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The traumatised chronic pain patient—Prevalence of posttraumatic stress disorder - PTSD and pain sensitisation in two Scandinavian samples referred for pain rehabilitation

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ABSTRACT

Introduction: Correctly identifying chronic pain patients with posttraumatic stress disorder (PTSD) is important because the comorbidity of a chronic pain condition and PTSD is found to compromise treatment success. In addition, the existence of PTSD is associated with pain sensitisation, elevated levels of pain, and disability. Furthermore, the diagnostic criteria for PTSD has changed dramatically in the last two decades which has had a profound impact on the reported prevalence rates of PTSD in chronic pain samples. To our knowledge, no study has employed the DSM-IV criteria for estimating the prevalence of PTSD in chronic pain patients referred consecutively for multidisciplinary pain rehabilitation.
Aim: The aim of the present study was to assess the prevalence of significant traumatic stressors and PTSD in chronic pain patients referred consecutively to multidisciplinary pain rehabilitation. We wanted to investigate whether specific pain diagnoses were more related to PTSD than others. Moreover, we investigated the possible association of altered sensory processing (hypersensitivity or hyposensitivity) and PTSD.
Methods: Data were collected from two Scandinavian multidisciplinary pain centres (Denmark and Finland). All patients referred consecutively were assessed for PTSD and sensitisation at admission. A total of 432 patients were assessed, of which 304 (DK, $N = 220$, female $n = 144$; FIN, $N = 84$, female $n = 44$) were admitted and consented to participate. All patients had to be diagnosed with a non-malign chronic pain condition lasting for at least 6 months (median = 6.0 years). The Harvard Trauma Questionnaire was employed to measure PTSD symptoms, using the DSM-IV criteria. To measure altered sensory processing, anaesthetists performed quantitative sensory testing on admission. Patients were asked to report if cold, brush, and pinprick mechanical stimulation resulted in decreased or increased sensation or pain.
Results: A high prevalence of PTSD was found in both consecutive samples. Using the DSM-IV criteria, 23% fulfilled the criteria for a possible PTSD diagnosis. There were no gender differences in PTSD. The three most reported traumatic events: traffic accidents, serious illness personally or in the family, and the actual loss of someone, were reported as the primary traumatic events by almost 50% of those with PTSD. No particular pain diagnosis was significantly related to PTSD. However, hypersensitivity to cold and hyposensitivity to brush were significantly associated with PTSD.
Discussion: The prevalence of PTSD in the present study was 23%. Earlier studies finding a lower prevalence rate of PTSD may reflect the use of older diagnostic criteria for PTSD or other estimates, for instance PTSD symptom cut-off scores.
Conclusion: The study emphasised the importance of screening all chronic pain patients for PTSD at admission for pain rehabilitation, using up to date diagnostic tools.
Implications: Untreated PTSD may exacerbate or maintain the pain condition and negatively affect outcome of pain rehabilitation.

1. Introduction

Correctly identifying chronic pain patients with a possible posttraumatic stress disorder (PTSD) diagnosis is important as the comorbidity of chronic pain and PTSD has been found to

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compromise treatment success [1,2]. Moreover, PTSD symptoms are associated with higher levels of pain, emotional distress, and disability in chronic pain (for a review see [3]). PTSD is an anxiety disorder that can develop following exposure to a traumatic event. According to the DSM-IV [4], the PTSD symptoms are divided into three symptom clusters, re-experiencing, avoidance, and hyperarousal. To qualify for a PTSD diagnosis the following DSM-IV criteria have to be met. The event has to involve actual or perceived threat to the physical integrity of self or other (A1) and the experience of intense fear, helplessness, or horror (A2). In addition, the symptoms have to be present for at least 1 month after the trauma (E) and cause significant distress or impairment in social, occupational, or other important areas of functioning (F). Also, at least one re-experiencing symptom (B), three avoidance symptoms (C), and two hyperarousal symptoms (D) have to be present [4].

The lifetime prevalence of PTSD is estimated to be 6.8%; 3.6% for men and 9.7% for women [5]. However, when trauma and pain coexist high prevalence rates are generally reported. The prevalence rate of PTSD in chronic pain patients referred for pain rehabilitation ranges from 9.5% to 34.7% [6,7]. The wide variation in prevalence may reflect the use of case studies with selected patient groups and the use of different diagnostic tools and criteria. Furthermore, as the diagnostic criteria for PTSD has changed dramatically in the last two decades, this may have had a profound effect on the reported prevalence of PTSD. This was demonstrated in a recent study using the same diagnostic tool with different diagnostic criteria (DSM-III-R vs. DSM-IV). The study showed that the prevalence rate varied by 20% [8].

