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Detection of heat and cold pain thresholds: an intra and inter rater reliability study

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Purpose: It is estimated that 28 million people experience long term pain in the UK, with this number predicted to increase. A mechanistic approach to assessing both acute and long-term pain may optimise outcomes through enabling personalised management. Quantitative sensory testing (QST) through a range of modalities (pressure, thermal, vibration, and temporal summation) has been used to characterise patient populations (e.g. whiplash and osteoarthritis) and predict outcomes. Whilst reliability studies have shown adequate to good reliability (intra and inter rater) of QST measures, few have evaluated both intra and inter-rater reliability and many are of poor methodological quality. The objective of this study was to establish intra (between day) and inter (within day) rater reliability of heat and cold pain thresholds. **Methods:** A test-re-test study design of within day (interrater) and between day (intra-rater) reliability with two raters e28 Oral Presentation Abstracts / Physiotherapy 105 (2019) e1–e53 was conducted in a University setting, with a convenience sample of healthy participants. Four measurements were taken over two days, at least 48 hours apart, using a TSAII NeuroSensory Analyzer thermal stimulator (Medoc Ltd). A minimum two-hour interval between testing sessions on the same day was observed to allow for washout and to minimise learning effects. Raters, modality, site and laterality were randomised. Upper limb (extensor carpi radialis), lower limb (tibialis anterior) and spinal (lumbar erector spinae) sites were assessed. Intra-class correlation coefficient estimates (ICC 3,2), 95% confidence intervals and Bland Altman plots for limits of agreement for between and within day results were calculated. Ethical approval was obtained from the University of Birmingham Ethics Committee (ERN 17-0893). **Results:** 17 participants were recruited (53% women, mean age (SD) 28.2 years (8.5)). Heat pain thresholds: Intra-rater reliability for both raters was good to excellent for all sites (ICC range = 0.77–0.97). Inter-rater reliability was excellent for all sites (ICC range = 0.83–0.95). Cold pain thresholds: Both intra-rater reliability (ICC range = 0.85–0.97) and inter-rater reliability (ICC range = 0.83–0.98) was excellent for all sites. Some participants reached the equipment safety limit of 00. When data of 00 were excluded, the inter-rater reliability was good to excellent (ICC range = 0.79–0.97), but intra-rater reliability varied from adequate to excellent (ICC range = 0.55–0.93). **Conclusion(s):** Both heat and cold pain thresholds were reliable measures for within and between day testing in an asymptomatic population. Inadequate statistical power could explain the reduced intra rater reliability when excluding safety limit data. Establishing intra and inter-rater reliability in symptomatic populations is now warranted. **Implications:** Heat and cold pain thresholds are useful assessment tools in both research and clinical practice moving towards a more mechanistic approach for assessing pain, but reliability needs to be assessed across symptomatic populations in rigorous studies. The potential limitation of the thermal analyser safety limit of 00 requires evaluation for symptomatic participants.