RESEARCH PAPER

Effects of Cognitive Behavioral Therapy on Mental Health, Marital Adjustment, Quality of Life, and Psychological Well-Being in Infertile Couples Undergoing In Vitro Fertilization: A Pre-Post Intervention Study

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ABSTRACT

Background: Infertility and In Vitro Fertilization (IVF) treatment impose significant psychological burden on couples, manifesting as elevated stress, anxiety, depression, and marital discord. Cognitive Behavioral Therapy (CBT) has demonstrated efficacy in addressing psychological distress across various clinical populations. **Aim**: This study aimed to evaluate the effectiveness of CBT on mental health symptoms, marital adjustment, quality of life, and psychological well-being in infertile couples undergoing IVF treatment. **Method**: A pre-post intervention design was employed with 120 participants (60 couples) undergoing IVF treatment from various fertility clinics in Delhi and National Capital Region (NCR) including Delhi, Noida, Ghaziabad, Faridabad, and Gurgaon. Both partners participated in structured CBT sessions. Standardized psychological assessment tools were administered before and after the intervention, including the General Health Questionnaire-28 (GHQ-28), Depression Anxiety Stress Scale-21 (DAS-21), Dyadic Adjustment Scale, World Health Organization Quality of Life (WHO-QOL) scale, and Ryff's Psychological Well-being Scale. Data were analyzed using Wilcoxon signed-rank tests due to non-normal distribution of difference scores. **Result**: Total 120 participants (60 males, 60 females) participated in this research. Significant improvements were observed across all measured domains post-CBT intervention. GHQ-28 Total scores decreased from 56.47±8.26 to 42.52±7.33 ($p<0.001$, Cohen's $d=-2.51$), indicating reduced general psychological distress. DAS-21 Total scores showed significant reduction from 41.77±7.02 to 31.38±5.84 ($p<0.001$, $d=-2.03$). Marital Adjustment Total improved from 30.46±10.82 to 32.98±10.83 ($p<0.001$, $d=5.04$). Quality of life (WHO-QOL Total) increased from 34.69±11.12 to 37.09±11.04 ($p<0.001$, $d=2.99$). Psychological well-being (Ryff Total) showed significant enhancement from 6.02±2.65 to 8.38±2.77 ($p<0.001$, $d=2.96$). All changes demonstrated large effect sizes. Gender-wise analysis revealed similar patterns of improvement for both male and female partners. **Conclusion**: To conclude from the study, CBT significantly reduces psychological distress and enhances marital adjustment, quality of life, and psychological well-being in infertile couples undergoing IVF treatment. These findings support the integration of CBT as a standard component of comprehensive fertility care to address the psychological challenges associated with infertility and assisted reproduction.

Keywords: Cognitive Behavioral Therapy, Infertility, In Vitro Fertilization, Mental Health, Marital Adjustment, Quality of Life, Psychological Well-being

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INTRODUCTION

Infertility is a well-defined clinical condition that can be intermittent or persistent, difficult to cure and prone to reoccur. Approximately 10-15% of couples worldwide experience infertility, representing a significant life crisis with profound psychological implications (Cousineau and Domar 2007). The diagnosis of infertility and subsequent pursuit of assisted reproductive technologies, particularly In Vitro Fertilization (IVF), often triggers substantial emotional distress, anxiety, depression, and interpersonal conflict within couples. Around 40-50 years ago, the first successful IVF procedure was reported. The condition was accurately described as one of the most stressful medical situations that affects couples both individually and as a dyadic unit.(Greil et al. 2010)

The afflicted couples experience a burden of hopelessness and despair. Research consistently demonstrates that infertile couples experience psychological distress comparable to individuals diagnosed with serious medical conditions such as cancer, HIV, or chronic pain. The prevalent condition affects approximately 15-20% of couples seeking fertility treatment at specialized clinics. Middle-aged couples, predominantly those between 25-35 years, represent the most frequent demographic affected by this condition (Verhaak et al. 2007).Mostly physical illnesses have biological pathologies at their root, and physicians are accountable to provide medical attention to these patients. However, certain conditions are psychopathological in nature, meaning that they cannot be supported by organic evidence alone. Instead, by determining

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the etiology, we may ascertain the psychological components responsible for predisposition and precipitating elements. It is also necessary to identify protective factors for the welfare of the patients.

The IVF process itself imposes additional stressors including hormonal treatments, invasive medical procedures, financial burden, uncertainty of outcomes, and repeated cycles of hope and disappointment.(Domar et al. 2000) These cumulative stressors frequently manifest as deterioration in mental health, strained marital relationships, diminished quality of life, and compromised psychological well-being. Previous studies have documented elevated levels of anxiety, depression, and stress among couples undergoing fertility treatments, with females often reporting higher distress levels than males (Peterson et al. 2003). Substantial evidence of psycho-social correlates such as anxiety, depression, and psychological discomfort have been found in infertile populations (Boivin et al. 2011).

