

Original Article

The Effectiveness of Cognitive Behavioral Therapy on Reducing Symptoms of Depression, Pain Intensity, and Movement Limitation in Patients with Rheumatoid Arthritis

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Abstract

Background and Aim: Rheumatoid arthritis is a disease that due to pain in the patient's joints, the patient cannot make strong movements due to the muscles around the joints are weakened and the patient's movement capability is reduced. Thus, this disease is associated with pain, depression, and also movement disability.

Materials and Methods: This research is in the qualitative part of a semi-experimental design with a pre-test and post-test with a control group. The statistical population included people suffering from rheumatoid arthritis. In the quantitative part, based on the size of the population, 30 women with rheumatoid arthritis were and randomly replaced in the experimental and control groups. The experimental group in this study underwent cognitive behavioral therapy. The required information was collected by Beck's Depression Questionnaire, McGill Pain Intensity Questionnaire (SF-MPQ-2), Osostris ODI Questionnaire, Physical Disability Assessment Questionnaire (Rowland & Morris, 1983), and Quebec Pain Disability Scale (QPDS). Also, for the measurement level of the desired variables and hypotheses, descriptive statistics such as mean, standard deviation, frequency distribution tables, and graphs were used in the descriptive section. In the inferential part, the assumptions of univariate and multivariate covariance analysis, Levine's test, and Sphericity were used.

Results: The results of univariate and multivariate analysis of covariance showed that CBT reduces depression, pain, and their components; Motor disability, components of functional disability, physical disability, and back pain disability were effective in patients with rheumatoid arthritis. It was also stated that CBT has a higher effectiveness in reducing pain and its components (except emotional perception of pain) in patients with rheumatoid arthritis.

Conclusion: CBT has been effective in all four variables.

Keywords: Cognitive behavioral therapy, Depression, Feeling pain, Movement limitation, Rheumatoid arthritis

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Introduction

Rheumatoid arthritis is an inflammatory, chronic, and systemic disease that can only be seen in humans and its cause is unknown. The inflammation of the joints may be temporary, but it becomes chronic and leads to the destruction of the joints in a few months to a few years (1). This disease has many extra-articular manifestations, which include anemia, fatigue, subcutaneous nodules, neuropathy, vasculitis, and Sjogren's syndrome (2). Only a small number of people with rheumatoid arthritis recover completely, and the rest will have the disease forever but with fluctuating severity, which causes disability (3). Rheumatoid arthritis is a disease in that due to pain in the patient's joints, the patient cannot make strong movements and often the muscles around the joints are weakened and the patient's movement capability decreases (4). A socio-economic survey was conducted across Europe, the results of which showed that people with rheumatoid arthritis with severe (60%) or moderate pain (48%) compared to people with mild pain (34%) or no pain (19%), experienced additional work barriers, also a significant statistical correlation was found between severity, pain, disability and early retirement (5). One of the most important symptoms of rheumatoid arthritis in the knee is vague and intermittent pain in the muscles around the joint, which can occur during exercise due to the mechanical pressure of osteophytes on the capsule and ligaments, or after resting at night due to changes in hormonal levels and Obstruction of venous blood flow (6). Pain is one of the most common health problems that force people to seek help from health care professionals. Therefore, after saving the patient's life, pain management is the most important priorities (7). The International Society for the Study of Pain, defines pain as an unpleasant feeling and emotional experience associated with acute or potential tissue damage (8). The pain caused by this disease leads to movement limitation, dry inflammation of joints, and chronic pain in patients. The movement problems of the patient will bring

major complications and damage in terms of physical, mental, social, and economic aspects (9).

