PAIN® 147 (2009) 147–152

PAIN®

www.elsevier.com/locate/pain

Depressive symptoms and pain evaluations among persons with chronic pain: Catastrophizing, but not pain acceptance, shows significant effects

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ARTICLE INFO

Article history:
Received 14 January 2009
Received in revised form 21 August 2009
Accepted 28 August 2009

Keywords:
Chronic pain
Catastrophizing
Acceptance
Pain ratings
Depressive symptoms

ABSTRACT

Cognitive factors such as catastrophic thoughts regarding pain, and conversely, one's acceptance of that pain, may affect emotional functioning among persons with chronic pain conditions. The aims of the present study were to examine the effects of both catastrophizing and acceptance on affective ratings of experimentally induced ischemic pain and also self-reports of depressive symptoms. Sixty-seven individuals with chronic back pain completed self-report measures of catastrophizing, acceptance, and depressive symptoms. In addition, participants underwent an ischemic pain induction procedure and were asked to rate the induced pain. Catastrophizing showed significant effects on sensory and intensity but not affective ratings of the induced pain. Acceptance did not show any significant associations, when catastrophizing was also in the model, with any form of ratings of the induced pain. Catastrophizing, but not acceptance, was also significantly associated with self-reported depressive symptoms when these two variables were both included in a regression model. Overall, results indicate negative thought patterns such as catastrophizing appear to be more closely related to outcomes of perceived pain severity and affect in persons with chronic pain exposed to an experimental laboratory pain stimulus than does more positive patterns as reflected in measures of acceptance.

1. Introduction

Approximately half of chronic pain patients exhibit significant depressive symptomatology [10,36,49] which exceeds the 2–9% found in the general population [1,19]. Although these purported rates of depression are higher among persons with chronic pain, not all chronic pain patients exhibit symptoms indicative of major depression [52]. Identifying mechanisms through which those individuals are able to preserve positive emotional functioning has clinical value when treating those who exhibit psychological difficulty concurrent to chronic pain.

The degree to which an individual experiences depressive symptoms in the context of pain may be mediated by cognitive appraisal variables [38,49]. One variable, catastrophizing, has been found to have a powerful influence on the experience of pain [18,43]. Catastrophizing is a cognitive process involving an exaggeration or magnification of the perceived threat of pain sensations [43,50]. Catastrophizing has been associated with higher affective ratings of pain [13,42], depressive symptoms, and general affective distress [3,6,22,37]. This relationship persists even when controlling for pain intensity, cognitive beliefs and coping variables [51].

In recent years, there has been interest in identifying the possible adaptive mechanisms through which individuals maintain psychological well-being despite chronic pain. One such positive psychological factor is acceptance; a broad construct that has been conceptualized as the belief that living fully can still be achieved despite pain and the negative internal experiences that pain may foster [24,26]. Acceptance has been found to be inversely related to physical disability, limited work status and depressive symptomatology [23]. Moreover, acceptance has been found to account for more variance in emotional distress above and beyond negative coping variables [25,27] although the variable of catastrophizing was excluded from these analyses. Vowles et al. [54] investigated catastrophizing and acceptance simultaneously and found that both of these variables were comparable in predicting depressive symptoms. Other researchers [9] found acceptance to be a better predictor of functional outcomes, while catastrophizing and negative coping were better predictors of emotional functioning. Thus, the impact of catastrophizing and acceptance on depression

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0304-3959/$36.00
doi:10.1016/j.pain.2009.08.030

remains unclear. One aspect of the present study was to extend the investigation of the relationship of catastrophizing and acceptance to depression using a group of chronic low back pain patients.

Prior investigations on the effects of catastrophizing on experimentally induced pain have used pain-free subjects, with high catastrophizers reporting more anxiety during an experimental pain induction procedure [7]. However, when pain-free patients were asked to rate the valence of the pain stimuli, there was no difference between catastrophizers and non-catastrophizers [53]. To the best of our knowledge, the effects of catastrophizing on experimentally induced pain ratings, among chronic pain patients, has received little attention. Yet it is the response to experimentally induced pain in the laboratory that stimulates theories of pain processing and forms the basis for the development of therapeutic interventions. Therefore, a second aspect of this study was to explore how catastrophizing and acceptance, as it relates to a patient's chronic pain, impacts affective ratings of experimentally induced pain.