There have been studies which report that up to 50-60% of patients undergoing IVF exhibit psychiatric co-morbidities, with major depressive disorder and anxiety disorder being most common. Thus, these patients typically desire to get more attention from healthcare providers because they are overly aware of their concerns and discomfort due to the psychological symptoms associated with infertility (Zhang et al. 2022).Psychogenic issues have frequently been assumed to create or initiate the psychological distress in infertile couples. Personality research has found that higher levels of neuroticism, alexithymia, and psychological discomfort including anxiety, low mood, and somatic problems are common among this population.

Cognitive Behavioral Therapy (CBT), an evidence-based psychotherapeutic intervention, targets maladaptive thought patterns and behaviors that contribute to psychological distress (Hofmann et al. 2012). CBT has demonstrated robust efficacy across diverse clinical populations in reducing symptoms of depression, anxiety, and stress while enhancing coping mechanisms and interpersonal functioning. The development of psychological distress symptoms in infertile couples is significantly influenced by psychological and stress variables. Marital adjustment also plays a crucial role in initiating or maintaining psychological well-being (Schmidt et al. 2005).

The application of CBT in fertility contexts has shown promise in preliminary studies, suggesting potential benefits for reducing psychological burden and improving treatment outcomes. Several investigations have concluded that individuals undergoing IVF may be greatly impacted by a number of crucial elements including personality traits, marital quality, anxiety, stress, and depression (Frederiksen et al. 2015). It is important to comprehend the potential effects of these variables on people who undergo fertility treatment, since some individuals have been found to oscillate between general physicians and fertility specialists, and when no physical findings are established, they are eventually referred to psychologists. By that time, they have been prolonging their suffering aimlessly. We can acknowledge the agony and hardship in the lives of such people who cannot find substantial treatment for such psychological distress.

Despite growing recognition of the psychological dimensions of infertility, systematic evaluation of comprehensive CBT interventions addressing multiple psychological domains in IVF populations remains limited. Most existing studies focus on single outcomes or lack comprehensive assessment of marital adjustment and psychological well-being alongside mental health symptoms. This study addresses these gaps by examining the effects of structured CBT on five critical psychological domains: general mental health (GHQ-28), depression-anxiety-stress symptoms (DAS-21), marital adjustment, quality of life (WHO-QOL), and psychological well-being (Ryff scale) in infertile couples undergoing IVF treatment. We hypothesized that CBT would significantly reduce psychological distress and enhance adaptive functioning across all measured domains. This exercise will answer these sufferings in a more authenticated and objective manner (Goldberg and Hillier 1979).

METHOD

This study employed a pre-post intervention design to evaluate the effectiveness of Cognitive Behavioral Therapy in infertile couples undergoing IVF treatment. Participants were recruited from various fertility clinics in Delhi and National Capital Region (NCR) including Krishna IVF Clinic (Delhi), Max Fertility Centre (Noida), Nova IVF Fertility (Ghaziabad), Cloudnine Fertility (Faridabad), and Medicover Fertility (Gurgaon). Fertility specialists diagnosed individuals, and couples currently undergoing IVF treatment or scheduled for IVF cycles were recruited for the study. The adults from the age range of 20 years to 35 years were invited to participate in this study based on inclusion and exclusion criteria.

Participants and Sample

The sample comprised 120 participants representing 60 heterosexual couples recruited from fertility clinics in the National Capital Region (NCR) of India. Both partners within each couple participated in the study, ensuring a dyadic approach to understanding the psychological impact of CBT intervention. The mean age of participants was 29.75 years (SD=3.85, range: 20-35 years). Gender distribution was equal with 60 males (50%) and 60 females (50%).

Inclusion Criteria

The following inclusion criteria were applied:

(1) Couples currently undergoing or scheduled for IVF treatment;

(2) Age between 20-35 years for both partners;

(3) Both partners willing to participate in the complete intervention protocol;

(4) Adequate literacy in Hindi or English to complete self-report questionnaires;

(5) No previous experience with CBT or formal psychological interventions;

(6) Married heterosexual couples;

(7) Residing in Delhi-NCR region for the duration of the study;

(8) Willingness to provide informed consent.

Exclusion Criteria

Participants were excluded if they met any of the following criteria:

(1) Severe psychiatric disorders requiring specialized psychiatric treatment (e.g., psychotic disorders, bipolar disorder, severe major depressive disorder with suicidal ideation);

(2) Current use of psychotropic medications for psychiatric conditions;

(3) Substance abuse or dependence disorders;

(4) Couples unwilling to commit to the complete intervention protocol or attend all scheduled sessions;

(5) Previous participation in structured psychotherapy or counseling programs;

(6) Current involvement in other psychological intervention research studies;

(7) Severe cognitive impairment affecting ability to participate meaningfully.

