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Major clinical approaches in the treatment of chronic pain through cognitive-behavioral and lifestyle therapy: a systematic review

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Abstract

Introduction: It is estimated that millions of people worldwide suffer from chronic pain, which is a condition influenced by biological, psychological, and social factors and optimally managed by treatments that address not only its biological causes but also its psychological and social influences and consequences. Over the past 60 years, parallel advances in the scientific understanding of pain and the development of cognitive and behavioral therapies have led to the widespread application of cognitive-behavioral therapy (CBT) to chronic pain problems. **Objective:** This was to conduct a systematic review to demonstrate, through randomized clinical trials and meta-analyses, the real impact of treating chronic pain through cognitive-behavioral therapy. **Methods:** The systematic review rules of the PRISMA Platform were followed. The search was conducted from August to September 2024 in the Scopus, PubMed, Science Direct, Scielo, and Google Scholar databases. The quality of the studies was based on the GRADE instrument and the risk of bias was analyzed according to the Cochrane instrument. **Results and Conclusion:** A total of 84 articles were found. 21 articles were evaluated and 07 were included in this systematic review. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 29 studies with a high risk of bias and 22 studies that did not meet GRADE. Most studies presented homogeneity in their results, with X^2= 88.7% >50%. It was concluded that the effectiveness of cognitive-behavioral therapy for individuals with chronic pain has been evaluated in randomized clinical trials for more than three decades, mainly in adults with chronic back pain, headaches, orofacial pain, or arthritis-related pain. Cognitive-behavioral therapy is the "gold standard" psychological treatment for individuals with a wide range of pain problems. The effectiveness of cognitive-behavioral therapy in reducing pain, distress, pain interference with activities, and disability has been established in systematic reviews and meta-analyses. Although the average effect sizes are small to moderate across all pain outcomes, CBT does not have the risks associated with chronic pain medications, surgeries, and interventional procedures. Furthermore, CBT may well have benefits for common comorbid conditions such as diabetes and cardiovascular disease. Research is needed to develop CBT interventions that have stronger beneficial effects, with attention to whether tailoring therapy to specific patient subgroups or problems improves outcomes.

Keywords: Cognitive behavioral therapy. Chronic pain. Lifestyle.

Introduction

It is estimated that millions of people worldwide suffer from chronic pain, a condition influenced by biological, psychological, and social factors and optimally managed by treatments that address not only its biological causes but also its psychological and social influences and consequences [1-3]. Over the past 60 years, parallel advances in the scientific understanding of pain and the development of cognitive and behavioral therapies have led to the widespread application of cognitive-behavioral therapy (CBT) to chronic pain problems [4-7].

Indeed, CBT is now a mainstream treatment, alone or in conjunction with medical or interdisciplinary rehabilitation treatments, for individuals with chronic pain problems of all types [8-12]. The beginning of this modern era in the treatment of chronic pain began with the publication of the pain control theory [13], which emphasized the importance of cognitive and affective, as well as sensory, influences on pain. In the decade since the understanding and treatment of chronic pain, psychologist Wilbert Fordyce [14] has argued that pain behaviors can be triggered and shaped by social and environmental factors stimuli and consequences.

The repertoire of treatments for chronic pain has expanded to include behavioral treatments that aim to decrease patients' pain behaviors. Over the three decades since the initial applications of CBT for chronic pain, a vast body of research has established the importance of cognitive and behavioral processes in how individuals adapt to chronic pain. As postulated by learning theory [14], social and environmental variables (e.g., family responses) are associated with pain behaviors and levels of disability.

Several studies have also documented the associations of pain-related beliefs and appraisals with pain intensity and related problems, including depression, physical disability, and activity and social role limitations. In particular, pain catastrophizing (magnification of threat, rumination about, and perceived inability to cope with pain) has been consistently associated with greater physical and psychosocial dysfunction, even after controlling for pain and depression levels [1,3-6].

Furthermore, fear avoidance (avoidance of activities due to fear of increased pain or bodily harm) has also been shown to be important in pain and physical and psychosocial function. CBT is currently the predominant psychological treatment for individuals with chronic pain conditions such as low back pain, headaches, arthritis, orofacial pain, and fibromyalgia. CBT has also been applied to pain associated with cancer and its treatment. The goals of CBT for pain are to reduce pain and psychological distress and improve physical function by decreasing maladaptive behaviors, increasing adaptive behaviors, identifying and correcting maladaptive thoughts and beliefs, and increasing self-efficacy for pain management [1,2].

