACTILE				
Allen & Hulten, 2001	Graded tactile desensitization: 2x/day for 10 weeks Progressed to coarser material each week Materials: cotton ball → raw rotini noodles	YES	Pain & Allodynia	Improved self-reported pain & reduction of allodynia Normal somatosensation level Improved grip/pinch strength and WB tolerance
Cleland & McRae, 2002	Self-administered graded tactile desensitization 10 sessions over 3 months; Materials: cotton ball → towel Desensitization used in first 3 appointments	NO	Pain & Function	No objective improvements post desensitization treatment At 3-months and 1 year follow-up: Improved ROM, SF-35, MPQ, and NPRS
Cucchiari et al, 2013	Writing desensitization using massage & hydrotherapy	NO	Function	WeeFIM score improvement (11→45) Functional gains and decreased use of medications
Lewis et al, 2011	Self-administered tactile desensitization program 1-5 minutes up to 6-8 times a day for 6 weeks 5 different textures per subject progression	YES	Pain, Function, & Allodynia	Improved tactile tolerance and reduced allodynia Decreased pain Minimal decrease of Body Perception Scale
Logan et al, 2012	Progressive individualized tactile desensitization and sensory discrimination	NO	Pain & Function,	Improvement of LEFS, FDI, and BOT-2 98-100% had improvement on COPM
Menck et al, 2000	Self-administered tactile desensitization: Towel rub 5x/day and light massage 5x/day Thermal Therapy: warm/cold contrast baths 3x/day	NO	Pain, Function, Edema	Improved ROM and NRPS Normalization of autonomic activity Functional gains
Pandita & Arfath, 2013	Graded tactile desensitization: Progressed coarseness of textures and proximity to affected area; 20 minutes Home exercise program: 3x per day for 15 minutes	NO	Function & Allodynia	Improved tolerance of sensory stimulation and function Increased ROM and pain response threshold Decreased hypersensitivity
THERMAL				
Allen et al, 2001	Started at 96°F, decreased by 2°F each session 12 sessions total in a 4 week span; 2 minute immersion followed by 5 minute rest x 3 times each session	YES	Function, Allodynia, Thermal	Temperature tolerance improved (96°F→ 76°F) Improvement of vasomotor recovery Functional Gains
PRESSURE				
Allen et al, 2004	Graded pressure desensitization; rolling progressively firmer balls on the affected skin area; 1x/day with 3 min. exposure → 2 min. rest → 3 min. exposure	YES	Function & Allodynia	Increase pressure tolerance (31% and 92% increase) Functional gains Decreased and abolished medication use
CHEMICAL				
Ribbers et al, 2001	Topical Capsaicin: .075% strength applied 2x/day to the affected area	NO	Pain	Decreased pain (VAS Score 8→2) Resolved spontaneous pain, edema, and sudomotor disturbance

Table 1. Breakdown of each article's desensitization protocol and results

METHODS

PEDro, PubMed, CINHALL and MEDLINE were searched between Mar and Aug of 2014 with the following search terms: complex regional pain syndrome, CRPS, allodynia, desensitization, neuropathic pain, physical therapy, tactile desensitization, pressure desensitization, hydrotherapy, physiotherapy, capsaicin and somatosensory. Articles were excluded if the mode of desensitization was not identified.

RESULTS

Initial search yielded 42 articles with 10 published between 2001 and 2013 fitting the inclusion/exclusion criteria. After evaluating the articles with the STROBE scale, they were organized by desensitization type. Varieties included: chemical, tactile, thermal and pressure desensitization. Studies combined represented 68 patients total, ranging in age from 8-57 years.

Thermal, pressure, and chemical desensitization were each represented by one article. The studies conducting thermal and pressure desensitization by Allen et al in 2001 and 2004 respectively, were isolated interventions while the chemical desensitization study by Ribbers et al, 2001 had an added component of stress loading mobilization. All 3 studies demonstrated effectiveness of the specific somatosensory modality utilized for desensitization treatment.

CONCLUSIONS

Overall, studies lacked a standard desensitization protocol. However, common themes for the implementation of desensitization therapy included the importance of selecting the proper somatosensory modality and using a graded desensitization protocol in order to reduce allodynia. Although the research available is limited, the consistency of positive results supports the utilization of desensitization in the treatment of people with CRPS.

RELEVANCE

The prevalence of desensitization as a common element of CRPS treatment supports its relevance as a significant treatment option. Desensitization is often a component of a multifaceted treatment approach for patients with CRPS, which is an endemic problem for physical therapists (PT) research because PTs rarely treat patients unidimensionally. As a result, it is rarely isolated for controlled study. To make solid conclusions about desensitization efficacy, studies need to isolate desensitization as a treatment using larger numbers of subjects with CRPS with clear, controlled and replicable protocols. Given current research limitations, existing evidence is promising for continued utilization of graded desensitization therapy for individuals with CRPS.

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