

## Research Paper

# The Efficacy of Cognitive-behavioral Therapy on Psychological Distress and Coping Strategies of Employees With Chronic Low Back Pain



Farzin Bagheri Sheykhgafshe<sup>1\*</sup>, Khazar Tajbakhsh<sup>2</sup>, Vahid Savabi Niri<sup>3</sup>, Zahra Nakhostin Asef<sup>4</sup>, Ali Fathi-Ashtiani<sup>5</sup>

1. Department of Psychology, Faculty of Humanities, Tarbiat Modares University, Tehran, Iran.

2. Department of Psychology, Faculty of Literature and Human Sciences, University of Guilan, Rasht, Iran.

3. Department of Clinical Psychology, Ardabil Branch, Islamic Azad University, Ardabil, Iran.

4. Department of Clinical Psychology, Behshahr Branch, Islamic Azad University, Behshahr, Iran.

5. Department of Clinical Psychology, Behavioral Sciences Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran.



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## ABSTRACT

**Background and Purpose:** Chronic low back pain (CLBP) is one of the most common reasons for confining daily activities and functional disability at work, which can reduce people's mental health. The research was conducted to assess the efficacy of cognitive-behavioral therapy (CBT) in the psychological distress and coping strategies of employees with CLBP.

**Materials and Methods:** The current research approach is a clinical trial with a pre-test-post-test design and a control group. The statistical population included employees of private offices suffering from CLBP in the 8 districts of Tehran City, Iran, in 2021. The study sample consisted of 30 patients with CLBP selected by the available sampling and randomly assigned to control (n=15) and experimental groups (n=15). The study tools included psychological distress and coping strategies. The experimental group received eight 90-minute sessions of CBT, but the control group did not receive any intervention. The obtained information was analyzed using multivariate covariance analysis using SPSS software, version 24.

**Results:** The outcomes of the present study confirmed that CBT significantly reduces depression, anxiety, stress, and emotional and avoidance coping strategies in patients with CLBP ( $P < 0.01$ ). Also, CBT increased the problem-oriented coping strategy in the employees who received the treatment ( $P < 0.01$ ).

**Conclusion:** The studies conducted showed the efficacy of CBT on depression, anxiety, stress, and coping styles of CLBP. Considering the impact of mental health in reducing the physical and social consequences of CLBP, it is necessary to pay special attention to the psychological variables of employees in addition to medical treatments.

**Keywords:** Cognitive-behavioral therapy, Psychological distress, Coping strategies, Chronic low back pain

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### \* Corresponding Author:

**Farzin Bagheri Sheykhgafshe, PhD.**

**Address:** Department of Psychology, Faculty of Humanities, Tarbiat Modares University, Tehran, Iran.

**Tel:** +98 (911) 4969488

**E-mail:** [farzinbagheri@modares.ac.ir](mailto:farzinbagheri@modares.ac.ir)

## 1. Introduction

**M**usculoskeletal discomforts contribute to many occupational diseases [1]. Chronic pain has continuity; usually, 6 months is considered a diagnostic criterion for chronic pain [2]. The International Association for the Study of Pain defines persistent pain as pain without a specific organic cause that remains after the natural time required for recovery (usually between three and 6 months). Depending on the tissue damage, it can last from less than 4 weeks to 6 weeks or even 8 weeks [3]. The prevalence of chronic low back pain (CLBP) has been recorded among people and different occupational groups, which will cause medical expenses for the patient [1]. Employees may experience many physical, psychological, social, family, and financial problems during employment. The boss's expectations from the employee create a lot of anxiety and stress for the employees, aggravating their pain [3].

Patients with CLBP usually experience depression, anxiety, problems in interpersonal relationships, sleep disorders, and fatigue [4]. People with high psychological distress suffer from significant depression, anxiety, and stress, which reduces their psychological and social performance [5]. According to the surveys, female sex, young age, low education, low income, and lack of social support are among the factors that can predict high levels of psychological distress in employees [6]. Since mental health plays a very important role in treating patients with CLBP, paying attention to the dimensions related to the psychological distress of employees is of considerable importance [7]. Research conducted in this field indicates the fact that reducing depression, anxiety, stress, and negative emotions can reduce the severity of pain and illness in employees with CLBP [8, 9]. Based on surveys conducted in 43 countries, the prevalence rates of low back pain and CLBP were reported as 35.1% and 6.9%, respectively. Also, the obtained results indicated the correlation between anxiety, depression, and stress with CLBP, which aggravated symptoms in patients [10]. Chronic back pain significantly impacts a person's social and occupational performance, reducing patients' mental health. Based on this, the results of the studies indicated the prevalence rates of 7.6% for depression, 37.8% for anxiety, and 46.4% for stress in patients with CLBP [11].