The co-occurrence of depression with a chronic disease is associated with an increase in depression further worsening the patient's health level (10). The prevalence of depression in patients with rheumatoid arthritis is reported to be 14.8 % to 22.5%, and the risk of depression in the lifetime of patients is 47% (11). A significant relationship between persistent depression and persistent high disease activity has been shown (12). Depression will be effective on the biological outcome of the disease by reducing the desire to see a rheumatologist, reducing the patient's adherence to drug and non-drug recommendations, and reducing his interest in obtaining sufficient information about the disease (13). In rheumatoid arthritis, like the disease activity score, it is based on the mental criteria of the patient, which can be influenced by the patient's mental state, and this leads to major changes in the evaluation of the disease activity in the patient. In these patients, depression is a negative and strong predictor for recovery, therefore, evaluating these patients in terms of depression can be effective in the possible control of the disease (14). In addition, several physical symptoms of depression (for example, fatigue, insufficient sleep, and loss of appetite) may occur in rheumatoid arthritis as part of the disease process (15). The point is that people suffering from rheumatoid arthritis suffer from isolation and withdrawal on the one hand due to pain and reduced range of motion and on the other hand due to anxiety and depression caused by it (16). Therefore, attending group therapy while saving money for the family can also lead to the re-establishment of their social relationships by establishing social relationships in a supportive environment. For this reason, providing psychological group treatments for these patients along with physiological treatments is a priority (17). They suggest several psychological interventions for psychological symptoms in the mentioned patients, one of the interventions performed is cognitive behavioral therapy (18). Cognitive behavioral therapy includes a set of methods including cognitive reconstruction, behavior change, and social support, to help people identify stress levels and correct negative

cognitive beliefs and behaviors, reducing or eliminating symptoms of psychological distress, and it aims to help people return to normal life in terms of psychological and social functions (19).

Methods

The population of the present study includes people with rheumatoid arthritis disease. The statistical population included people suffering from rheumatoid arthritis who, expressed their willingness to cooperate. The entry criteria for women were an age range of 18 to 35 years, having a diploma and above, signing the ethical consent form to participate in the research, and suffering from rheumatoid arthritis and depression. The exclusion criteria of people without rheumatoid arthritis disease, people without depression disorder, and psychosis disorder were considered. The sampling of this research was randomly selected from the available people. The code of ethics in this research is IR.PNU.REC.1400.125. The sample size was 30 patients who were referred to the center. Using the available sampling method, 15 people were randomly selected and placed in two groups (a control group and an experimental group). Then, cognitive behavioral therapy was performed on the experimental group for 12 sessions in the form of weekly sessions of 90 minutes, and the control group did not receive the treatment. After the end of the treatments, both groups were given a post-test, and finally, after 1 and a half months, both groups were asked to answer the relevant questionnaire again for the follow-up phase.

Materials

Demographic Information Questionnaire

A researcher-made questionnaire of individual characteristics was prepared due to the influence of background factors and biological characteristics on the subjects' moods. This questionnaire included questions about personal information, date of birth, marital status, and duration of illness.

Physiological Symptom

The diagnosis of rheumatoid arthritis is based on clinical symptoms, physical examination, laboratory tests, and final confirmation of the diagnosis by a rheumatology specialist.

Beck's Depression Questionnaire

The Beck depression questionnaire, the second edition, is the revised form of the Beck questionnaire, which was compiled to measure depression in the population over 13 years old. This questionnaire, like the first edition, consists of 21 questions and is classified into three groups: emotional symptoms, cognitive symptoms, and physical symptoms. For each question, the subject chooses one of the 4 options that show the severity of the depression symptom, and the questions are scored based on a 4-point Likert scale from 0 to 3. The total score of the questionnaire ranges from 0 to 63. This questionnaire has good reliability and validity, so the internal stability of this instrument is 73% to 92% and its Cronbach's alpha is reported as 86% for the patient group and 81% for the non-patient group. In Iran, in research, Cronbach's alpha coefficient was 92% for outpatients and 93% for students (20, 21).

McGill Pain Questionnaire (SF-MPQ-2)

In 2009, Durkin et al. expanded and completed the old McGill questionnaire by adding symptoms of both types of neuropathic and non-neuropathic pain in 22 items and by modifying the response framework and changing it with a range of 0 to 10 about pain severity was studied on 882 people who had various pain symptoms and also 226 diabetic patients with neuropathic pain who participated in a randomized clinical trial. The findings showed the acceptable validity and reliability of this questionnaire. The results of exploratory and confirmatory factor analysis indicated the existence of four subscales of continuous pain, varied pain, neuropathic pain, and emotional pain. Cronbach's alpha coefficient was reported as 0.87, 0.87, 0.83, and 0.86 respectively (22).

