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Does Cognitive Behavioral Therapy Effectively Decrease the Severity of Chronic Pain in Patients With Motor Vehicle Accident (MVA) Associated Post Traumatic Stress Disorder (PTSD)?

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Does Cognitive Behavioral Therapy Effectively Decrease the Severity of Chronic Pain in Patients with Motor Vehicle Accident (MVA) Associated Post Traumatic Stress Disorder (PTSD)?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

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Abstract

OBJECTIVE: The objective of this selective EBM review is to determine whether or not cognitive behavioral therapy effectively decreases the severity of chronic pain in patients with motor vehicle accident (MVA) associated post traumatic stress disorder (PTSD).

STUDY DESIGN: Systematic review of two randomized, controlled clinical trials published in 2009 and 2012, respectively, and one primary research case study published in 2003.

DATA SOURCES: Three published studies comparing patient reported reduction in pain severity following treatment with cognitive behavioral therapy (CBT) were found using PubMed.

OUTCOMES MEASURED: The extent of pain reduction experienced by the patient after receiving treatment. Recording methods included the Pain Severity subscale of the Multidimensional Pain Inventory (PS-MPI) and Numerical Rating Scales (NRSs).

RESULTS: Beck et al[3] reported a significant time effect ($F = 7.61$, $p = .01$), indicating that both the treatment group (GCBT) as well as the control group (MCC) showed a significant reduction in pain severity from pre-assessment to post-assessment. Dunne et al[4] concluded that there was no significant change in pain intensity in either group over time or between the treatment (TF-CBT) and control (waitlist) groups. It should be noted that there was an increase in pain severity within the waitlist group from pre- and post-treatment assessment, although this was also determined not to be significant. The case study produced by Shipherd et al[5] also reported a decrease in pain severity among their six patients, however there was no mention of the significance of this change.

CONCLUSIONS: The data to suggest that cognitive behavioral therapy effectively decreases the severity of chronic pain in patients with motor vehicle accident (MVA) associated post traumatic stress disorder (PTSD) is inconclusive. Future studies should aim to report data in a dichotomous fashion so to provide more statistically sound evidence.

KEY WORDS: Chronic pain, Post Traumatic Stress Disorder, Cognitive Behavioral Therapy

INTRODUCTION

Post Traumatic Stress Disorder (PTSD) is defined as anxiety in response to a severe and traumatic event lasting longer than 1 month. When re-experiencing the traumatic event, the patient may have an increase in arousal as well as avoidance of the stimuli associated with the event[1]. More often than not, the experienced traumatic event is associated with physical consequences as well. An individual in a motor vehicle accident (MVA), for example, may experience anxiety and other symptoms associated with PTSD as well as the lasting symptoms of chronic pain. Chronic pain can be defined as pain in one or more anatomical site lasting longer than 3-6 months that is significant enough to warrant medical attention[1,2].

In the United States, an estimated one third of the population suffers from chronic pain[2]. Approximately one fourth of patients with chronic pain suffer some sort of disability preventing them from performing their activities of daily living[2]. The total healthcare cost of chronic pain and PTSD is difficult to calculate, as there are many factors involved including subsequent ER visits, imaging studies, treatment expenses and even lawsuits involving the associated MVA[2,3]. The exact number of healthcare visits due to MVAs is also unknown, however, over two million individuals in the U.S. are injured in serious MVAs each year[2]. Furthermore, MVAs are one of the leading causes of PTSD in American civilians[3]. Approximately 15% - 35% of patients with chronic pain also have PTSD[2]. It is thought that the pain serves as a constant reminder of the traumatic event, thus creating a cycle between the patient's PTSD and chronic pain.

Chronic pain and PTSD are often managed medically as separate entities. Chronic pain is typically managed with pharmacologic pain medications including acetaminophen and narcotics[3,4]. Other treatment modalities for chronic pain include physical therapy, aquatic therapy, or injection therapy with cortisone and/ or novocain[3,4,5]. First line treatment of PTSD, on

the other hand, includes the use of selective-serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac) or sertraline (Zoloft).

Cognitive behavioral therapy (CBT) is a form psychotherapy in which patients are encouraged to shift their thoughts and beliefs into those which are more positive and constructive. CBT is meant to create sustainable behavioral adaptations that allow for a more congruent mood and an overall improved state of mental health. Mennin et al[6] describes the three core principles of CBT as context engagement, attention change, and cognitive change.

