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Determining the Effectiveness of Cognitive Behavioral Training on the Rate of C-Reactive Protein and Depression in Patients Afflicted With Rheumatoid Arthritis

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Abstract

Background: Rheumatoid arthritis is a progressive autoimmune disease with variable clinical symptoms. This study aimed to investigate the effectiveness of cognitive behavioral training on C-reactive protein (CRP) and depression in patients with rheumatoid arthritis.

Methods: This research was a semi-experimental study with a pretest-posttest design and a control group. The statistical population of this study involved all women suffering from rheumatoid arthritis who went to Iran Rheumatology Center. From among them, 60 individuals were randomly selected and consigned to the control and experimental groups. The control group received only medication, and an educational package about rheumatoid arthritis provided for them. Beck's depression and biochemical evaluations questionnaires were used to measure dependent variables. To analyze the data, multivariate analysis of covariance and SPSS. 22 software were used.

Results: The mean (SD) of depression in the experimental group in the pretest was 25.5 (3.8), which decreased to 18.9 (4.2) in the post-test ($P<0.01$), but the mean (SD) of the control group was not statistically significant. Also, the mean (SD) of the CRP in the experimental group was 27.3 (6.9) in the pretest, which increased to 22.8 (4.6) in the post-test ($P<0.01$), but the mean (SD) of the control group was not statistically significant.

Conclusion: This research revealed that cognitive behavioral training led to a reduction of CRP and depression in patients with rheumatoid arthritis.

Keywords: C-reactive protein; Rheumatoid arthritis; Cognitive-behavioral therapy; Depression.

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Introduction

Chronic diseases are among the most common health problems around the world that people's health habits and behaviors dramatically affect their affliction and severity.[1] Bone and joints disease is one of the most common diseases in both the developed and developing countries, in a way that in an international action during the period 2000-2010 has been entitled as bone and joint diseases.[2] Rheumatoid arthritis is a progressive autoimmune disease with variable clinical symptoms. Rheumatoid arthritis starts with periods of inflammation in the synovium, which causes thickening and edema in it. Synovial inflammation produced in the joint or joints results in their inflammation, tenderness, and stiffness, which can be associated with fatigue, weight loss, anxiety, and depression. This disease can be a significant reason for disability and death.[3] Rheumatoid arthritis is an incapacitating autoimmune disease that affects between 0.5% and 1% of the adult population throughout the world.[4] The main complaints of these patients are a pain, disability, and fatigue. A significant number of patients with rheumatoid arthritis experience severe exhaustion. Different research in the psyche domain has shown that the chronicity of this disease affects the physical and cognitive variables of these patients, including their depression.[5]

On the other hand, C-reactive protein (CRP) is a sensitive and non-specific index of inflammation that has widely studied.[6] This protein binds to a wide variety of materials such as microbial polysaccharides and phosphatidylcholine, which damage the membrane of the cell.[7] Also, CRP increases the activity of phagocytosis and activates the classical complement pathway.[8] Today, CRP is used to identify and control a variety of diseases, but

research on cystatin C, particularly the effects of physical activity on concentration changes, is limited.[9]

Cognitive-behavioral therapies considered as modern growth and development in psychological treatment. Nevertheless, during a reasonably short time, it has been able to absorb much interest from the clinical experts. Cognitive-behavioral therapy is a combination of cognitive and behavioral approaches.[10] In this kind of treatment, the patient is assisted to recognize his/her distorted thinking patterns and ineffective behaviors. In order to be able to change these distorted and ineffective thoughts, regular discussions, and well-organized behavioral assignments provided for the patient.[11,12] The findings show that there is a relationship between perceptual representations of disease and mood and behavioral efficacy in chronic patients. These findings are significant because they indicate that there are conformity and accommodation between the predictions of the Leventhal's self-regulation model and the underlying theories of cognitive-behavioral interventions that accept the presence of a relationship between thoughts, feelings (emotional feelings, physical senses) and behavior.[13,14] Investigations in patients with rheumatoid arthritis show that there is a relationship between the emotional-cognitive dimensions and the behavior of the disease in patients who have rheumatoid arthritis. The results of various studies[15,16] indicate the influence of cognitive-behavioral interventions on patients with rheumatoid arthritis.

Concerning the fact that rheumatic diseases impact various aspects of the patients' daily life and result in harms that reduce their ability to perform specific tasks and activities.[17] Also, on the other hand, in different studies, it has been shown that rheumatic diseases are often associated with a high outbreak of psychiatric disorders and psychological distresses.[18] Therefore, there is a necessity to do investigations on this group of patients and the psychological interventions. The present study aimed to determine the effectiveness of cognitive-behavioral training on the rate of CRP and depression in patients who have rheumatoid arthritis.