Many individuals with chronic pain have mood, anxiety, and sleep disturbances, and CBT is also used to treat these conditions. There is no standard protocol for CBT, and the number of sessions and specific techniques vary. Techniques often used for pain include relaxation training, setting and working toward behavioral goals (often including systematic increases in exercise and other activities), behavioral activation, activity pacing, problem-solving training, and cognitive restructuring. CBT typically includes intersession activities to practice and apply new skills [1–4].

Therefore, the present study conducted a systematic review to demonstrate, through randomized clinical trials and meta-analyses, the real impact of cognitive-behavioral therapy on the treatment of chronic pain.

Methods

Study Design

This study followed the international systematic review model, following the PRISMA (preferred reporting items for systematic reviews and meta-analysis) rules. Available at: http://www.prisma-statement.org/?AspxAutoDetectCookieSupport=1. It was accessed on: 09/12/2024. The AMSTAR-2 (Assessing the methodological quality of systematic reviews) methodological quality standards were also followed. Available at: https://amstar.ca/. It was accessed on: 09/12/2024.

Data Sources and Search Strategy

The literature search process was carried out from August to September 2024 and developed based on Web of Science, Scopus, PubMed, Lilacs, Ebsco, Scielo, and Google Scholar, covering scientific articles from various periods to the present day. The Health Science Descriptors (DeCS /MeSH Terms) were used: "Cognitive-behavioral therapy. Chronic pain. Lifestyle", and using the Boolean "and" between MeSH terms and "or" between historical findings.

Study Quality and Risk of Bias

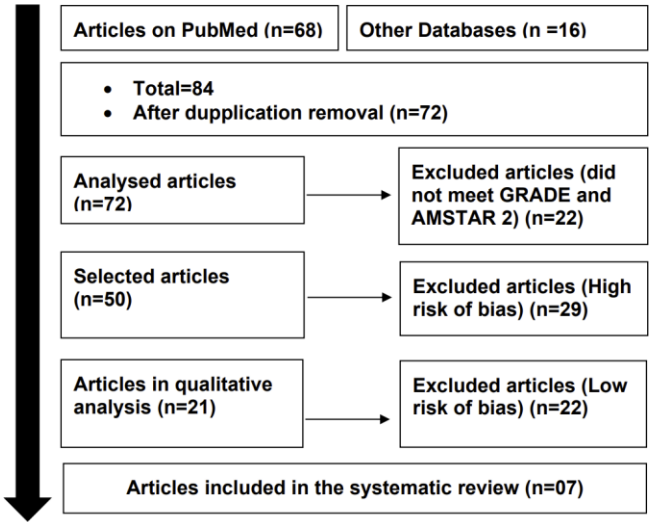
The quality was classified as high, moderate, low, or very low regarding the risk of bias, clarity of comparisons, precision, and consistency of analyses. The most evident emphasis was on systematic review articles or meta-analysis of randomized clinical trials, followed by randomized clinical trials. Low quality of evidence was attributed to case reports, editorials, and brief communications, according to the GRADE instrument. The risk of bias was analyzed according to the Cochrane instrument by analyzing the Funnel Plot graph (Sample size versus Effect size), using Cohen's d test.

Results and Discussion

Summary of Findings

As a corollary of the literature search system, a total of 84 articles were found that were submitted to eligibility analysis and, subsequently, 07 of the 21 final studies were selected to compose the results of this systematic review. The listed studies presented medium to high quality (Figure 1), considering in the first instance the level of scientific evidence of studies in study types such as meta-analysis, consensus, randomized clinical, prospective, and observational. Biases did not compromise the scientific basis of the studies. According to the GRADE instrument, most studies presented homogeneity in their results, with X^2=88.7%>50%. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 29 studies with a high risk of bias and 22 studies that did not meet GRADE and AMSTAR-2.

