

Effect of Mindfulness-Based Interventions on Success Rate of Infertility Treatments in Infertile Women; a Meta-Analysis

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Abstract

Aims: Infertility has many psychological effects on infertile people. One of the interventions designed to help infertile women is mindfulness. So far, several studies have examined the effect of mindfulness on infertile people. This meta-analytical study was conducted to determine the effect of mindfulness-based interventions on the success rate of infertility treatments in infertile women.

Information & Methods: In this review study, articles published between 1990 and 2020 were searched in international databases such as Web of Science, Google Scholar, Scopus, Proquest, and PubMed and Iranian databases such as Irondoc, Magiran, SID, using keywords of "Mindfulness", "Intervention", "Infertility", "Assisted Reproductive Treatments" and "Health Promotion". Then, based on the Consort checklist, the full text of the selected articles was reviewed, and the articles with the highest score were included in the study. Data analysis was done using Comprehensive Meta-Analysis statistical software version 2.2.064.

Findings: Finally, four articles were reviewed. The results of the meta-analysis showed the effect of mindfulness on the success of treatment, and the chance of pregnancy in the mindfulness group was 2.895 times that of the control group, so the percentage of pregnancy in the intervention group was significantly higher than the control group ($p < 0.001$).

Conclusion: Mindfulness-based interventions increase the success rate of infertility treatments in infertile women.

Keywords

Mindfulness [<https://www.ncbi.nlm.nih.gov/mesh/68064866>];

Infertility [<https://www.ncbi.nlm.nih.gov/mesh/68007246>];

Health Promotion [<https://www.ncbi.nlm.nih.gov/mesh/68006293>];

Women [<https://www.ncbi.nlm.nih.gov/mesh/68014930>]

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Introduction

Infertility is the inability to conceive after one year of regular unprotected sexual intercourse, seen in both primary and secondary forms [1].

The World Health Organization (WHO) has named infertility a public health problem worldwide [2]. Infertility as a biological-psychological and social crisis puts a lot of stress on infertile couples. It threatens the mental health of couples in various ways. It causes a disturbance in the quality of marital relations, a decrease in intimacy, fear of termination of the marital relationship, divorce, a decrease in self-confidence, depression, feelings of rejection, and helplessness [3].

Performing assisted reproductive treatments, in addition to the need to spend money and time, leads to many psychological pressures on people, so infertile couples abandon assisted reproductive treatments after one or two experiences [4].

Infertile women often consider infertility the most stressful event in their lives and describe repeated and consecutive treatment periods as repeated periods of crisis. Fertility treatments, in addition to physical involvement, can cause adverse psychological reactions. Long waiting periods, feelings of loneliness and rejection, and fear of failure in treatment cause high anxiety and physical symptoms [5].

Mental health and infertility are in a vicious cycle; on the one hand, psychological problems reduce physical performance and response to medical treatments for infertility, and on the other hand, continued infertility and possible failures in the treatment stages lead to an increase in psychological problems in people [4, 5].

One of the interventions designed to help infertile women is mindfulness. Mindfulness therapies include interventions focusing on the relationship between the brain, mind, body, and behavior and their impact on health and disease. Mindfulness therapies include a wide range of approaches, some from Eastern philosophy and Buddhism, and consist of relaxation, yoga, mind, body, and mindfulness-based programs such as reducing stress based on mindfulness and cognitive therapy based on mindfulness [6].

In mindfulness, a person becomes aware of his/her mental mode every moment. Mindfulness is a receptive and non-judgmental awareness of what is happening now. People with a conscious mind perceive internal and external realities freely and without distortion and can deal with a wide range of thoughts, emotions, and experiences, both pleasant and unpleasant.

Irrational and absolute thoughts about parenthood increase the mental pressure of infertile people [7]. Thoughts related to the positive or negative outcome of treatment increase during assisted reproductive treatments, leading to increased

distress in infertile women. Helping infertile women manage disturbing thoughts may lead to a reduction of stressful experiences and psychological distress in women [8]. Through mindfulness exercises and techniques, a person becomes aware of his/her daily activities and can control them by being aware of her thoughts, feelings, and mental states from moment to moment [9].

