The Effect of Cryotherapy on Pain Modulation
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PURPOSE
Does the literature support the use of cryotherapy for modulating pain?

WHAT IS CRYOTHERAPY?
Cryotherapy is the general use of cold temperatures that has a numbing effect, with a goal to control inflammation, control pain, control edema, and facilitate movement1,2,3. The numbness allows for decreased nerve conduction velocity4 by inhibiting sensory nerve fibers, which ultimately decreases pain associated with injury. Additionally, cryotherapy reduces secondary injury caused by inflammation by decreasing the metabolic rate involved in the inflammatory process. Cryotherapy is indicated for immediate care of musculoskeletal injury5, pain control5,6, modification of muscular spasticity, and limitations in range of motion, secondary to arthritis.

LITERATURE REVIEW

32 subjects

Subjects divided into 2 groups

Table 1: Changes in VAS scores on the VAS and KESD for each group, differences within groups, and differences between groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>VAS Score</th>
<th>Between Treatment</th>
<th>Range</th>
<th>Discharge</th>
<th>Range</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP</td>
<td>6.3±2.7</td>
<td>-0.7±2.0</td>
<td>5.6</td>
<td>4.2±2.6</td>
<td>-2.3</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Control</td>
<td>6.4±2.5</td>
<td>-0.3±2.8</td>
<td>5.1</td>
<td>4.2±2.6</td>
<td>-2.3</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>EXP vs. Control</td>
<td></td>
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</table>

To examine the effects of cold versus cold compression after shoulder arthroscopy.

Methods

Group 1 (Control): No treatment group

Group 2 (Experimental): Whole-body cryotherapy in conjunction with modalities group

Subjective outcomes measured: Pain, swelling, and skin surface temperature measured 2, 8, and 24 hours

Significant reduction in circumference of arm 24 hr after surgery

Resting pain significantly decreased with cold compression bandage compared to a cold pack

Pain during activity decreased significantly after 24 hours with cold compression bandage (Figure 6)

Conclusion: No recommendations can be made based on results as to whether cold or cold compression bandage should be preferred.

Changes in VAS scores prior to the use of cryotherapy and when being discharged:

Figure 1: Changes in VAS Scale

Figure 2: Nerve Conduction Velocity

Inclusion criteria:

- At least 18 years of age or older
- No history of central or peripheral nervous system disorders
- No history of acute or chronic diagnosis
- Shoulder history of pain and stiffness of the shoulder
- Showed to have global restriction of adhesive capsulitis of the shoulder

Methods

Group 1 (Control): Whole-body cryotherapy (15min), ultrasound (5 min, 25mA), WBC

Group 2 (Experimental): Whole-body cryotherapy (15min), ultrasound (5 min, 25mA), WBC

Primary outcome measure consisted of nerve conduction velocity on the tibial nerve, which is relatively superficial

Results

Significant decrease in pain based on the VAS scale for each group

Significant decrease in pain for the experimental group

Significant improvement in active range of motion observed within the WBC group

Larger increase in active range of motion in experimental group (p<0.01)

Conclusion: Range of motion increased for both groups but a greater change was observed with the WBC group. WBC is shown to improve function and provide more efficacious reasoning for treating adhesive capsulitis than solely using modalities.

Figure 3: Pain Threshold after Cryotherapy

CONCLUSION

The literature reviewed confirmed that the use of cryotherapy is efficacious in modulating pain after shoulder arthroscopy, adhesive capsulitis of the shoulder, and ankle sprain1,2,3,4. Based on previous research the effect of cryotherapy is limited to the superficial 5mm of the tissue. Future research involving cryotherapy and the effect on pain modulation should involve nerves that course deeper than the tibial nerve. Future research involving cryotherapy and the effect on pain modulation should involve elevation of the injury due to pain being a secondary effect to swelling. Additionally, future research should limit variables throughout the study. Seen in the study completed but Ma et al, several variables were used making it difficult to distinguish results solely from cryotherapy.

Figure 4: VAS 2, 8, 24 hours post-operation.

The cryotherapy modalties of cold compression bandage, whole body cryotherapy, plastic ice pack, and nerve conduction velocity exhibited a significant decrease in pain based on the VAS scale (Figure 1 and Figure 3). Research that was analyzed only examined the effects of nerve conduction velocity on the tibial nerve, which is relatively superficial1. Additionally, previous research has also demonstrated significant ankle pain reduction during activity after intermittent cryotherapy treatment when applying ice for 10 minutes and resting the acute ankle sprain for 10 minutes after removal of a plastic ice pack. However, there was no significant reduction in patient ankle pain after performance of activity with pain cryotherapy treatment4. Research demonstrated resting pain significantly decreased with cold compression bandage and pain during activity decreased significantly after 24 hours with cold compression bandage1. Finally, a significant decrease in pain was demonstrated in the experimental group (p<0.01) whole-body cryotherapy4.

Figure 5: BIBLIOGRAPHY

1. Alfuth M, Str柬埔寨 M, Volge T, Rosenthal D, Liem D. Does the literature support the use of cryotherapy for modulating pain?