AN INVESTIGATION MAPPING CRYOTHERAPY INDUCED ANALGESIA

Bethany Toft MCSP HCPC, Simon Barry PhD, MCSP, HCPC
Faculty of Health and Life Sciences, Coventry University, Coventry ,UK ,CV1 5FB
Department of Medical Education, University of Leicester, Leicester ,UK, LE1 9HN

Introduction:
Cryotherapy is widely recognised as a simple and effective intervention for pain management after acute musculoskeletal injuries. It remains an essential adjunct to physiotherapy practice. However it has been suggested that to optimise the clinical effectiveness of cryotherapy induced analgesia, a critical level of tissue cooling must be achieved (Algarfly and George 2007). Previous research has indicated that a skin surface temperature of 13.6 °C is required to induce local analgesia. However there is some debate in the current research regarding the optimum temperature for inducing local analgesia and the longevity of the analgesic effect (Bleakley and Hopkins 2010, Zemke et al 1998).

Purpose:
This study aimed to establish the optimum point in the cooling profile for cryotherapy induced analgesia using a crushed ice pack and also to map the duration of the analgesic affect as tissues re-warm. This information could then be used to inform clinical practice and to enhance soft tissue rehabilitation following the application of cryotherapy.

Participants:
Using convenience sampling 16 healthy volunteers (11 females, 5 males) were recruited subject to inclusion and exclusion criteria.

Methods:
An experimental design was used to quantify and record superficial skin temperature and pain pressure threshold following a routine cryotherapy treatment. Baseline measurements of skin temperature and pain pressure thresholds were taken from 15 healthy volunteers who had consented to be participants. Each participant underwent a twenty minute treatment with a standardised ice pack made from crushed ice contained within a wet towel and applied to the anterior thigh. Using a standardised approach, skin surface temperature was recorded using a digital thermometer and pain pressure threshold readings were taken with a pressure algometer at baseline, immediately upon removal of the ice pack and every 5 minutes thereafter until surface skin temperature had returned to baseline values.

Results:
The results indicated that following the crushed ice pack treatment, 13 out of 15 participants achieved a reduction in skin surface temperature sufficient to achieve local analgesia (13.6°C). However this state persisted for less than 5 minutes before tissues began to re-warm consequently diminishing the cryotherapy induced effect as skin surface temperature raised to above the recognised minimum skin surface temperature required for analgesia.

Discussion and Conclusion:
For the majority of participants a crushed ice pack applied to the anterior thigh for 20 minutes induced local analgesia. However, the duration of the analgesic effect was relatively short lived with no indication of a period of prolonged analgesia despite skin temperature taking an average of 40 mins to return to baseline levels. It is clear from this research that there is no guarantee that a crushed ice pack will induce local analgesia in all recipients and of those who achieve local analgesia the effect is relatively short lived. Further research is required to test the cooling profiles of other cryotherapy modalities to determine if any produce a longer duration of analgesia which would be clinically beneficial to patients.

Keywords: Cryotherapy, analgesia, pain perception

References:

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Contact details: Dr Simon Barry email s.barry@coventry.ac.uk