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REVIEW ARTICLE



The effects of cognitive interventions on quality of life in infertile women: a meta-analysis of randomized controlled trials

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ABSTRACT

Infertility can lead to significant psychological distress, including depression and anxiety, adversely affecting the quality of life and treatment outcomes for affected women. This study systematically reviews non-pharmacological interventions, particularly cognitive behavioral therapy (CBT), aimed at improving quality of life, mental health, and birth rates among infertile women. A comprehensive literature search was conducted across multiple databases (PUBMED/MEDLINE, Embase, Scopus, Web of Science, and ULAKBİM) up to 22 February 2025, following PRISMA guidelines, with registration in the PROSPERO database (CRD42023457742). The analysis included randomized controlled trials (RCTs) focusing on CBT, with quality of life as the primary outcome. Eight studies involving 687 women met the inclusion criteria. Meta-analysis results revealed significant enhancements in quality of life (SMD: 1.97), alongside notable reductions in depression (SMD: -3.34) and anxiety (MD: -2.09). Additionally, a positive trend in pregnancy rates was observed (MD: 0.48). Despite the promising findings, the overall quality of evidence was deemed low to moderate due to potential biases. This meta-analysis underscores the effectiveness of CBT in improving mental health and quality of life in infertile women, highlighting the need for further high-quality research to validate these outcomes and endorse cognitive interventions in infertility treatment.

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KEYWORDS

Infertility; cognitive behavioral therapy; quality of life; anxiety; depression

Abbreviations

ART	assisted reproductive technology
CI	confidence interval
CBT	cognitive behavioral therapy
GRADE	grading of recommendations, assessment, development and evaluations
MD	mean difference
OR	odds ratio
PRISMA	preferred reporting items for systematic reviews and meta-analysis statement
RCT	randomized controlled trials
SMD	standardized mean difference
WHO	World Health Organization

Introduction

According to the World Health Organization (WHO), infertility is a disease of the reproductive system, defined as the inability to achieve a clinical pregnancy after 12 months or more of unprotected regular sexual intercourse [1]. Infertility affects 8–12% of couples of childbearing ages trying to conceive worldwide [2]. As one of the primary issues in reproductive health, infertility is a significant concern for WHO. The

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organization has stated that the neglect of infertility in various countries leads to widespread psychological problems at both individual and societal levels [3]. Many women experiencing infertility undergo significant psychological changes, such as depression, which can lead to social isolation and low self-esteem [4]. However, some women successfully cope with infertility and lead positive, meaningful lives [5]. The thoughts that infertile women have about pregnancy can contribute to depression, anxiety, and stress, with depression levels comparable to those experienced by women with cancer [4]. Furthermore, the psychosocial consequences of infertility not only result in the failure or termination of infertility treatments [6,7] but also negatively affect pregnancy outcomes due to the stress hormones generated by these experiences [8]. These challenges inevitably impact their quality of life, with some affected women even contemplating suicide due to widespread social pressures in addition to their depression [4,9,10]. Therefore, it is essential to provide holistic support for individuals facing infertility [11,12]. Assisting women with infertility in improving their self-management and coping skills is crucial for enhancing their overall well-being [13,14].

Although pharmacological interventions are seen as an effective and safe method for managing fertility and quality of life in infertile women, it is unclear to what extent non-pharmacological interventions improve fertility outcomes [13,15]. Furthermore, some treatments, such as assisted reproductive techniques, are expensive and lead to a heavy economic burden on infertile couples [16,17]. Therefore, it is necessary to summarize the available evidence on non-pharmacological interventions in infertile women and their effects on fertility outcomes.

In recent years, the first-line treatment of depression in most countries is cognitive behavioral therapy (CBT) interventions. Mindfulness-based intervention programs, including CBT and mindfulness-based education, are reported to be highly effective in relieving anxiety, depression, and perceived stress, reducing body mass index, and improving quality of life in infertile women [18,19].

A systematic review and meta-analysis previously conducted by Dube et al. [20] highlighted the effectiveness of psychological interventions in alleviating infertility-related distress and enhancing pregnancy rates [20]. However, this review included a broad array of psychological interventions and did not focus specifically on cognitive interventions, such as CBT, which have gained prominence in recent years. Moreover, several recent studies, including those by Abdolahi et al. [21], Golshani et al. [22] and Wang et al. [23], have demonstrated promising results regarding the efficacy of CBT in reducing anxiety and depression among infertile women. These findings indicate a growing body of evidence that suggests the need for a focused meta-analysis on CBT specifically tailored for this population [21–23].

Given the considerable time gap since the last comprehensive review and the emergence of new studies over the past few years, this meta-analysis aims to synthesize the latest evidence on the effects of cognitive behavioral interventions on quality of life, mental health, and pregnancy outcomes in infertile women. By addressing this gap in the literature, our review seeks to provide updated insights and recommendations for incorporating cognitive interventions into infertility treatment protocols.

Methods

A systematic review and meta-analysis of studies evaluating the impact of cognitive interventions given to infertile women on women's quality of life, anxiety, depression, and pregnancy outcomes was conducted. The Cochrane Handbook was used to systematically review interventions [24]. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis Statement) guideline was followed in preparing the systematic review and meta-analysis [25]. The protocol for this systematic review and meta-analysis was recorded in the PROSPERO database (Number: CRD42023457742). To control the risk of bias during the study, a literature review, article selection, data extraction, and quality assessment of included articles were independently conducted by two researchers. In case of disagreement on any issue, all researchers came together for a discussion and a final consensus.

Search strategy

A comprehensive literature search was performed across multiple electronic databases including PUBMED/MEDLINE, Embase (via OVID), Scopus, Web of Science, and ULAKBİM, covering publications up to 22

February 2025. The search strategy was developed in three stages. Initially, a preliminary search was conducted using broad terms related to infertility (P), cognitive-behavioral interventions (I), and study design (S) to identify relevant concepts and indexing patterns. Based on this, a refined and structured search strategy was formed. In the second stage, Medical Subject Headings (MeSH) and relevant keywords were determined. Finally, Boolean operators (AND/OR) were applied to combine terms effectively.

The search terms included combinations such as: 'infertility' OR 'in vitro fertilization' OR 'reproductive techniques' OR 'intrauterine insemination (IUI)' AND 'cognitive behavioral therapy' AND ('stress' OR 'depression' OR 'anxiety' OR 'quality of life' OR 'psychiatric' OR 'psychological' OR 'psychosocial') AND ('Randomized Controlled Trial' OR 'Controlled Clinical Trial'). These were filtered primarily by abstract and title. Detailed database-specific strategies are provided in the supplementary file.

Eligibility criteria

Study selection adhered to the PICOS (Participants, Interventions, Comparisons, Outcomes, Study Design) framework.

Participants (P): Women diagnosed with infertility, including those undergoing fertility treatments or referred to infertility clinics.

Intervention (I): Cognitive-behavioral therapies delivered either in-person or online, in both individual and group settings.

Comparison (C): Control groups without any cognitive-behavioral intervention.

