

# Effectiveness of Cognitive-behavioral Therapy on Depression in Infertile Women

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## Abstract

**Background:** Infertility is an individual and social problem that affects people's life quality and has been addressed in several scientific fields. Nevertheless, the psychosocial needs of infertile couples during the medical treatment process are discussed to a lesser degree.

**Objectives:** This study aimed to investigate the efficacy of cognitive-behavioral therapy on depression in infertile women referring to the infertility clinic of Birjand University of Medical Sciences.

**Methods:** This randomized controlled trial (RCT), with two groups of control and experiment, is performed on infertile women referring to the university clinic in 2019. Beck Depression Inventory was used for data collection. The cognitive-behavioral intervention was conducted during 10 sessions. Data analysis was administered by SPSS version 19 using statistical tests like t-test and repeated measures ANOVA.

**Results:** The mean age of women in the experimental and control group was  $28 \pm 4.1$  and  $28.04 \pm 3.64$  years, respectively. There was a significant difference between experimental and control groups in the mean score of depression ( $P < 0.05$ ). Also, the post hoc test showed the stable effect of cognitive-behavioral training on reducing depression in infertile women after the intervention and during the follow-up period.

**Conclusions:** Given the positive impact of cognitive-behavioral therapy on reducing depression in infertile women, it is suggested to consider the psychological needs of couples during medical treatment.

Keywords: Depression; Cognitive-Behavioral Therapy; Infertile Women

## 1. Background

Infertility is a major worry and life crisis for millions of couples that can affect many parameters of peoples' lives. It is a significant gynecological and Bio-Psycho-Social problem for healthcare systems (1). The World Health Organization (WHO) defined infertility as the 'failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse' (2).

The prevalence of infertility is significantly different in various parts of the world. For example; 8/9% in Urban Population of Central India (3), 11.5 - 15.7% in Canada (4), 25% in China (5), 15.7% in Nigeria (6) 12.5% in Britain (7), and 7.8 - 22% in Iran (8, 9).

In many countries and cultures, including Iran, child-bearing is a social value for married women (10). Therefore, men and women who experience this critical condition are at risk of psychological symptoms, such as

depression, anxiety, low self-esteem, (11-13), low quality of life (14-16), sexuality dissatisfaction and lower psychological well-being (17), negative self-image, and feelings of inferiority and guilt (18). The most common symptoms of depression include lowered mood, decreased activity, loss of interest, reduced relationships with others, and inability to experience pleasure from joyful situations (1). Depression has a major impact on life, and according to the WHO, it is expected to be among the top three causes of the global burden of disease in 2030 (19). Studies showed that women with depression during IVF/ICSI treatment not only had a significantly lower pregnancy rate but also experienced a lower live birth rate in comparison to women without depression symptoms (20).

Although men and women are equally responsible for infertility, due to social prejudices, infertility is considered a female problem, which is why even in male infertility, women often face more social and family problems



and tolerate its burden. The burden of infertility is, therefore, highly important to know their issues in this regard and may determine the social consequences of this phenomenon for women (21).

Some studies showed that psychological interventions, including cognitive-behavioral therapy (CBT), pose major positive effects on reducing the psychological problems of people suffering from infertility (22). They recommended employing CBT as a method of coping with psychological problems during medical treatment (23), and argued that CBT is as effective as drugs in resolving and reducing infertility stress and a viable alternative to pharmacotherapy in the treatment of depression (24-26). Nevertheless, few studies reported that psychological interventions do not affect psychological status (27, 28).

Although the results of current studies are conflicting, many researchers have reported an increased level of depression and anxiety in couples undergoing infertility treatment and have expressed the importance of physical and mental relationships in infertility. However, the psychosocial aspects of infertility have received less attention, and most treatments are solely focused on medical interventions. Therefore, this study aimed to assess the efficacy and effectiveness of cognitive-behavioral therapy in reducing depression in infertile women referred to the infertility clinic of Birjand University of Medical Sciences.

**Methods**

Following a randomized controlled trial (RCT) design, this study was conducted on 50 women with infertility to evaluate the effects of CBT. The study population comprised all women referring to the infertility clinic of Birjand University of Medical Sciences in 2019. The study sample was incorporated via the convenience sampling method and allocated into study groups via random assignment. According to the study by Talaei et al. (29) and considering the 95% confidence interval, 80% power, mean and standard deviation ( $20 \pm 6.94$  &  $14.5 \pm 7.37$ ), and based on the following formula, the sample size for each group was calculated as 25 subjects:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 (\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2}$$

The inclusion criteria consisted of the female gender, a minimum of 6 months to a maximum of 3 years from the diagnosis of infertility, age between 20 - 40 years, informed consent to participate in the study, and the ability to read and write. The exclusion criteria included unwillingness to cooperate, previous pregnancy, history of previous depression, having an illness, and history of hospitalization due to mental disorders.