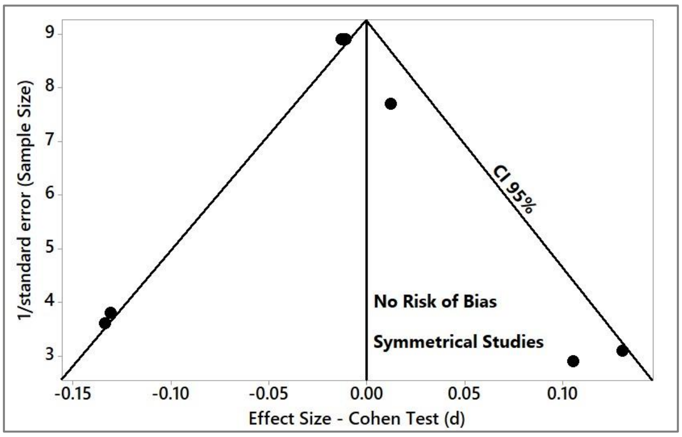
Figure 1. Flowchart showing the article selection process.



Source: Own Authorship.

Figure 2 presents the results of the risk of bias of the studies using the Funnel Plot, showing the calculation of the Effect Size (Magnitude of the difference) using Cohen's Test (d). Precision (sample size) was determined indirectly by the inverse of the standard error (1/Standard Error). This graph had a symmetrical behavior, not suggesting a significant risk of bias, both among studies with small sample sizes (lower precision) at the base of the graph and in studies with large sample sizes at the top.

Figure 2. The symmetrical funnel plot suggests no risk of bias among the small sample size studies at the bottom of the graph. High confidence and high recommendation studies are shown above the graph (n=07).



Source: Own Authorship.

Principais Achados Clínicos

Several studies have gathered evidence from systematic reviews and meta-analyses of randomized controlled trials on the effectiveness of acceptance and commitment therapy (ACT) for adults with chronic pain concerning pain intensity, painrelated functioning, quality of life, and psychological factors. And reviews comprising 84 meta-analyses of interest were included. Some meta-analyses mainly showed that ACT can reduce symptoms of depression, symptoms of anxiety, psychological inflexibility, and pain catastrophizing; and can improve mindfulness, pain acceptance, and psychological flexibility. At three-month follow-up, ACT can reduce symptoms of depression and psychological inflexibility, as well as improve pain-related functioning and psychological flexibility. At a six-month follow-up, ACT can improve mindfulness, pain-related functioning, pain acceptance, psychological flexibility, and quality of life. At six- to twelve-month follow-up, ACT can reduce pain catastrophizing and can improve pain-related functioning. Some methodological and clinical issues are identified in the reviews, such as a very high overlap between systematic reviews, the certainty of the evidence is often not rated, and specific details needed to replicate the reviewed interventions are often not reported. Overall, randomized controlled trials and systematic reviews show that ACT can improve outcomes related to chronic pain (e.g., pain-related functioning) [15].

The authors Salazar-Méndez et al. (2024) [16] determined through a meta-analysis the effects of cognitive-behavioral therapy for insomnia (CBT-I) on sleep disturbances, pain intensity, and disability in patients with chronic musculoskeletal pain (CMD), as well as analyzed the dose-response association between CBT-I dose (total minutes) and improvements in sleep disturbances, pain intensity, and disability in patients with CMD. A total of 11 randomized controlled trials (n = 1801 participants) were included. A significant effect in favor of CBT-I was found for insomnia (SMD: -1.34;

95% CI: -2.12 to -0.56), with a peak effect size at 450 min of CBT-I (-1.65, 95% CI: -1.89 to -1.40). A non-significant effect was found for pain intensity. A disability meta-analysis was not possible due to a lack of data. Therefore, the benefits of CBT-I for insomnia were observed compared to control interventions, with a large effect size. Furthermore, it was estimated that a dose of 250 min of CBT-I had a large effect in reducing insomnia and that the peak effect was reached at 450 min.

