






ORIGINAL

## Effectiveness of cognitive-behavioral treatment for chronic pain in patients with comorbidities

## Efectividad del tratamiento cognitivo-conductual para el dolor crónico en pacientes con comorbilidades

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**Cite as:** Sofía Moretti L, Medrano LA, Garcia-Batista ZE, Morera LP, Heinz-Dieter B. Effectiveness of cognitive-behavioral treatment for chronic pain in patients with comorbidities. Health Leadership and Quality of Life. 2025; 4:649. <https://doi.org/10.56294/hl2025649>


Submitted: 10-06-2024

Revised: 09-11-2024

Accepted: 21-05-2025

Published: 22-05-2025

Editor: PhD. Neela Satheesh 

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### ABSTRACT

**Introduction:** although it is well-known that cognitive-behavioral therapy is efficacious for the treatment of chronic pain patients, studies that have evaluated its efficacy lose external validity because the scenario used in these investigations are highly different from natural settings.

**Objective:** to determine the effectiveness of a cognitive-behavioral treatment for patients with chronic pain in a natural ambulatory setting.

**Method:** a quasi experimental design with no control group was implemented, in which a 14-session treatment program was used with 6 patients with chronic pain.

**Results:** after the treatment participants showed statistically significant reductions on the worst pain experienced and on pain average. Moreover, patients exhibited increments on health-related quality of life related to role limitations due to emotional problems, emotional wellbeing, loss of energy and fatigue and social functioning. Effect size measures revealed to be from moderate to big (d between 0,44 and 0,81).

**Conclusion:** these results suggest that the treatment program administered showed to be effective to diminish perceived pain and to improve health quality of life among chronic pain patients.

**Keywords:** Effectiveness; Cognitive-Behavioral Therapy; Effectiveness; Chronic Pain.

### RESUMEN

**Introducción:** la terapia cognitivo-conductual ha demostrado ser eficaz para el tratamiento del dolor crónico, sin embargo, los estudios de eficacia se centran fundamentalmente en garantizar la validez interna del estudio perdiendo validez ecológica. En efecto, el control de variables intervinientes (como, por ejemplo, el control de la comorbilidad) lleva a que el tratamiento se asemeje poco al modo en que se administran en la labor clínica habitual. Por este motivo se requiere de estudios que analicen la efectividad de protocolos que ya han demostrado ser eficaces.

**Objetivo:** evaluar la efectividad de un tratamiento cognitivo-conductual en pacientes con dolor crónico (DC).

**Método:** se empleó un diseño cuasi experimental pre pos sin grupo control con 6 pacientes con DC que recibieron un tratamiento de 14 sesiones.

**Resultados:** se observaron reducciones estadísticamente significativas del peor dolor percibido y del promedio

de dolor. Asimismo, se obtuvieron aumentos estadísticamente significativos en la calidad de vida relacionada a las limitaciones del rol ocasionados por problemas emocionales, a la percepción de falta de energía y fatiga, al bienestar emocional y al funcionamiento social. Las medidas del tamaño del efecto resultaron ser moderadas a elevadas ( $d$  entre 0,44 y 0,81).

**Conclusiones:** los resultados sugieren que el tratamiento administrado ha demostrado utilidad en la reducción del dolor y en el aumento de la calidad de vida en pacientes con dolor crónico.

**Palabras clave:** Efectividad; Tratamiento Cognitivo-Conductual; Efectividad; Dolor Crónico.

## INTRODUCTION

Chronic pain is a complex problem that causes high levels of discomfort and has a significant impact on society and individuals.<sup>(1)</sup> It is currently one of the most common reasons for absenteeism from work and disability retirement.<sup>(2,3)</sup> The 2016 Global Burden of Disease Study reaffirmed the great importance of pain and related disorders and diseases, as it was presented as the leading cause of disability and illness worldwide.<sup>(4)</sup>

According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. This definition considers pain to be a multidimensional experience, consisting not only of biological components, but also of subjective factors. In this sense, people suffering from chronic pain exhibit high levels of impairment in various aspects of their lives: they withdraw from their social and family environment, interpersonal conflicts arise, they become very frustrated, hopeless, and angry due to failed treatment attempts, and they avoid activities for fear that they will cause them more pain, among other things.<sup>(5)</sup>

The gate theory and, later, the neuromatrix theory have reaffirmed that the brain and psychological factors, such as attentional processes, previous experiences, cognitions and beliefs, and emotional states, have a great influence on the experience of pain.<sup>(6)</sup>

Based on these formulations, it is considered that DC cannot be reduced solely to physical factors, which is why reductionist models, such as the biomedical model, are not sufficient for the study and treatment of DC problems.

