

Depression Correlated Higher with Functional Impairment of Chronic Pain than Pain Severity in Both Veterans with and without PTSD

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Abstract

Objective: Several studies have examined the correlation of either Post-Traumatic Stress Disorder (PTSD) or depression to chronic pain and disability and yielded varying and sometimes contradicting results. The objective of this study was to investigate this correlation and the possible additive effect of PTSD and depression on pain and functional disability.

Methods: All patients evaluated in the Chronic Pain clinic completed a pre-assessment questionnaire that included Visual Analogue Scale (VAS) scores for pain, Brief Pain Inventory (BPI), and pain interference with daily functioning. We also assessed level of depression and presence of PTSD. We then performed statistical analyses using Pearson's correlation to compare the correlations in PTSD group versus non-PTSD group.

Results: We examined 182 patients presenting to the Durham VA Medical Center Chronic Pain clinic. The correlation between depression and pain severity in patients with PTSD is 0.43 ($p < 0.0048$) while the correlate in those without PTSD is 0.45 ($p < 0.0001$). The correlation between depression and pain interference with daily functioning in patients with PTSD is 0.62 ($p < 0.0001$) versus those without PTSD is 0.66 ($p < 0.0001$).

Conclusion: This study suggests significant correlation between pain and depression, both in patients with and without PTSD. PTSD did not have an additive effect on that correlation of depression with pain. Depression correlated stronger with pain interference than with pain severity.

Keywords: Chronic Pain; Veterans; Post-traumatic Stress Disorder; Depression

PTSD is uniquely associated with several physical disorders, disability, and suicidality. It is also significantly associated with several physical health problems including chronic pain [3]. A meta-analysis by Pacella et al. found significantly greater general health symptoms, general medical conditions, and poorer health related quality of life for PTSD patients [14]. Geisser et al. studied the correlation between symptoms of PTSD, pain and disability and found that patients with accident related pain and high PTSD symptoms displayed higher levels of self-reported pain, affective disturbance and disability compared to patients whose pain was not accident related [11]. Another study in civilians, demonstrated that patients with a current PTSD diagnosis had significantly higher pain and pain-related functional impairment ratings per SF-36 Health Questionnaire than those with no PTSD [15].

Regarding depression, many studies show that comorbidity with chronic pain also has an effect on daily functioning and quality of life [6,13,16]. For example, Holzberg et al. [17] found in pain clinic patients, that somatic and cognitive symptoms of depression significantly correlate with psychosocial functioning even after controlling for the effects of pain level.

Veterans with chronic pain and PTSD have more severe depression, pain, and disability compared to those without PTSD [12]. Bras et al found that quality of life measured by the World Health Organization Quality Of Life-BREF questionnaire, was reduced by 9.9% in war veterans with low back pain, 26.0% in those with PTSD, and 37.0% in combined PTSD and low back pain; suggesting strong synergistic effect of PTSD and low back pain [5].

Taken together, the above studies indicate independent effects of depression and PTSD in the functioning of chronic pain patients. However, there remains a gap in our knowledge in understanding how much PTSD contributes to chronic pain and pain disability beyond what is attributed to depression; and if there is an additive effect in disability for patients suffering from both psychiatric disorders.

Limited studies address the interplay between pain, PTSD, and depression and no studies examined the direct effect of PTSD in the relationship between depression and pain in a cohort of veterans. Understanding such relationship can have important prognostic and treatment implications. Thus, the objective of this study was to investigate this correlation and the possible additive effect of PTSD and depression on pain and disability in the veteran population. A related objective was also to examine if there was an additive effect of comorbid depression and PTSD on pain intensity and interference with functioning. We hypothesized that depressed patients with PTSD would have significantly more pain and functional disability than those with depression but without PTSD.

Abbreviations

PTSD: Post-Traumatic Stress Disorder; BPI: Brief Pain Inventory; VAS: Visual Analogue Scale; PHQ-9: Patient Health Questionnaire; DSM-IV: Diagnostic and Statistical Manual of Mental Disorders; OIF: Operation Iraqi Freedom; OEF: Operation Enduring Freedom; PHQ: Patient Health Questionnaire.

