

Algaflly AA, George KP. The Effect of Cryotherapy on Nerve Conduction Velocity, Pain Threshold and Pain Tolerance. *Br J Sports Med.* 2007;41:365-369.

Cryotherapy is a common modality applied to injuries in an attempt to reduce, among other inflammatory responses, pain. However, the physiological effectiveness of this intervention is still in question. The purpose of this study was to observe changes in nerve conduction velocity (NCV), pain threshold (PTH) and pain tolerance (PTO) after an application of cryotherapy.

Investigators recruited 23 active men in their 20s to participate in this study. Each subject had one ankle in the experimental (EXP) group and one in the control group, the ankles were randomly assigned. Skin temperature measurements were taken on the EXP ankles at baseline, 15°C, 10°C and again at 15°C when the ankles were re-warmed. Crushed ice packs were used to reduce temperature of EXP ankles. NVC was measured with an EMG system; electrodes were placed to the fifth toe and over the tibial nerve. PTH and PTO were measured at two points along the tibial nerve with a pressure algometer. The first site was posterior to the lateral malleolus, the second was lateral to the shaft of the fourth metatarsal. Pressure was applied to the sites of assessment until discomfort was reported by the participant.

The study found significant differences between the EXP and CON groups at 15°C, 10°C and the second 15°C for NCV. An average reduction of 33% was found in NCV from baseline measurements to 10°C. PTH and PTO were reported to increase at both sites of measurement after ice was applied. At the first site of assessment PTH increased by 89% from baseline to 10°C and PTO increased by 76% from baseline to 10°C. The second assessment site showed PTH increases of 71% and PTO of 56% from baseline to 10°C.

This was a prospective, cohort, therapeutic study. According to the AAOS level of evidence scale this article reported a level II study due to insignificant blinding. Strength of recommendation according to the SORT scale is a grade B due to limited patient orientated measures. While pain was the main outcome of this study, it was measured with PTH and PTO using an algometer and discomfort, not any type of pain scale. The study also focused more on the clinician based measures of decreased NCV than patient reported outcomes. Critical appraisal checklist score for this study was 37/48.

This study supports that ice is a valid modality for treating pain, and thus muscle spasm as well. The study used crushed ice, and the authors noted that the average time to cool the EXP ankles to 10°C was 26 minutes. This gives the clinician relevant information that can be easily applied to practice settings. The specific type of ice and time required for sufficient cooling is also beneficial for patient education. Many patients do not ice for long enough or use a type of cryotherapy that does not cool the injured tissues enough to achieve much, if any, real benefit. Using this study, the clinician can educate his/her patients about how cryotherapy reduces pain, by increasing pain threshold and tolerance, and also that crushed ice for between 25 to 30 minutes seems to be an efficient method for achieving these benefits.

## **Critical Appraisal Checklist**

### ***Evaluation Criteria:***

*(Score from 0 -2 on all questions using guidelines on pages 2-9)*

#### **Study Question**

1. Was the relevant background work cited to establish a foundation for the research question? 1

#### **Study Design**

2. Was a comparison group used? 1
3. Was patient status at more than one time point considered? 2
4. Was data collection performed prospectively? 2
5. Were patients randomized to groups? 2
6. Were patients blinded to extent possible? 1
7. Were treatment providers blinded to the extent possible? 1
8. Was an independent evaluator used to administer outcome measures? 1

#### **Subjects**

9. Did sampling procedures minimize sample / selection biases? 1
10. Were inclusion / exclusion criteria defined? 2
11. Was an appropriate enrollment obtained? 2
12. Was appropriate retention / follow up obtained? 2

#### **Intervention**

13. Was the intervention applied according to established principles? 2
14. Were biases due to treatment provider minimized (i.e., attention, training)? 1
15. Was the intervention compared with the appropriate comparator? 2

#### **Outcomes**

16. Was an appropriate primary outcome defined? 2
17. Were appropriate secondary outcomes considered? 2
18. Was an appropriate follow-up period incorporated? 2

#### **Analysis**

19. Was an appropriate statistical test(s) performed to indicate differences related to the intervention? 2
20. Was it established that the study had significant power to identify treatment effects? 1
21. Was the size and significance of the effects reported? 2
22. Were missing data accounted for and considered in analyses? 2
23. Were clinical and practical significance considered in interpreting results? 1

#### **Recommendations**

24. Were the conclusions/clinical recommendations supported by the study objectives, analysis, and results? 1

**Total Quality Score (Sum of above / 48) = 37/48 = 77%**