Outcomes (O): Primary outcome was quality of life. Secondary outcomes included mental health parameters (depression, anxiety), pregnancy-related metrics, hormonal indicators, and cognitive-behavioral outcomes.

Study design (S): Only prospective randomized controlled trials (RCTs) were included.

Exclusion criteria encompassed studies on women not actively seeking pregnancy, studies solely involving pharmacological treatments, non-English or non-Turkish publications, theoretical or review articles, conference papers, protocol-only reports, and studies lacking a control group or methodological rigor.

Selection of studies and data extraction

The data were extracted by one reviewer (A.Y.K.) using a data extraction form and verified by a second reviewer (F.S.B.). Disputes between the two reviewers were resolved by a third investigator (T.Y.). General characteristics of the study (author, country, publication year and study design); characteristics of participants included in the studies (mean age, duration of infertility, and sample size); type and description of intervention; participation of healthcare professionals; setting, format, duration and number of sessions; frequency of contact; follow-up time; dropout rate; and main outcome variables were extracted from each included study (Table 1).

Risk of bias assessment

The risk of bias for each included RCT was evaluated using the Cochrane RoB 2.0 tool. This included domains such as random sequence generation, allocation concealment, blinding (of participants, personnel, and outcome assessors), handling of incomplete data, and selective outcome reporting. Additional potential sources of bias—such as baseline group imbalances—were also considered. Each study was rated as low, high, or unclear risk. Two independent reviewers conducted the assessment, and any disagreements were resolved by discussion and re-evaluation of full texts to reach consensus (A.Y.K. and F.S.B.)

Quality assessment of studies

To assess methodological quality, the Joanna Briggs Institute (JBI) Critical Appraisal Checklists for Randomized and Quasi-Experimental Studies were utilized. The RCT checklist includes 13 items, with each rated as 'Yes', 'No', 'Unclear', or 'Not Applicable'. Studies were categorized as 'poor' (<50% 'Yes' responses), 'fair' (51–80%), or 'good' (>80%).

Table 1. Study characteristics ($N = 8$).

References, country	Study design	Study period	Data collection tools	Age	Sample size/parite	Nonpharmacological type	Application time and method	Yaşam kalitesi	Depression-	Anxiety	Pregnancy status
Heredia et al, 2020, Spain [8]	RCT	2014	FertiQoL, STAI, BDI, SES, LOT	N/A	Psychological intervention: 23 Control: 23 Infertile woman	Training including psychoeducation, relaxation training and coping skills	90 min Face to face	Psychological intervention: 1. Pre-intervention: 82.96 ± 16.61 2. Post-intervention: 92.96 ± 11.82 Control	Psychological intervention: 8.18 ± 3.39 Control 5.73 ± 1.68	Psychological intervention: 22.30 ± 3.80 Control 18.53 ± 1.90	N/A
Özcan and Kırca, 2023, Turkey [26]	RCT	2020	FertiQoL VAS	LCM: 34.42 ± 3.17 Control: 34.57 ± 3.56	LCM: 40 Control: 40 Infertile woman	Levine's Conservation Model (LCM) with five interviews	N/A Face to face	LCM: 73.08 ± 5.39 Control: 41.04 ± 7.40	N/A	N/A	N/A
Hosseini et al, 2020, Iranian [18]	RCT	2018	SF-36	N/A	MBSR: 18 Control: 18 Infertile woman	Mindfulness-based stress reduction (MBSR) program Midwifery	8 week Face to face	MBSR 1. Baseline: 38.07 ± 3.06 2. Immediately after the intervention: 62.89 ± 8.65 3. One month after the intervention: 62.32 ± 7.58 Control 1. Baseline: 42.86 ± 3.67 2. Immediately after the intervention: 45.06 ± 4.72 3. One month after the intervention: 48.66 ± 7.03	MBSR 1. Baseline: 20.35 ± 16.70 2. Immediately after the intervention: 66.62 ± 21.87 3. One month after the intervention: 62.32 ± 7.58 Control 1. Baseline: 37.00 ± 19.74 2. Immediately after the intervention: 37.00 ± 15.69 3. One month after the intervention: 42.55 ± 19.13	N/A	N/A
Rahimi et al., 2021, Iran [27]	Randomized control-led trial	2019	DASS-21 Scale, SF-12 Quality of life scale	Counseling: 34.4 ± 6.0 Control: 32.9 ± 7.4	Counseling: 30 Control: 30 Infertile woman	Hope-oriented group counseling	Six 45–60-min sessions (once a week)	Counseling: before intervention: 31.8 ± 3.7 One week after intervention: 40.3 ± 3.5 One month after intervention: 38.1 ± 3.1 Control Before intervention: 32.1 ± 3.5 One week after intervention: 32.2 ± 3.5	Counseling: before intervention: 15.9 ± 3.0 One week after intervention: 12.2 ± 3.1 One month after intervention: 13.3 ± 2.9 Control Before intervention: 16.0 ± 2.7 One week after	Counseling: before intervention: 15.7 ± 3.0 One week after intervention: 13.3 ± 2.6 One month after intervention: 15.3 ± 2.8 Control	N/A

Table 1. (Continued)

References, country	Study design	Study period	Data collection tools	Age	Sample size/parite	Nonpharmacological type	Application time and method	Yaşam kalitesi	Depression-	Anxiety	Pregnancy status
Legro et al., 2022, ABD [28]	Randomized control-led trial	2010	Health-Related Quality of Life (HRQOL)	Lifestyle arm: 28.6 ± 3.4 Oral contraceptive arm: 29.8 ± 3.7 Combine: 28.7 ± 4.2	Lifestyle arm: 50 Oral contraceptive arm: 49 Combine: 50 Infertile woman	The lifestyle program	5 days per week	Lifestyle arm: 4.5 ± 1.2 Oral contraceptive arm: 4.6 ± 1.0 Combine: 4.5 ± 1.2	N/A	Before intervention: 15.7 ± 2.8 One week after intervention: 15.5 ± 2.7 One month after intervention: 15.5 ± 2.7 One month after intervention: 15.5 ± 2.9 One month after intervention: 15.7 ± 2.9	
Domar et al., 2015, Boston [29]	Randomized control-led trial	2011–2012	FertiQoL, STAI, BDI	CCRI: 34.67 ± 4.26 Control: 35.03 ± 4.18	CCRI: 89 Control: 77 Infertile woman	Cognitive coping and relaxation intervention	Reading several times a day–12-month assessment	CCRI: 52.27 (49.36, 55.17) Control: 51.54 (48.46, 54.63)	N/A	CCRI: 2.431 (2.15, 2.47) Control: 2.40 (2.23, 2.57) N/A	Lifestyle arm: 32.0 ± 4.2 Oral contraceptive arm: 16.00 ± 4.2 CCRI: 66.19 (47) Control: 66.67 (58) N/A
Baghbani et al., 2024, Iran [30]	Randomized control-led trial	2021–2022	FertiQoL	MBCT: 28.6 ± 3.71 Control: 32.11 ± 5.9	MBCT: 10 Control: 9	Counseling with mindfulness-based cognitive therapy	8 weeks–45 min per session program	MBCT: 62.02 ± 10.61 Control: 50.37 ± 10.61	N/A	N/A	
Szigeti et al., 2024, Hungary [31]	Randomized control-led trial	2019–2022	FertiQoL, BDI, STAT-I, SSS	MBPI: 34.34 ± 4.75 Control: 36.89 ± 3.96	MBPI: 84 Control: 84	Mind/body Program for Infertility	10-week, 135-min per session program	2.180 0.031 4.14 1.903	–0.385 0.701 –0.476 1.238	–0.633 0.527 –1.034 1.633	0.024 0.981 0.018 0.743