Studies examining the co-occurrence of chronic pain and PTSD have been limited with an emphasis thus far on case studies and on the use of inadequate diagnostic tools which are not in accordance with the DSM-IV criteria for PTSD. To our knowledge only one study has looked at the prevalence of PTSD in a sample of pain patients consecutively referred for pain rehabilitation, this study reported a PTSD prevalence of 9.5% [7]. However, the sample size of the study was small ($N = 64$) and the diagnostic criteria employed was based on a proposed combination of the DSM-III criteria for PTSD and chronic pain. Two more recent studies have employed narrower selected patient groups with chronic pain who were consecutively referred for pain rehabilitation. These studies concluded that 34.7% of the sample fulfilled the DSM-IV criteria for PTSD after experiencing a work-related injury [6], and that 18.7% of the sample experienced severe PTSD symptoms after experiencing accidents [9]. However, Geisser et al. [9] did not use the DSM PTSD criteria, making it impossible to estimate the actual prevalence of PTSD.

When pain is secondary to motor vehicle accidents as many as 50% meet the diagnostic criteria for PTSD [10]. Also, up to 50% of the patients receiving treatment for chronic low back pain or fibromyalgia report experiencing mild to severe PTSD symptoms [11,12]. However, these studies did not report the actual prevalence of PTSD. For migraine and tension-type headaches, 16% of patients meet the DSM-IV criteria for a possible PTSD diagnosis [13]. Moreover, in a large national co-morbidity study, patients with musculoskeletal pain were found to be four times more likely to develop PTSD compared to those without pain [14]. Indeed, it has also been reported that even many years after a traumatic incident, a high prevalence of PTSD is found. For example, Mayou and Bryant [15], who employed a sample of whiplash victims, concluded that at 3 months post-injury, 24% met the diagnostic criteria for PTSD and at 3 years post-injury 17% still met the diagnostic criteria for PTSD.

1.1. Mutual maintenance of pain and PTSD

The high prevalence of PTSD in chronic pain has been explained by different mechanisms. In particular elevated levels of arousal, anxiety sensitivity and avoidance behaviours have been proposed as mechanisms maintaining both conditions (for a review see [16]). PTSD may not only increase the risk for developing chronic pain because of elevated levels of anxiety and avoidance behaviours, but also because of alterations of specific neurobiological mechanisms within the central nervous system [17]. When a stressor is not immediately controllable a reorganisation of the neural circuitry takes place and pain sensitisation may develop so that previous neutral stimuli become noxious [18]. Also, extreme stressors such as a traumatic event may promote the development of sensitisation in predisposed individuals by altering the arousal mechanisms and the pain transduction pathways in the brain [19].

Sterling and Kenardy [20] found that whiplash injured patients with persistent PTSD symptoms showed sensory hypersensitivity compared to those without PTSD symptoms. In particular, within 1-month post-injury, cold hyperalgesia predicted persistent 6-month PTSD symptoms and neck pain. Furthermore, and of clinical importance, preliminary results from a randomised controlled study of physical rehabilitation for chronic whiplash showed that a subgroup of whiplash patients with mechanical, and cold hyperalgesia only had marginal relief compared to those without sensory hypersensitivity [21]. However, also hyposensitivity has been associated with PTSD. A recent study by Defrin et al. [22] found significantly higher pain thresholds in patients with combat- and terror related PTSD compared to controls without PTSD, but higher pain intensity for suprathreshold pain stimuli.

1.2. Aim

The aim of the present study was to assess the prevalence of significant traumatic stressors and PTSD in chronic pain patients referred consecutively to multidisciplinary pain rehabilitation. We wanted to investigate whether specific pain diagnoses were more related to PTSD than others. Moreover, we investigated the possible association of altered sensory processing (hypersensitivity or hyposensitivity) and PTSD.

