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TITLE: Intra and inter rater reliability of temporal summation, thermal and pressure pain thresholds in the asymptomatic population

ABSTRACT:

TITLE: Intra and inter-rater reliability of temporal summation, thermal and pressure pain thresholds in the asymptomatic population

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BACKGROUND: It is estimated that 28 million people experience long term pain in the UK, with this number predicted to increase. Quantitative sensory testing (QST), a psychophysical method, allows for quantification of pain and can help predict prognosis in populations including whiplash and osteoarthritis. QST modalities include: pressure and thermal pain thresholds, vibration detection and thresholds, and temporal summation. Current evidence supports use of individual QST components in isolation or in specific populations, but the use of multiple combined modalities is indicated. However, reliability of combined modalities is unknown.

PURPOSE: To investigate intra and inter-rater reliability of the combined modalities of temporal summation (TS), thermal pain thresholds (TPT) and pressure pain thresholds (PPT).

METHODS: A test-re-test study design of within (inter-rater) and between day (intra-rater) was conducted in a University setting with 2 raters and a convenience sample of healthy participants. Four measurements over 2 days, 48 hours apart were completed for each participant. Measurements were taken in the upper limb, lower limb and lumbar spine. Raters, modality, site and laterality were randomised, with temporal summation performed last due to the requirement of PPT scores. Intra-class correlation coefficient (ICC 3,2), 95% confidence intervals (CI), standard error of measurement (SEM) and Bland Altman plots for limits of agreement for between and within day results were calculated. Both raters received training in QST prior to data collection.

RESULTS: 20 participants were recruited (54.4% male, mean (SD) age 27.62 (7.86) years).

TPT: For all sites intra-rater reliability was moderate to excellent (heat ICC range 0.76-0.94, cold ICC range 0.71-0.99) and inter-rater reliability good to excellent (heat ICC range 0.83-0.95, cold ICC range 0.78-0.99). SEM for both raters was $<1^{\circ}$ for heat and 2° for cold.

PPT: For intra-rater reliability, one lower limb site was rated as poor (ICC 0.41), with the remaining sites ranging from moderate to good (ICC range 0.52-0.88). Inter-rater reliability ranged from moderate to excellent (ICC range 0.66-0.93). SEM varied considerably from 5-9N on day 1, to 3-9N on day 2.

TS: Reliability ranged from poor to excellent for intra rater reliability (ICC range 0.34-0.90) and inter rater reliability (ICC range 0.30-0.92).

CONCLUSIONS: Results show moderate to excellent reliability for TPT and PPT, however SEM illustrated considerable variability for PPT. The reliability of TS was variable and inconsistent, indicating that participants' pain ratings were changeable within and between sessions. A learning effect of raters and participants, and the possible effect of sensitisation due to number of sites tested could explain the variability in scores and needs to be investigated further.

IMPLICATIONS: QST is a useful tool in research and clinical practice. However, further research and consideration of number of sites tested in a session as well as possible learning effects is warranted. Investigation of the reliability of multiple modalities of QST is now required in symptomatic populations.

KEYWORDS: Quantitative Sensory Testing, Reliability, Pain Mechanisms

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ETHICS: Ethics was sought and approval gained from the University of Birmingham Ethics Committee (ERN_17-0893).

BIOGRAPHY: Nicola Middlebrook is an experienced musculoskeletal physiotherapist and currently a PhD candidate investigating enhanced management of acute post traumatic pain for the prevention of chronic pain and disability. She qualified as a physiotherapist from the MSc Physiotherapy (Pre-Registration) in 2009 from the University of Birmingham and focused her clinical time to musculoskeletal physiotherapy both within the NHS and privately. Nicola also has a BSc in Sport and Exercise Science.

The dataset in its entirety has not been presented previously but a subset of the data will be presented as a rapid 5 presentation at Physio UK 2018 on the 20th October 2018.