Note: Table summarizing the main features of the eight randomized controlled trials included in the meta-analysis. It presents author, year, country, study design, sample size, intervention type, duration, and measured outcomes such as quality of life, depression, anxiety, and pregnancy status. N/A: Not applicable; VAS: Visual Analog Scale; STAI: State Trait Anxiety Inventory; SAL: State Anxiety Inventory; IDF: Individual Descriptive Form; W-DEQA: Version A of the Wijma Delivery Expectancy/Experience Questionnaire; PLPQ: Perception of Labor Pain Questionnaire; BPS: Behavioral Rating Scale; PBI: Present Behavioral Intensity, Anxiety (State-Trait Anxiety Inventory, STAI); Beck Depression Inventory, BDI • Rosenberg Self-Esteem Scale, SES • Optimism (Life Orientation Test, LOT, isual Analog Scale for Fatigue (VAS-F) and Fertility Quality of Life (FertiQoL) Questionnaire, mindfulness-based stress reduction (MBSR), mindfulness-based cognitive therapy (MBCT), Mind/Body Program for Infertility (MBPI) Estimated effect of treatment on quality of life (PCOSQ) and psychological morbidity (DAS521), The Fertility Quality of Life scale (FertiQoL), The State-Trait Anxiety Inventory (STAI) Beck Depression Inventory (BDI), Cognitive Coping and Relaxation Intervention (CCRI), Trait subscale of the Spielberger State-Trait Anxiety Inventory (STAT-I), SSS, Short Stress Scale.

Four reviewers independently scored the studies and then convened to discuss results and resolve discrepancies. Additionally, the strength of evidence at the outcome level was assessed using the GRADE approach, according to standardized GRADE methodology.

Statistical analysis

The meta-analysis used Review Manager 5.4 (The Nordic Cochrane Center, Copenhagen, Denmark) for data analysis. Heterogeneity between studies was evaluated using Cochran's Q -test and Higgins' I^2 , and it was accepted that I^2 greater than 50% indicated significant heterogeneity. Accordingly, random effect results were considered when I^2 was greater than 50%, and fixed effect results were considered if it was less than the value. Odds ratio (OR) for categorical variables, mean difference (MD), and standardized mean difference (SMD) for continuous variables were calculated. MD or SMD is appropriately pooled for continuous variables based on whether the results are measured with the same scales and the corresponding 95% confidence interval (CI). All tests were calculated from two-pronged tests, and a p -value of less than 0.05 was considered statistically significant.

Results

Search result

Figure 1 presents the PRISMA flowchart summarizing the literature review and study selection process. As a result of electronic database searches and manual searches, a total of 756 articles were obtained. After the duplicate entries were eliminated, 714 articles were evaluated. Titles and abstracts were examined to identify relevant articles, review articles, protocols, copies, and different populations. As a result, 693 articles that did not meet the inclusion criteria were excluded. The remaining 21 full-text articles were evaluated for relevance, and Eight articles that met the criteria for randomized controlled trials (RCT) were included in the analysis (see Figure 1).

Study features

This systematic review and meta-analysis cover Eight studies involving a total of 687 infertile women to examine the impact of cognitive intervention on quality of life [8,18,26–31]. Data were collected from four different countries: Iran [18,27,30] Spain [8], Turkey [26], USA [29,28], Hungary [31]. All studies included in this systematic review and meta-analysis evaluated the quality of life of women after cognitive therapy was applied to infertile women. The study design of all included studies was a randomized controlled trial (RCT). Table 1 provides a summary of the study characteristics. In all studies within the scope of this study, a cognitive therapy method was applied to infertile women: psychoeducation [8], Levine's Conservation Model [26], mindfulness [18], hope-oriented group counseling [27], the lifestyle program [28], cognitive coping relaxation intervention [29], Counseling with Mindfulness-based Cognitive Therapy [30] and Mind/Body Program for Infertility [31], Quality of life was considered the primary outcome in all studies. Anxiety, depression, and pregnancy rate were evaluated as secondary outcomes. All included studies had an RCT design. According to the GRADE assessment tool, the overall quality of the included studies was low to moderate. Serious risk of bias (lack of randomization, allocation concealment, and participant blinding) was the main factor contributing to the lower quality of evidence. GRADE quality assessments for the included studies are presented in Table 2.

Outcomes

Primary outcomes: quality of life

In Figure 2, the results of a meta-analysis of the impact of cognitive therapy interventions on quality of life in infertile women are presented as Forest Plot. All included studies have reported results on the impact of cognitive therapy on quality of life. A high level of heterogeneity was found when aggregating the data after cognitive intervention ($I^2 = 97\%$, $p < 0.00001$). Therefore, according to the results of the random effects

