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The extent of neurocognitive dysfunction in a multidisciplinary pain centre population. Is there a relation between reported and tested neuropsychological functioning?

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ABSTRACT

Patients with chronic nonmalignant pain syndromes frequently report cognitive dysfunction, in particular with respect to concentration and attention. Such complaints have, in general, been attributed to depressive symptoms. In this study we showed that cognitive complaints in chronic pain patients are significantly associated with objective test performance in the area of inhibitory control after partialling out degree of depressive symptoms. Furthermore, about 20% of the patients performed below cut-off for clinically significant impairment on tests of basic neurocognitive functioning. A larger proportion of patients with generalized and neuropathic pain performed below this cut-off, whereas patients with localized pain exhibited impaired function to a lesser degree. Chronic pain patients receiving opioids did not perform worse than patients off opioid treatment. Systematic assessment of basic neurocognitive functions in centres treating chronic pain patients is warranted.

1. Introduction

Patients with severe chronic pain have several other usual complaints besides pain. Some of these complaints have been extensively assessed and studied, but this is not the case for cognitive dysfunction. This is surprising because it is now well known that patients with chronic pain, including those without a history of neurological disorders, frequently complain of cognitive impairment that causes difficulties in social situations and everyday functioning [25,32]. Roth et al. found that 62% of the patients in an outpatient multidisciplinary chronic pain program reported moderate to severe problems with at least 1 out of 5 possible cognitive areas [30]. Such subjective cognitive complaints may reflect genuine impaired function or, alternatively, represent the patients' perception although no objective dysfunction exists.

One reason that cognitive dysfunction has not – contrary to depression, anxiety, and insomnia – typically been assessed in patients with severe chronic pain could be that subjective cognitive complaints have generally been attributed to depressive symptoms, which are found in 40% to 50% of individuals with chronic pain [15]. Other explanations for why cognitive impairment is usually not assessed could be that neuropsychological tests are time consuming, they require neuropsychological expertise, and there exists an impression that there is a poor correlation between subjective cognitive complaints and objective neuropsychological tests in chronic pain patients.

Chronic pain is not only associated with subjective cognitive impairments, but is also reflected in objective neuropsychological test performance [11,18,26]. The majority of existing studies have assessed selected types of patients with chronic pain – like fibromyalgia, whiplash, or low back pain. Sjøgren et al. [33], however, found cognitive impairments in a heterogeneous sample of chronic nonmalignant pain patients treated in a multidisciplinary pain centre. Opioid treatment was also associated with poorer performance

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on one working memory measure. A limitation of this study [33] is that it did not include a reasonable range of neuropsychological tasks covering the main functional areas.

The main research questions of the current study were: (1) Is there a relation between self-reported and performance-based neuropsychological functioning in patients referred to a multidisciplinary pain centre when controlling for depressive symptoms? (2) To what extent are main objective neuropsychological functions impaired in a pain clinic population? (3) Does neuropsychological functioning vary across subgroups (localized vs generalized vs neuropathic pain)? (4) Do pain medications reduce neuropsychological functions in chronic pain patients?

2. Materials and methods

2.1. Subjects and study design

During a period of 3½ months, all the 123 new patients who started their treatment in a specialized Multidisciplinary Pain Centre at St. Olav's University Hospital in Trondheim were considered to participate in the study. Inclusion criterion was chronic nonmalignant pain. Exclusion criteria were acute pain and pain due to known organic brain dysfunction, because these would contaminate the pure effects of pain on performance on the neuropsychological tests. Since exact understanding of the instructions is crucial for successful performance on neuropsychological tests, poor knowledge of Norwegian was also a reason for exclusion.

Ninety-six patients fulfilled the inclusion criterion and were asked to participate, and 73 of these responded positively. One patient was excluded due to missing data, thus leaving us with 72 patients for the analyses.

The patients were divided into 3 subcategories: (1) generalized pain, which consisted of chronic widespread pain including fibromyalgia, and visceral pain disorders with referred pain; (2) localized pain, which included low back, neck, and thoracal pain, and residual localized pain; and (3) neuropathic pain, which included central and peripheral neuropathic disorders, that is, pain arising as a direct consequence of a lesion or disease affecting the somatosensory system [38]. Patients with neuropathic pain associated with diabetes were excluded.