A systematic review and meta-analysis study by authors Paschali et al. (2024) [17] summarized the existing evidence examining the effects of mindfulness-based interventions (MBIs) for chronic low back pain (CLBP). A total of 18 studies used validated patient-reported pain outcome measures and were therefore included in the meta-analysis. MBIs included mindfulness meditation, mindfulness-based stress reduction, mindfulness-based cognitive therapy, mindfulness-oriented recovery enhancement, acceptance and commitment therapy, dialectical behavior therapy, cognitive behavior therapy-meditation, mindfulness-based care for chronic pain, selfcompassion course, and loving-kindness course. Pain intensity scores were reported using a numerical rating scale (0–10) or an equivalent scale. The meta-analysis revealed that MBIs have a beneficial effect on pain intensity with a large effect size in adults with CLBP. MBIs appear to be beneficial in reducing pain intensity. Although these results were informative, the findings should be interpreted cautiously due to limited data, high variability in study methodologies, small sample sizes, inclusion of studies with a high risk of bias, and reliance on pre-post-treatment differences without attention to maintenance of effects. More large-scale RCTs are needed to provide reliable effect size estimates for MBIs in people with CLBP.

Over the past three decades, cognitive-behavioral therapy (CBT) has become a first-line psychosocial treatment for individuals with chronic pain. Evidence of efficacy in improving pain and pain-related problems across a broad spectrum of chronic pain syndromes has come from several randomized controlled trials. CBT has been adapted and found to be beneficial for special populations with chronic pain, including children and the elderly. Innovations in CBT delivery formats (e.g., web-based, telefone-delivered) and treatments based on CBT principles that are delivered by healthcare professionals other than psychologists have shown promise for chronic pain problems [18]. Furthermore, an individualized intervention called cognitive functional therapy (CFT) was superior for chronic low back pain compared with manual therapy and exercise in a randomized controlled trial. However, systematic reviews show that group interventions are as effective as individual interventions for musculoskeletal pain. A total of 206 adults with chronic low back pain were randomized to CFT (n = 106) or group exercise and education (n = 100). The duration of the TFC intervention varied according to participants' clinical progression (mean = 5 treatments). The group intervention consisted of up to 6 classes (mean = 4 classes) over 6 to 8 weeks. Primary outcomes were disability and pain intensity in the previous week at 6 months and 12 months after randomization. Analysis was by intention-to-treat using linear mixed models. TFC reduced disability more than the group intervention at 6 months (mean difference, 8.65; 95% CI 3.66 to 13.64; p = 0.001) and at 12 months (mean difference, 7.02; 95% CI 2.24 to 11.80; p = 0.004). There were no observed between-group differences in pain intensity at 6 months (mean difference, 0.76; 95% CI -0.02 to 1.54; p=0.056) or 12 months (mean difference, 0.65; 95% CI -0.20 to 1.50; p=0.134). Thus, CFT reduced disability, but not pain, at 6 and 12 months compared with the group exercise and education intervention [19].

Cognitive functional therapy (CFT) is a physical therapy-led intervention that evolved from an integration of fundamental behavioral psychology and neuroscience into physical therapist practice that targets the multidimensional nature of chronic low back pain. Current evidence on the comparative effectiveness of CFT for chronic low back pain is sparse. Our objective was to investigate whether CFT is more effective than core training exercise and manual therapy (CORE-MT) on pain and disability in patients with chronic low back pain. A total of 148 adults with chronic low back pain were randomly assigned to receive 5 individualized 1-hour sessions of either CFT (n = 74) or CORE-MT (n = 74) over 8 weeks. Primary outcomes were pain intensity (numeric pain rating scale, 0-10) and disability (Oswestry Disability Index, 0-100) at 8 weeks. Patients were assessed before intervention, at 8 weeks, and 6 and 12 months after the first treatment session. Overall, 97.3% (n = 72) of patients in each intervention group completed the 8-week study. Cognitive functional therapy was more effective than CORE-MT on disability at 8 weeks (MD = −4.75; 95% CI −8.38 to −1.11; P = 0.011, effect size = 0.55) but not on pain intensity (MD = −0.04; 95% CI −0.79 to 0.71; P = 0.916). CFT treatment reduced disability, but the difference was not clinically important compared with CORE-MT postintervention (short-term) in patients with chronic low back pain. There was no difference in pain intensity between interventions, and the treatment effect was not maintained at medium- and long-term follow-ups [20].