Another variable related to chronic pain is coping strategies and how people react to stressful issues [12]. People must use appropriate and efficient coping strategies to control and reduce the tension caused by these stressful conditions. Coping strategies are a person's

cognitive and behavioral efforts to evaluate, solve problems, manage a stressful situation, and reduce suffering and stress caused by those special conditions [13]. The problem-oriented communication style describes the methods based on which the person examines the actions that should be taken to reduce or eliminate a stressful factor [14]. However, in the emotion-oriented coping style, people pay attention to their existential dimensions without considering the opinions of others and environmental pressures; they try to manage their undesirable emotions and do not make emotional decisions in stressful situations [13].

Continuing to complete this theory, researchers added avoidance-oriented coping strategies to this collection [15]. In the avoidant coping style, people with cognitive and thinking errors avoid anxiety-provoking situations or engage with something else. In this method, the problem is not only in the person's mind but in reality; it may still implicate the person [16]. Suffering from chronic diseases and requiring the patient to receive special care causes many challenges in people's daily lives, making it necessary to use coping strategies to adapt to these conditions [17]. The studies showed that patients with chronic pain have high posttraumatic stress and depression. People who use effective coping strategies have better mental health [18]. In another study, it was found that the use of problem-oriented coping strategies reduces the pain intensity and adaptability of patients with CLBP. On the contrary, ineffective coping strategies lead to psychological distress [19].

Recently, many drug and non-drug treatments have been used for CLBP patients. However, due to its symptom-oriented nature, drug treatment has not only been successful in the basic and definitive treatment of disorders, but drug side effects caused by their long-term use have also added to the problem [20]. However, there are various non-pharmacological methods, such as cognitive-behavioral therapy (CBT), which not only do not cause side effects but also contribute greatly to the disorders mentioned above. These techniques have significant theoretical and experimental support due to their problem-oriented nature in treating disorders [21]. In the meantime, CBT must have a strong theoretical basis, and much research has confirmed its effectiveness in reducing the symptoms of the disease and improving and increasing the mental health of different patients [22]. This treatment combines speech interventions and behavior change techniques, including helping people identify their false cognitions, testing the foundations of cognitions, and correcting distorted conceptualizations and dysfunctional beliefs, which helps a person with distorted patterns change their dysfunctional

behavior [21]. The CBT approach to chronic pain assumes that attention to emotional and cognitive factors affecting pain behavior improves and maintains treatment results. This assumption is consistent with the gate control theory of pain, considering that pain perception results from the complex interaction of afferent stimuli from pain receptors and mediating factors such as efferent stimuli, environmental events, emotional reactions, and cognitions [20]. Based on studies, it was found that patients with CLBP have better mental health and reported less pain intensity after receiving CBT [23].

Based on the investigations, it was determined that unfavorable working conditions are the basis for the creation of musculoskeletal disorders, the most common of which today are spine pains. Despite the progress of medical science and the systems that support the work environment (ergonomic science), the mentioned disorders are increasing in the working population. It is predicted that these problems will increase depression, anxiety, stress, and disorders in the short term and emotional burnout of many employees in the long term. As CLBP is a common disease among employees, in the long term, it can have many mental, physical, and social consequences for the individual, society, and family. For this purpose, the current study was conducted to research the efficacy of CBT in the psychological distress and coping style of employees with CLBP.

## 2. Materials and Methods

The current research method was quasi-experimental, with a pre-test-post-test design and a control group. The employees suffering from CLBP in the 8 districts of Tehran City, Iran, in 2021 were considered the statistical population of the present study. Research samples were selected from physiotherapy clinics in Tehran. Additionally, the G\*power software program was used to calculate the sample size, with a confidence interval of 95% and estimation mistakes of less than 2%. The pattern size was calculated to be 12 sufferers in every clinic, considering 15 people in every group, contemplating the drop of 10% [24]. By examining the patient's medical records and observing the ethical points in the research, 30 CLBP employees were selected, 15 were randomly assigned to the control group, and 15 to the experimental group. The inclusion criteria included being an employee in the last 5 years, under 50 years old, having a diploma, not suffering from other chronic diseases, and not using anti-depressants, anxiety, etc., drugs. The exclusion criteria were the absence of more than 2 sessions from the CBT sessions, infection with COVID-19, and the severity of the patient's pain.