2.2. Procedure

The participants filled out 3 self-report forms and completed a neuropsychological testing session, which lasted approximately 1½ hours. The tests were administered in the same order for all participants. Two graduate psychology students (L.L.V. and Ø.H.) recruited and tested the patients. The results were compared to normative data. Based on this comparison, a brief comment regarding the test performance was reported back to the patients' attending physician. The participants' pain conditions were assessed by their attending physician at the pain clinic. The participants rated their pain intensity and also answered additional questions by means of questionnaires. The prescribed medication was noted by the doctors and double-checked by comparison with the doctors' medical records. Depression and cognitive complaints were assessed through self-report forms. All procedures were approved by the Regional Ethic Committee in Sør-Trøndelag, Norway. Participants gave informed and written consent prior to the test session.

2.3. Assessments

2.3.1. Pain

Before admission to the multidisciplinary pain centre, the patients were asked to complete The Norwegian Pain Association Minimum Questionnaire [14], which includes sociodemographic information and mean pain (0–10) last week, with maximal and minimal scores using Brief Pain Inventory (BPI [5], 0 = "no pain", 10 = "pain as bad as you can imagine"). In validation studies among chronic pain patients the BPI has shown good psychometric properties. The published Norwegian translation has also shown good psychometric properties in a validation study [22].

2.3.2. Cognitive complaints

2.3.2.1. Everyday memory questionnaire (EMQ). The EMQ, originally developed by Sunderland et al. [36], consists of 28 subjective report items concerning the participant's memory and attentional functioning in everyday life. Each item is rated on a 9-point scale ranging from 1 – "not at all in the last 6 months" to 9 – "more than once a day." The questionnaire has been validated psychometrically and is assessed to have a clear factor structure and a good internal consistency [6]. Royle and Lincoln [31] identified 2 main factors: general memory and attentional function. The participant's average score on the EMQ constitutes what we will describe as cognitive complaints. Internal consistency, as measured by Cronbach alpha, was 0.96.

2.3.3. Depression

2.3.3.1. Beck depression inventory (BDI). The BDI [3] is a self-rated questionnaire consisting of 21 items designed to tap depressive symptoms. BDI is the most used self-report instrument to assess depression severity. The patients are asked to choose, based on how frequently they experienced each symptom in the past week, 1 of 4 statements, rank-ordered by severity of content. Each item is scored from 0 for endorsement of a neutral statement (eg, "I do not feel disappointed in myself") to 3 for the most severe statement (eg, "I hate myself"). The BDI has good predictive validity among chronic pain patients [15]. The depression score used is the sum score of all the items on the BDI. Cronbach alpha was 0.89. In the present study the sum score of all items, as well as categorization into minimal (0–13), mild (14–19), moderate (20–29), and severe (29–63) were used, as specified by Beck et al. [2].

2.4. Neuropsychological tests

All tests used in this project are well-established test procedures with a normative standard of comparison [34]. The battery of tests was chosen to tap basic cognitive functions, such as psychomotor speed, attention, working memory, verbal learning, and memory in addition to indicators of general intelligence. They are well-known and validated tests covering main areas included in standard clinical neuropsychological assessment procedures [24].

2.4.1. General intelligence

The subtests Matrix Reasoning and Vocabulary in the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III) were used as measures of general intelligence [39]. These 2 subtests are highly correlated with nonverbal and verbal IQ, respectively. In the Matrix Reasoning test, the participant is presented a series of increasingly difficult visual pattern completion and analogy problems, and has to choose the one that best completes the pattern among 5 different alternatives [34]. There are no sensorimotor requirements to perform this task. Because chronic pain might influence motor function in some cases, we think this is an advantage. In the Vocabulary test, the participant has to explain the meaning of words of increasing difficulty, and this is a gauge of verbal comprehension. Additionally, Vocabulary is the WAIS-III subtest that to the largest degree reflects premorbid functioning.