As a result, research into the psychological variables involved in the experience of CP has gained relevance in the last 20 years. In this regard, the biopsychosocial model of pain argues that the final experience of pain is due to the interplay of several factors, such as biological, psychological, and social aspects, which have a major influence on the onset and maintenance of pain.

Along the same lines, models have been developed in the field of psychotherapy that train strategies that allow patients to control their pain, with cognitive variables being one of the most important factors in pain perception.

In addition, this model has received considerable empirical support regarding its explanatory value for the experience of CP, as well as the predictive value of the psychological variables involved.

The cognitive-behavioral approach to CP is based on the idea that problems related to CP are related to the way in which the person perceives the painful experience. This perception will largely determine the person's adjustment to the disease and the strategies they will implement to cope with their pain problem.

Thus, cognitive-behavioral techniques are designed to help people identify and correct distorted conceptualizations and maladaptive behaviors and replace them with more adaptive coping strategies that help the patient cope with their condition.

With this approach, patients are taught to: 1) monitor automatic negative thoughts; 2) recognize the connections between cognitions, emotions, and behaviors; 3) examine evidence to counteract distorted thoughts; 4) replace cognitive distortions with reality-based interpretations; 5) recognize dysfunctional or irrational beliefs that predispose the person to distort their experiences; and 6) train patients in active pain management strategies.

In general, cognitive-behavioral techniques are distinguished by being comprehensive and active in order to help patients gain control over their own pain.

Based on this approach, patients are taught to take an active role in their treatment, committing to developing and implementing a series of behaviors aimed at repairing damage and modifying maladaptive behaviors.

A large number of studies and meta-analyses have proven the effectiveness of cognitive-behavioral treatments for addressing DC disorders.<sup>(2,9,10)</sup> For example, in a meta-analysis conducted by <sup>(9,10)</sup> it was concluded that cognitive-behavioral therapy proved to be significantly more effective in modifying the experience of pain, developing more functional cognitive coping strategies, and reducing patients' pain behaviors. These researchers also reported a moderate effect size ( $d = 0,50$ ) for cognitive-behavioral treatments, while other

studies reported a large overall effect size ( $d = 0,80$ ). Another meta-analysis conducted by Afrina and Karimah<sup>(11)</sup> concluded that the cognitive-behavioral approach, combined with other treatment modalities (medical and/or physiotherapy), was beneficial in improving physical function, health-related quality of life, and reducing pain levels.

According to the studies reported, it is clear that cognitive-behavioral therapy is effective for the treatment of DC. However, it is worth asking whether these results continue to be observed in real clinical settings and with DC patients with comorbid disorders and diseases. According to a study by Mills et al.<sup>(1)</sup> 88 % of patients with DC had comorbid diseases and/or disorders, and between 20 % and 50 % suffered from depression. This shows that the presence of comorbidities in people suffering from DC is the rule rather than the exception. In this regard, the research that has been conducted consists of efficacy studies, which evaluate whether cognitive behavioral therapy produces the expected effects in highly controlled contexts and with methodological designs that allow for the control and/or exclusion of variables that could bias the results. Although these studies are strong in terms of internal validity, they lack ecological validity as they bear little resemblance to the typical patient with CD (with comorbid disorders and illnesses) and to the real clinical settings in which interventions are usually administered (outpatient clinics, health institutions, among others).<sup>(12,13)</sup>

In this vein, Chambless and Hollon<sup>(14)</sup> highlight the need for studies that evaluate the effectiveness of interventions that have been shown to be effective, since the ultimate goal of empirically evaluated treatments is to determine how well they work in real-world settings, where they are applied to all patients seeking treatment (without excluding them due to the presence of comorbidities) and in poorly controlled clinical environments. That is why this study was conducted with the aim of determining the impact of a cognitive behavioral treatment program for pain reduction and quality of life improvement in patients with chronic benign pain in an outpatient setting.

## METHOD

Using a pre-post quasi-experimental design without a control group<sup>(19)</sup>, the impact of cognitive behavioral therapy on quality of life and pain intensity was evaluated in patients with chronic pain in the city of Córdoba (Argentina).

### Participants

The study population consisted of older adults attending a center for older adults in the city of Córdoba (Argentina). From this population, a sample was selected using intentional non-probability sampling, consisting of six participants diagnosed with benign chronic pain who voluntarily agreed to participate based on the criteria established by the study.

To participate in the treatment, individuals had to meet inclusion criteria that required a medical diagnosis of a benign chronic pain disorder lasting six months or longer and the presence of pain, either continuous or recurrent. No exclusion criteria related to the presence of comorbid diseases and/or disorders were applied. In this regard, four of the participants had comorbid medical conditions (type II diabetes, hyperthyroidism, hypertension, and gastritis). In addition, all participants reported mild to moderate depressive symptoms, and three of them exhibited moderate anxiety symptoms. The sample consisted of five women and one man with a mean age of 58,20 ( $SD = 14,44$ ), of whom three received a medical diagnosis of fibromyalgia and three were diagnosed with osteoarthritis. At the time of treatment, all participants were taking painkillers, with a mean perceived relief of 1,33 ( $SD = 1,63$ ), ranging from 0 (no relief) to 10 (maximum perceived relief).