2. Methods

2.1. Participants

Participants were recruited from the University of Alabama at Birmingham Highlands Hospital Pain Clinic and the Doleys Clinic/Pain and Rehabilitation Institute in Birmingham, Alabama. Patients needed to be 19–65 years of age, have a history of lumbar surgery (e.g., lumbar laminectomy and/or fusion) at least six months prior, and a diagnosis of chronic low back pain for six months or longer in order to be eligible for the study. Exclusion criteria included a diagnosis of severe psychiatric or personality disorder and, due to the ischemic nature of the induced pain procedure, patients were also ineligible if they had a history of peripheral vascular disease, severe cardiovascular disease or untreated hypertension (i.e., those with systolic pressure greater than 160 mm Hg or a diastolic pressure greater than 95 mm Hg). For ethical reasons, participants were not asked to discontinue pain medications. A total of 67 patients agreed to participate and gave informed consent for the study as required by the University of Alabama at Birmingham IRB. Monetary compensation was provided for participation.

2.2. Measures

2.2.1. Pain Catastrophizing

To assess the degree of pain catastrophizing, the Pain Catastrophizing Scale (PCS) was used [41]. This 13-item self-report scale has been used in both clinical and non-clinical samples. Participants were asked to rate on a scale of 0 (not at all) to 4 (all the time) the degree to which they experienced the thought or feeling as indicated by the item. The score range is 0–52, with higher scores indicating more catastrophizing. The PCS has been shown to have good internal consistency (Chronbach's alpha = .87), test–retest reliability and construct validity [41].

2.2.2. Acceptance

To assess the degree of acceptance of participants' chronic pain condition, the 20-item version of the Chronic Pain Acceptance Questionnaire (CPAQ) was used [28]. Items on the CPAQ assess the level of activity participation despite pain and the degree to which one attempts to control or avoid pain. Individuals are instructed to rate on a scale of 0 (never true) to 6 (always true) the extent to which a given statement applies to them. The 20 items can be summed (with 9 items reversed scored prior to summing) for a total score of acceptance. Higher scores indicate a greater level of acceptance regarding one's pain condition. Previous studies utilizing this measure indicate the CPAQ to show good psychometric properties [26,28,29].

2.2.3. Baseline chronic pain intensity (BCPI)

Pain Intensity was measured via a 0–10 numeric rating scale (NRS), with 0 = "no pain" and 10 = "absolute worst pain." NRS pain ratings have been shown to be valid measures of pain intensity [17].

2.2.4. Ischemic pain ratings

The Short Form McGill Pain Questionnaire (SF-MPQ) [30] was used to assess the qualitative and quantitative aspects of the experimentally induced ischemic pain (IP). The SF-MPQ consists of 15 descriptors (11 sensory; 4 affective) that are rated based on intensity using a Likert scale ranging from 0 (none) to 3 (severe). Three pain scores are derived from the sum of the intensity rank values of the words chosen for sensory, affective and total descriptors. The SF-MPQ also includes the Present Pain Intensity (PPI) score which requires respondents to mark the degree of experienced pain intensity from 0 (no pain) to 5 (excruciating). For the present study, the Affective, Sensory and PPI scores were used in analyses. The SF-MPQ is sensitive to changes in pain brought about by pharmacologic agents [16]. It also demonstrates good validity and stability over time [31].

2.2.5. Depressive symptoms

The Patient Health Questionnaire-9 (PHQ-9) [39], a brief 9-item self-report depression screen, was used to assess the degree of depressive symptoms. The PHQ-9 was derived from the clinician administered Primary Care Evaluation of Mental Disorders (PRIME-MD), and as such, was developed specifically for use with medical patients in clinical settings [40]. The nine items included on the PHQ-9 reflect Diagnostic and Statistical Manual of Mental Disorders (DSM) symptoms of depression and encompass both purely psychological (hopelessness, anhedonia) and somatic (fatigue, loss of appetite) symptoms. Each item is scored on a scale of 0–3, with a total possible score range of 27. Higher scores on the PHQ-9 are indicative of greater depressive symptomatology. When used as a continuous measure, a cut-off score of 10 or more showed good sensitivity and specificity for clinically significant symptoms of depression [21].

2.3. Experimentally induced pain

Ischemic pain (IP) was induced by a modified submaximal tourniquet procedure [32], as both affective and sensory pain responses have been shown to be evoked via IP [35]. Using this procedure, the participant was first required to elevate their arm above the heart level for 30 s in order to be exsanguinated. A standard blood pressure cuff was then wrapped around the arm above the elbow and inflated to 250 mm Hg. Once the arm was occluded, participants performed 20 handgrip exercises of 2 s duration at 4-s intervals. This was done via a hand dynamometer at 50% of previously determined maximum grip strength. The NRS pain rating for IP was obtained at the point when the patients first began to experience discomfort (threshold) and at the point where the participant wished to discontinue the procedure (tolerance). The times and NRS ratings for both IP threshold and tolerance were not used in main outcome analyses for the present study. The IP procedure was stopped when the participants reached tolerance or after 15 min, whichever occurred first.

2.4. Procedures

Blood pressure vitals, current BCPI scores related to chronic low back pain, PHQ-9, CPAQ, and PCS scores were obtained from each