Finally, a clinical trial by Darnall et al. (2022) [21] evaluated whether a single class in evidence-based pain management skills (empowered relief) is non-inferior to 8-session CBT and superior to health education at 3 months post-treatment for improving pain catastrophizing, pain intensity, pain interference, and other secondary outcomes. Participants included community-dwelling individuals with self-reported chronic low back pain for 6 months or longer and average pain intensity of at least 4 (range 0-10, with 10 indicating the worst pain imaginable). Data were analyzed using both intention-to-treat and per-protocol approaches. Participants were randomized to (1) empowered relief, (2) health education (combined with empowered relief for duration and format), or (3) 8-session CBT. Self-reported data were collected at baseline, pre-treatment, and at months 1, 2, and 3 post-treatment. A total of 263 participants were included in the analysis (131 women [49.8%], 130 men [49.4%], and 2 others [0.8%]; mean [SD] age, 47.9 [13.8] years) and were randomized into 3 groups: strengthened relief (n = 87), CBT (n = 88), and health education (n = 88). Strengthened relief was non-inferior to CBT for pain catastrophizing scores at 3 months (CBT difference, 1.39 [97.5% CI, -∞ to 4.24]). Enhanced relief and CBT were superior to health education for pain catastrophizing scores (enhanced relief vs. health education difference, -5.90 [95% CI, -8.78 to -3.01; p<0.001]; CBT vs. health education difference, -7.29 [95% CI, -10.20 to -4.38; p<0.001]). Reductions in pain catastrophizing scores for both enhanced relief and CBT at 3 months posttreatment were clinically meaningful (enhanced relief, -9.12 [95% CI, -11.6 to -6.67; P < .001]; CBT, -10.94 [95% CI, -13.6 to -8.32; P < .001]; health education, -4.60 [95% CI, -7.18 to -2.01; P = .001]). Between-group comparisons for pain catastrophizing at months 1 to 3 were adjusted for baseline pain catastrophizing scores and used intention-to-treat analyses. Enhanced relief was non-inferior to CBT for pain intensity and pain interference (priority secondary outcomes), sleep disturbance, pain bothersomeness, pain behavior, depression, and anxiety. Enhanced relief was inferior to CBT for physical function. Among adults with chronic low back pain, a single-session pain management class resulted in clinically meaningful improvements in pain catastrophizing, pain intensity, pain interference, and other secondary outcomes that were non-inferior to 8-session CBT over 3 months.

Future Directions for Improving the Efficacy and Dissemination of CBT for Chronic Pain

A considerable body of research supports the efficacy of CBT in improving chronic pain and related outcomes across a wide range of pain syndromes. However, its benefits are generally modest on average. What can be done to improve CBT outcomes for patients with chronic pain? How can progress be made to overcome the underutilization of CBT for the many people living with chronic pain? Progress in answering these questions can come from addressing several gaps in the CBT literature.

CBT interventions evaluated in randomized controlled trials vary widely in their content, format (e.g., group vs. individual, face-to-face vs. Web-based), and dose. CBT for pain is typically a multi-component treatment with no single standard treatment manual for group or individual therapy. Among the studies that do use treatment manuals, many are developed by the investigators for the trial and are not published, making comparisons of specific CBT interventions across studies impossible.

Research comparing different treatment doses, formats, and content is also lacking. It is not yet known which specific components of CBT, delivery methods, or therapeutic dosages are optimally effective for individuals with chronic pain as a whole or for specific subgroups. Research is also needed to determine whether and how the use of booster sessions after initial treatment promotes the maintenance of treatment effects, as well as the optimal frequency, duration, and mode (e.g., in-person, telephone) of sessions.

Conclusion

The efficacy of cognitive-behavioral therapy for individuals with chronic pain has been evaluated in randomized controlled trials for more than three decades, primarily in adults with chronic back pain, headaches, orofacial pain, or arthritis-related pain. Cognitive-behavioral therapy is the “gold standard” psychological treatment for individuals with a wide range of pain problems. The efficacy of cognitive-behavioral therapy for reducing pain, distress, pain interference with activities, and disability has been established in systematic reviews and meta-analyses. Although the average effect sizes are small to moderate across all pain outcomes, cognitive-behavioral therapy does not have the risks associated with chronic pain medications, surgeries, and interventional procedures. Furthermore, cognitive-behavioral therapy may well have benefits for common comorbid conditions such as diabetes and cardiovascular disease. Research is needed to develop cognitive-behavioral therapy interventions that have stronger beneficial effects, with attention to whether tailoring therapy to specific patient subgroups or problems improves outcomes.

CRediT

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Conflict of Interest

The authors declare no conflict of interest.

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