To assess the magnitude of the changes observed, the effect size was calculated using Cohen's  $d$ , considering the cut-off points proposed by Cohen (1988) to interpret the effects as small ( $d \approx 0,20$ ), moderate ( $d \approx 0,50$ ), or large ( $d \geq 0,80$ ).

### Instruments

Before beginning the protocol, participants were given a brief interview in which they were asked about different aspects related to their pain problem and other symptoms and/or comorbid diseases or disorders.

#### *SF-36 Quality of Life Questionnaire*

This questionnaire consists of a series of questions that assess both positive and negative health states ("How would you rate your current overall health compared to a year ago?", "During the past 4 weeks, to what extent have your physical health or emotional problems interfered with your normal social activities with your family, friends, neighbors, or other people?"). In this study, the Argentine version of the scale was used, which consists of 36 items grouped into eight dimensions: physical activities, social activities, physical limitations in usual activities, body pain, general mental health, emotional limitations in usual activities, vitality, and general perception of health. The internal consistency indices of the dimensions range from 0,79 to 0,92. According to the local version of the instrument, this scale does not provide an overall quality of life score, but rather

a score for each dimension. In this regard, to interpret the scores, it is considered that the higher the score obtained (closer to 100), the better the quality of life of the participant in that particular area of their life.

### Visual Analog Scale

This scale measures the intensity of pain perceived by patients in a unidimensional manner. It consists of a 10-centimeter line ranging from 0 (no pain) to 10 (worst pain imaginable), along which participants must mark the intensity of pain perceived.<sup>(16)</sup> This instrument, in addition to being one of the most widely used in unidimensional pain assessment<sup>(17)</sup>, does not require psychometric adaptation, since internal consistency and internal structure studies require a group of items or variables<sup>(18)</sup>, and in this case there is only one item.

### Procedure

After the pre-treatment assessment of the quality of life and pain intensity variables, participants received cognitive-behavioral treatment consisting of 14 group sessions lasting an hour and a half. The structure of the sessions was as follows: 1) Set the objectives for the session; 2) Rate pain intensity; 3) Review the tasks assigned in the previous session; 4) Psychoeducation; 5) Work on the planned objectives; 6) Assign tasks; and 7) Request feedback and close the session. The different techniques used to design the treatment were aimed at increasing self-efficacy towards pain, improving coping skills, restructuring thoughts and beliefs about pain, optimizing pain management skills, and reducing pain behaviors. Once the treatment phase was completed, participants were re-evaluated on pain intensity and health-related quality of life.

## RESULTS

In order to evaluate the impact of the treatment program on pain intensity and quality of life dimensions, the Student's t-test for related samples was used. The results suggest that after treatment, significant reductions were observed in the worst perceived pain ( $t = 2,07$ ;  $gl = 5$ ;  $p < 0,046$ ) and average pain ( $t = 2,47$ ;  $gl = 5$ ;  $p < 0,02$ ). These findings allow us to conclude that after treatment, participants showed significant reductions in pain levels.

On the other hand, statistical analysis also revealed changes in quality of life levels. In this regard, it was found that after the intervention, significant increases were observed in quality of life related to role limitations caused by emotional problems ( $t = -3,43$ ;  $gl = 5$ ;  $p < 0,009$ ), perceived lack of energy or fatigue ( $t = -2,21$ ;  $gl = 5$ ;  $p < 0,03$ ), emotional well-being ( $t = -3,36$ ;  $gl = 5$ ;  $p < 0,01$ ), and social functioning ( $t = -2,46$ ;  $gl = 5$ ;  $p < 0,028$ ). That is, participants who received cognitive-behavioral treatment showed significant increases in their perception of their own health-related quality of life.

The effect size was also calculated using Cohen's  $d$  to determine the size of the differences found.<sup>(14)</sup> First, the effect size observed on the intensity of the worst perceived pain is 0,70, and on the average pain is 0,81. On the other hand, in terms of the dimensions of health-related quality of life evaluated, the effect size found was 0,57 for role limitations due to emotional problems, 0,44 for perceived lack of energy or fatigue, 0,57 for emotional well-being, and 0,58 for social functioning. Based on the effect sizes calculated using Cohen's  $d$ , the values found can be considered moderate to high (table 1).

