2016

Effects of Desensitization on Pain Distribution and Normalization of Somatosensation in a Patient with Quadrilateral Complex Regional Pain Syndrome

Lisa Cook  
*University of Puget Sound*

Kristen Dullen  
*University of Puget Sound*

Jacob Hoffman  
*University of Puget Sound*

Megan Vento  
*University of Puget Sound*

Roger Allen  
*University of Puget Sound*

Follow this and additional works at: [http://soundideas.pugetsound.edu/ptsymposium](http://soundideas.pugetsound.edu/ptsymposium)

Part of the [Physical Therapy Commons](http://soundideas.pugetsound.edu/ptsymposium)

Recommended Citation  
Cook, Lisa; Dullen, Kristen; Hoffman, Jacob; Vento, Megan; and Allen, Roger, "Effects of Desensitization on Pain Distribution and Normalization of Somatosensation in a Patient with Quadrilateral Complex Regional Pain Syndrome" (2016). *Physical Therapy Research Symposium*. 21.  
[http://soundideas.pugetsound.edu/ptsymposium/21](http://soundideas.pugetsound.edu/ptsymposium/21)

This Poster is brought to you for free and open access by the Physical Therapy, School of at Sound Ideas. It has been accepted for inclusion in Physical Therapy Research Symposium by an authorized administrator of Sound Ideas. For more information, please contact soundideas@pugetsound.edu.
Effects of Desensitization on Pain Distribution and Normalization of Somatosensation in a Patient with Quadrilateral Complex Regional Pain Syndrome

Lisa Cook, SPT; Kristen Dullen, SPT; Jacob Hoffman, SPT; Megan Vento, SPT; Roger J. Allen, PhD, PT

1. School of Physical Therapy
University of Puget Sound - Tacoma, WA, United States of America

INTRODUCTION

Complex regional pain syndrome (CRPS) is a chronic condition involving allodynia, constant limb pain, and hyperesthesia, autonomic, and somatic symptoms, which affects at least one extremity and can develop after injury.1 The five types of allodynia are tactile, pressure, thermal, vibration, and chemical, with tactile being the most associated with CRPS. The kinesiophobia that results from allodynia may cause decreased movement and excessive guarding from even the most delicate contact, leading to wearing clothing over the affected region.2,3 Learned non-use may then lead to a multitude of sequelae, including central sensitization and plastic remodeling of the neuromatrix of pain, which can further exacerbate conditions.

Conventional therapy for CRPS varies greatly, however, only some forms of treatment are supported by evidence.3 Within the last decade, somatosensory desensitization (SD) has been shown to be effective in the treatment of CRPS and is considered to be an essential component in restoring function.2,4 SD is a functional form of physical therapy involving the management of pain avoidance behavior by repeated exposure to increasingly coarser and irritating materials to the affected regions. This treatment typically involves a 10 to 15 week protocol, much of which is self-management that can be done at home.5

The mechanism of SD is still unclear, but the goal is to decrease pain, allodynia, and kinesiophobia so that the patient will increase self-confidence and contact with the external environment in order to improve functional use of the affected limb.2,3 While desensitization is considered standard care for CRPS and there is evidence of decreased pain and allodynia in the affected limb, research is still limited.2,3

METHODS

Following three weekly baseline assessment sessions, the patient participated in a ten-week treatment program of progressive tactile desensitization, applied to the distal right upper and left lower limb via self-massage two times per day. The patient completed pain body diagrams (PBD), from which pain intensity and distribution decreased, there was also a corresponding improvement in

RESULTS

PAIN DISTRIBUTION

<table>
<thead>
<tr>
<th>Pain Distribution</th>
<th>Whole body</th>
<th>Treated limbs</th>
<th>Untreated limbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole body</td>
<td>Number of PPD</td>
<td>1.5%</td>
<td>Parasthesias</td>
</tr>
<tr>
<td>Treated limbs</td>
<td>Pain</td>
<td>9.5%</td>
<td>Number of PPD</td>
</tr>
<tr>
<td>Untreated limbs</td>
<td>Pain</td>
<td>14.0%</td>
<td>Number of PPD</td>
</tr>
</tbody>
</table>

TABLE ANALOG PAIN SCALE

<table>
<thead>
<tr>
<th>TABLE ANALOG PAIN SCALE</th>
<th>Treated Limbs</th>
<th>Untreated Limbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated limbs</td>
<td>3.95 cm</td>
<td>0.45 cm</td>
</tr>
<tr>
<td>Untreated limbs</td>
<td>0.5 cm</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

Throughout the somatosensory desensitization (SD) protocol and seven months following the treatment, the participant experienced a general trend of greater improvements in treated versus untreated limbs of all studied outcomes. Changes observed in pain body diagrams revealed that as pain decreased, parasthesia and numbness increased, indicating a transformation towards normal somatosensation. As pain intensity and distribution decreased, there was also a corresponding improvement in somatosensory re-organization of painful areas, even though those areas were not directly treated. Prior to the SD, the participant’s neuromatrix may have been reorganized in a way such that more of his somatosensory homunculus was devoted to painful distal areas, effectively crowding out the representation of non-painful proximal areas. Secondary to the treatment, the participant may have undergone a process of central reorganization, such that those under-represented areas were gradually normalized. Improvements were also noted in untreated limbs, most notably with Semmes-Weinstein monofilament testing, two-point discrimination, and allodynia. This suggests that an overall central desensitization may occur in response to SD regardless of where exactly the treatment is applied.

The participant also improved with more functional measures, which suggests not only a decrease in pain, but also a reduction in fear of symptom provocation. CRPS is often exacerbated by fear-avoidance behavior, so the ability to weight bear more heavily through limb with the knowledge that it is painful to touch towards a return towards an improved level of function. Improvements in pain and grip strength were likely due to a decrease in allodynia, though muscular atrophy due to non-use may have been a factor, as well. The changes observed in these two outcome measures have obvious functional implications, and are representative of the gains that the participant made as a whole.

While the data suggests a consistent trend improvement across all outcome measures, the participant did experience a notable spike in symptoms that occurred during his fifth visit. This may have been due to a pacing issue, in which he likely overexerted himself the day before the visit due to improving so rapidly following five years of constant pain. Despite this setback, the patient again responded well to treatment and continued on the path towards his previous level of function.