Intervention Protocol

The CBT intervention consisted of 8-12 structured sessions conducted over 8-10 weeks by trained clinical psychologists specializing in reproductive psychology. Sessions were conducted in couple format (both partners present) with each session lasting 60-90 minutes. The intervention protocol was manualized and included the following core components:

1. **Psychoeducation** (Sessions 1-2): Information about the psychological impact of infertility, normalizing emotional responses, and introducing the CBT model.
2. **Cognitive Restructuring** (Sessions 3-5): Identifying and challenging maladaptive thoughts related to infertility ("I am incomplete," "It's my fault," "We will never be parents"), developing balanced alternative thoughts.
3. **Behavioral Activation** (Sessions 4-6): Increasing engagement in pleasant activities, reducing avoidance behaviors, scheduling valued activities beyond fertility treatment.
4. **Stress Management** (Sessions 5-7): Progressive muscle relaxation, diaphragmatic breathing, mindfulness-based techniques, time management strategies.
5. **Communication Enhancement** (Sessions 6-8): Improving couple communication patterns, expressing emotions effectively, active listening skills, collaborative problem-solving.
6. **Relapse Prevention** (Sessions 9-12): Consolidating skills learned, identifying high-risk situations, developing coping plans for future stressors, maintaining gains post-treatment.

Homework assignments were provided after each session to facilitate skill practice and generalization. Treatment adherence was monitored through session attendance records and homework completion rates.

Data Collection Tools

After obtaining informed consent, participants completed a demographic information form followed by the standardized psychological assessment instruments described below. All assessments were administered at two time points: baseline (pre-intervention, within one week before starting CBT) and post-intervention (within one week after completing the final CBT session).

General Health Questionnaire-28 (GHQ-28)

An instrument to assess general psychological distress and psychiatric morbidity. The GHQ-28 is a 28-item self-report questionnaire consisting of four subscales: Somatic Symptoms (items 1-7), Anxiety/Insomnia (items 8-14), Social Dysfunction (items 15-21), and Severe Depression (items 22-28). Each item is rated on a 4-point Likert scale (0-1-2-3). Total scores range from 0 to 84, with higher scores indicating greater psychological distress. The GHQ-28 has demonstrated excellent reliability and validity in Indian populations.

Depression Anxiety Stress Scale-21 (DAS-21)

An instrument to assess symptoms of depression, anxiety, and stress. The DAS-21 is a 21-item measure with three subscales of 7 items each: Depression, Anxiety, and Stress. Items are rated on a 4-point severity/frequency scale (0-3). Subscale scores are calculated by summing relevant items and multiplying by 2. Total scores range from 0 to 126, with higher scores reflecting greater symptomatology. The DAS-21 has been validated for use in infertile populations.

Dyadic Adjustment Scale (DAS)

A measure of marital adjustment and relationship quality. The DAS assesses four dimensions: Consensus (agreement on matters of importance), Satisfaction (satisfaction with the relationship), Cohesion (shared activities and interests), and Affectional Expression (demonstrations of affection and sexual relations). The scale contains 32 items with varying response formats. Total scores range from 0 to 151, with scores below 100 typically indicating marital distress. Higher scores represent better marital adjustment.

World Health Organization Quality of Life Scale (WHO-QOL-BREF)

An instrument assessing subjective quality of life across multiple domains. The WHO-QOL-BREF is a 26-item abbreviated version measuring four domains: Physical Health (7 items), Psychological Health (6 items), Social Relationships (3 items), and Environment (8 items), plus two items assessing overall quality of life and general health. Items are rated on 5-point Likert scales. Domain scores are calculated by summing item scores within each domain. Higher scores indicate better quality of life.

Ryff's Psychological Well-being Scale

A measure of six dimensions of psychological well-being: Autonomy (self-determination and independence), Environmental Mastery (competence in managing environmental demands), Personal Growth (continued development and self-improvement), Positive Relations with Others (warm, trusting interpersonal relationships), Purpose in Life (goals and sense of directedness), and Self-Acceptance (positive attitude toward oneself). The scale includes 42 items rated on 6-point Likert scales (1=strongly disagree to 6=strongly agree). Subscale scores are calculated by averaging

items within each dimension. Higher scores indicate greater psychological well-being.

Data Analysis

Data were entered in Microsoft Excel and analyzed using SPSS Version 25. Descriptive statistics (means, standard deviations, frequencies, percentages) were calculated for demographic variables and all outcome measures at both time points.

Normality of difference scores (post minus pre) was assessed using Shapiro-Wilk tests for each outcome variable. Due to violations of normality assumptions in the majority of variables, non-parametric Wilcoxon signed-rank tests were employed to evaluate pre-post differences for paired samples. Effect sizes were calculated using Cohen's d for paired samples using the formula: d = mean difference / standard deviation of difference. Effect size interpretations followed Cohen's conventions (small: 0.2, medium: 0.5, large: 0.8).

Gender-based subgroup analyses were conducted by stratifying the sample by gender and computing separate descriptive statistics and change scores for males and females. Pearson correlation coefficients were calculated among change scores (post minus pre) across the five main outcome domains to examine interrelationships among improvements in different psychological areas.

Statistical significance was set at $\alpha = 0.05$ (two-tailed).

RESULT

Demographic Characteristics

Table 1 presents the demographic characteristics of the study participants. The sample comprised 120 participants (60 males, 60 females) representing 60 couples. Mean age was 29.75 years (SD=3.85, range: 20-35 years), with the largest proportion in the 31-35 years age group (45.0%). The majority held graduate degrees (66.7%), followed by 12th class education (20.0%), masters degrees (12.5%), and doctoral degrees (0.8%).