Some studies have investigated mindfulness intervention's effect on treatment success. In the study of Lee *et al.*, the intervention based on mindfulness affected the quality of life and the pregnancy rate of infertile women [10]. However, in Kim *et al.*'s study, although mindfulness improved the uncertainty and anxiety of infertile women, it did not affect the pregnancy rate of infertile women undergoing IVF treatment [11]. Also, in the study of Gaitzsch *et al.*, the effect of mindfulness on the success rate of infertility treatments was investigated in a systematic review, and the results showed that mindfulness is ineffective on the success rate of fertility treatments [6].

By reviewing the available literature, no study has been conducted that has investigated the success of assisted reproductive treatments in a meta-analysis. Considering the contradictory results of the studies conducted in the field of the effect of mindfulness on fertility treatments and to validate the results of these studies, it seems necessary to conduct a meta-analysis study. Therefore, this meta-analytical study was conducted to determine the effect of mindfulness-based interventions on the success rate of infertility treatments in infertile women.

Information and Methods

This study is taken from the approved research plan of Isfahan University of Medical Sciences (Code 299216). To access the available studies in the field of the subject under investigation, articles published between 1990 and 2020 were searched in international databases such as Web of Science, Google Scholar, Scopus, Proquest, and PubMed and Iranian databases such as Irondoc, Magiran, SID. To find all the desired Persian and English articles, the Persian and English keywords of "Mindfulness", "Intervention", "Infertility", "Assisted Reproductive Treatments", and "Health Promotion" were used. The search strategy was to design clinical questions based on the PICO model, which included "Population (P): Infertile women", "Intervention (I): Mindfulness", "Comparison (C): Receiving mindfulness intervention compared to not receiving intervention", and "Outcome (O): The result of treatment". The search for these keywords was limited to the title and abstract of the article, and studies were selected with the design of experimental and semi-experimental interventions. Finally, all the studies related to the effect of

mindfulness-based on the mentioned keywords were reviewed in the present study. To maximize the comprehensiveness of the search, the reference list of all related articles was reviewed.

At first, a list of titles and abstracts of articles was prepared. The inclusion criteria of the articles in the present review study included the use of experimental and semi-experimental study methods in investigating the impact of mindfulness on pregnancy rate, the clarity of aims, methods, and results, and the percentage of pregnancy in the intervention and control groups. Exclusion criteria included inappropriate and out-of-study content, articles presented at conferences, and letters to the editor. At first, based on the search strategy and the desired keywords, a list of all the articles in the mentioned databases was prepared. The titles of the searched articles were reviewed by the researchers, and after removing duplicate articles, the abstracts of the articles were reviewed, and irrelevant articles were discarded. Then, the full text of seemingly related articles was evaluated using the Consort checklist. Finally, the articles with the highest quality score and related to the purpose of the present study were selected and reviewed.

The Consort checklist contains 37 minor items in the fields of title, abstract, introduction, methods, results, discussion, and some information related to the article, and an overall score is calculated from the number of suitable items reported as the score obtained from this checklist. If any appropriate item was reported, the report page number of that item was recorded.

In the initial search, 1000 articles were found, and after removing duplicates and unrelated studies, 500 articles were examined. After reviewing the title and abstract of these 500 articles, 22 articles were reviewed in terms of full text. In the next step, the researchers evaluated the quality of the articles using the Consort checklist, and finally, four articles were selected for meta-analysis. (Figure 1).

The details of the final articles, including the author's name, the study's year, the study, the country of the study, the type of study, the number of samples, methods, tools, and results, were recorded in a checklist.

The effect size of the pregnancy percentage in the control and intervention groups was used to analyze the results. To check the homogeneity of the studies, Cochran's test and I^2 index were used, and in cases where the studies were heterogeneous, the random effect model was used. Data analysis was done using Comprehensive Meta-Analysis statistical software version 2.2.064.