Introduction

The lifetime prevalence of Post-Traumatic Stress Disorder (PTSD) in the general population is about 8% [1], but it can range from 20-50% in high risk groups [2]. PTSD is associated with high comorbidity of depression and several physical health problems including chronic pain [3]. In chronic pain patients, the prevalence of depression is 44%; and the prevalence of PTSD is 29% [4], resulting in significant decrease in daily functioning and quality of life [5-7]. Several studies have examined the correlation of either PTSD or depression to chronic pain and disability yielding varying and sometimes contradicting results [8-13].

Methods

After obtaining local IRB approval at the Durham VA medical Center, we examined 182 patients presenting to Durham VA Medical Center Chronic Pain clinic by clinical interview and physical examination. We assessed pain severity using the Brief Pain Inventory (BPI) and Visual Analogue Scale (VAS); and pain interference with daily functioning using the BPI-Interference subscale [18]. Chronic pain should be measured not only based on severity but also importantly on functional disability, i.e., the limitations on functioning due to pain [19]. A simple measure, that is commonly used in the literature for this purpose is the Interference subscale of the Brief Pain Inventory (BPI) [20].

Depression was assessed using the Patient Health Questionnaire (PHQ-9) scale [21]. Patient Health Questionnaire (PHQ) is a self-administered scales used to assist in diagnosis and severity of depression based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Each of the 9 items is rated as "0" (not at all) to "3" (nearly every day). Diagnosis of PTSD was obtained from the patients' records based on clinical interview.

We performed statistical analyses using SAS version 9.2 (Cary, NC). Pearson's correlation with a priori significance level at 0.05 was used to estimate the correlation between pain intensity and depression as well as the correlation between pain interference and depression in veterans with and without PTSD.

Results

One hundred and eighty two veterans participated in this study, 42 with PTSD diagnosis and 140 without. Characteristics of both groups are detailed in Table 1. Groups had similar age and gender distribution, with slightly higher percentage of white race in the PTSD group (50% vs. 36%). Depression scores were higher in the PTSD group, with a mean PHQ-9 score of 17.38 (SD = 5.64) vs. 13.15 (SD = 6.58) in the non-PTSD group. Using the optimal PHQ-9 cut point of > or = 10 for detecting depressive disorders (21) we found that the vast majority of patients in the PTSD group (88%) met the diagnostic threshold for depression vs. 68.57% in the non-PTSD group. Severe depression, measured by (PHQ > or = 20) was almost twice as prevalent in the PTSD group (38%) compared to the non-PTSD counterpart (19%). (Table 1)

Analyses using Pearson's correlation show that the correlate between depression and pain severity in patients with PTSD is 0.43 ($p < 0.0048$) while the correlate in those without PTSD is 0.45

	PTSD	NO PTSD
Sample (n)	42	140
Age (mean)	53.14	54.49
Gender		
Male n = 162	88.10%	89.29%
Female n = 20	11.90%	10.71%
Race		
White n = 71	50.00%	35.71%
Black n = 101	45.24%	58.57%
Other n = 10	4.76%	5.71%
PHQ-9	17.38 (± 5.65)	13.15 (± 6.58)
PHQ9 < 10	11.90%	31.43%
PHQ9 10 - 14	23.81%	26.43%
PHQ9 15 - 19	26.19%	22.86%
PHQ9 over 20	38.10%	19.29%
BPI-Pain (mean)	26.83 (± 5.79)	25.23 (± 7.40)
BPI-Interference	49.60 (± 13.96)	46.99 (±14.79)

Table 1: Demographics.

Variable	Sample size	Mean	Standard Deviation	Correlation Coefficient
PHQ-9	140	13.15	6.58	-
BPI Pain	140	25.23	7.40	0.446
BPI Interference	140	46.98	14.79	0.664

A) No PTSD patients (n = 140)

Variable	Sample Size	Mean	Standard Deviation	Correlation Coefficient
PHQ-9	42	17.38	5.65	-
BPI Pain	42	26.83	5.79	0.427
BPI Interference	42	49.60	13.96	0.624

B) PTSD patients (n = 42)

Table 2: Correlation Analysis: PHQ-9 with BPI Pain Intensity and PHQ 9 with BPI Interference.