2. Materials and methods

2.1. Participants

Data were collected simultaneously from two Scandinavian multidisciplinary pain centres (Odense University Hospital, Denmark and Oulu University Hospital, Finland). All new patients were referred consecutively between May 2009 and May 2010 and were thoroughly assessed by a multidisciplinary team before admission. In some instances competing somatic disorders lead to exclusion. A total of 432 patients (Denmark, DK: 285; Finland, FIN: 147) were assessed, of which 304 consented to participate (DK, 220; FIN, 84). The remaining patients were either not admitted for treatment or did not consent to participate. The services are specialist multidisciplinary rehabilitation centres that receive referrals from the municipal health care system. The team of specialists included anaesthetists, nurses, physiotherapists, social workers, and clinical psychologists. Exclusion criteria were, inability to speak the native language, current major psychiatric disorders, and substance abuse disorder as outlined in the DSM-IV [4]. Mild to moderate symptoms of anxiety and depression detected at the clinical interview at admission did not result in exclusion. All patients had to be diagnosed with a non-malign chronic pain condition lasting for at least 6 months. The research protocol was approved by the review board of the University of Southern Denmark. Furthermore, all participants in the study volunteered freely and written consent to participate in the research project was given to participants on admission to the pain centres.

Table 1
Prevalence estimates of pain locations, hypersensitivity and hyposensitivity for PTSD and non-PTSD cases.

	All $N = 304$	No PTSD $n = 234$	PTSD $n = 70$	Group difference		
χ^2 test	*n* (%)	*n* (%)	*n* (%)	χ^2	df	*p*
Headache	23 (7.6)	17 (7.3)	6 (8.6)	.13	1	.72
Neck	71 (23.0)	54 (23.1)	16 (22.9)	.00	1	.97
Upper back	17 (5.6)	14 (6.0)	3 (4.3)	.06	1	.77
Lower back	83 (27.3)	60 (25.6)	23 (32.9)	1.41	1	.23
Chronic wide spread pain	35 (11.5)	29 (12.4)	6 (8.6)	.77	1	.38
Chronic regional pain	17 (5.6)	14 (6.0)	3 (4.3)	.06	1	.77
Visceral	10 (3.3)	9 (3.8)	1 (1.4)	.38	1	.46
Hypersensitivity cold	85 (28.0)	59 (25.2)	26 (37.1)	**3.81**	**1**	**.05**
Hypersensitivity brush	63 (20.7)	47 (20.1)	16 (22.9)	.25	1	.62
Hypersensitivity pinprick	71 (23.4)	50 (21.4)	21 (30.0)	2.24	1	.13
Hyposensitivity cold	95 (31.3)	67 (28.6)	28 (40.0)	3.24	1	.07
Hyposensitivity brush	88 (28.9)	59 (25.2)	29 (41.4)	**6.89**	**1**	**.01**
Hyposensitivity pinprick	97 (31.9)	67 (28.6)	30 (42.9)	**5.02**	**1**	**.03**

Note: Significant χ^2 in bold.

2.2. Measures

The Harvard Trauma Questionnaire part IV (HTQ) [23] was used to measure PTSD symptomatology. The HTQ consists of 17 items with a 4-point Likert scale (1 = not at all to 4 = very often). The 17 items relate to PTSD's core clusters within the DSM-IV: avoidance (7 items, $\alpha = .88$), re-experiencing (5 items, $\alpha = .88$), and hypervigilance (5 items, $\alpha = .88$). The HTQ follows the diagnostic criteria for the PTSD diagnosis according to the DSM-IV. The scale thus makes it possible to measure both the severity of symptoms and to estimate the prevalence of a PTSD diagnosis in the sample. Following the DSM-IV, a PTSD diagnosis was proposed if participants reported at least one re-experiencing symptom, three avoidance symptoms, and two hyperarousal symptoms. An item was deemed to be positively endorsed if scores were ≥ 3. The HTQ self-report measure of PTSD has previously been reported as having an 88% concordance with interview based estimates of PTSD [23]. The internal consistency, measured by Cronbach's alpha, was excellent (total $\alpha = .95$). The Danish version of the HTQ has been validated in a large sample of 4268 respondents from different trauma populations [24]. Two independent forward-translations into Finnish were carried out using the original English version of the HTQ. The two versions were carefully reviewed and edited into a final version. The Finnish version of the HTQ, was then back-translated by a different translator and compared with the original English version.

Preceding the completion of the HTQ, the patients were asked to identify significant traumatic stressors from a 20-item list that included experiences of both direct and indirect exposure to traumatic events. Moreover, the participants were asked to mark which event they experienced as the primary traumatic event. The items were based on a variety of experiences included in the diagnostic criteria for traumatic exposures according to the DSM-IV [4].