Osostri Questionnaire

The Osostria questionnaire is the gold standard for measuring the degree of functional disability in back pain. In this questionnaire, the subject's functional ability level is in ten sections with six options (minimum zero and maximum five) in the field of tolerating and coping with pain intensity, personal care, lifting objects, walking, sitting, sleeping, social

life, traveling and changing pain levels is evaluated. In the worst case of disability, a score of 5 is given to each section, which means that the total score of 10 sections will be equal to 50. Total disability is calculated by multiplying the total scores of each section by two. This questionnaire evaluates the inability to perform between zero and 100. In this way, a score of 0 indicates a person's complete health and pain-free functioning, 0 to 25 means mild disability, 25 to 50 moderate disability, 50 to 75 severe disability, and 75 to 100 means severe and completely acute disability. The reliability of this questionnaire obtained by MasoudiThabit et al. is 0.84 (23).

Questionnaire by Rowland and Morris

This was created in 1983. The purpose of creating this questionnaire is to evaluate people's physical disability. This questionnaire has 24 questions. This tool contains 24 questions and scores from 0 to 24. A score of zero indicates maximum disability. The Qarsi version of this questionnaire has been approved and is widely used in research related to back pain, and it shows a sensitivity of 94.6% and a specificity of 88.2%. The vas pain visual ruler scale, which is a scale for assessing the pain intensity of patients, is a 10 cm long line whose numbers are graded from 0 (absence of pain) to 10 (the most severe possible pain). The scoring criterion in this scale is the number that the patient draws a line around. This scale has been widely and

comprehensively used in research related to pain, and its validity and reliability have been confirmed in various studies (24).

The Quebec Pain Disability Scale (QPDS) presented in this section is modified from the original Quebec Back Pain Disability Scale so that it can be used for any injury. This is possible because the questionnaire contains twenty questions related to general activities of daily life. Davidson and Keating (2002) showed that the QBPDS is similar to the physical functioning component of the SF-36, which has been used in several settings. This questionnaire has twenty questions that represent six areas of daily life activities: sleeping, sitting/standing, traveling, general body movements, bending/stooping, and handling large/heavy objects (25).

Results

Descriptive findings include the mean and standard deviation of the research variables in the treatment and control groups, separating the pre-test and post-test stages, which are shown in Table 1.

According to Table 1, the mean scores of depression, pain, and movement limitations variables in the cognitive-behavioral group therapy group have changed in the post-test stage compared to the pre-test stage. These changes confirm that the post-test scores of the participants in the research variables have decreased in the two treatment groups.

Table 1. The mean and standard deviation of the research variables in the treatment and control groups, separated in the pre-test and post-test stages.

Variable	Stage	Cognitive and Behavioral Group Therapy		Control	
		Mean	Standard Deviation	Mean	Standard Deviation
Depression	Pre-test	40.40	78.7	46.39	58.7
	Post-test	60.10	17.4	53.40	55.6
Pain	Pre-test	0.47	92.6	86.39	39.8
	Post-test	26.7	21.3	86.40	60.8
Functional Disability	Pre-test	86.63	22.15	26.60	41.11
	Post-test	80.20	36.7	66.59	46.8
Physical Disability	Pre-test	0.36	80.6	80.29	17.8
	Post-test	13.12	68.4	93.29	81.8
Back Pain Disability	Pre-test	46.70	14.8	80.65	67.8
	Post-test	80.25	53.5	40.59	48.13