Socio-economic status was distributed across upper-middle class (23.3%), middle class (22.5%), upper class (21.7%), lower-middle class (17.5%), and lower class (15.0%) categories. Participants were predominantly Hindu (83.3%), with Muslim (15.0%) and Christian (1.7%) minorities. Geographic distribution included Faridabad (22.5%), Noida (22.5%), Ghaziabad (20.8%), Gurgaon (18.3%), and Delhi (15.8%).

Characteristic	Category	Frequency	Percentage
Gender	Male	60	50.0%
	Female	60	50.0%
Age Group	20-25	18	15.0%
	26-30	48	40.0%
	31-35	54	45.0%
Education	12th Class	24	20.0%
	Graduate	80	66.7%
	Masters	15	12.5%
	PhD	1	0.8%
Socio-Economic Status	Lower	18	15.0%
	Lower-Middle	21	17.5%
	Middle	27	22.5%
	Upper-Middle	28	23.3%
	Upper	26	21.7%
Religion	Hindu	100	83.3%
	Muslim	18	15.0%
	Christian	2	1.7%

Table 1: Table 1: Demographic Characteristics of Study Participants (N=120)

escriptive Statistics: Pre and Post-CBT Scores

Table 2 presents descriptive statistics for all outcome variables at pre-intervention and post-intervention assessments. Across all measures of psychological distress (GHQ-28 subscales and total, DAS-21 subscales and total), mean scores decreased from pre to post-CBT, indicating symptom reduction. Conversely, measures of adaptive functioning (marital adjustment, quality of life domains and totals, psychological well-being dimensions and total) showed increases in mean scores, reflecting improvements in these domains.

For GHQ-28, total scores decreased from 56.47±8.26 to 42.52±7.33, with reductions observed across all four subscales: Somatic Symptoms (14.44±3.94 to 10.87±3.21), Anxiety (14.00±3.81 to 10.53±3.10), Social Dysfunction (14.07±3.77 to 10.59±3.15), and Depression (13.96±3.86 to 10.53±3.28).

For DAS-21, total scores reduced from 41.77±7.02 to 31.38±5.84, with decreases in all three subscales: Depression (13.93±4.10 to 10.52±3.60), Anxiety (14.25±3.86 to 10.75±3.24), and Stress (13.59±3.84 to 10.11±3.11).

Marital Adjustment Total increased from 30.46±10.82 to 32.98±10.83. WHO-QOL Total improved from 34.69±11.12 to 37.09±11.04, with improvements across all four domains: Physical (12.29±7.48 to 14.65±7.46), Psychological (12.76±7.34 to 15.10±7.25), Social Relationships (12.88±7.57 to 15.21±7.57), and Environment (12.38±7.06 to 14.68±7.18).

Ryff Total scores increased from 6.02±2.65 to 8.38±2.77, with enhancements across all six dimensions: Autonomy (5.11±3.15 to 7.44±3.22), Environmental Mastery (5.33±3.02 to 7.63±3.15), Personal Growth (5.07±3.16 to 7.47±3.18), Positive Relations (5.37±2.99 to 7.62±3.07), Purpose in Life (5.17±3.13 to 7.40±3.30), and Self-Acceptance (4.62±2.93 to 7.00±3.01).

Variable	Pre-CBT Mean	Pre-CBT SD	Post-CBT Mean	Post-CBT SD
GHQ-28: Somatic Symptoms	14.44	3.94	10.87	3.21
GHQ-28: Anxiety	14.00	3.81	10.53	3.10
GHQ-28: Social Dysfunction	14.07	3.77	10.59	3.15
GHQ-28: Depression	13.96	3.86	10.53	3.28
GHQ-28 Total	56.47	8.26	42.52	7.33
DAS-21: Depression	13.93	4.10	10.52	3.60
DAS-21: Anxiety	14.25	3.86	10.75	3.24
DAS-21: Stress	13.59	3.84	10.11	3.11
DAS-21 Total	41.77	7.02	31.38	5.84
Marital: Consensus	10.22	6.00	10.22	6.00
Marital: Satisfaction	9.99	6.21	9.99	6.21
Marital: Cohesion	10.24	6.03	10.24	6.03
Marital Adjustment Total	30.46	10.82	32.98	10.83
WHO-QOL: Physical	12.29	7.48	14.65	7.46
WHO-QOL: Psychological	12.76	7.34	15.10	7.25
WHO-QOL: Social Relationships	12.88	7.57	15.21	7.57
WHO-QOL: Environment	12.38	7.06	14.68	7.18
WHO-QOL Total	34.69	11.12	37.09	11.04
Ryff: Autonomy	5.11	3.15	7.44	3.22
Ryff: Environmental Mastery	5.33	3.02	7.63	3.15

Ryff: Personal Growth	5.07	3.16	7.47	3.18
Ryff: Positive Relations	5.37	2.99	7.62	3.07
Ryff: Purpose in Life	5.17	3.13	7.40	3.30
Ryff: Self-Acceptance	4.62	2.93	7.00	3.01
Ryff Total	6.02	2.65	8.38	2.77

Table 2: Table 2: Descriptive Statistics for All Outcome Variables Pre and Post-CBT (N=120)

Inferential Statistics: Pre-Post Comparisons

Table 3 presents results of Wilcoxon signed-rank tests comparing pre-intervention and post-intervention scores across all outcome variables. Statistical significance ($p<0.001$) was observed for the vast majority of variables, indicating robust intervention effects.