## Study tools

### Psychological Distress Scale (DASS-21)

The shortened version of the psychological distress questionnaire with 21 questions includes three subscales of stress (7 questions), depression (7 questions), and anxiety (7 questions). This scale is scored on a 4-point Likert scale from not at all=0 to very much =3. The scores obtained on this scale are between 0 and 28, with higher scores indicating more depression, stress, and anxiety [25]. In Iran, the Cronbach  $\alpha$  coefficients of the scale are 0.84 for depression, 0.82 for anxiety, and 0.79 for stress [26]. In the present study, the Cronbach  $\alpha$  coefficients for depression, anxiety, and stress were obtained as 0.89, 0.8, 1, and 0.84, respectively.

### Coping Strategies Scale (CSS)

Endler and Parker [15] developed this questionnaire to evaluate people's coping strategies in three coping strategies: emotion, problem, and avoidance. This test consists of 48 questions; every 16 questions are related to one of the coping dimensions, scored from 1 to 5. The validity of this test was obtained by calculating the Cronbach  $\alpha$  coefficient in the study of Endler and Parker [15] for three strategies in the range of 0.82 to 0.92. The reliability coefficient of the scale by Endler and Parker [15] for emotion, problem, and avoidance coping strategies, respectively, for the sample of men, was 0.92, 0.82, and 0.85, and the sample of 0.90, 0.85, and 0.82 were obtained for girls. In Iran, several studies investigated the reliability of the mentioned scale, which shows its high validity [27]. In the present study, the Cronbach  $\alpha$  coefficients were obtained for problem, emotion, and avoidance coping strategies as 0.87, 0.86, and 0.82, respectively.

### Cognitive-behavioral Intervention Protocol

Before the treatment sessions started, research questionnaires were distributed among the patients in the pre-test phase. After completing the pre-test, 15 employees received CBT by the therapist during 8 sessions of 90 minutes that lasted for 2 months [28]. To comply with ethical points, another 15 employees were told they would be given the desired treatment in one month, and now it is better to do their physiotherapy. After completing the treatment sessions of the experimental group, all people participated in the post-test and answered the questions of the research questionnaires. During the initial interview with all of them, we asked the members to keep their commitment to the company throughout the meetings to prevent group members from dropping out. This matter was

**Table 1.** Characteristics of cognitive-behavioral therapy training sessions [28]

Session	Content
1	Introducing and explaining the basic principles of CBT, introducing the fundamental concepts of therapy, setting the schedule of sessions, discussing the rules of sessions
2	Determining the agenda of the meeting, evaluating, formulating, conceptualizing the subjects' problems, and filling the formulation worksheet
3	Determining the agenda of the meeting, selecting goals and determining treatment goals with the help of members, preparing notebooks for treatment and activity planning
4	Determining the agenda of the meeting, identifying and recognizing their thoughts, practicing recording thoughts, and assigning them to the patient as homework
5	Changing and correcting one's thoughts, teaching the technique of creating a logical alternative, introducing the weekly activity registration form as homework
6	Diagnosing cognitive errors, examining evidence, and preparing confrontation cards
7	Graded task design, use of visual confrontation technique
8	Review of uncompleted activities, homework, and therapy notebooks, answers to members' questions, and summaries

also observed during the meetings, and the group solidarity between the members prevented the group from falling apart. Below is a summary of CBT group sessions for employees with CLBP (Table 1).

After collecting the research data, they were entered into SPSS software, version 24. Multivariate covariance analysis (MANCOVA) was used to analyze the obtained scores. Also, the significance of the tests was considered at the level of 0.05.

### 3. Results

The mean age of employees with CLBP in the experimental group was  $36.41 \pm 5.74$  years, and the control group was  $37.02 \pm 6.86$  years. The Chi-square test was used to check the demographic information of employees with CLBP, and the results are reported in Table 2.

The Chi-square test results showed that the intervention and control groups had no significant differences in gender, marital status, and education ( $P > 0.005$ ). Table 3 presents the mean and standard deviation of pre-test-post-test depression, stress, anxiety, problem, emotion, and avoidance strategies of employees with CLBP.