Before analyzing the data related to the hypotheses, they were examined to ensure that the data of this research meet the basic assumptions of covariance analysis (assumption of normality, homogeneity of variances, homogeneity of covariance matrix, and homogeneity of regression slopes). Shapiro-Wilk test was used to check the assumption of normality of distribution of variables. The results showed that the significance level of the Shapiro-Wilk test is greater than 0.5, so the assumption of normality of the distribution of the variables has been observed. The results of the pre-test and post-test regression slope homogeneity test of the research variables showed that the regression slope for the research variables is equal in both groups. Levine's test was used to check the homogeneity of variance. The results showed that Levin's test was not significant in the research variables at the level of 0.5 ($P > 0.5$). As a result, the assumption of homogeneity of variances is confirmed. The results of the Box's M test confirmed the homogeneity of the covariance matrix of the dependent variables at all levels of the independent variable (groups) ($P = 0.54$; Box's $M = 207.374810$, $F = 1.325$; Box's $M = 35.763$). Also, the absence of multivariate outlier data was investigated using Mahalanobis distance, no outlier data was identified and the validity of this hypothesis was investigated. In addition, the collinearity between the dependent variables was investigated with the correlation coefficient between the pairs of variables, and considering that all the correlation coefficients between the pairs of variables were moderate (0.3 to 0.5), this hypothesis was confirmed. According to the average

correlation coefficients, it can be concluded that there is no multiple linear correlation between the variables. By establishing the presuppositions of univariate and multivariate covariance, the use of this test is unimpeded. The results of univariate covariance analysis to investigate the difference between treatment and control groups in the total score of depression and pain variables in the post-test stage are reported in Table 2.

According to Table 2, the F-statistic of depression in the post-test was 361.218, which is significant at the 0.1 level ($P < 0.1$ and $F = 1.27, 361/218$), so it shows that there is a difference between the two groups in terms of the reduction of depression score in patients. Also, the effect size was equal to $2\eta = 0.930$, which shows that the amount of this difference in the society is 93% and at an acceptable level. Therefore, the results show that CBT treatment is effective in reducing patients' depression. Also, the F-statistic of pain in the post-test was 154.592, which is significant at the 0.1 level ($P < 0.1$ and $F = 154.592, 27.1$), therefore, it shows that there is a significant difference between the two groups in terms of reducing the pain score in the patients. Also, the effect size was equal to $2\eta = 0.852$, which shows that the amount of this difference in society is 85.2% and at an acceptable level. Therefore, the results show that CBT treatment is effective in reducing patients' pain.

The results of the Wilkes lambda statistic in the multivariate analysis of covariance for the components of movement limitation showed that the effect of the group on the combination of components is significant ($F(3, 23) = 249.031, P < 0.001, \eta^2 = 0.970$). Therefore, it can be said that there is a significant difference

Table 2. The results of univariate covariance analysis to investigate the difference between treatment and control groups in the variables of depression and pain in the post-test stage.

Variable	Source	Sum of Squares	Degrees of Freedom	Average of Squares	F Statistic	Significance Level	Effect Size	Test Power
Depression	Modified Pattern	621.7051	2	811.3525	300.185	<0.1	0.930	1
	Pre-test	588.331	1	588.331	427.17	<0.1		
	Group	112.6837	1	112.6873	218.361	<0.1		
	Error	745.513	27	28.19	--	--		
Pain	Modified Pattern	139.780	2	69.390	805.86	<0.1	0.852	1
	Pre-test	6.10	1	10.6	227.2	0.147		
	Group	475.696	1	475.696	592.154	<0.1		
	Error	328.121	27	494.4	--	--		

Table 3. The results of one-way covariance analysis related to the difference between the groups of movement limitation components in the post-test stage.

Variable	Source	Sum of Squares	Degrees of Freedom	Average of Squares	F	Significance Level	Eta ²	Test Power
Functional disability	Intergroup	807.9722	1	807.9722	799.331	<0.1	0.930	1
	Error	582.732	25	303.29				
Physical disability	Intergroup	948.3272	1	948.3272	928.513	<0.1	0.954	1
	Error	212.159	25	368.6				
Back Pain disability	Intergroup	509.6773	1	509.6773	583.66	<0.1	0.727	1
	Error	243.2543	25	730.101				

between the CBT treatment groups and the control group in terms of the adjusted scores of the movement limitation components in the post-test stage, and the amount of this difference in the society is 97% based on the effect size and at an acceptable level. That is, 97% of the variance related to the difference between the two groups is caused by the mutual effect of the dependent variables. Investigating which of the components of movement limitation have significant differences between the two groups, the results of univariate covariance analysis are reported in Table 3.