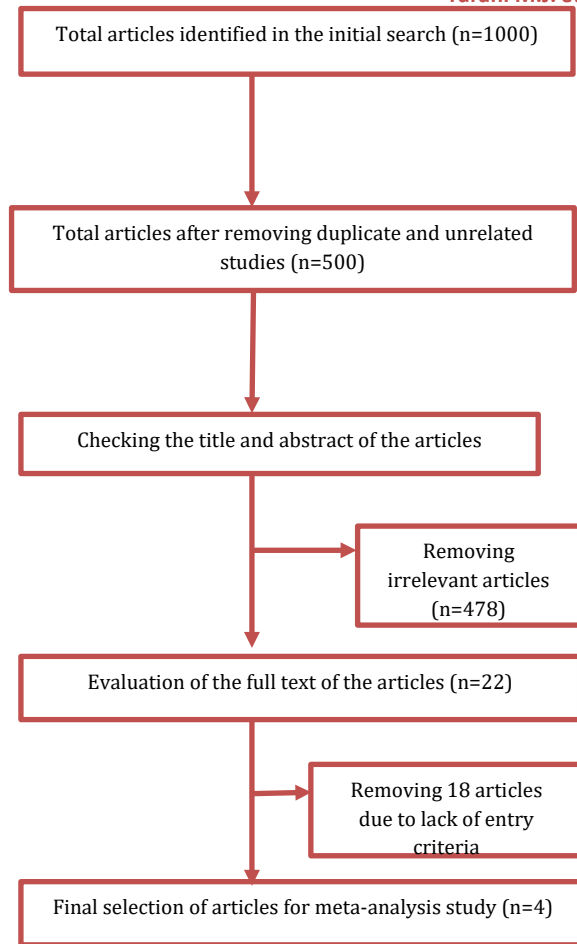


Figure 1. Steps of selecting and entering articles into the study

Findings

Finally, four articles were reviewed (Table 1). The studies that investigated the effect of mindfulness on treatment success were homogeneous ($Q=1.367$; $p=0.713$). The results of the meta-analysis showed the effect of mindfulness on the success of treatment, and the chance of pregnancy in the mindfulness group was 2.895 times that of the control group, so the percentage of pregnancy in the intervention group was significantly higher than the control group ($p<0.001$; Table 2; Figure 2).

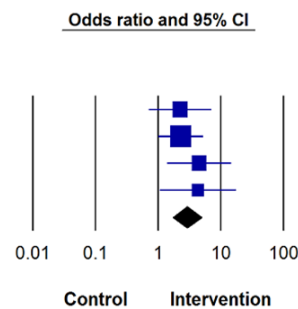


Figure 2. A stacked chart of the effect size of the studies included in the meta-analysis

Table 1. The details of the final articles *Chi-Square

Characteristics of reviewed articles	
Author/year: Kim <i>et al.</i> (2014) ^[11]	
Title: Effect of a mind-body Therapeutic program for infertile Women repeating in Vitro fertilization treatment on Uncertainty, Anxiety, and Implantation Rate	
Country: South Korea	
Type of Study: Randomized controlled trial	
Number of samples: 26 people in the intervention group, 24 people in the control group	
Method: Intervention group: Mindfulness training in 5 sessions of 120 minutes individually and in groups; Control group: Not receiving intervention	
Tool: Kim's Uncertainty Scale, Spielberger Anxiety Inventory, Pregnancy rate	
Results: Mindfulness significantly reduced uncertainty (p<0.001) and anxiety (p<0.001) in the intervention group, but there was no significant difference between the two groups in terms of pregnancy rate (p=0.164).	
Author/year: Li <i>et al.</i> (2015) ^[10]	
Title: Effects of a mindfulness-based Intervention on Fertility Quality of Life and Pregnancy Rates among Women subjected to first in Vitro Fertilization Treatment	
Country: China	
Type of Study: Randomized controlled trial	
Number of samples: 58 people in the intervention group, 50 people in the control group	
Method: Intervention group: Mindfulness training in 5 sessions of 120-150 minutes in groups; Control group: Not receiving intervention	
Tool: The Fertility Quality of Life (FertiQoL) questionnaire (Boivin <i>et al.</i> , 2011), Pregnancy rate	
Results: Mindfulness improves quality of life (p=0.004) and increases fertility in infertile women.	
Author/year: Clifton <i>et al.</i> (2020) ^[12]	
Title: An Internet-based mind/body intervention to mitigate distress in women experiencing infertility	
Country: United States	
Type of Study: Randomized controlled trial	
Number of samples: 36 people in the intervention group, 35 people in the control group	
Method: Intervention group: Mindfulness training in 10 sessions individually and online; Control group: Not receiving intervention	
Tool: Beck's Depression Inventory, Beck Anxiety Inventory, The Infertility-Related Stress Scale	
Results: Mindfulness reduced anxiety (p=0.003), depression (p=0.007), and stress (p=0.041), and the chance of pregnancy in the intervention group was 4.47 times higher than in the control group.	
Author/year: Domar <i>et al.</i> (2011) ^[13]	
Title: Impact of a group mind/body intervention on pregnancy rates in IVF patients	
Country: United States	
Type of Study: Randomized controlled trial	
Number of samples: 46 infertile women in the intervention group, 51 infertile women in the control group	
Method: Intervention group: Mindfulness training in 10 sessions in groups; Control group: Not receiving intervention	
Tool: Pregnancy rate	
Results: There was no significant difference in the pregnancy rate in the first treatment cycle. However, in the second treatment cycle, 52% in the intervention group and 20% in the control group.	