Methods

The present study was a semi-experimental type with a pretest-posttest design and control group. The population of this research included 200 women who have rheumatoid arthritis that referred to rheumatology specialist in Iranian Rheumatism Center in Tehran. One-Hundred participants were randomly selected, and then 60 of these patients whose depression test scores were higher than 20 in their Beck depression test, and their CRP in blood tests was higher than 12, were randomly assigned into 2 experimental and control groups (N=30). There were 60 patients with rheumatoid arthritis who had CRP higher than 12, and their depression score was higher than 20 in the Beck test, who were selected by simple random sampling method.

Female patients referred to the Iranian Rheumatism Center examined under the supervision of a specialist in rheumatology, and their disease diagnosed as rheumatoid arthritis, after being introduced to a therapist who was a graduate student and selecting a few in the experimental group, they went under behavioral treatment. Of course, the control group also received a package of applied information on rheumatic disease. The overall reason for women's selection was that the incidence of this illness in women was three times in comparison with its incidence in men. The physician prescribed drug therapy for rheumatoid arthritis, including Prednisolone and Sulfasalazine. Cognitive behavioral training implemented. To the experimental group in the first session, the training given along with the training package and its benefits explained to them. Then, every week, two or three sessions and a total of 3 to 4 weeks of 30-minute training were individually held for each patient. All of these conducted during eight sessions. The experimental group became familiar with positive thinking in the second session and the benefits of learning this type of thinking in order to prevent psychological problems explained. In the third session, positive thinking to stop negative thoughts taught and methods to prevent unwanted thoughts provided. The fourth session was about teaching anxiety reduction with the help of positive thinking, during the fifth session the therapist taught how to reduce depression with the help of positive thinking, the sixth session was about stress management with relaxation exercises and time management. The seventh session of training was about stress management through the method of being decisive. In the eighth session, the therapist taught stress management by introducing breathing exercises, meditation, and yoga. After three months, the two groups took a posttest that was the same Beck's depression test and blood test to determine the amount of CRP. Different factors may influence CRP level, but for eliminating these effects and bias in results, rheumatoid arthritis patients were in the same situation which other probable factors controlled.

Blood Sampling

To assess biochemical variables, blood sampling was performed after 12-14 hours of fasting (at 8 AM) and in two stages, i.e., before treatment, and after cognitive-behavioral therapy, and in both control and experimental groups. In the first phase, because of taking blood samples, the subjects were informed to not undergo severe activity two days before the test. Then they were in a sitting and resting position that 5 milliliters of blood were taken from the right hand (8-10 AM). In the second phase, after completion of cognitive-behavioral therapy, and 72 hours after the last treatment session, like the first phase and in similar conditions, the subjects tested for any changes after behavioral treatment.

Biochemical Evaluations

The concentration of CRP was determined using a commercially available kit with high-sensitivity ELISA method (IBL, Germany) and cysteine C concentration was determined through enzymatic met h od using commercial kit (Biowendo, UK).

Beck Depression Test

This questionnaire was developed by Beck in 1988 and included 21 items. By examining the research that had this tool, Beck and his colleagues found that its validity coefficient was varied from 0.48 to 0.86 in terms of the interval between running times and the type of population tested. In 1996, Beck et al again obtained the validity test of 0.93 per week.[19] Various studies have also conducted the validity of Beck's depression inventory. The mean correlation of Beck's Inventory with Hamilton Psychiatric Scale (HRSD), Zong Self-Measurement Scale, Depression Scale (MMPI), Multiple Sclerosis Depression Scale, and SCL-90 was more than 0.65. Among these studies, Sepehrmanesh et al's research could mention that its reliability coefficient in Iran obtained 0.78.[20] The internal consistency coefficient of Cronbach's alpha in this research was 0.79.

In order to test the research hypotheses, the mean scores of the pretest and posttest of the 2 experimental and control groups analyzed by multivariate covariance analysis.

Results

The mean (SD) of the participants' age was 39.8 (10.11). Each of the control and experimental groups consisted of 10 women with an average age of 25-68 years, and the educational level ranged from grades fifth of primary school to a master of arts, and 25% were single, and the rest were married.

By examining the results of the Box test, it revealed that there it is no significant (MBox= 2.716, F = (3, 58320.000) = 0.796, $P > 0.05$), so the assumption of the equality of the variance-covariance matrices is not rejected. Also, according to the results of Levene test (Table 1), lack of significant difference between the dependent variables, the equality of variances is established, and the performance of MANCOVA is possible.

Also, in the table above, the ANCOVA single variate covariance analysis has been shown given that there are two dependent variables. The Eta value indicates that approximately 50% of the variance of the depression variable, and approximately 70% of the variance of the CRP variable considered for the group variable. The results of Table 2 show that there is a significant difference between the experimental group that was influenced by the cognitive behavioral therapy training and the control group that did not receive any training, and this difference is for the benefit of the training group. Patients undergoing CBT training showed slight depression and little CRP than the control group.