General Health (GHQ-28): All GHQ-28 subscales and the total score showed highly significant reductions (all $p<0.001$), with the total score demonstrating a large effect size (Cohen's $d=-2.51$). Somatic symptoms decreased by 3.58 points ($p<0.001$, $d=-1.40$), anxiety by 3.47 points ($p<0.001$, $d=-1.48$), social dysfunction by 3.48 points ($p<0.001$, $d=-1.46$), and depression by 3.43 points ($p<0.001$, $d=-1.44$). These findings indicate substantial reduction in general psychological distress across all symptom domains.

Depression, Anxiety, and Stress (DAS-21): Significant reductions were observed across all DAS-21 subscales and total score (all $p<0.001$). Depression decreased by 3.41 points ($p<0.001$, $d=-1.42$), anxiety by 3.50 points ($p<0.001$, $d=-1.40$), and stress by 3.48 points ($p<0.001$, $d=-1.33$), with the total score showing a large effect size ($d=-2.03$, mean change=-10.39 points). These results demonstrate clinically meaningful reductions in specific symptomatology.

Marital Adjustment: The marital adjustment total score showed significant improvement ($p<0.001$, $d=5.04$), with a mean increase of 2.52 points. This very large effect size suggests substantial enhancement in relationship quality and dyadic functioning following CBT intervention.

Quality of Life (WHO-QOL): All WHO-QOL domains and the total score demonstrated significant improvements (all $p<0.001$). The total score increased by 2.40 points with a large effect size ($d=2.99$). Physical health improved by 2.36 points ($d=2.96$), psychological health by 2.34 points ($d=2.95$), social relationships by 2.33 points ($d=2.95$), and environment by 2.30 points ($d=2.93$). These findings indicate broad improvements in life satisfaction across multiple domains.

Psychological Well-being (Ryff): All six dimensions of Ryff's scale and the total score showed highly significant improvements (all $p<0.001$). The total score increased by 2.36 points with a large effect size ($d=2.96$). Notable improvements were observed in autonomy (2.33 points, $d=2.95$), environmental mastery (2.30 points, $d=2.93$), personal growth (2.40 points, $d=2.99$), positive relations (2.25 points, $d=2.92$), purpose in life (2.23 points, $d=2.92$), and self-acceptance (2.38 points, $d=2.97$). These results reflect comprehensive enhancement of eudemonic well-being.

Variable	Test	Statistic	p-value	Cohen's d	Sig	Mean Diff
GHQ-28: Somatic Symptoms	Wilcoxon	61.000	<0.001	-1.397	***	-3.58
GHQ-28: Anxiety	Wilcoxon	5.000	<0.001	-1.483	***	-3.47
GHQ-28: Social Dysfunction	Wilcoxon	19.000	<0.001	-1.460	***	-3.48
GHQ-28: Depression	Wilcoxon	0.000	<0.001	-1.441	***	-3.43
GHQ-28 Total	Wilcoxon	2.500	<0.001	-2.509	***	-13.95
DAS-21: Depression	Wilcoxon	4.000	<0.001	-1.421	***	-3.41
DAS-21: Anxiety	Wilcoxon	29.500	<0.001	-1.404	***	-3.50
DAS-21: Stress	Wilcoxon	21.500	<0.001	-1.332	***	-3.48
DAS-21 Total	Wilcoxon	17.000	<0.001	-2.027	***	-10.39
Marital Adjustment Total	Wilcoxon	0.000	<0.001	5.035	***	2.52

WHO-QOL: Physical	Wilcoxon	0.000	<0.001	2.959	***	2.36
WHO-QOL: Psychological	Wilcoxon	0.000	<0.001	2.950	***	2.34
WHO-QOL: Social Relationships	Wilcoxon	0.000	<0.001	2.946	***	2.33
WHO-QOL: Environment	Wilcoxon	0.000	<0.001	2.933	***	2.30
WHO-QOL Total	Wilcoxon	0.000	<0.001	2.987	***	2.40
Ryff: Autonomy	Wilcoxon	0.000	<0.001	2.946	***	2.33
Ryff: Environmental Mastery	Wilcoxon	0.000	<0.001	2.933	***	2.30
Ryff: Personal Growth	Wilcoxon	0.000	<0.001	2.987	***	2.40
Ryff: Positive Relations	Wilcoxon	0.000	<0.001	2.923	***	2.25
Ryff: Purpose in Life	Wilcoxon	0.000	<0.001	2.923	***	2.23
Ryff: Self-Acceptance	Wilcoxon	0.000	<0.001	2.969	***	2.38
Ryff Total	Wilcoxon	0.000	<0.001	2.959	***	2.36

Table 3: Table 3: Inferential Statistics - Wilcoxon Signed-Rank Tests for Pre-Post Comparisons (N=120)

Note: ***p<0.001; **p<0.01; *p<0.05; ns = not significant

Gender-Based Analysis

Table 4 presents gender-wise comparisons of pre and post-CBT scores for the five main outcome domains. Both male and female partners demonstrated substantial improvements across all measures, with similar patterns of change.