Although data is present regarding the use of CBT as treatment of PTSD and chronic pain separately, little data exists which incorporates both conditions. It is known that PTSD and chronic pain often present together, and therefore it is important to understand the effectiveness of CBT on the severity of chronic pain in those with co-morbid PTSD. This review will examine the effectiveness of cognitive behavioral therapy in the treatment of chronic pain associated with PTSD.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not cognitive behavioral therapy effectively decreases the severity of chronic pain in patients with motor vehicle accident associated post traumatic stress disorder.

METHODS

Two of the studies used in this selective review were randomized controlled trials (Beck et al[3] and Dunne et al[4]), while one was a primary research case study (Shipherd et al[5]). The specific criterion used to select for patient population included individuals with chronic pain secondary to PTSD after a MVA[3,4,5]. The intervention utilized was cognitive behavioral therapy (CBT) which was compared to patients with chronic pain secondary to PTSD not receiving CBT.

The outcome measured in each study included the extent of pain reduction experienced by the patients after receiving or not receiving CBT.

In the study by Beck et al[3], group cognitive behavioral therapy (GCBT) was implemented over the course of 14 weekly sessions, each lasting 2 hours. Treatment consisted of psychoeducation, in-vivo and imaginal exposure, mindfulness meditation, progressive muscle relaxation exercises, cognitive therapy interventions, anger management, behavioral activation and relapse prevention. The study by Dunne et al[4] consisted of trauma-focused cognitive behavioral therapy (TF-CBT) over the course of 10 weekly 1 hour sessions. This studies treatment plan included psychoeducation, anxiety management (deep breathing and muscle relaxation exercises), cognitive reconstruction, relapse prevention, and imaginal/ in-vivo exposure. Lastly, the case study conducted by Shipherd et al[5] consisted of CBT over the course of 12 weeks. Treatment included imaginal and in-vivo exposure, cognitive reconstruction, relaxation techniques, social support, anger management, and pleasant event scheduling.

I, ReAnna Gibbs, did all of the research for this selective review via PubMed. Cochrane Systematic Reviews was first used to ensure that the clinical question at hand had not yet been reviewed. The key words used in the search for these articles were: “cognitive behavioral therapy”, “chronic pain” and “post traumatic stress disorder”. All articles were selected based on their relevance to the clinical question as well as their use of patient oriented outcomes (POEMs). The three articles selected were published and written in the English language. Inclusion criteria included studies published after 1999 which focused specifically on patients with chronic pain and PTSD secondary to a MVA. The patients must have had the associated chronic pain for at least 3 months and must have met the DSM diagnostic criteria for PTSD. Studies were excluded if they were published before 1999. The statistical values reported in

these studies included p values, baseline and end of treatment pain scores, standard deviations and means. Table 1 displays the demographics and characteristics of these studies.

Table 1 - Demographics & Characteristics of included studies

Study	Type	# of pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Beck, 2009[3]	RCT	44 (36 female, 8 male)	22-69	Pts that had experienced a MVA involving actual or threatened death or serious injury at least 6 months prior to assessment	Neurological impairment, substance dependence or abuse, co-morbid psychiatric disorder, suicidal tendencies or restrictive medical conditions	None	Group Cognitive Behavioral Therapy (GCBT) (14 weekly sessions, each lasting 2 hours)
Dunne, 2012[4]	RCT	26 (13 female, 13 male)	20-49	Patients with chronic whiplash-associated disorders (WAD) grade II or III (range 3 mo to 5 yr) and met the diagnostic criteria for current MVC-related PTSD.	Patients with cervical spine fractures, serious head injuries, burns, previous hx of treatment for neck pain or headaches, or an underlying psychiatric disorder	None	Trauma-Focused Cognitive Behavioral Therapy (10 weekly 1 hour sessions)
Shipherd, 2003[5]	Primary Research Case Study	6 (all female)	33-47	Patients stable or deteriorating in their PTSD symptomatology as well as those that had not responded to standard pain interventions for a min. of 3 months.	Patients with current substance use disorders	None	Cognitive Behavioral Therapy over the course of 12 weeks

OUTCOMES MEASURED

The outcomes measured in each of these studies consisted of patient oriented outcomes (POEMs) – specifically the extent of pain reduction experienced by the patient after receiving treatment. Beck et al[3] utilized the Pain Severity subscale of the Multidimensional Pain Inventory (PS-MPI), with 0 rated as no pain and 6 rated as severe pain. The study by Dunne et al[4] utilized a numerical rating scale (NRS), with 0 being no pain, 5 being some pain, and 10 being the worst pain imaginable. Finally, Shipherd et al[5] utilized a NRS which allowed patients to report average pain intensity on a scale of 0–6, with 0 being not at all severe, and 6 being extremely severe.