Table 2. The results of the meta-analysis of the effect of mindfulness on treatment success

Study	Confidence Interval 95%			z Value	p Value
	Odds ratio	Lower limit	Upper limit		
Kim <i>et al.</i> (2014) ^[11]	2.237	0.716	6.988	1.385	0.166
Li <i>et al.</i> (2015) ^[10]	2.313	1.022	5.234	2.012	0.044
Clifton <i>et al.</i> (2020) ^[12]	4.511	1.407	14.457	2.535	0.011
Domar <i>et al.</i> (2011) ^[13]	4.333	1.079	17.405	2.067	0.039
Meta-analysis	2.895	1.699	4.932	3.911	0.0001

Discussion

This meta-analytical study aimed to determine the effect of mindfulness-based interventions on the success rate of infertility treatments in infertile women. The results of the present meta-analysis showed that mindfulness affects the success of infertility treatment. Through exercises and techniques based on mindfulness, a person becomes aware of her daily activities, and this awareness makes him/her able to control her emotions and mental states. So that the mind is freed from thoughts focused on the past and future and becomes very capable of dealing with

unpleasant thoughts, emotions, and experiences ^[9]. In a meta-analysis study, Frederickson *et al.* investigated the effect of psycho-social interventions on the pregnancy rate in infertile women and men, and the results of their study showed that psychological interventions increase the pregnancy rate in infertile people ^[14]. In the study of Maleki *et al.*, who investigated the effect of counseling on the success rate of assisted reproductive treatments in a meta-analysis and systematic review, the results showed that counseling affects the success rate of assisted reproductive treatments of infertile people ^[15], which was consistent with the results of the present study. However, in the study of Hämmerli *et al.*, the effect of psychological interventions on the pregnancy rate was investigated in a meta-analysis. The results showed that psychological interventions did not significantly affect the pregnancy rate of infertile people ^[16]. Also, Gaitzsch *et al.* studied the effect of mindfulness on the success rate of infertility treatments in a systematic review. They showed that mindfulness does not affect the success rate of fertility treatments ^[6], which was not in line with the results of the present study.

Anxiety and depression hurt the physiological function of the body and affect fertility. Various mechanisms have been proposed for the effect of psychological stress on fertility, including disrupting the secretion of gonadotropins, the local effect of catecholamine on the uterus and fallopian tubes, and disrupting the immunological processes that participate in the maintenance of fertility and implantation. Anxiety aggravates infertility by increasing cortisol and prolactin [10].

In the study of Kokanali *et al.*, in addition to factors such as age, the condition of the ovaries, and the number of follicles, the level of obvious anxiety during IUI treatment had a significant relationship with the success of the treatment [17]. A lot of evidence shows that psychological problems caused by infertility can contribute to the aggravation of infertility [17, 18]. On the other hand, people who have peace of mind and mental health experience less mental stress, and as a result, the probability of their fertility increases [19, 20].

Although there is a difference of opinion about the effect of supportive and psychological interventions on the success rate of fertility treatments, since the diagnosis and treatment of infertility causes a lot of stress and anxiety in infertile couples [21], it is necessary to use counseling and supportive interventions to help infertile people.

Considering that mindfulness intervention is an accessible and applicable intervention for all infertile people, it is recommended to use this intervention to improve the health of infertile people and increase the success rate of infertility treatments in infertility centers.

One of the limitations of this study was the limited number of studies on the effect of mindfulness on the success of assisted reproductive treatments, and most of the studies were on the effect of mindfulness on the success of IVF treatment. Therefore, it is suggested that the effect of this intervention on the success of other infertility treatments with different male and female causes should be investigated in future studies.

Conclusion

Mindfulness-based interventions increase the success rate of infertility treatments in infertile women.

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Ethical Permissions: This study results from a research project approved by Isfahan University of Medical Sciences with code IR.MUI.NUREMA.REC.1400.191.

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Ghasemi Gujani M (Second Author), Introduction Writer/Methodologist/Main Researcher/Discussion Writer (40%); Mohammadi Rizi S (Third Author), Introduction Writer/Methodologist/Assistant Researcher/Discussion Writer (30%)

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