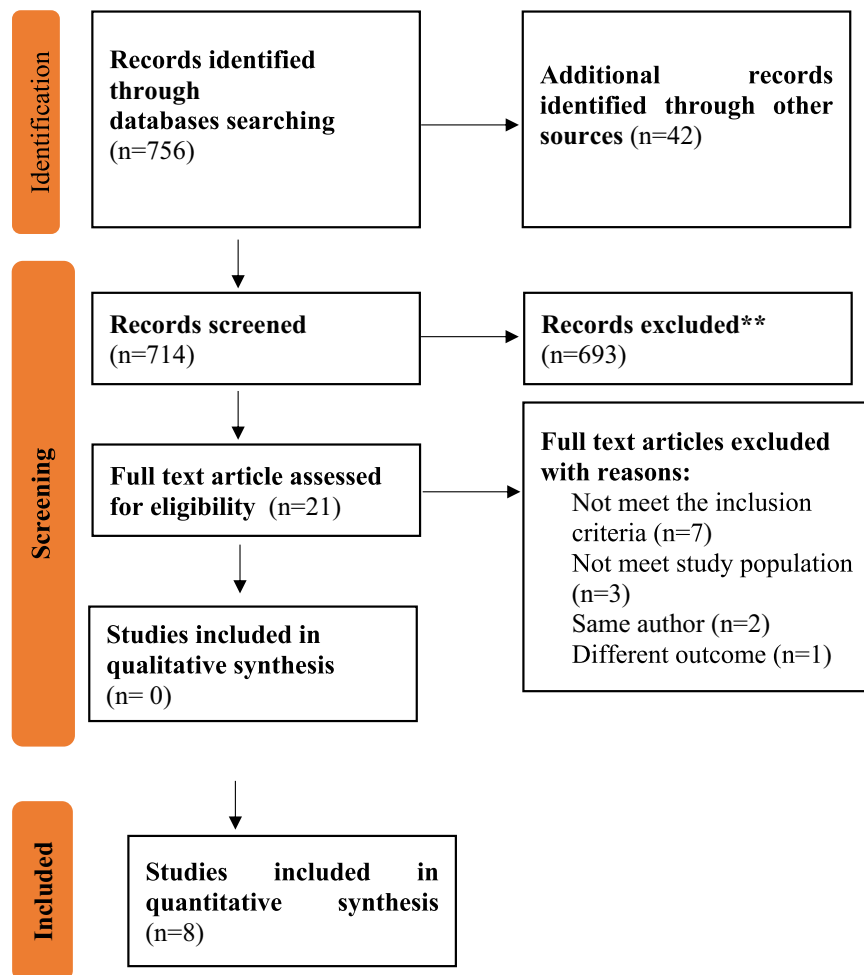


Figure 1. PRISMA flow diagram. Note: Flow diagram showing the study selection process: 756 records identified, 714 screened, 21 full-text articles assessed, and 8 randomized controlled trials included in the final meta-analysis. PRISMA: preferred reporting items for systematic reviews and meta-analyses.

model, it was shown that there was a significant difference between the groups in the quality of life of infertile women after the cognitive intervention and that the quality of life was positively affected (SMD: 1.97, 95% CI: 0.94–3.00, $Z = 3.75$, $p = 0.0002$; [Figure 2](#)). Despite efforts to identify the source of heterogeneity by excluding certain studies in sensitivity analysis, the effect of cognitive intervention administered to women on quality of life remained consistent, highlighting the reliability of the results.

Secondary outcomes

Depression

In [Figure 3](#), the results of a meta-analysis of the impact of cognitive therapy interventions on depression in infertile women are presented as Forest Plot. A high level of heterogeneity was found when aggregating the data after cognitive intervention ($I^2 = 99\%$, $p = 0.00001$). Therefore, according to the results of the random effects model, there was a significant difference between the groups on depression after cognitive intervention (SMD: -3.34 , 95% CI: -6.25 to -0.43 , $Z = 2.25$, $p = 0.02$; [Figure 3](#)).

Anxiety

In [Figure 3b](#), the results of a meta-analysis of the impact of cognitive therapy interventions on anxiety in infertile women are presented as Forest Plot. A high level of heterogeneity was found when aggregating

Table 2. GRADE assessment.

Certainty assessment				Summary of findings								
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	No of patients		Effect	Certainty	Importance	
							Cognitive therapy	Control	Relative (95% CI)	Absolute (95% CI)		
Quality of life 8	RCT	Serious ^a	Not serious	Not serious	Serious ^b	none	447\447 (100%)	413\413 (100%)		SMD 1.97 higher (0.94 higher to 3 higher))	⊕⊕○○ Low ^{a,b}	Important
	RCT	Serious ^a	Not serious	Not serious	Serious ^b	None ^c	139\139 (100%)	126\126 (100%)		MD 0.48 higher (0.44 higher to 0.52 higher)	⊕⊕○○ Low ^{a,b,c}	Important
Depression 4	RCT	Serious ^a	Not serious	Not serious	Serious ^b	None ^c	213\213 (100%)	195\195 (100%)		SMD 3.34 lower (6.25 lower to 0.43 lower)	⊕⊕○○ Low ^{a,b,c}	Important
Anxiety 3	RCT	Serious ^a	Not serious		Serious ^b	None ^c	139\139 (100%)	126\126 (100%)		MD 2.09 lower (4.01 lower to 0.17 lower)	⊕⊕○○ Low ^{a,b,c}	

Note: Table showing the GRADE quality of evidence assessment for the meta-analysis outcomes. It evaluates risk of bias, inconsistency, indirectness, imprecision, and provides overall certainty ratings for quality of life, pregnancy rate, depression, and anxiety.

Explanation

^a Downgraded one level for unclear sequence generation, allocation concealment, and lack of blinding.

^b Downgraded one level for considerable heterogeneity or publication bias.

^c Total population < 300.

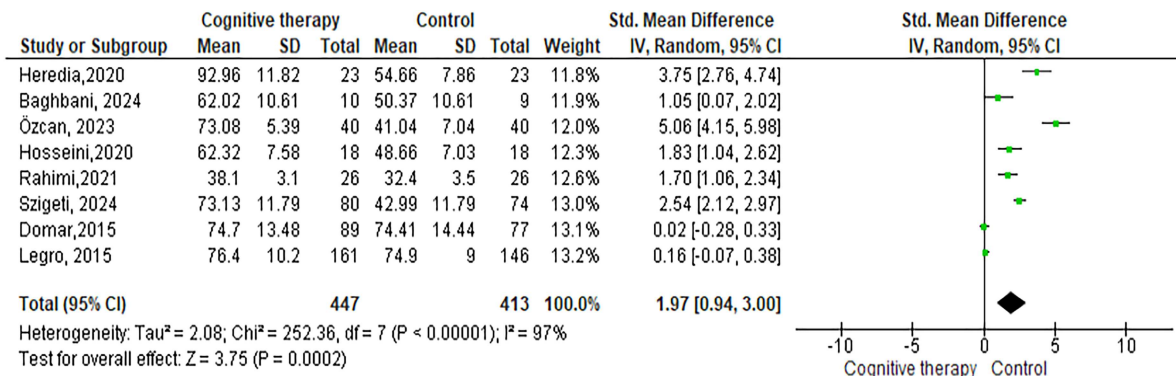


Figure 2. Meta-analysis results regarding the effect of cognitive therapy on quality of life for infertile woman. Note: Forest plot displaying the pooled effect of cognitive therapy interventions compared to control on quality of life in infertile women. Results indicate a significant improvement in quality of life.