Employees with CLBP were assessed for psychological distress and coping styles using a multivariate analysis of covariance. The variance of psychological distress ( $F=1.03$ ,  $P=0.317$ ) and coping methods ( $F=1.22$ ,  $P=0.279$ ) was equal across the groups, according to the results of the Levene's test used to investigate the homogeneity of variance of dependent variables in groups. The Box's M test results to determine if the covariance matrices of the dependent variables are similar between the experimental and control groups likewise indicated that they are (Box's M= 38.57,

**Table 2.** Demographic information of employees with chronic low back pain

Demographic information		No. (%)		Chi-square Test
		Experimental	Control	
Gender	Female	7(46.6)	9(60.0)	$P \geq 0.052$
	Male	8(53.4)	6(40.0)	
Marital status	Married	11(73.4)	11(66.6)	$P \geq 0.066$
	Single	4(26.6)	5(33.4)	
Education	Diploma	6(40.0)	7(46.6)	$P \geq 0.059$
	Bachelor	4(26.6)	4(26.6)	
	Masters	5(33.4)	4(26.6)	

**Table 3.** Descriptive Indices in the control and experimental groups

Variables		Groups	Mean±SD
Depression	Pre-test	Experimental	18.73±2.36
		Control	18.86±4.29
	Post-test	Experimental	15.93±2.67
		Control	18.66±2.18
Stress	Pre-test	Experimental	17.60±1.84
		Control	17.46±4.60
	Post-test	Experimental	15.06±3.14
		Control	17.65±2.51
Anxiety	Pre-test	Experimental	18.13±1.96
		Control	18.06±2.44
	Post-test	Experimental	15.33±1.52
		Control	18.26±4.78
Problem-oriented coping	Pre-test	Experimental	39.26±3.82
		Control	39.20±1.85
	Post-test	Experimental	44.32±2.66
		Control	39.01±2.85
Emotion-oriented coping	Pre-test	Experimental	55.13±2.96
		Control	55.33±4.27
	Post-test	Experimental	48.52±3.47
		Control	55.60±2.50
Avoidance-oriented coping	Pre-test	Experimental	57.53±4.07
		Control	57.33±2.54
	Post-test	Experimental	52.06±2.37
		Control	57.51±2.69

F=1.18, P=0.195). Since the significance level of the box test is greater than 0.05, we can conclude that this assumption is valid. Also, the Chi-square values of Bartlett's test results were used to determine the sphericity or significance of the association between psychological distress and coping styles. The results revealed a significant relationship between the two ( $\chi^2=97.04$ ,  $df=20$ ,  $P<0.05$ ). Another important assumption of multivariate analysis of covariance is the homogeneity of regression coefficients. It should be mentioned that the pre-test and post-test interactions between dependent and independent variables (the intervention

technique) were used to examine the homogeneity test of regression coefficients. This assumption is also true because the pre-test and post-test interactions with the independent variable were not statistically significant and showed the homogeneity of the regression slope. The application of this test will be permitted due to the establishment of a multivariate analysis of covariance. Subsequently, a multivariate analysis of covariance was carried out to determine the differences between the groups (Table 4).

**Table 4.** The findings from multivariate covariance analysis on Mean Post-test scores

Test	Value	F	df	Error df	P	Effect Size
Pillai's Trace	0.776	9.827	6	17	0.001	0.77
Wilks Lambda	0.224	9.827	6	17	0.001	0.77
Hotelling Trace	3.468	9.827	6	17	0.001	0.77
Roy's Largest Root	3.468	9.827	6	17	0.001	0.77

Table 4 findings revealed the influence of the independent variable on the dependent variables; in other words, there is a significant difference between the experimental and control groups in at least one of the psychological distress and coping strategy variables. Based on the calculated effect size, the independent variable is responsible for 77% of the variance between the experimental and control groups. Also, the test's statistical power is equal to 1, demonstrating the appropriateness of the sample size. However, in the MANCOVA text, a univariate analysis of the covariance test was applied to establish which areas the difference is significant. The outcomes are presented in Table 4.

Based on Table 5, the F statistics is significant for depression (24.41), stress (16.15), anxiety (19.08), problem-oriented coping (26.18), emotion-oriented coping (23.43), and avoidance-oriented coping (19.31) at the 0.001 significance. These findings indicate a significant difference between the groups in these variables. Additionally, based on the determined effect value, 53% of depression, 42% of stress, 46% of anxiety, 54% of problem-oriented coping, 51% of emotion-oriented coping, and 47% of avoidance-oriented coping were not affected by the effect of the variable. Hence, CBT significantly increases problem-oriented coping and decreases depression, stress, anxiety, emotion-oriented coping, and avoidance-oriented coping in employees with CLBP.

#### 4. Discussion

This study examined CBT's efficacy in addressing psychological distress and coping strategies in patients with CLBP. The obtained results showed that the depression, stress, and anxiety of the experimental group decreased significantly after receiving CBT, which is consistent with the results of previous studies [10, 11].

