Original Article

Effects of a Brief Coping Skills Training Intervention on Nociceptive Flexion Reflex Threshold in Patients Having Osteoarthritic Knee Pain: A Preliminary Laboratory Study of Sex Differences

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Abstract

Studies have documented the efficacy of coping skills training (CST) for managing pain, distress, and disability in persons with arthritis. However, no laboratory studies have examined the effects of CST on descending modulation of nociception. This study used the nociceptive flexion reflex (NFR) to document pain and nociceptive responding among 62 men and women with osteoarthritis of the knee (mean age = 63.3 ± 7.5 years). Before and after a 45-minute CST session, participants completed laboratory assessments of NFR threshold and questionnaires evaluating pain and state anxiety. Results indicated significantly increased NFR thresholds and decreased pain ratings following CST for men and women. A significant time by sex interaction was observed for state anxiety, with women reporting greater decreases in anxiety following CST than men. This is the first study to demonstrate effects of a CST protocol on a measure of descending inhibition of nociception among patients with osteoarthritic knee pain. J Pain Symptom Manage 2006;31:262–269. *© 2006 U.S. Cancer Pain Relief Committee. Published by Elsevier Inc. All rights reserved.*

Key Words

Nociception, osteoarthritis, coping skills, sex differences, nociception flexion reflex

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Introduction

Patients with osteoarthritis (OA) experience persistent pain, often accompanied by limitations in physical mobility and impaired quality of life. Medical treatments (e.g., aspirin, nonsteroidal anti-inflammatory medication) provide pain relief, and self-management approaches such as coping skills training (CST) have been found to reduce pain, psychological disability, and pain behavior among patients with OA.[1] CST is a multifaceted psychosocial intervention that provides patients with education about gate control theory[2] and the complex nature of pain control pathways, teaching patients that pain may be influenced by thoughts, feelings, and behavior. Specific components of CST include relaxation training, activity scheduling, and cognitive restructuring to enhance the patient's ability to modify thoughts, feelings, and behavior relevant to pain stimuli.[3] Prior studies have documented the efficacy of CST in patients with arthritis, including patients with OA of the knees[1,3] and rheumatoid arthritis.[4,5] However, to date no studies have examined the effects of a CST intervention for arthritis pain on descending modulation of nociception.

This study used the nociceptive flexion reflex (NFR) as an index of descending modulation of nociception, to evaluate the effects of an abbreviated CST intervention on NFR threshold. The NFR was chosen because it provides an indicator of nociception that is typically correlated with subjective pain threshold, but is distinct in its ability to provide an objective measure of spinal modulation of nociceptive transmission.[6,7] Clinical studies reveal that NFR threshold is often lower among individuals with pain disorders such as fibromyalgia,[6,8] tension headache,[9] and cluster headache.[10] It has been suggested that long-term noxious stimulation or nervous system damage results in neuronal functioning changes in the spinal cord and sensitization of the nervous system. The resulting central sensitization may contribute to development and maintenance of chronic spontaneous pain.[6] Evidence of such neuroplasticity is found in animal studies showing that increased nociceptive stimulation elicits hyperexcitability both in the spinal cord and in higher central nervous system sites involved in pain perception.[11] Clinical studies have also shown that NFR threshold increases in response to pain-relieving procedures, such as analgesic administration[12,13] or transcutaneous electrical nerve stimulation (TENS).[14] Relatively few studies have examined the effects of psychosocial interventions on NFR. Hypnotic analgesia has been shown in laboratory studies to increase NFR but only in healthy individuals.[15,16] Thus, although NFR is an objective outcome that cannot be consciously manipulated, prior studies indicate that NFR threshold may be influenced by conscious cognitive processes and behavioral changes. No prior study has examined the effects of CST on NFR thresholds in a population of patients suffering from a disease-related pain condition such as OA.

An additional goal of the study was to examine sex differences in NFR threshold and subjective pain ratings following the brief CST intervention. Previous research indicates that women with OA report higher levels of pain and psychological disability, and they exhibit more pain behavior than men. Women with OA pain also are much more likely than men to use emotion-focused coping such as seeking emotional support or venting emotions[17] and to engage in pain catastrophizing.[18]

This laboratory study evaluated the effect of a single-session CST intervention on NFR threshold, pain ratings, and anxiety. The single-session format was used to facilitate evaluation of acute changes in NFR following the intervention. The study also examined sex differences in responsiveness to the CST intervention as well as the relationship of pain coping and pain catastrophizing at baseline to changes in NFR threshold, pain, and anxiety following CST.

Methods

Participants

The study sample included women ($n = 35$) and men ($n = 27$) over age 50 with OA of the knee. Mean age of the sample was 63.3 ($\pm$7.5) years (range 50–76 years). The sample was predominantly Caucasian (89%; African American 9%; Asian 2%) and well educated (97% with high school education; 53% college degree or beyond). Among the women, 21 (60%) were taking hormone replacement