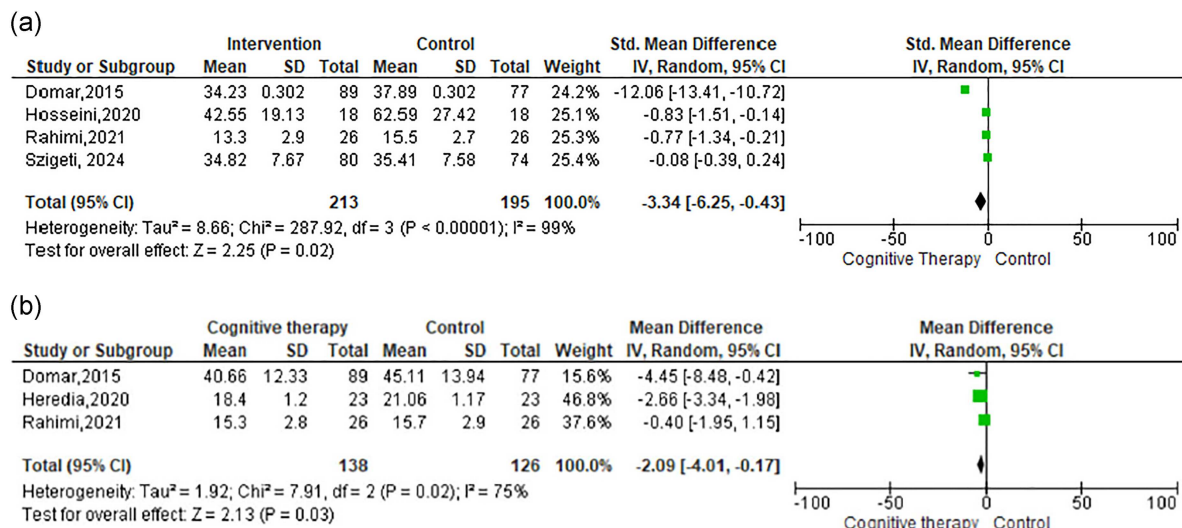


Figure 3. a. Meta-analysis results regarding the effect of cognitive therapy on depression for infertile woman. a) pre-intervention, b) post-intervention. b. Meta-analysis results regarding the effect of cognitive therapy on anxiety for infertile woman. a) pre-intervention, b) post-intervention. Note: Forest plot comparing depression scores in infertile women before and after cognitive therapy, showing reductions in depression symptoms compared with controls and Forest plot comparing anxiety scores in infertile women before and after cognitive therapy, indicating a decrease in anxiety symptoms compared with controls.

the data after cognitive intervention ($I^2 = 75\%$, $p = 0.02$). For this reason, according to the results of the random effects model, there was a significant difference between the groups on anxiety after cognitive intervention (MD: -2.09 , 95% CI: -4.01 to -0.17 , $Z = 2.13$, $p = 0.03$; Figure 3b). Despite efforts to identify the source of heterogeneity by excluding certain studies in sensitivity analysis, the effect of cognitive intervention administered to infertile women on anxiety remained consistent, highlighting the reliability of the results.

Pregnancy rate

In Figure 4, the results of a meta-analysis of the impact of cognitive therapy interventions on the birth rate in infertile women are presented as Forest Plot. A high level of heterogeneity was found when pooling the data after the intervention ($I^2 = 69\%$, $p = 0.07$). Therefore, according to the random effects model results, cognitive intervention's effect on pregnancy rates significantly differed between the groups (MD: 0.48 , 95% CI: 0.44 – 0.52 , $Z = 22.55$, $p < 0.00001$; Figure 4).

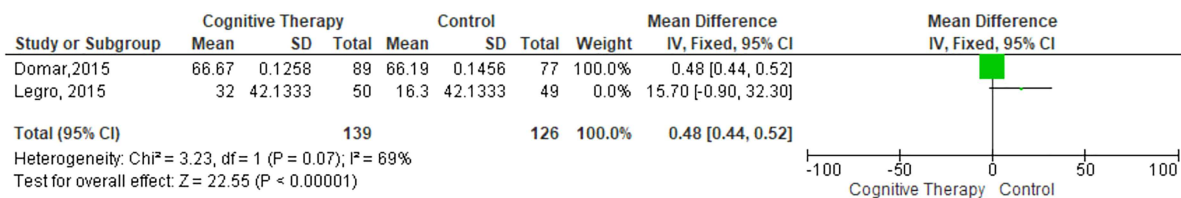


Figure 4. Meta-analysis results regarding the effect of cognitive therapy on pregnancy rate for infertile woman.

Note: Forest plot showing the effect of cognitive therapy interventions on pregnancy rates in infertile women, with higher rates observed in intervention groups.

Risk of bias

All studies have identified an adequate method for randomly assigning participants to cognitive behavioral intervention groups. For this reason, we evaluated these studies in this area as having a low risk of favoritism. Four studies reported sufficient allocation secrecy for randomization and assessed them at a low risk of bias. Two studies were rated as uncertain risks due to insufficient information or no mention of factors about randomization or allocation confidentiality [8,29]. In the four studies included in the meta-analysis, the participants and researchers could not be blinded to the study; thus, all studies were evaluated under the risk of bias in blinding participants and employees, and this was considered when interpreting the findings.

On the other hand, two studies did not provide information on this issue and were evaluated under the risk of uncertain bias [8,27]. The three studies in the meta-analysis assessed the risk of bias and favoritism error as uncertain risks without blinding the outcome evaluation [8,18,29]. In all studies, work stoppages were balanced between the intervention and control groups, or we found a low attrition risk because there were too few dropouts to affect the study. In all studies included in the meta-analysis, across all study methods, they were assessed at low risk of reporting bias because they discussed significant outcomes reported, including adverse outcomes, and matched those reported in their records. For each included study, we disclosed significant concerns regarding other possible sources of bias not previously addressed in the above categories. Specifically, we sought a conflict-of-interest statement and a source of funding. Of the included studies, all reported no further risk of bias (Figure 5).

Discussion

This systematic review and meta-analysis evaluated Eight randomized controlled trials evaluating the effectiveness of cognitive-based intervention programs in improving quality of life and reducing anxiety and depression in infertile women. This meta-analysis is the first systematic review to synthesize and evaluate the available evidence on cognitive-based interventions for infertile women using meta-analytic methods. Overall, the combined meta-analysis results revealed significant effects of a cognitive-based intervention, which can effectively reduce anxiety and depression symptoms, increase the pregnancy rate, and improve the quality of life in infertile women. Although the meta-analysis revealed specific benefits of a cognitive-based intervention program concerning increasing the pregnancy rate of infertile women, this conclusion should be considered with caution as only two studies were included in the meta-analysis. The heterogeneity shown by the meta-analysis results may be due to the clinical diversity of design, cognitive intervention programs, types of infertility, and various scales used.

In a systematic review, 20 cross-sectional studies and 8 qualitative studies were included and it was reported that the stigma rate was high and the quality of life was low in infertile women. The combined meta-analysis results showed that cognitive-based intervention significantly improved the quality of life for infertile women at follow-up after the intervention [32]. A systematic review that included 14 studies reviewing findings on quality of life in infertile women found evidence of significant quality of life or health-related impairment in quality of life in infertile women [33]. Another meta-analysis revealed the specific benefits of a mindfulness-based intervention program on the health-related quality of life of infertile women. However, only two studies were included in the meta-analysis [34].



Figure 5. Risk of bias graph.

Note: Risk of bias summary graph illustrating the proportion of included studies rated as low, unclear, or high risk across different bias domains.

A systematic review and meta-analysis assessed the effectiveness of psychological interventions in alleviating infertility-related distress and enhancing pregnancy rates among individuals and couples facing infertility. The findings indicated a significant positive effect on psychological outcomes and a modest increase in conception rates. However, the overall quality of the evidence was rated as low to moderate, largely due to a high risk of bias in many studies, highlighting the need for more rigorously conducted trials [20]. A systematic review and meta-analysis examined the effects of psychosocial interventions on pregnancy outcomes in couples undergoing assisted reproductive technology (ART). The analysis of 15 trials with 2434 participants found a positive impact on pregnancy rates, particularly with longer-duration and

mind-body interventions. The authors highlight the need for more high-quality research to improve guidance for infertile couples and explore effects on live birth and abortion rates [35].