The Beck Depression Inventory (BDI) was used to assess depression, which is developed in the early 1960s to assess the severity of depression, emphasizing the cognitive and behavioral dimensions of depression. It contains 21 self-assessment items with 4 phrases describing the depression level in each item. The total score ranges from zero to 63, which is the sum-up of scores on each item (30).

In the first session, after establishing the initial communication and stating the course’s objectives, the Beck questionnaire was distributed among all participants, and they were asked to read the items carefully and answer them. After completing the questionnaires, the participants were randomly allocated to the intervention and control groups, each with 25 cases. Those in the control group were informed that they would receive the intervention after filling out the questionnaire. At the end of the intervention period, both groups were called and filled out the questionnaire again. One month after the intervention period, both groups were invited to fill out the follow-up questionnaires via SMS. To observe ethical considerations, three training sessions were held for them.

Ten 90-minute sessions of CBT were held weekly for 2 and a half months. The contents of the training protocol were compiled based on Taylor’s Cognitive Behavioral Therapy for Chronic Illnesses and Disabilities (2005) (31) and presented by a Ph.D. psychologist. The contents are summarized in Table 1.

**Table 1.** The Protocol of Taylor’s 2005 Cognitive Behavioral Therapy Sessions for Chronic Illnesses and Disabilities (p 79 - 85).

Session	Contents
1	Introducing the members and the goals; describing the techniques of the sessions; pre-test administration Thoughts, feelings, and behaviors; the association between thoughts and emotions; homework and practical work
2	Cognitive errors, types of cognitive errors, methods of recognizing negative spontaneous thoughts, homework assignment
3	Reviewing the assignments of the previous session, investigating the effect of negative thinking and cognitive stimuli, homework assignment
4	The technique of reconstructing thoughts, replacing logical thoughts for irrational thoughts, group practice
5	Courage, types of courageous behavior, negative consequences of not having courage, contributors to avoiding courageous behavior, strategies for expressing courage, assignment
6	Self-control and mood enhancement, positive cognitive strategies, mood regulation, worksheets, enjoyable activities

7	Spontaneous training with illustration and self-induction, practice in groups
8	Anger control and management training, ways to express anger related to infertility, homework, and practice
9	Self-expression training, breathing count meditation, expressing the benefits of social support and its expression
10	Expression of misconceptions related to infertility, comments of group members, post-test administration

Data analysis was administered using SPSS version 19. Descriptive indices of mean and standard deviation were reported. The Shapiro-Wilk test was used to examine the normality of the variables. Statistical tests, such as t-test and repeated measures ANOVA, were used for data analysis. Bonferroni-test was employed to compare paired time.

## Results

In this study, 50 infertile women were selected among the referrals to the infertility clinic of Birjand University of Medical Sciences in 2019. Subjects were randomly di-

vided into control and experimental groups (25 subjects in each group). The mean age of participants in the experimental and control groups was  $28.0 \pm 4.1$  and  $28.04 \pm 3.64$  years, respectively. There was no significant difference between the study groups concerning variables of age, employment status, and education level. Mean scores ( $\pm$  standard deviation) of depression in both control and experimental groups are reported for before and after the intervention and the follow-up period (Table 2). Repeated-measures analysis of variance was used to evaluate the mean score of depression before, immediately after, and one month after intervention in the experimental and control groups (Table 3).

**Table 2.** Mean Scores and Standard Deviation Before, Immediately After, and 1 Months After Intervention

Groups	Before Intervention	After Intervention	1 Months After Intervention
Control	21.4 $\pm$ 8.5	20.06 $\pm$ 7.1	21.6 $\pm$ 7.9
Experimental	20.01 $\pm$ 6.4	14 $\pm$ 5.5	15.4 $\pm$ 5.2

**Table 3.** Comparison of Mean Depression Scores and Standard Deviation Before, Immediately After, and 1 Months After Intervention in Study Groups

Groups	Before Intervention	After Intervention	1 Months After Intervention	Repeated Measures	Multiple Comparisons
Control (n = 25)	21.4 $\pm$ 8.5	20.06 $\pm$ 7.1	21.6 $\pm$ 7.9	F = 2.31 P = 0.11	NS
Experimental (n = 25)	20.01 $\pm$ 6.4	14 $\pm$ 5.5	15.4 $\pm$ 5.2	F = 12.4 P < 0.001	Before with Immediately after P = 0.003 Before with 1 months after P = 0.009 Immediately after with 1 months after P = 0.04
<b>Test results</b>	T = 0.64 P = 0.53	T = 3.61 P < 0.001	t = 3.27 P < 0.002		

A comparison of the mean score of depression between the two groups showed no significant difference before the intervention ( $P > 0.05$ ). However, the mean score of depression in the experimental group after the intervention and in the follow-up phase (ie, one month after intervention) was significantly reduced compared to the control group ( $P < 0.05$ ).