Table 1. Negative $t$ values indicate an increase in the variable (improvement) after the intervention				
Variable evaluated	$t$	$gl$	$p$	$d$ (Cohen)
Worse perceived pain	2,07	5	,046	0,7
Average pain	2,47	5	,020	0,81
Role limitations due to emotional problems	-3,43	5	,009	0,5
Perceived lack of energy or fatigue	-2,21	5	,030	0,44
Emotional well-being	-3,36	5	,010	0,57
Social functioning	-2,46	5	,028	0
Note: All reported changes are statistically significant ( $p < ,05$ ).				

## DISCUSSION

The objective of the present study was to evaluate the effectiveness of cognitive-behavioral treatment aimed at reducing pain and improving health-related quality of life in people with chronic benign pain and associated comorbidities. This study emphasized the evaluation of the results of cognitive-behavioral treatment with a special focus on the ecological validity of the design. In this regard, one of the major contributions of this research is that the intervention was developed in a real clinical setting and included all participants who requested treatment (no exclusion criteria were used for participants, although all of them presented symptoms

and/or comorbid disorders). According to Chambless and Hollon<sup>(14)</sup>, this type of study has gained relevance in the field of therapeutic intervention research because it evaluates treatments in the circumstances and conditions in which they are usually applied.

The results obtained from testing a cognitive-behavioral intervention to reduce pain intensity and improve the quality of life of the patients treated prove to be effective in improving quality of life and reducing pain in the people with CP treated here. These findings are consistent with those reported by other studies in the field, which show that, among psychological interventions for chronic pain, cognitive-behavioral therapy is the most widely used approach and has been shown to be effective in addressing these syndromes.<sup>(15,16,17,18)</sup> Specifically, patients who participated in the program showed significant reductions in perceived pain, results consistent with those observed,<sup>(19)</sup> who found a significant reduction in pain intensity in the group of patients with chronic low back pain who received cognitive therapy compared to the control group. Along the same lines,<sup>(20)</sup> comparable results were observed: in a meta-analysis conducted by these authors based on the analysis of 16 studies, they found a positive effect of cognitive-behavioral therapy compared to conventional (pharmacological) treatment in patients with chronic pain. Although the findings favor cognitive behavioral therapy, the reported effect sizes range from small to medium. In another meta-analytic study,<sup>(22)</sup> the efficacy of cognitive-behavioral interventions in older adults with chronic pain was reviewed. The results of their review of 12 studies suggest that cognitive-behavioral interventions are effective with an effect size of 0,47. In this regard, the effect sizes found in the present study range from medium to large, so at this point, the treatment evaluated here shows superior results to those reported by the studies.<sup>(23,24,25,26,27)</sup>

On the other hand, in a study conducted by <sup>(28)</sup>, patients with rheumatoid arthritis who participated in the study showed a reduction in perceived pain after receiving eight treatment sessions in a cognitive-behavioral program, results comparable to those found in the present sample. Likewise,<sup>(29)</sup> evaluated the effectiveness of a cognitive-behavioral group psychological treatment protocol in patients with fibromyalgia. The results found coincide with those obtained in this study: significant reductions in pain intensity were observed after cognitive-behavioral treatment. Similarly, in a study conducted by <sup>(30)</sup>, results similar to those found in the present study were obtained: after receiving five weeks of cognitive-behavioral treatment, patients with chronic low back pain showed significant improvements in their perception of their health status, including social functioning and emotional stability. These results are especially relevant to this study, as the findings coincide not only in pain relief but also in increased emotional well-being and social functioning.

However, in a study conducted by <sup>(31)</sup>, a methodology similar to that of the present study was used, i.e., an eight-session group cognitive-behavioral program was implemented to reduce pain, anxiety, and depression levels and increase self-efficacy, perception of health status, and quality of life. The program administered was similar to the one used in the present study: psychoeducation, relaxation, cognitive restructuring, and training in healthy habits, among other skills, were used. The results found by <sup>(31)</sup> revealed a reduction in the average level of pain, a reduction in the worst perceived pain, a reduction in symptoms of anxiety and depression, improvements in health status, and an increased perception of self-efficacy.

Although the results of this study are encouraging, there are methodological weaknesses that should be noted. First, the sample size used is small and the sampling is non-probabilistic, which limits the generalizability of the results to a broader population. Second, the absence of a control group prevents comparison of the results of the intervention with the absence of treatment, which weakens the conclusions regarding the effectiveness of the program evaluated. These methodological weaknesses can be considered strengths for future studies which, while continuing to seek ecologically valid results, reinforce the attainment of similar results by ensuring the internal validity of the methodological design.

Finally, the results of this study suggest that cognitive-behavioral treatment has been shown to be effective in reducing the worst perceived pain and average pain, and in increasing quality of life related to role limitations caused by emotional problems, emotional well-being, social functioning, and reducing the perception of lack of energy or fatigue.

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## FUNDING

The authors did not receive funding for the development of this research.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHOR CONTRIBUTION

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