($p < 0.0001$). Additionally, correlates between depression and pain interference with daily functioning in patients with PTSD is 0.62 ($p < 0.0001$) versus those without PTSD is 0.66 ($p < 0.0001$). (Table 2)

Discussion

The results of this study corroborate that there is significant correlation between pain and depression, both in patients with and without PTSD. The presence of PTSD did not have an additive effect on this correlation. We found a stronger correlation between pain interference and depression (than pain severity) in patients with and without PTSD.

Jakupcak et al. noted in a cohort of veterans seeking inpatient treatment for PTSD that PTSD, depression, and anxiety symptom severity were each related to the veteran's severity of somatic complaints. Hierarchical regression analyses indicated that anxiety sensitivity and depression severity accounted for the relationship between PTSD and somatic complaints, rather than a direct effect of PTSD [22]. This corroborates with our findings that PTSD alone does not appear to have an additive effect on pain and disability amongst depressed veterans.

Potential Mechanism Correlating PTSD, Depression and Chronic pain

There is evidence for altered sensory processing among subjects with PTSD. However, this area is still controversial. Defrin et al. measured quantitative pain perception among subjects from a psychiatric outpatient clinic in Tel Aviv with combat- and terror-related PTSD. The researchers found a unique sensory profile of hyposensitivity to pain accompanied by hyper-reactivity to supra-threshold noxious stimuli [10]. Geuze et al. found evidence for reduced pain sensitivity in PTSD [23]. In the Geuze study, twelve veterans with PTSD and matched controls were subjected to administration of a fixed thermal stimulus. PTSD veterans rated the thermal stimulus as less painful compared to controls. Functional magnetic resonance imaging of these patients revealed increased activation in the left hippocampus and decreased activation in the bilateral ventrolateral prefrontal cortex and the right amygdala. This neural activation pattern is proposed to be related to altered pain processing in patients with PTSD [23].

Subdividing PTSD into symptom clusters may provide additional insight. Cyders et al. [24] disaggregated PTSD and found that the hyper-arousal symptom cluster exerted both direct effects on pain severity and indirect effects through sleep quality. Avoidance had both direct effects on pain-related disability and indirect effects on disability through reduced general activity levels. Re-experiencing had direct effects on both hostility and anxiety. The numbing symptom cluster was predictive of pain-related disability and pain

severity through its effects on depression. Additional studies have also identified emotional numbing as the cluster that holds the most significant interaction with pain and decreased functioning and life satisfaction [25-26].

Integrated treatment

Pain treatment should be integrated with psychiatric care [27] as there is a clear neuroanatomical and functional overlap between pain and emotion, reward, and motivation brain circuitry [28]. Psychiatric disorders are commonly associated with alterations in pain processing [29], whereas chronic pain has been linked with degenerative cortical changes that may impair emotional and neurocognitive functioning [30].

Veterans with comorbid chronic pain and significant levels of PTSD symptomatology endorse significantly higher levels of maladaptive coping strategies and beliefs about pain (greater catastrophizing and emotional impact on pain; less control over pain) when compared to veterans with chronic pain alone [8]. Measures of catastrophizing and perceived injustice have prospectively predicted the persistence of pain [31]. Distorted cognitions about pain and avoidance of activities in response to pain also appear to predict increased disability [32]. Psychiatric treatment would target such cognitions, avoidance behaviors, and active PTSD symptoms.

The Veterans Affairs Health System has already started initiatives for Integrated Care of Veterans with Chronic Pain and preliminary trials are showing positive results. Plagge et al. reported significant improvement on PTSD, pain severity and interference as well as mental health and quality of life for OEF/OIF veterans who completed an intervention utilizing collaborative care and behavioral activation at the Portland Veterans Affairs Medical Center [33]. The Integrative Health Clinic and Program at Salt Lake City VA demonstrated an improvement in depression and anxiety scores, as well as in some SF-36 categories. Greatest improvements at 6 months were found in the high anxiety group, the high-depression group, and the PTSD group [34].