Another meta-analysis assessed the effects of psychotherapy interventions on pregnancy and psychological outcomes for infertile couples. It found that psychotherapy particularly CBT approach can significantly enhance pregnancy rates and alleviate psychological distress. However, despite these positive results, the overall impact on pregnancy rates was limited, emphasizing the need for further rigorous studies in this area [36].

Additionally, many studies have reported a decline in the physical, emotional, and social health of infertile women [16,37,38]. Specifically, the results of our meta-analysis showed a significant difference in the effectiveness of cognitive-based intervention in improving quality of life in women who were infertile compared to the control group. However, the meta-analysis revealed specific benefits of a mindfulness-based intervention program on the health-related quality of life of infertile women; the Eight studies included in the meta-analysis assessed overall quality of life using different quality of life scales. This situation was evaluated without sub-dimensions such as social, emotional, pain, or physical affecting the quality of life.

The combined meta-analysis results showed that the cognitive-based intervention had an influential and significant effect in reducing anxiety and depression symptoms after the intervention compared to the control group. Diagnosis and treatment of infertility can cause emotional and psychological stress in female patients, and anxiety and depression are the most common mental disorders [39]. In a meta-analysis that included ten studies, mindfulness-based intervention in infertile women reported a significant impact improvement on symptoms of depression and anxiety [34]. In a meta-analysis study that included 44 studies with a sample size of 53.300 infertile female patients, it was reported that the prevalence of major depressive disorder, general anxiety and depression was quite high, especially in infertile women in the Asian continent [40]. Another review and meta-analysis revealed that the collective prevalence values of depression among infertile women were 44.32% in low- and middle-income countries and 28.03% in high-income countries [41]. A review analyzes shows that infertility affects mental health, including depression and anxiety, in men and women worldwide. The study emphasizes the importance of assessing quality of life for people facing infertility and recommends the use of psychosocial fertility questionnaires to address their psychological needs [42]. A meta-analysis evaluated the effectiveness of psychological therapies in reducing depression and anxiety among infertile women by reviewing 22 studies. The results indicated that cognitive behavioral therapy, mindfulness-based therapies, and positive psychotherapy were particularly effective in interventions lasting more than five sessions [43]. In a meta-analysis of six studies including Iranian women, it was reported that although CBT intervention in infertile women reduced depression in women, there was no statistically significant difference in the control group [44]. A meta-analysis investigates the effectiveness of CBT in reducing anxiety and depression among infertile women, concluding that CBT significantly decreases both symptoms compared to control groups. Despite these positive findings, the authors emphasize the need for more high-quality studies to strengthen these conclusions and further explore CBT's impact in this population [21]. A systematic review and meta-analysis evaluate the efficacy of CBT in reducing anxiety, and depression in infertile couples, finding that CBT significantly decreases both anxiety and depression compared to control groups. However, it highlights the need for further research to better understand the overall impact of CBT on mental health in this population [45]. Given these results, a mindfulness-based intervention program seems to be an effective approach for alleviating psychological distress in infertile women.

CBT effectively addresses depression by leveraging several key mechanisms that highlight the interconnectedness of thoughts, emotions, and behaviors. Through CBT, individuals learn to identify and challenge dysfunctional thought patterns, replacing them with more rational and positive alternatives. This cognitive restructuring alleviates depressive symptoms and enhances emotional well-being. Additionally, CBT promotes behavioral activation, encouraging individuals to engage in positive activities, which further contributes to their mood improvement. By developing problem-solving skills and coping strategies, participants can better manage stress and navigate life's challenges. The therapeutic alliance and the patient's motivation are crucial for success, as improvements in these areas often precede observable reductions in depressive symptoms, ultimately leading to an enhanced quality of life [46,47].

Strengths and limitations

The strengths of this meta-analysis include its comprehensive review of multiple randomized controlled trials, which enhances the reliability of the findings regarding the effectiveness of cognitive behavioral

interventions in improving quality of life for infertile women. Additionally, the focus on non-pharmacological approaches highlights the potential for these therapies to complement traditional medical treatments. Despite its advantages, the current meta-analysis has several notable limitations. Firstly, there is a high level of heterogeneity among the included studies, which may affect the overall conclusions drawn. Additionally, several studies exhibited a risk of bias related to randomization and blinding, raising concerns about the validity of the results. The analysis included only articles published in English and Turkish, introducing potential language bias, and was limited to full-text and published articles, which may have influenced the findings due to publication bias. Lastly, while there is some evidence suggesting improved pregnancy rates, the limited number of studies addressing this outcome necessitates cautious interpretation of these findings.

Implications of practice and research

The findings from this meta-analysis highlight the significant positive impact of cognitive behavioral interventions on the quality of life, depression, anxiety, and pregnancy outcomes in infertile women. These results underscore the importance of integrating non-pharmacological approaches, particularly CBT, into clinical practice for managing infertility-related distress. Healthcare providers should consider recommending CBT as a complementary treatment alongside traditional medical interventions for infertility.

Further research is warranted to explore the long-term effects of these interventions and their applicability across diverse populations and settings. Future studies should aim to standardize the intervention protocols and include larger sample sizes to enhance the generalizability of the findings. Additionally, investigating the mechanisms through which cognitive interventions affect psychological and reproductive outcomes could provide deeper insights into their efficacy and inform future therapeutic strategies.

Conclusion

This systematic review and meta-analysis presents the first effort to synthesize and meta-analytically evaluate existing evidence on the quality of life of cognitive-based interventions for infertile women. Overall, the results of the current meta-analysis reveal that cognitive-based interventions can improve the quality of life, effectively reduce anxiety and depression symptoms. Furthermore, there is an indication of a positive effect on pregnancy rates, although further high-quality studies are needed to confirm this finding. Given the psychological burden associated with infertility, incorporating cognitive-based therapies into the treatment regimen for infertile women is essential. It may be recommended to be added to routine treatment in infertile women. These interventions not only address mental health concerns but also enhance overall well-being, offering a holistic approach to infertility management.

Clinical trial number

Not applicable.

Consent for publication

Not applicable.

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Author contributions

AY.K, FS.B, T.Y and Sh.ShL played equal roles in various aspects of the study, including literature screening, evaluating the quality of the included studies, and authoring the manuscript. They were also involved in

conducting the statistical procedures and interpreting the findings. The manuscript underwent an editing process with input from all the authors, who then approved the final version for submission.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

Data is available on reasonable request from corresponding author.