To measure altered sensory processing, anaesthetists performed quantitative sensory testing on admission. Patients were asked to report if cold, brush, and pinprick mechanical stimulation resulted in decreased or increased sensation or pain. Testing was performed according to the guidelines for bedside sensory examination [25]. The patient response was recorded as normal, decreased or increased sensitivity. Sensitivity disturbances were dichotomized as present or not present and categorised into the presence of either hypersensitivity or hyposensitivity to cold, brush, and pinprick. All threshold tests were performed within the mapped painful area and at contra-lateral areas as control. Testing started well outside the painful area converging towards the painful area. A 20 °C metal roll was rolled over the area at 1–2 cm/s to map changes in cold sensitivity. A brush was dragged over the skin at 1–2 cm/s to map tactile sensitivity and finally a von Frey fiber was used to punctuate mechanical mapping.

2.3. Statistical analysis

All analyses were conducted in SPSS version 19.0. Descriptive statistics were calculated for all variables. Continuous variables were compared for the two countries using independent samples, 2-tailed, *t*-tests. Categorical variables were analysed using chi-square analysis, with Yates' correction for continuity. The prevalence of pain locations/diagnoses, hypersensitivity and hyposensitivity were compared for those with a PTSD diagnosis and those without using chi-square analysis. The relationship between PTSD and pain diagnoses and altered sensory processing was further investigated by logistic regression analysis. The trauma variables were recoded into a binary variable (having experienced a traumatic event: yes = 1, no = 0) to avoid an unnecessarily complex statistical model. The regression model involved four steps. In step 1, the demographic variables (gender, age), were entered as a block. In step 2, trauma exposure was entered. In step 3, the pain diagnoses were entered as a block. Finally in step 4, the presence of hypersensitivity and hyposensitivity to cold, brush and

Table 2
Multiple logistic regression analysis for pain diagnoses and sensitivity measures on PTSD.

Variable	Coefficient (β)	S.E.	Wald χ^2	*P*-Value	Odds ratio	95% CI	
						Lower	Upper
Constant	−2.62	1.19	4.88	.03	.07		
Age	−.02	.01	3.58	.06	.98	.96	1.00
Gender	−.01	.30	.00	.98	.99	.56	1.78
Trauma	2.19	1.04	4.44	.04	8.96	1.16	68.91
Hypersensitivity cold	.62	.31	4.06	.04	1.86	1.02	3.40
Hyposensitivity brush	.70	.30	5.47	.02	2.01	1.12	3.62

Note: Final model, $\chi^2(5) = 22.36$, $p < .001$. $R^2 = .08$ (Cox & Snell), .11 (Nagelkerke).

pinprick were entered as binary variables. Stepwise analysis was performed for the two final steps because no previous research has been carried out telling which variables to be expected as reliable predictors.

3. Results

3.1. Participant characteristics and prevalence of PTSD

On average the Danish patients had experienced pain across more years ($M = 10.81$, SE = .84) than the Finnish patients ($M = 6.43$, SE = .91). This difference was significant $t(256) = 3.53$, $p < .001$. The median years of pain for the total sample was 6.0 years (DK = 7 years; FIN = 3 years). There was no statistically significant age difference between the two samples. The mean age for the Danish patients was ($M = 48.18$, SE = .94) and for the Finnish patients was ($M = 45.58$, SE = 1.59), $t(302) = 1.44$, $p > .05$. There were significantly more females in the Danish sample (DK, 65.5%; Fin, 47.6%), $\chi^2(1) = 7.36$, $p < .01$.

A high prevalence of PTSD was found in both consecutive samples. Using the DSM-IV criteria, 23% fulfilled the criteria for a possible PTSD diagnosis. There were no statistically significant differences in prevalence rates for the two countries. In the Danish sample 23.6% qualified for a PTSD diagnosis whereas in the Finnish sample 21.4% qualified for a PTSD diagnosis. There were no gender differences in the prevalence of PTSD (female = 23.4% and men = 22.5%).

3.2. Primary traumatic experiences

The prevalence of having experienced a trauma was 84% for the total sample. Serious illness of oneself or others was the most frequent reported traumatic event, experienced by 16.8% of the participants, followed by the loss of someone close, experienced by 14.1% and finally traffic accidents, experienced by 13.8%. Among those with PTSD, almost 50% had experienced one of the above mentioned, traumatic events. Moreover, having experienced a traffic accident was the most frequent reported primary traumatic event among those with PTSD. About one-fourth ($n = 18$) of the total PTSD cases ($n = 70$) had experienced a traffic accident.