Shpherd et al. found that 66% of veterans with PTSD had chronic pain diagnoses prior to treatment. Patients with higher pain levels before treatment reported reductions in pain over the course of PTSD treatment and in the four months following treatment [35]. A tele-medicine intervention of five sessions of education and therapy in combination with daily home practice of a portable biofeedback device showed positive results for treatment of veterans with chronic pain and comorbid depression and/or PTSD [36].

No prior studies examine veterans with Pain, depression, and PTSD focusing on the aims of this current study. We summarize in the following paragraphs the state of the literature on studies of the association of pain with depression or PTSD.

Association of Pain with Depression or PTSD in civilian population

Means-Christensen et al studied primary care patients who endorse pain symptoms, and found a significant association with several anxiety disorders or major depression, with odds ratios ranging from approximately 3 to 9 [37]. They also reported greater interference from pain, lower mental health functioning and higher scores on severity measures of depression, social anxiety, and PTSD. Mediation analyses conclude that depression mediated some, but not all of the relationships between anxiety symptoms and pain [37].

A multi-site study by Lowe et al. [38] found that PTSD patients

had higher rates of somatic symptoms than the general population. PTSD was significantly associated with elevated rates of psychiatric comorbidity, pain, and impaired functioning. However, in contrast to the previously mentioned study, adjusting for depression substantially attenuated the association of PTSD with somatic symptoms, which suggests that depression may be an important mediator of the PTSD-somatic symptoms relationship [38].

Association of Pain with Depression or PTSD in veterans

In Vietnam veterans the prevalence of PTSD is 15.2% for males and 8.5% for females; and the prevalence of MDD is 5.1% for males and 12.4% for females [39]. Among Operation Iraqi Freedom and Operation Enduring Freedom (OIF/OEF) veterans seeking specialty care for neck or back pain, the prevalence of PTSD rose to 46.8% [40]. In a cohort seeking integrated care for chronic pain, 18% met criteria for MDD and 17% for PTSD, 65% were receiving disability, and 60% reported strong avoidance of painful activities [41]. On the other hand, in a study of 129 outpatient combat veterans with PTSD, 80% reported chronic pain. The locations of chronic pain included limb pain - 83%, back pain - 77%, torso pain - 50%, and headache - 32% [42].

Veterans with prior deployments in Afghanistan (OEF) or Iraq (OIF) were three times more likely than soldiers with no previous deployments to have a positive screen for PTSD and MDD [43]. The deployed OEF/OIF veterans were also more than twice as likely, compared to those with no previous deployments, to report chronic pain; and more than 90% more likely to score below the general population norm on physical functioning (43).

Thus, this current study is a helpful initial step to understand the relationships between PTSD, depression and pain and the contributions of both of these psychiatric disorders to pain and functionality.

Strengths/Limitations of the study

Limitations: The main limitation of this study was relying on chart diagnosis of PTSD for our sample based on interviews in the context of clinical care. Although generally reliable, chart diagnosis does not allow assessment of active symptomatology or severity of current PTSD symptoms. In addition, it is not clear how much the results from this study would generalize to other settings or to civilian population with chronic pain.

Strengths: This study examined a relevant clinical population, with high occurrences of pain and disability. The study provided further insight towards optimizing and improving treatments for these patients. The finding of a stronger relationship between depression and pain disability poses an important finding towards clinical practice, stressing the importance of assessing functioning scores and not just pain levels.

Conclusions

This study suggests significant correlation between pain and depression, both in patients with and without PTSD. PTSD did not have an additive effect on that correlation of depression with pain. Depression correlated stronger with functional pain interference than with pain severity.

These findings have important clinical and public health implications, as they highlight the importance of addressing functional outcomes above and beyond symptom control.

This study highlights the importance of screening and treating PTSD and depression in veterans with chronic pain, in order to improve care of chronic pain conditions. This study also provides insight for future studies by suggesting measurement of pain interference as a more relevant target than pain intensity alone.

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