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Title

Tactile acuity, laterality discrimination and motor control impairment in adults with chronic low back pain - A review

Background

As well as pain, non-specific chronic low back pain (CLBP) is a long-term condition contributing to morbidity and low quality-of-life. Treatments often focus on pain medication and motor function but improvements are moderate at best and many sufferers stop seeking help, despite on-going pain. Absence of local tissue damage or other clinical features means aetiology often remains unknown and thus treatment is difficult. Other chronic pain conditions may provide a new approach to the problem. In both Complex Regional Pain Syndrome (CRPS) and Phantom Limb Pain (PLP), the cortical neurophysiology and corresponding efferent outputs to specific sensory functions (such as discriminatory touch, self-perception and body schema) appear to be altered. Interventions to reverse these impairments also coincide with a reduction in pain intensity.

Before exploring whether similar approaches are appropriate for improving pain outcomes in adult CLBP sufferers; understanding whether similar characteristics occur in adults with CLBP remains a priority.

Aims

Through systematically synthesising the empirical evidence relating to specific functions in adults with CLBP this review aimed to answer the question: '*Are two-point discrimination threshold (TPDT) and body schema (BS) altered in adults with CLBP and do they relate to impaired voluntary lumbopelvic motor control (LMC)?*'

Methods

A systematic search for mixed-methods and quantitative approaches such as randomised controlled trials, cohort and cross-sectional studies was conducted using MeSH terms and PICO tools between February and June 2015. The strategy incorporated 12 bibliographic databases, Google Scholar and grey literature databases. Reference lists of included articles were hand searched for further relevant articles. Studies involving adults aged 18 or older with CLBP lasting longer than 3 months duration were included. Pregnancy, 6 months post-partum, central neurological conditions and nerve root pathologies were exclusion criteria. Internal validity was assessed by two independent reviewers using an adapted Downs and Black Quality Index Score. Following testing, reporting quality, external validity, internal validity (bias), internal validity (confounding or selection bias) and power

were assessed. Studies considered high ($\geq 70\%$) or medium (60-69%) quality were included in the review. The included studies reported varied designs and techniques therefore, a narrative data synthesis was considered appropriate.

Results

A total of 334 studies were identified. Titles and abstracts were screened against inclusion and exclusion criteria. Subsequently 14 publications were included in the full review process, 13 were quantitative and one mixed-methods design. Of the 14 papers, eight met the selection criteria and were included in the data extraction process. Internal validity assessment revealed seven to be of high and one of medium quality. Assessment exposed similar areas of quality weakness and strength. Despite the quality of reporting to score highly across all eight articles; power was only mentioned in one. Sample sizes ranged from six to 51 with a total of 398 participants. All studies involved male and female participants with a mean age of 44.2 years. The studies utilised different techniques and study populations to explore tactile discrimination, body schema and motor function but critically; none explored all three concepts.

Conclusion

Altered two-point discrimination threshold occurred in those with CLBP but only within the area of their typical pain. Sub-groups reported within this group may be related to altered body schema.

Tasks relating to the low back that were dependent on an intact body schema were impaired in CLBP sufferers. Bilateral CLBP participants performed more poorly than unilateral sufferers, who performed worse than pain-free groups.

TPDT was negatively correlated with lumbopelvic motor control but the relationship between BS and LMC remains unknown.

This review revealed that the question cannot be fully answered and highlights specific knowledge gaps to be explored further.