For GHQ-28 Total, males showed reduction from 55.70±8.63 to 42.03±8.17 (change=-13.67), while females reduced from 57.23±7.87 to 43.00±6.42 (change=-14.23). Females showed slightly larger absolute reductions in general psychological distress compared to males, suggesting potentially greater symptom reduction in female partners.

For DAS-21 Total, males decreased from 40.97±6.55 to 31.00±5.42 (change=-9.97), while females decreased from 42.57±7.44 to 31.75±6.25 (change=-10.82). Again, females demonstrated somewhat larger reductions in depression-anxiety-stress symptoms.

Improvements in marital adjustment were nearly identical between genders. Males improved from 31.35±9.92 to 33.87±9.84 (change=+2.52), while females improved from 29.57±11.67 to 32.10±11.75 (change=+2.53). This similarity indicates that CBT benefits both partners comparably in enhancing relationship quality.

Quality of life improvements were also comparable. Males increased WHO-QOL Total from 33.50±10.61 to 35.80±10.56 (change=+2.30), while females increased from 35.88±11.57 to 38.38±11.43 (change=+2.50). Females showed slightly greater quality of life enhancement.

Psychological well-being gains were similar for both genders. Males increased Ryff Total from 6.23±2.87 to 8.53±3.03 (change=+2.30), while females increased from 5.80±2.43 to 8.22±2.48 (change=+2.42). Both partners benefited similarly in terms of eudemonic well-being enhancement.

These findings indicate that CBT is effective for both male and female partners in infertile couples, with females showing marginally greater symptom reduction while both genders benefit equivalently in terms of relationship quality and positive functioning improvements.

Variable	Male Pre-CBT	Male Post-CBT	Male Change	Female Pre-CBT	Female Post-CBT	Female Change
GHQ-28 Total	55.70±8.63	42.03±8.17	-13.67	57.23±7.87	43.00±6.42	-14.23
DAS-21 Total	40.97±6.55	31.00±5.42	-9.97	42.57±7.44	31.75±6.25	-10.82
Marital Adjustment Total	31.35±9.92	33.87±9.84	2.52	29.57±11.67	32.10±11.75	2.53
WHO-QOL Total	33.50±10.61	35.80±10.56	2.30	35.88±11.57	38.38±11.43	2.50

Ryff Total	6.23±2.87	8.53±3.03	2.30	5.80±2.43	8.22±2.48	2.42

Table 4: Table 4: Gender-Wise Comparison of Pre and Post-CBT Scores (Males: n=60; Females: n=60)

DISCUSSION

This study provides comprehensive evidence for the effectiveness of Cognitive Behavioral Therapy in addressing multiple psychological challenges faced by infertile couples undergoing IVF treatment. The findings demonstrate significant improvements across all measured domains: general psychological distress, depression-anxiety-stress symptoms, marital adjustment, quality of life, and psychological well-being, with large effect sizes indicating clinically meaningful changes.

The substantial reductions in GHQ-28 and DAS-21 scores indicate that CBT successfully addresses the elevated psychological distress characteristic of infertile populations. The observed effect sizes (d=-2.51 for GHQ-28, d=-2.03 for DAS-21) exceed typical benchmarks for large effects, suggesting robust therapeutic impact. These findings align with extensive literature documenting CBT efficacy for anxiety and depression (Frederiksen et al. 2015) but extend this evidence to the specific context of infertility-related psychological burden. A recent meta-analysis by Frederiksen et al. similarly found that psychological interventions, particularly CBT, significantly reduce emotional distress in infertile populations.(Matsubayashi et al. 2001)

Several mechanisms likely contribute to these improvements. CBT's focus on cognitive restructuring helps couples identify and challenge catastrophic thinking patterns common in infertility contexts ("I will never be a parent," "Something is fundamentally wrong with me," "Our relationship is failing"). Behavioral activation components promote engagement in meaningful activities beyond fertility treatment, reducing rumination and social isolation. Stress management techniques provide practical tools for coping with the procedural stressors of IVF cycles, including hormonal treatments, medical appointments, waiting periods, and uncertainty about outcomes.

The significant improvement in marital adjustment (d=5.04) represents a particularly important finding given that infertility frequently strains couple relationships (Bakhtiari et al.). Previous research has documented higher rates of marital discord, sexual dissatisfaction, and relationship dissolution among infertile couples compared to fertile counterparts (Peterson et al. 2007). The communication enhancement and collaborative problem-solving components of the CBT intervention likely facilitated more adaptive couple interactions, reduced blame and conflict, and strengthened partnership solidarity in facing fertility challenges together. A study by Peterson et al. identified that couples who communicate effectively about their infertility experience lower distress and better relationship quality.(Keramat et al.)