RESULTS

Results from each study were presented as continuous data that could not be converted to dichotomous data; therefore, relative risk reduction (RRR), absolute risk reduction (ARR), or numbers needed to treat (NNT) were not calculated for this review. Notably, no adverse effects or harm to patients secondary to treatment were reported in any of the studies. Patients were recruited by Beck et al[3] and Shipherd et al[5] through various pain clinics and treatment centers within the United States. The only non-American study was conducted by Dunne et al[4], which recruited their sample size through advertisements in Australia.

The study conducted by Beck et al[3] consisted of 44 patients (36 female and 8 male) randomly assigned to either GCBT (n=26) or to the minimum contact comparison group (MCC) (n=18). Patients in the MCC control group received a phone call once every 4 weeks in which they were provided with minimal support but without active intervention (i.e. CBT). Upon completing the post-assessment pain evaluations, the study size consisted of 11 GCBT patients, and 14 MCC patients. An explanation was not provided regarding these drop outs. It should be noted that individuals already on pain medications were permitted to continue their use during

the course of this study, in an attempt to simulate outpatient treatment. Baseline pain severity surveys (rated 0-6) were then compared to post-assessment pain severity surveys (also rated 0-6).

To analyze their data, Beck et al[3] used the multivariate analysis of variance algorithm (using Group (GCBT, MCC) × Time (PRE, POST) as the variables) and a statistically significant p value of $\leq .05$. To calculate effect size, the authors used Hedge's unbiased *g.* Analysis of the pain subscale of the multi-axial pain inventory (PS-MPI) revealed a significant time effect ($F = 7.61$, $p = .01$), indicating that both the GCBT group as well as the MCC group showed a significant reduction in pain severity from pre-assessment to post-assessment. The mean pre-treatment PS-MPI rating for the GCBT patients (with inclusion of effect sizes) was 52.2 with a standard deviation of 5.6. The mean pre-treatment PS-MPI rating for MCC patients was 48.8 with a standard deviation of 11.5. Following treatment, the mean PS-MPI rating for the GCBT patients (also with inclusion of effect sizes) was 47.7 with a standard deviation of 8.8 and the mean PS-MPI rating for MCC patients was 45.2 with a standard deviation of 10.5. Table 2 summarizes these results.

Table 2: Comparison of pre- and post-treatment pain severity (Beck et al[3])

Treatment Group	Pre-treatment PS-MPI Rating (SD)	Post-treatment PS-MPI Rating (SD)
GCBT (n=11)	52.2 (5.6)	47.7 (8.8)
MCC (n=14)	48.8 (11.5)	45.2 (10.5)

Dunne et al[4] conducted a study consisting of 26 patients (13 female, 13 male) randomly assigned to either TF-CBT (n=13) or to the waitlist group (n=13). The patients in the wait list group did not receive any treatment. At the time of the post-assessment evaluation, 1 patient in the TF-CBT group had moved interstate, resulting in a total of 12 patients. In regard to the waitlist group, 1 patient was unable to be contacted and 1 patient chose not to participate in the post-assessment evaluation, resulting in a total of 11 patients. Mean baseline pain severity surveys were then compared to mean post-assessment pain severity surveys.

To analyze their data, Dunne et al[4] also used the multivariate analysis of variance algorithm using Group (TF-CBT, waitlist) × Time (PRE, POST) as their variables. Furthermore, treatment effects were assessed using Consolidated Standards of Reporting Trials intent-to-treat. After analysis, it was determined that there was no significant change in pain intensity in either group over time or between the TF-CBT and waitlist groups. The mean NRS for the TF-CBT group at pre-assessment was 3.46 with a standard deviation of 1.39. The mean NRS for the waitlist group at pre-assessment was 3.77 with a standard deviation of 1.69. At the completion of the study, the mean NRS for the TF-CBT group was 3.23 with a standard deviation of 1.24 and the mean NRS for the waitlist group was 3.92 with a standard deviation of 1.44. It should be noted that there was an increase in pain severity within the waitlist group from pre- and post-treatment assessment, although this was also determined not to be significant. Table 3 summarizes these results.