The F statistic for the components of functional disability (331/799), physical disability (513/928), and back pain disability (66/583) in the movement limitation variable in the post-test stage is significant ($P < 0.1$).

This finding shows that there is a significant difference between the CBT and control treatment groups in the components of movement limitation. The effect size for functional disability components is (0.930), physical disability (0.954), and back pain disability (0.727), which shows that this difference is acceptable in society.

Discussion

Al-Nadi *et al.* (26) stated that the implementation of CBT to encourage RA patients to cope with their disease, change false beliefs, the possibility of maintaining jobs, normal socialization, and interaction with health care professionals. Nagy *et al.* (27) investigated the identification, evaluation, and combination of the effects of psychological interventions (for example, cognitive behavioral therapy (CBT), emotional disclosure (ED), group

therapy (GT), mindfulness (M), and relaxation training (R) to patients with rheumatoid arthritis. This study showed that psychological interventions can significantly contribute to the standard medical care of RA patients. Jahangiri *et al.* (28) attachment styles, ego strength, and cognitive regulation of emotion can, directly and indirectly, affect the perception of chronic pain and the performance of patients with rheumatoid arthritis, and on the other hand, play a dynamic role in adapting to chronic pain in them. These results can be used in the design of preventive and intervention programs for chronic pain. Hamzepour and Dosti (29) stated that cognitive behavioral therapy is effective in a group manner with an effect on ineffective thoughts and beliefs and cognitive biases on the level of disease perception and pain perception. In explaining this hypothesis, it can be stated that the disease of rheumatoid arthritis includes two psychological and biological parts, and on the other hand, in this disease, pain is the most important physical-psychological factor in suffering from rheumatoid arthritis, which provides the background for the personal and social disability of those suffering from this disease. Kend(30), on the other hand, rheumatoid arthritis disease is more based on the patient's mental criteria, which can be affected by the patient's mental status and lead to major changes in the evaluation of the disease activity in the patient. In these patients, depression is a negative and strong predictor for recovery (14; 15). It should be noted that the occurrence of depression is effective in worsening the clinical outcome of rheumatoid arthritis and leads to a further decrease in the level of health (31) because people with chronic pain evaluate activities that cause chronic pain as a stimulus as disgusting and avoid these activities (32) so that a negative evaluation of

activity as a negative stimulus causes the patient to consider the consequences of the activity and the expectations related to the creation and increase of pain. By doing the movement, he avoids it, and when people feel powerless, they try to show themselves powerless and do not move in line with their values, and so instead of letting their thoughts be free, they avoid them (33). In this regard, in cognitive-behavioral interventions, the patient is encouraged to consider the relationship between negative spontaneous thoughts and negative emotions as assumptions that must be tested and use behaviors that are negative spontaneous thoughts as a benchmark to evaluate and validate those thoughts (18, 34).

Limitations: This research was conducted on women with rheumatoid arthritis. The questionnaire data collection method was based on patients' self-reports and can be influenced by current attitudes. The samples were made only in Tehran and cannot be extended to other cities. The sample was only among those who volunteered for treatment, and one should be cautious in extending the results to other non-volunteer patients. There was no follow-up and no assurance of the durability of the treatment provided

Suggestions: A larger sample size should be done so that the results can be generalized to the society with greater probability. This research should be done on men with rheumatoid arthritis. This research should be done in other cities. Considering the effect of cognitive behavioral therapy on reducing pain, depression and movement limitations of rheumatoid arthritis patients, it is suggested to use this method in other diseases as well.

Conclusion

psychological treatments such as CBT can be effective along with drug treatments in rheumatoid arthritis and can significantly reduce depression in these patients

Acknowledgment

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Conflict of Interest

The authors declare that they have no conflict of interest.

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