References

- [1] World Health Organization. WHO fact sheet on infertility. *Glob Reprod Health*. 2021;6(1):e52.
- [2] Vander Borgh M, Wyns C. Fertility and infertility: definition and epidemiology. *Clin Biochem*. 2018;62:2–10. doi: [10.1016/j.clinbiochem.2018.03.012](https://doi.org/10.1016/j.clinbiochem.2018.03.012)
- [3] World Health Organization. Infertility is a global public health issue. New Jersey, USA: WHO; 2014. [accessed 2025 February 22]. <http://www.who.int/reproductivehealth/topics/infertility/perspective/en>
- [4] Kiani Z, Simbar M, Hajian S, et al. The prevalence of depression symptoms among infertile women: a systematic review and meta-analysis. *Fertil Res Pract*. 2021;7(1):6. doi: [10.1186/s40738-021-00098-3](https://doi.org/10.1186/s40738-021-00098-3)
- [5] Kiani Z, Simbar M, Hajian S, et al. Quality of life among infertile women living in a paradox of concerns and dealing strategies: a qualitative study. *Nurs Open*. 2020;8(1):251–261. doi: [10.1002/nop2.624](https://doi.org/10.1002/nop2.624)
- [6] Crawford NM, Hoff HS, Mersereau JE. Infertile women who screen positive for depression are less likely to initiate fertility treatments. *Hum Reprod*. 2017;32(3):582–587. doi: [10.1093/humrep/dew351](https://doi.org/10.1093/humrep/dew351)
- [7] Rich CW, Domar AD. Addressing the emotional barriers to access to reproductive care. *Fertil Steril*. 2016;105(5):1124–1127. doi: [10.1016/j.fertnstert.2016.02.017](https://doi.org/10.1016/j.fertnstert.2016.02.017)
- [8] Heredia A, Padilla F, Castilla JA, et al. Effectiveness of a psychological intervention focused on stress management for women prior to IVF. *J Reprod Infant Psychol*. 2020;38(2):113–126. doi: [10.1080/02646838.2019.1601170](https://doi.org/10.1080/02646838.2019.1601170)
- [9] Massarotti C, Gentile G, Ferreccio C, et al. Impact of infertility and infertility treatments on quality of life and levels of anxiety and depression in women undergoing in vitro fertilization. *Gynecol Endocrinol*. 2019;35(6):485–489. doi: [10.1080/09513590.2018.1540575](https://doi.org/10.1080/09513590.2018.1540575)
- [10] Rahiminejad ME, Moaddab A, Ebrahimi M, et al. The relationship between some endometrial secretion cytokines and in vitro fertilization. *Iran J Reprod Med*. 2015;13(9):557–562.
- [11] Ndegwa SW. Affordable ART in Kenya: the only hope for involuntary childlessness. *Facts Views Vis Obgyn*. 2016;8(2):128–130.
- [12] Erhard M, Fickler R, Krenn M, et al. Twisted photons: new quantum perspectives in high dimensions. *Light Sci Appl*. 2017;7:17146. doi: [10.1038/lsa.2017.146](https://doi.org/10.1038/lsa.2017.146)
- [13] Chamorro PP, Herruzo J, Pino MJ. Study on the interdependent relationship between the marital satisfaction variable and the psychosocial impact of infertility and anxiety disposition, according to gender. *J Sex Marital Ther*. 2022;48(5):461–474. doi: [10.1080/0092623X.2021.2008074](https://doi.org/10.1080/0092623X.2021.2008074)
- [14] Chamorro PP, Herruzo J, Pino MJ, et al. Coping, social support and medical factors on psychosocial impact in couples experiencing infertility. *J Sex Marital Ther*. 2024;50(2):197–215. doi: [10.1080/0092623X.2023.2269983](https://doi.org/10.1080/0092623X.2023.2269983). [Epub 2023 Oct 23]. Erratum in: *J Sex Marital Ther*. 2024;50(6). doi: [10.1080/0092623X.2024.2353483](https://doi.org/10.1080/0092623X.2024.2353483)
- [15] Royani Z, Heidari M, Vatanparast M, et al. Predictors of quality of life in infertile couples. *J Menopausal Med*. 2019;25(1):35–40. doi: [10.6118/jmm.2019.25.135](https://doi.org/10.6118/jmm.2019.25.135)
- [16] Boudreau G, Brassard A, Beaulieu N, et al. Attachment and sexual functioning in couples seeking fertility treatment: the role of infertility-specific coping strategies. *J Sex Marital Ther*. 2024;50(3):395–412. doi: [10.1080/0092623X.2024.2302019](https://doi.org/10.1080/0092623X.2024.2302019)