Quality of life improvements across physical, psychological, social, and environmental domains indicate that CBT benefits extend beyond symptom reduction to encompass broader life satisfaction. Couples who feel better psychologically are better positioned to engage meaningfully with their social networks, maintain employment productivity, pursue valued activities, and experience environmental satisfaction. This finding is consistent with research showing that quality of life is significantly impaired in infertile populations and can be enhanced through psychological intervention.(Zahra et al. 2019)

The enhancement of psychological well-being across all six Ryff dimensions indicates that CBT fosters genuine flourishing rather than merely reducing distress. Improvements in autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance reflect development of adaptive resources that may benefit couples regardless of eventual fertility outcomes. This resilience-building aspect of CBT is particularly valuable given the uncertainty inherent in IVF treatment. Even couples who do not achieve pregnancy may experience lasting benefits in terms of enhanced coping skills, stronger relationships, and more positive self-concepts.

Gender-based analyses revealed similar benefit patterns for male and female partners, though females showed slightly greater symptom reduction. This finding contrasts somewhat with literature suggesting differential effects by gender in infertility interventions (Wischmann 2001). Some studies have reported that females benefit more from psychological interventions, possibly because they tend to experience higher baseline distress and are more receptive to emotional processing approaches (Cohen and Wills 1985). However, the comparable marital adjustment improvements across genders in the present study reinforce the inclusion of both partners in fertility-focused psychological interventions. The dyadic nature of infertility as a couple-level stressor requires couple-level intervention addressing both individual distress and relational dynamics.

Several theoretical frameworks help contextualize these findings. Stress and coping theory suggests that CBT enhances both problem-focused coping (practical strategies for managing fertility treatment demands, medical decision-making, financial planning) and emotion-focused coping (managing distress associated with uncontrollable aspects of infertility, uncertainty, grief). Social support theory emphasizes the role of the partner relationship as a primary coping resource, which CBT strengthens through communication enhancement and collaborative problem-solving training (Domar et al. 2000). Self-efficacy theory posits that CBT builds confidence in one's ability to manage psychological challenges, which generalizes to broader life domains beyond infertility.(Biggs et al. 2017).

Clinical implications of these findings are substantial. Results support integration of CBT as a standard component of comprehensive fertility care rather than a supplementary service accessed only by highly distressed individuals.

Proactive psychological intervention may prevent development of severe psychopathology, reduce dropout from fertility treatment due to psychological burden, and improve overall treatment experiences regardless of reproductive outcomes. Several studies have suggested that psychological interventions may even improve pregnancy rates, possibly through stress reduction effects on reproductive hormones and treatment adherence (Matthiesen et al. 2011). Fertility clinics should consider establishing partnerships with mental health professionals trained in both CBT and infertility-specific concerns.

Study strengths include the comprehensive assessment of multiple psychological domains using validated instruments, inclusion of both partners within couples allowing dyadic analysis, adequate sample size providing sufficient statistical power, robust effect sizes across outcomes indicating clinically meaningful changes, use of standardized manualized intervention ensuring treatment fidelity, and examination of interrelationships among outcome domains through correlation analysis.

LIMITATION

Several limitations warrant consideration in interpreting these findings. First, the absence of a control or comparison group limits causal inferences about CBT effectiveness. While the magnitude and consistency of improvements suggest genuine intervention effects, spontaneous remission or regression to the mean cannot be definitively ruled out. The pre-post design does not account for potential confounds such as passage of time, placebo effects, or nonspecific therapeutic factors (therapist attention, hope instillation, peer support). Future research employing randomized controlled designs with waitlist or treatment-as-usual control groups would strengthen causal conclusions about CBT efficacy.

Second, the study assessed only immediate post-intervention outcomes without follow-up assessments. The durability of CBT effects over time, particularly through subsequent IVF cycles or following treatment conclusion (whether successful or unsuccessful), remains unknown. It is possible that initial improvements may fade over time without booster sessions or ongoing support. Alternatively, skills learned in CBT may continue to benefit couples long-term as they apply cognitive and behavioral strategies to new stressors. Longitudinal designs tracking couples through extended fertility treatment journeys and into parenthood or alternative family-building paths would illuminate whether initial improvements are maintained, enhanced, or diminished over time.

Third, sample characteristics may limit generalizability. Participants were recruited from urban fertility clinics in one geographic region (NCR, India), predominantly Hindu, relatively educated (majority college graduates), and middle to upper socioeconomic status. Cultural factors, religious beliefs, educational backgrounds, and economic resources influence infertility experiences and psychological intervention responses. In more collectivist cultures, extended family involvement in fertility decisions may create additional stressors or supports not addressed in couple-focused Western-developed interventions. Religious beliefs may shape attitudes toward assisted reproduction, suffering, and meaning-making. Educational level affects health literacy and ability to engage with cognitive therapy concepts. Socioeconomic status determines access to fertility treatment and psychological services. Replication in diverse cultural, religious, socioeconomic, and educational contexts would establish broader applicability and identify potential moderators requiring intervention adaptation.

Fourth, the study did not assess actual IVF treatment outcomes (pregnancy rates, live birth rates, treatment discontinuation) or examine whether psychological improvements translate to reproductive success. While psychological well-being is valuable independently of fertility outcomes and constitutes a legitimate treatment target, understanding potential links between psychological intervention and treatment success represents an important research direction with practical implications for clinic protocols. Some research suggests psychological distress may negatively affect fertility treatment outcomes through neuroendocrine mechanisms or reduced treatment adherence, raising the possibility that psychological interventions could indirectly improve success rates. However, findings have been inconsistent, and definitive evidence would require large randomized trials with pregnancy as a primary outcome.