The post hoc test showed no significant difference between the study groups concerning the mean score of depression before and after the intervention, immediately after the training, and in the follow-up phase ( $P < 0.05$ ). That is, the depression score in the control group was almost the same in the three stages. On the other hand, the results of the post hoc test in the experimental group showed significant differences between the mean depression scores before and immediately after the intervention, before and in the follow-up phase, and immedi-

ately after intervention and the in follow-up phase ( $P < 0.05$ ). This finding suggests that CBT not only reduced depression in infertile women but also had a lasting effect, as reflected in the follow-up.

Changes in the mean score of depression for both control and experimental groups during the three phases are reported in Table 4. As can be seen in the table, in the experimental group, there was a significant difference between the baseline, after the intervention, and the follow-up period concerning the mean changes of depression score. This finding may suggest a significant decline in the depression score of those in the experimental group, while changes in the control group were shallow.

**Table 4.** Comparison of Mean Changes in Depression Score Before, Immediately After, and 1 Months After Intervention in Study Groups

Groups	Before and Immediately After Intervention	Before and 1 Months	Immediately and 1 Months
	Mean ± SD	Mean ± SD	Mean ± SD
Control	-0.88± 3.1	0.2 ± 2.7	1.08± 2.1
Experimental	-6.04 ± 8.02	-4.68 ± 7.1	1.36 ± 2.5
Test results	t = 2.99 P = 0.004	t = 3.21 P = 0.002	t = 0.43 P = 0.67

## Discussion

Childbearing and parenting have traditionally been considered as one of the most prominent roles of the female gender (1). The usual reactions of the community to people with infertility problems cause several psychological pressures for them (11, 12), leading to senses of worthlessness and meaninglessness.

Many authors and researchers emphasized the effects of infertility on mental health and psychological state. Infertility is a significant factor that contributes to fear and stress. In addition, it is a significant psychosocial problem and a challenge for healthcare systems. It seems that stress and psychological symptoms related to infertility can negatively affect infertility treatment outcomes. Therefore, utilizing psychological therapies appears to have a positive effect on decreasing women's anxiety, depression, distress, and stress, and increasing fertility and quality of life. Incorporating complementary therapies can lead to improved psychosocial health and promoting outcomes for women undergoing IVF.

We need to know that the psychological characteristics of people must be considered during treatment. Man is a multidimensional being, and all these dimensions should be considered during medical treatments. Unfortunately, sometimes infertility is met with negative reactions from families and society (11-13). Such a situation causes feelings of low self-esteem, helplessness, shame, low quality of life, sexuality dissatisfaction, and lower psychological well-being, leading to anxiety and depressed mood (14-18).

Literature indicates that women with depression during IVF/ICSI treatment not only have a significantly lower pregnancy rate but also have a lower live birth rate in comparison to those without depression symptoms (20). Various treatments are suggested to reduce depression. CBT is based on the hypothesis that a person's feelings and behavior are related to his/her beliefs, and if negative thoughts are corrected, the person's feelings and behavior would be corrected.

These results of the present study indicate the positive impact of the intervention (ie, CBT) on improving depression. The findings are consistent with Paulina, Barbara, Maria, Piotr, and Mirosław (1), which investigated the anxiety and depression in women undergoing infertility treatment. It is also consistent with studies by Frederiksen et al. (22) and LoGiudice (27). They studied the efficacy

of psychosocial interventions intended to improve psychological and pregnancy outcomes in infertile women and men and showed that psychological interventions, including CBT, presented strong positive effects in reducing the psychological problems of people with infertility. Similarly, the results correspond with studies by Ying et al. (28), Frederiksen et al. (22), Domar (23), Faramarzi (24, 25), and Jacobson (26). They investigated the effect of psychological interventions on the mental health of infertile women and reported that CBT can be used as a method of coping with psychological problems during medical treatment.

Based on what was mentioned above, prevalence rate of infertility (3-9), and prevalence of psychological symptoms (10-18), psychological interventions must be employed as a complementary therapy that contribute to psychosocial factors in women undergoing in vitro fertilization (27).

According to the results of this study, we must pay attention to the important role of psychological needs in reducing psychological symptoms in infertile women. Furthermore, there should be centers or individuals to listen and help these cases to address their problems. Another important point that can be emphasized is following holistic views in fields of medicine and medical treatments.

## Conclusions

This study demonstrated that depression, feeling helplessness, and feeling emptiness in life are among the psychological consequences that infertile women may suffer. Therefore, medical science professionals need to keep in mind that sole physical infertility treatment is not enough, and attention should be paid to the psychological needs of infertile women. Accordingly, the use of psychological services by psychologists, such as health and clinical psychologists, is recommended.

## Ethical Considerations

Given the importance of observing ethical principles, the code of ethics was received from the ethics committee of Birjand University of Medical Sciences (identifier: Ir.bums.REC.1396.340). During the implementation, the objectives of the protocol were clearly explained to all participants, and all of them signed written consent to

participate in the study.

### Conflict of Interests:

The authors declare no Conflict of Interest.

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