3.3. Prevalence estimates of pain diagnoses, hypersensitivity and hyposensitivity

The prevalence of pain diagnoses, and altered sensory processing for the total sample and the PTSD group vs. the non-PTSD group are presented in Table 1.

The most frequent pain diagnoses were lower back pain and neck pain. Together they comprise 50.3% of the pain diagnoses. However, no particular pain diagnosis where significantly related to PTSD. Only hypersensitivity to cold and hyposensitivity to brush and pinprick reached statistically significance.

3.4. Multiple logistic regression analysis for pain locations and sensitivity measures on PTSD

In the final regression model, only exposure to a traumatic event, hypersensitivity to cold and hyposensitivity to brush reached statistical significance. Hypersensitivity to cold and hyposensitivity to brush increased the likelihood approximately twofold of fulfilling the DSM-IV criteria for a possible PTSD diagnosis. Neither, age, gender or any of the pain locations added significant value to the model. The odds ratios for the final model are reported in Table 2.

4. Discussion

Eighty-four percent of the total sample reported exposure to a traumatic event, which is in accordance with that found in the general population [5]. However, it is important to note that the three most frequent traumatic events reported (serious illness self/someone close, loss of close relative, and traffic accidents) were not regarded as criterion A qualifying events in the previous DSM-III criteria. However, with the expansion of criterion A qualifying events in the DSM-IV, events such as serious illness and traffic accidents were included. In the current study these events constitute the majority of traumatic events experienced by the chronic pain patients. Thus, these revisions may explain some of the inconsistencies in prevalence rates reported across studies. Indeed, Muse [7] found a PTSD prevalence rate of 9.5%, considerably lower than more recent studies, which have estimated the prevalence rate to be between 20 and 34% for patients referred for pain rehabilitation [3]. The latter is more in line with the present study, which found a prevalence rate of 23%. However, the present study is, to our knowledge, the only study, which has examined the prevalence of PTSD across two samples of chronic pain patients referred consecutively for multidisciplinary rehabilitation. The focus on consecutive samples of various pain diagnoses instead of selected case studies gives a more realistic picture of the magnitude of PTSD in the pain clinic. This emphasises the importance of using the correct diagnostic tools, which are up to date with the DSM-IV criteria for PTSD.

Surprisingly, there were no gender differences in PTSD contrary other studies [26], who have found that women have a twofold increased risk of developing PTSD after a traumatic event. This result was not attributable to women in the samples having lower rates of trauma exposure. The results probably reflect sampling characteristics for those with severe chronic pain. No particular pain location significantly explained the prevalence of PTSD. However, both hypersensitivity and hyposensitivity were significantly related to PTSD. The finding, that hypersensitivity to cold was related to PTSD is in agreement with previous results [20]. Although not directly comparable, the finding that also hyposensitivity was related to PTSD is in agreement with Defrin et al. [22] who found that the presence of PTSD resulted in hyposensitivity to non-noxious stimuli. Conclusions regarding pain sensitisation after PTSD are limited in that most studies use retrospective data and different sensitivity measures.

4.1. Limitations

The present study has several limitations. One is that we did not use a structured clinical interview for identifying the presence of a possible PTSD diagnosis. Although previous studies have found that self-report measures and clinical interviews are comparable [27] a future study could be strengthened by the use of a clinical interview. Although participants were asked to report the primary traumatic event experienced it cannot be assumed that this single event was the cause, triggering the PTSD condition. Also the association between hypersensitivity and hyposensitivity and PTSD should be further tested using more objective sensory measures within a controlled experimental setting. Finally, more knowledge pertaining to the mechanisms maintaining PTSD and chronic pain may help in tailoring more effective interventions. This could be achieved with a longitudinal design.

5. Conclusion and implications

Despite these limitations the high prevalence of PTSD cases in the study emphasises the importance of screening for PTSD at admission for pain rehabilitation. The presence of a PTSD dia-

gnosis may maintain the pain condition trough elevated levels of arousal, anxiety sensitivity, and avoidance behaviours. Also sensitisation may result in exacerbation of avoidance behaviour because of increased pain [16]. Although cognitive behaviour therapy has proven to be the most effective treatment for both PTSD and chronic pain disorders, the co-existence of the two disorders is found to complicate treatment, therefore both disorders should be addressed specifically in pain rehabilitation [1,2,21].

Conflict of interest statement

None.

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