- [17] Howard S. The hidden costs of infertility treatment. *BMJ*. 2018;361:k2204. doi: [10.1136/bmj.k2204](https://doi.org/10.1136/bmj.k2204)
- [18] Hosseini MS, Mousavi P, Hekmat K, et al. Effects of a short-term mindfulness-based stress reduction program on the quality of life of women with infertility: a randomized controlled clinical trial. *Complement Ther Med*. 2020;50:102403. doi: [10.1016/j.ctim.2020.102403](https://doi.org/10.1016/j.ctim.2020.102403)
- [19] Mousavi E, Hosseini S, Bakhtiyari M, et al. The effects of mindfulness-based stress reduction group therapy on anxiety, depression, stress, and the intolerance of uncertainty in infertile women. *Iran J Rehab Res*. 2020;18(2):137–144. doi: [10.32598/irj.18.2.862.1](https://doi.org/10.32598/irj.18.2.862.1)
- [20] Dube L, Bright K, Hayden KA, et al. Efficacy of psychological interventions for mental health and pregnancy rates among individuals with infertility: a systematic review and meta-analysis. *Hum Reprod Update*. 2023;29(1):71–94. doi: [10.1093/humupd/dmac034](https://doi.org/10.1093/humupd/dmac034)
- [21] Abdolahi HM, Ghojaziadeh M, Abdi S, et al. Effect of cognitive behavioral therapy on anxiety and depression of infertile women: a meta-analysis. *APJR*. 2019;8(6):251–259. doi: [10.4103/2305-0500.270102](https://doi.org/10.4103/2305-0500.270102)
- [22] Golshani F, Mirghafourvand M, Hasanpour S, et al. The effect of cognitive behavioral therapy on anxiety and depression in Iranian infertile women: a systematic and meta-analytical review. *Iran J Psychiatry Behav Sci*. 2020;14(1):e96715.
- [23] Wang G, Liu X, Lei J. Cognitive behavioural therapy for women with infertility: a systematic review and meta-analysis. *Clin Psychol Psychother*. 2023;30(1):38–53. doi: [10.1002/cpp.2792](https://doi.org/10.1002/cpp.2792)
- [24] Chandler J, Cumpston M, Li T, et al. *Cochrane handbook for systematic reviews of interventions*. Hoboken: Wiley; 2019
- [25] Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi: [10.1136/bmj.n71](https://doi.org/10.1136/bmj.n71)
- [26] Ozcan S, Kirca N. Effects of care given in line with Levine's Conservation Model on the quality of life of women receiving infertility treatment: a single blind randomized controlled trial. *Health Care for Women International*. 2023;44(4):418–439. doi: [10.1080/07399332.2021.2007927](https://doi.org/10.1080/07399332.2021.2007927)
- [27] Rahimi R, Hasanpour S, Mirghafourvand M, et al. Effect of Hope-oriented group counseling on mental health of infertile women with failed IVF cycles: a randomized controlled trial. *BMC Psychiatry*. 2021;21(1):286. doi: [10.1186/s12888-021-03280-5](https://doi.org/10.1186/s12888-021-03280-5)
- [28] Legro RS, Hansen KR, Diamond MP, et al. Effects of preconception lifestyle intervention in infertile women with obesity: The FIT-PLESE randomized controlled trial. *PLoS Med*. 2022;19(1):e1003883. doi: [10.1371/journal.pmed.1003883](https://doi.org/10.1371/journal.pmed.1003883)
- [29] Domar AD, Gross J, Rooney K, et al. Exploratory randomized trial on the effect of a brief psychological intervention on emotions, quality of life, discontinuation, and pregnancy rates in in vitro fertilization patients. *Fertil Steril*. 2015;104(2):440–51e7. doi: [10.1016/j.fertnstert.2015.05.009](https://doi.org/10.1016/j.fertnstert.2015.05.009)
- [30] Baghbani F, Alidousti K, Parvizi MM, et al. Efficacy of dry cupping versus counselling with mindfulness-based cognitive therapy approach on fertility quality of life and conception success in infertile women due to polycystic ovary syndrome: a pilot randomized clinical trial. *Int J Community Based Nurs Midwifery*. 2024;12(1):57–69. doi: [10.30476/IJCBNM.2023.100249.2351](https://doi.org/10.30476/IJCBNM.2023.100249.2351)
- [31] Szigeti F J, Kazinczi C, Szabó G, et al. The clinical effectiveness of the mind/body program for infertility on wellbeing and assisted reproduction outcomes: a randomized controlled trial in search for active ingredients. *Hum Reprod*. 2024;39(8):1735–1751. doi: [10.1093/humrep/deae119](https://doi.org/10.1093/humrep/deae119)
- [32] Xie Y, Ren Y, Niu C, et al. The impact of stigma on mental health and quality of life of infertile women: a systematic review. *Front Psychol*. 2023;13:1093459. doi: [10.3389/fpsyg.2022.1093459](https://doi.org/10.3389/fpsyg.2022.1093459)
- [33] Chachamovich JR, Chachamovich E, Ezer H, et al. Investigating quality of life and health-related quality of life in infertility: a systematic review. *J Psychosom Obstet Gynaecol*. 2010;31(2):101–110. doi: [10.3109/0167482X.2010.481337](https://doi.org/10.3109/0167482X.2010.481337)
- [34] Wang G, Liu X, Lei J Effects of mindfulness-based intervention for women with infertility: a systematic review and meta-analysis. *Arch Womens Ment Health*. 2023;26(2):245–258. doi: [10.1007/s00737-023-01307-2](https://doi.org/10.1007/s00737-023-01307-2). [Epub 2023 Mar 23]. Erratum in: *Arch Womens Ment Health*. 2023 Dec;26(6):869. doi: [10.1007/s00737-023-01363-8](https://doi.org/10.1007/s00737-023-01363-8)
- [35] Katyal N, Poulsen CM, Knudsen UB, et al. The association between psychosocial interventions and fertility treatment outcome: a systematic review and meta-analysis. *Eur J Obstet Gynecol Reprod Biol*. 2021;259:125–132. doi: [10.1016/j.ejogrb.2021.02.012](https://doi.org/10.1016/j.ejogrb.2021.02.012)
- [36] Zhou R, Cao YM, Liu D, et al. Pregnancy or psychological outcomes of psychotherapy interventions for infertility: a meta-analysis. *Front Psychol*. 2021;12:643395. doi: [10.3389/fpsyg.2021.643395](https://doi.org/10.3389/fpsyg.2021.643395)
- [37] Dadhwal R, Sharma M, Surani S. Restrictive lung disease in patients with subclinical coronavirus infection: are we bracing ourselves for devastating sequelae?. *Cureus*. 2021;13(1):e12501. doi: [10.7759/cureus.12501](https://doi.org/10.7759/cureus.12501)
- [38] Güngör, O, Üsküdarlı, S, Güngör, T. Improving named entity recognition by jointly learning to disambiguate morphological tags. In: *Proceedings of the 27th international conference on computational linguistics*. Santa Fe, New Mexico, USA: Association for Computational Linguistics; 2018. pp. 2082–2092.
- [39] Gdańska P, Drozdowicz-Jastrzębska E, Grzechocińska B, et al. Anxiety and depression in women undergoing infertility treatment. *Ginekol Pol*. 2017;88(2):109–112. doi: [10.5603/GP.a2017.0019](https://doi.org/10.5603/GP.a2017.0019)
- [40] Salari N, Babajani F, Hosseini-Far A, et al. Global prevalence of major depressive disorder, generalized anxiety, stress, and depression among infertile women: a systematic review and meta-analysis. *Arch Gynecol Obstet*. 2024;309(5):1833–1846. doi: [10.1007/s00404-024-07444-y](https://doi.org/10.1007/s00404-024-07444-y)

- [41] Kiani AK, Paolacci S, Calogero AE, et al. From Myo-inositol to D-chiro-inositol molecular pathways. *Eur Rev Med Pharmacol Sci.* 2021;25(5):2390–2402. doi: [10.26355/eurrev_202103_25279](https://doi.org/10.26355/eurrev_202103_25279)
- [42] Braverman AM, Davoudian T, Levin IK, et al. Depression, anxiety, quality of life, and infertility: a global lens on the last decade of research. *Fertil Steril.* 2024;121(3):379–383. doi: [10.1016/j.fertnstert.2024.01.013](https://doi.org/10.1016/j.fertnstert.2024.01.013)
- [43] Tomy TSVK. Psychological intervention in depression, anxiety, and stress among infertile women: a meta-analysis. *Trends Psychol.* 2023:1–27.
- [44] Golshani F, Mirghafourvand M, Hasanpour S, et al. The effect of cognitive behavioral therapy on anxiety and depression in Iranian infertile women: a systematic and meta-analytical review. *IJPBS.* 2020;14(1). doi: [10.5812/ijpbs.96715](https://doi.org/10.5812/ijpbs.96715)
- [45] Abdollahpour S, Taghipour A, Mousavi Vahed SH, et al. The efficacy of cognitive behavioural therapy on stress, anxiety and depression of infertile couples: a systematic review and meta-analysis. *J Obstet Gynaecol.* 2022;42(2):188–197. doi: [10.1080/01443615.2021.1904217](https://doi.org/10.1080/01443615.2021.1904217)
- [46] Bruijniks SJE, Meeter M, Lemmens LHJM, et al. Temporal and specific pathways of change in cognitive behavioral therapy (CBT) and interpersonal psychotherapy (IPT) for depression. *Behav Res Ther.* 2022;151:104010. doi: [10.1016/j.brat.2021.104010](https://doi.org/10.1016/j.brat.2021.104010)
- [47] Humeniuk E, Pucek W, Wdowiak A, et al. Supporting the treatment of infertility using psychological methods. *Ann Agric Environ Med.* 2023;30(4):581–586. doi: [10.26444/aaem/171874](https://doi.org/10.26444/aaem/171874)