By explaining these results, we can tell through learning about emotional regulation and cognitive re-evaluation that the experimental group created positive and moderate negative emotions, helping to reduce their psychological distress [9]. Teaching the main components of CBT (such as imagery, exposure, and cognitive reconstruction) is an important factor in improving symptoms. A negative mood is essential in patients suffering from chronic pain and can affect motivation and adherence to treatment [10]. Also, negative mood causes anxiety and stress, and learning cognitive-behavioral components such as cognitive reconstruction and stress relief can reduce the feeling of helplessness and stress in patients suffering from chronic pain. Compared to other treatments, CBT reduces the possibility of relapse and anxiety return. In this treatment, anxiety disorders and depression recur less, which is one of the advantages of this treatment over anxiety medication [5-7].

**Table 5.** Findings from a univariate study of covariance on the mean post-test scores of dependent variables in the experimental and control groups

Variables	SS	SS Error	df	MS	MS Error	F	P	Effect Size
Depression	46.452	40.21	1	46.452	1.82	25.41	0.001	0.53
Stress	46.069	62.74	1	46.069	2.85	16.15	0.001	0.42
Anxiety	61.682	71.09	1	61.682	3.23	19.08	0.001	0.46
Problem-oriented coping	186.354	156.58	1	186.354	7.11	26.18	0.001	0.54
Emotion-oriented coping	346.323	325.07	1	346.323	14.77	23.43	0.001	0.51
Avoidance-oriented coping	233.179	265.67	1	233.179	12.07	19.31	0.001	0.47



A CBT model is suggested for pain management by correcting misplaced interpretations, guiding negative self-talk, correcting illogical thought patterns and ineffective cognitions to launch effective and adaptive coping responses, and inhibiting negative emotions and biological treatments [23]. By using CBT and the cognitive content of therapy sessions and perceptual change in patients, their processing style changes, and new coping strategies are proposed to solve problems. The stress caused by suffering from chronic pain can lead to many psychological complications for the patient and his family [20]. Considering CBT techniques focus directly on physical symptoms and teach a person how to relax, reduce tension, and reduce anxiety, this issue directly relates to chronic pain [22].

Results have shown that the experimental group's emotional and avoidance coping strategies decreased, and using the problem-oriented coping strategies increased after receiving CBT. This finding is consistent with previous studies [17, 18].

In explaining these results, it may be acknowledged that people with high levels of anxiety and tension are less likely to go towards problem-solving and more soothing strategies without directly dealing with stressful factors, i.e. excitement strategies. This is even though according to the results of research [14, 15], problem-oriented coping strategies can reduce the injuries of the disease and the stress caused by them. However, people use a more emotion-oriented strategy to face the disease's challenges, stresses, and treatment. Although stressful factors play an important role in aggravating chronic diseases [12], it should be kept in mind that how people deal with stressful situations plays an important role in their health, and how a person copes with problems can be more important than intensity and frequency of stress [18]. Various stressors and people's responses to stressors play a significant role in the onset and worsening of various types of chronic pain [13]. Accordingly, in the interventions considered for these patients, in addition to medical interventions, psychological training, such as using efficient confrontational styles and controlling emotions in stressful situations, have a role. It can play a significant role in the physical and mental recovery and rehabilitation of patients with CLBP [21, 22].

#### Study Limitations:

Finally, it is necessary to point out that current research has certain limitations. The statistical research community was the employees of private offices working in the 8 districts of Tehran in 2021. For this reason, care must be taken in generalizing the results to other

groups and regions. The impossibility of long-term follow-up of the program's effect was also one of the other limitations. Based on this, it is suggested that this issue be considered in future research so that it is possible to examine the long-term effect of CBT.

## 5. Conclusion

Using CBT strategies in pain management, in addition to improving pain, improves the psychological state of pain sufferers and is an effective step to save money on drug consumption and reduce the side effects of drugs.

## Abbreviations

## Ethical Considerations

### Compliance with ethical guidelines

Ethical approval and consent to participate were obtained. All approaches achieved in studies concerning human participants have been conducted following the moral standards of institutional and country-wide studies and with the 1964 Helsinki Declaration and its later amendments or similar ethical standards. This study was approved by the [Baqiyatallah University of Medical Sciences](#) (Ethics Code: IR.BMSU.REC.1398.276).

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## Authors contributions

Conceptualization of the project: Farzin Bagheri Sheykhangafshe and Khazar Tajbakhsh; Methodology: Vahid Savabi Niri and Ali Fathi-Ashtiani; Writing the original draft: Farzin Bagheri Sheykhangafshe and Zahra Nakhostin Asef; Review and editing: Farzin Bagheri Sheykhangafshe and Khazar Tajbakhsh.

## Conflict of interest

The authors declared no conflict of interest.

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