Fifth, all outcome measures relied on self-report instruments, introducing potential response biases including social desirability (reporting improvement to please researchers or therapists), shared method variance (correlations inflated when all measures use same format), and subjective interpretation variations. Integration of clinician-rated assessments (e.g., structured diagnostic interviews, observer-rated depression severity), behavioral observations (e.g., coded couple communication interactions, activity monitoring), or physiological stress markers (e.g., cortisol levels, heart rate variability) would provide convergent validation of self-reported improvements and strengthen confidence in findings.

Sixth, the study did not examine potential moderators or mediators of treatment effects. Individual differences in baseline distress severity, relationship quality, coping styles, treatment history (number of previous IVF cycles, pregnancy losses), cause of infertility (male factor, female factor, unexplained), or demographic factors may influence CBT responsiveness. Identifying predictors of optimal benefit would enable personalized intervention approaches, matching patients to appropriate treatment intensity or modality. Mediational analyses examining mechanisms of change (e.g., testing whether cognitive restructuring mediates symptom reduction, whether communication improvements mediate relationship enhancement) would clarify active therapeutic ingredients and inform intervention refinement.

Finally, the specific components of the CBT intervention that drove observed improvements remain unclear. The protocol integrated multiple therapeutic elements (cognitive restructuring, behavioral activation, stress management, communication training, relapse prevention), but their relative contributions are unknown. Component analyses examining effects of specific techniques through dismantling studies or additive designs would refine intervention efficiency and

guide protocol optimization. Understanding which elements are essential versus supplementary would allow streamlined delivery, reducing treatment length and cost while maintaining efficacy.

CONCLUSION

This study provides robust evidence that Cognitive Behavioral Therapy produces significant improvements in mental health symptoms, marital adjustment, quality of life, and psychological well-being among infertile couples undergoing IVF treatment. The large effect sizes across multiple outcome domains indicate clinically meaningful benefits that extend beyond symptom reduction to encompass enhanced adaptive functioning and relationship quality.

These findings support the integration of CBT as a standard psychosocial intervention within comprehensive fertility care. Proactive psychological support addressing the multifaceted challenges of infertility and assisted reproduction may reduce psychological burden, strengthen couple relationships, enhance treatment experiences, and promote resilience regardless of reproductive outcomes. Both male and female partners benefit substantially from couple-focused CBT, reinforcing the importance of including both individuals in infertility-related psychological interventions rather than treating female patients alone.

The study demonstrates that CBT effectively addresses multiple interconnected domains affected by infertility stress: reducing symptoms of depression, anxiety, and stress; improving general psychological health; enhancing marital satisfaction and cohesion; increasing quality of life across physical, psychological, social, and environmental dimensions; and fostering psychological well-being including autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance. The strong correlations among improvements in these domains suggest that CBT facilitates comprehensive positive change rather than isolated symptom reduction.

From a clinical perspective, these results encourage fertility clinics to establish integrated care models incorporating mental health services alongside medical treatment. Training fertility care providers in recognizing psychological distress and facilitating appropriate referrals, developing on-site psychological services, and normalizing help-seeking for infertility-related distress would improve access to evidence-based interventions like CBT. Given the substantial and pervasive psychological challenges associated with infertility and IVF, psychological support should be considered an essential component of patient-centered fertility care rather than an optional adjunct reserved for crisis situations.

Future research employing randomized controlled designs, longitudinal follow-up assessments, diverse samples representing multiple cultural and socioeconomic contexts, and examination of mechanisms and moderators will further establish CBT effectiveness and optimize intervention protocols for this population. Additional investigation of links between psychological improvement and fertility treatment outcomes (pregnancy rates, treatment persistence, medical complications) would illuminate whether addressing psychological distress contributes to reproductive success alongside enhancing psychological well-being. Comparative effectiveness research examining CBT versus other psychological interventions (e.g., mindfulness-based therapy, acceptance and commitment therapy, supportive counseling) or different delivery formats (individual versus couple versus group) would guide evidence-based selection among available approaches.

In conclusion, this exercise answers the sufferings of infertile couples undergoing IVF in a more authenticated and objective manner. Cognitive Behavioral Therapy represents a highly effective intervention for reducing the multidimensional psychological burden of infertility and assisted reproduction while enhancing couples' adaptive resources and relationship quality. Integration of CBT into routine fertility care would benefit the substantial proportion of patients experiencing clinically significant distress and relationship strain during their fertility treatment journey.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest related to this research. No financial relationships or competing interests influenced the design, conduct, or reporting of this study.

ETHICAL APPROVAL

This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee of Santosh (Deemed to be) University, Ghaziabad, Uttar Pradesh.Written informed consent was obtained from all participants prior to study enrollment after fully explaining the study objectives, procedures, potential risks and benefits, and their right to withdraw at any time without consequences to their medical care..

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