Table 1. Statistics of Dependent Variables in Both Experimental and Control Groups

Scale	Group	Pretest Mean (SD)	Posttest Mean (SD)	*P*
Depression	Experimental	25.5 (3.8)	18.9 (4.2)	0.001
	Control	25.6 (3.2)	25.3 (3.1)	0.54
CRP	Experimental	27.3 (6.9)	22.8 (4.6)	0.0001
	Control	26.9 (6.2)	26.4 (5.9)	0.61

Discussion

This study showed that the mean (SD) of depression in the experimental group was 25.5 (3.8) in the pretest, which decreased to 18.9 (4.2) in the post-test (P <0.01), but the mean (SD) of the control group in the pretest was 25.6 (3.2), which decreased to 25.3 (3.1) in the post-test, which was not statistically significant. Also, the mean (SD) of the CRP in the experimental group was 27.3 (6.9) during the pretest, which increased to 22.8 (4.6) in the post-test (P <0.01), but the mean (SD) of the control group was 26.26 (6.2) in the pretest, which reached to 26.4 (5.9) in the post-test, which was not statistically significant. These findings were consistent with the results of Hamzehpour Haghighi et al[21] and Nazemi Ardakani et al.[22]

Based on the many studies conducted around the world, the majority of patients with rheumatoid arthritis suffer from depression and anxiety. The reason that these people are afflicted with depression is that these patients suffer from much pain and thus become depressed because the pain caused by the disease prevents them from doing their daily routine. Depression exacerbates their illness, and they suffer from a defective cycle, and it is also right about anxiety, and of course, as described above, anxiety is one of the factors to determine this disease. Using psychological training such as cognitive behavioral therapy to reduce the depression of these individuals can be effective even in the improvement of this disease.

Table 2. Results of Covariance Analysis of Dependent Variable Components

Variable	Sources of changes	SS	*df*	MS	F	*P*	ETA
Depression posttest	Between group Inter-group	204.395 200.559	126	204.395 12.535	16.306	0.0001	0.505
CRP posttest	Between group Inter-group	244.237	1	244.237	42.953	0.0001	0.729

The result of this research showed that cognitive behavioral training is effective in reducing depression and CRP in patients with rheumatoid arthritis. This finding was consistent with the results of Sharp et al.'s research on the effect of the cognitive-behavioral therapy on reduction of this disease and reduction of CRP. The disease causes the patient not to be able to do their daily tasks and to be dependent on others in doing their very simple act. Deformation of the joints involved, such as hand joint, attracting the attention of others to this joint deformation, fast exhaustion after doing works that in the opinion of others are very simple, taking more than 12 pills per day. Also, many other problems cause the patient to feel a sense of inadequacy in his/her life, and as a result suffer depression, that this per se will result in exacerbation of this illness and, unfortunately, a defective cycle would be created. In this way, as the level of depression increases, the disease gets worse, the quality of patient's life deteriorates, depression becomes more severe, and thus, this cycle continues permanently. However, through receiving the cognitive behavioral training, the patient initially overwhelms his/her negative thoughts that exacerbate depression and then substitutes positive thoughts instead. Therefore the quality of his life increases, the rate of depression comes down, and the process of healing accelerates. In explaining this finding, it could say that cognitive behavioral training by reducing CRP helps patients with rheumatoid arthritis to improve their disease because when CRP in the blood test of a patient is over 12, it is an evidence of inflammation in the body. This symptom can be one of the reasons for rheumatic disease. The presence of this inflammation in the blood may result in inflammation of the joints, and due to this inflammation, the joints will be painful and sensitive, in such a way that the patient is in trouble even in doing their smallest actions. Bearing a lot of pain even at the time of resting, breakdown of joints and reduction in the daily functioning reduces these patients' life quality that through cognitive behavioral training they can be helped to reduce these pains and thus improving the quality of their life can be effective in improving and reducing the symptoms of this disease.

The degree of collaboration between patients with rheumatoid arthritis is very low because they are not familiar with the positive effects of cognitive therapies. There was no suitable place for training and, of course, processing after the end of the training. Time and space constraints prevent the processing of treatment results after the end of the study. There are a few health centers for patients with rheumatoid arthritis in the country that provide all of their required services, and none of them offers psychological services, even though the presence of psychological disorders has proven in these patients. It would be better to increase the number of these centers and, of course, to provide psychological services. It suggested that the specialist physicians ask patients with rheumatoid arthritis to go to the psychological centers to receive the required services. It is advisable to continue processing up to 6 months or more so that the result of treatment is better. Further research should do on the anxiety of patients with rheumatoid arthritis, and more patients should participate in order to generalize the findings of this research. It seems that many patients with rheumatoid arthritis need to change their attitudes to accelerate and increase the function of drug therapy, for example, persuading the participants to accept culturally that psychological treatments also help to accelerate drug therapies.

Conclusion

This research showed that cognitive-behavioral training resulted in CRP and depression decline in patients with rheumatoid arthritis.

Conflict of interest Disclosures

The authors declare that they have no conflict of interests.

Ethical Statement

All ethical principles considered in this article. The participants were informed about the purpose of the research and its implementation stages and signed the informed consent; they also assured about the confidentiality of their information; Moreover, they were allowed to leave the study whenever they wish, and if desired, the results of the research would be available to them.

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