Application of Physiology in Physical Therapy- Evidence for Efficacy of Pain Neurophysiology Education

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Abstract

Poor knowledge about pain and underestimation of patients' ability to understand pain-related information represented barriers to reconceptualization of chronic pain problem and hence this short communication was aimed at providing a descriptive summary of evidence for pain neurophysiology education (PNE) as an effective intervention through studies retrieved from PubMed. PNE was shown to be effective in one study on fibromyalgia, four studies on chronic low back pain (one pilot study, one single case study, one randomized controlled trial, one systematic review), and one study on chronic whiplash. The ensuing paradigm shift towards mechanism-based classification of pain and mechanism-based physical therapy warranted establishing mechanism-based treatment guidelines so that treatments not only aim at symptom control but also enhancement of quality of life in people.

Keywords: Manual therapy; Applied physiology; Therapeutic physiology; Clinical physiology; Pain neurophysiology.

Although both healthcare professionals and patients could understand the neurophysiology of pain, professionals tend to underestimate patients' ability to understand. This would imply:

(1) a poor knowledge of currently accurate information about pain and

(2) the underestimation of patients' ability to understand currently accurate information about pain represent barriers to reconceptualization of the problem in chronic pain.[1]

Fibromyalgia

van Ittersum *et al*[2] studied 41 participants with fibromyalgia (FM) who were given pain neurophysiology educational booklet and found that they had notable improvements in illness coherence, emotional representations, pain and fatigue levels, with no positive effects on illness perceptions, catastrophizing or impact of FM on daily life.

Chronic Low Back Pain

Ryan *et al*[3] in their pilot RCT investigated the effect of pain biology education and group exercise classes compared to pain biology education alone for individuals with chronic low back pain (CLBP) who were randomised to a pain biology education and group exercise classes group (EDEX) [n = 20] or a pain biology education only group (ED) [n = 18].

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The authors found short-term effectiveness of pain biology education alone for pain and pain self-efficacy than a combination of pain biology education and group exercise classes. However the between-group effects were not evident at 3-months follow-up.

Moseley *et al*[4] compared two groups:individual education sessions on neurophysiology of pain (experimental group) and back anatomy and physiology (control group) and found important beneficial treatment effects on Survey of Pain Attitudes (revised) (SOPA-R),Pain Catastrophizing Scale (PCS), Roland Morris Disability Questionnaire (RMDQ), straight leg raise (SLR) and forward bending. Education about pain neurophysiology was found to change pain cognitions and physical performance and was recommended for inclusion in wider pain management programs.

Clarke *et al*[5] searched MEDLINE, CINAHL and AMED and found two moderate quality RCTs (n=122)suggesting very low quality evidence that PNE is beneficial for pain, physical-function, psychological-function, and social-function. Meta-analysis showed that PNE reduced short-term pain by 5 mm on 100 mm visual analogue scale.

Whiplash-Associated Disorders

Van Oosterwijck *et al*[6] performed a single-case study (A-B-C design) with six patients with chronic whiplash associated disorders (WAD) where periods A and C represented assessment periods, while period B consisted of the intervention (pain neurophysiology education). A significant decrease in kinesiophobia (Tampa Scale for Kinesiophobia), the passive coping strategy of resting (Pain Coping Inventory), self-rated disability (Neck Disability Index), and photophobia (WAD Symptom List) was observed with increased pain pressure thresholds and improved pain-free movement performance (visual analog scale on Neck Extension Test and Brachial Plexus Provocation Test).

Nijs and Van Houdenhove[7] explained that "manual therapy might be able to influence the process of chronicity in three different ways.

(I) In order to prevent chronicity in (sub)acute musculoskeletal disorders, it seems crucial to limit the time course of afferent stimulation of peripheral nociceptors.

(II) In the case of chronic widespread pain and established sensitisation of central pain pathways, relatively minor injuries/trauma at any locations are likely to sustain the process of central sensitisation and should be treated appropriately with manual therapy accounting for the decreased sensory threshold. Inappropriate pain beliefs should be addressed and exercise interventions should account for the process of central sensitisation.

(III) However, manual therapists ignoring the processes involved in the development and maintenance of chronic widespread pain/FM may cause more harm than benefit to the patient by triggering or sustaining central sensitisation."

The ensuing paradigm shift towards mechanism-based classification of pain[8] and mechanism-based physical therapy[9] warranted establishing mechanism-based treatment guidelines so that treatments not only aim at symptom control but also enhancement of quality of life in people.[10]Nijset al[11] provided mechanism based clinical guidelines for the recognition of central sensitization in patients with musculoskeletal pain by which manual therapists can apply the science of nociceptive and pain processing neurophysiology to the practice of manual therapy.

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