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## **Lack of exercise induced hypoalgesia in response to repeated lifting in individuals with low back pain**

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**Purpose:** Central and peripheral sensitisation is a major contributor to ongoing disability in chronic low back pain (LBP). Exercise as a management option is recommended in all clinical guidelines. In addition to its general effects, exercise induced hypoalgesia (EIH), referring to a temporary change in pain sensitivity, is a documented effect. Few studies to date have investigated EIH in patients with LBP, with some evidence for impaired EIH potentially driven by peripheral and central sensitisation. The aim of the study was to investigate if pressure pain thresholds (PPT), as a measure of EIH, are decreased in patients with LBP compared to healthy controls over the lumbar erector spinae and at a remote area after a prolonged lifting task.

**Methods:** An observational, case control study recruited participants with chronic LBP (>3 months) and healthy controls with ethical approval from the University of Birmingham. Psychometric data and the Oswestry disability index (ODI) characterised the participants. PPT measurements were taken over 8 sites at each side of the lower back and a remote site before and after the lifting task. To mimic an occupational task, participants were asked to lift a 5-kg box in a rotational pattern onto different shelves for ~7 minutes. Pain (NRS 0-10) and perceived exertion (Borg Scale (BS)) were recorded. Data were analysed using a three-way analysis of variance (ANOVA) with time, location and group as factors. ANOVA was followed by Student Newman Keuls (SNK) post hoc analysis.

**Results:** The sample comprised participants with chronic but relatively mild LBP (ODI =  $16.0 \pm 7.0$ ) ( $n = 20$ ) (9 women, age  $30.1 \pm 11.5$ ) and healthy controls ( $n = 18$ ) (11 women, age  $28.2 \pm 12.5$ ). The LBP group perceived the task as significantly more fatiguing (BS =  $13.1 \pm 1.7$ ) and reported higher pain ( $4.7/10 \pm 2.2$ ) during lifting. PPT was dependent on group ( $F = 35.1$ ,  $p < 0.00001$ ), test location ( $F = 2.9$ ,  $p < 0.001$ ), and the interaction between group and time ( $F = 9.2$ ,  $p < 0.01$ ). Post hoc analysis revealed that the control subjects displayed higher PPTs across all locations both pre- and post- the repeated lifting task. However, unlike the control subjects which showed a significant increase in the PPT across all locations after the lifting task (SNK:  $p < 0.01$ ; pre:  $341.4 \pm 116.9$  kPa, post:  $371.2 \pm 130.4$  kPa), the participants with LBP did not display a significant change in the PPT pre- to post-testing (SNK:  $p = 0.15$ ; pre:  $320.1 \pm 113.7$  kPa, post:  $305.2 \pm 101.0$  kPa). No changes at remote sites could be detected.

**Conclusion(s):** Asymptomatic people responded favourably to a repeated lifting task displaying evidence of EIH as revealed by a significant reduction in pressure pain sensitivity across the lumbar region. In contrast, this phenomenon was absent in participants with LBP. These findings have important implications for exercise prescription.

**Implications:** EIH was absent in individuals with relatively mild chronic LBP. Additional research is required to further elucidate the mechanisms and evaluate the effect of difference exercise interventions.

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