Table 3: Comparison of pre- and post-treatment pain severity (Dunne et al[4])

Treatment Group	Pre-treatment NRS (SD)	Post-treatment NRS (SD)
TF-CBT (n=11)	3.46 (1.39)	3.23 (1.24)
Waitlist (n=12)	3.77 (1.69)	3.92 (1.44)

The final study conducted by Shipherd et al[5] was a case study consisting of 6 female patients. All participants were present at the end of the 12 week treatment process. Mean baseline pain severity surveys were compared to mean post-assessment pain severity surveys. Before the intervention of CBT was administered to these patients, the average reported pain intensity was 4.2 on a numerical rating scale ranging from 0-6. The standard deviation of this pre-assessment NRS was determined to be 0.98. At the end of treatment, the average pain intensity was reported to be 3.5, with a standard deviation of 0.84. Table 4 summarizes these results.

Table 4: Comparison of pre- and post-treatment pain severity (Shipherd et al[5])

	Pre-treatment NRS (SD)	Post-treatment NRS (SD)
Patients (n=6)	4.2 (0.98)	3.5 (0.84)

DISCUSSION

This systematic review was intended to compare the results of efficacy of CBT on patients with chronic pain and PTSD secondary to a MVA. A number of limitations existed within the three studies reviewed. Each study consisted of a relatively small sample size (each < 50 patients), which could potentially skew the validity of the significance of each result[3,4,5]. The smallest of the sample sizes came from the study conducted by Shipherd et al[5], which only consisted of 6 individuals, all of which were females. Furthermore, this particular study was not a randomized or controlled trial[5].

Although the treatment provided in each study consisted of CBT, the means of distributing this therapy was not a standardized process. Psychoeducation, for example, was utilized in the studies by Beck et al[3] and Dunne et al[4], but not in the study by Shipherd et al[5]. All studies utilized in-vivo and imaginal exposure, anger management, and various relaxation techniques[3,4,5]. A lack of standardization also existed between each studies method of collecting reported pain severity. Beck et al[3] used a severity scale ranging from 0-6 that was based on the PS-MPI. Both Dunne et al[4] and Shipherd et al[5] used a numerical rating scale (NRS), however their ranges varied between 0-10 and 0-6, respectively.

The current health care reform bill in the United States ensures that insurance companies treat mental health in the same way that they treat medical or surgical needs[7]. This being said, CBT and other forms of psychotherapy are becoming more accessible and affordable. More data supporting the use and effectiveness of CBT will only continue this trend of mental health equality. As of 2013, however, there was still a reported 42.0 million individuals without health care insurance, suggesting that a large portion of the population is still required to pay for CBT out of pocket[7,8].

CONCLUSIONS

After review of two randomized controlled trials and one primary research case study, the data to suggest that CBT effectively decreases the severity of chronic pain in patients with MVA associated PTSD is inconclusive. The study conducted by Beck et al[3] showed a significant reduction in pain severity within the GCBT group as well as the MCC group over time, however, it does not appear that this difference was significant between the two groups. Dunne et al[4] concluded that there was no significant change in pain intensity in either group over time or between the treatment and control groups. Regardless, it should be noted that there was a decrease in pain severity within the TF-CBT group, but an increase in pain severity over time within the waitlist group. Shipherd et al[5] also reported a decrease in pain severity, however there was no mention of the significance of this change.

Future studies should aim to report data in a dichotomous fashion so to provide more statistically sound evidence. Administrators, could, for example, set criteria at the start of the study indicating what degree of change is significant. A patient reported pain reduction greater than 1 could indicate a "yes", thus allowing for the creation of dichotomous data and further statistical evaluation. Furthermore, to add congruity to the topic, further reviews should focus on one subset of CBT (GCBT, TF-CBT, etc.). Finally, although MVAs are one of the leading causes of PTSD in American civilians, further research should examine the effectiveness of CBT on chronic pain and PTSD associated with combat, domestic violence, or other significant stressors.

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