



# International Journal of Obstetrics and Gynaecological Nursing

E-ISSN: 2664-2301

P-ISSN: 2664-2298

[www.gynaecologicalnursing.com](http://www.gynaecologicalnursing.com)

IJOGN 2025; 7(1): 36-41

Received: 25-11-2024

Accepted: 29-12-2024

**Amandeep Kaur**

Ph.D., Research Scholar, Baba Farid University of Health Sciences, Faridkot, Punjab, India

**Dr. Dimple Madaan**

Principal Cum Professor, Shri Guru Ram Dass College of Nursing, Hoshiarpur, Punjab, India

**Dr. Parnita Sardana**

Obstetrician and Gynecologist (IVF specialist), Amritdhara - My-Hospital, Karnal, Haryana, India

**Corresponding Author:**

**Amandeep Kaur**

Ph.D., Research Scholar, Baba Farid University of Health Sciences, Faridkot, Punjab, India

## Impact of nursing-based psychotherapy intervention on implantation rate in women undergoing *in vitro* fertilization: A randomized controlled trial

**Amandeep Kaur, Dimple Madaan and Parnita Sardana**

**DOI:** <https://doi.org/10.33545/26642298.2025.v7.i1a.183>

### Abstract

**Background:** The prevalence of infertility in India varies from 3.9% to 16.8%. Nursing-based psychotherapy is a successful approach for lowering the psychological issues related to infertility and enhancing the effectiveness of embryo implantation in women undergoing *in-vitro* fertilization.

**Material and Methods:** A total of 300 samples were collected for the experimental and controls groups, with 150 samples from each of two distinct infertility centers. The samples were chosen using a multistage random selection technique. The experimental group underwent four distinct sessions of Nursing-based psychotherapy at varied time intervals, whereas the controlled group received standard routine care. The effectiveness of Nursing-based psychotherapy in the experimental group and control group was assessed by analyzing the laboratory findings report of women and the reports were authenticated by the obstetrician.

**Results:** Findings illustrate that experimental group had a significantly greater rate of successful implantation compared to the control group.

**Conclusion:** Nursing -Based psychotherapy is a successful approach for improving the success rate of implantation in women undergoing *in vitro* fertilization treatment.

**Keywords:** Impact, Nursing-based psychotherapy, Implantation, In -vitro fertilization

### Introduction

Fertility yields progeny. Human fertility refers to the capacity to conceive and deliver offspring. In 2024, India's fertility rate is projected to be 2.122 births per woman, reflecting a decrease of 0.79% from 2023 <sup>[1]</sup>. According to the All India Institute of Medical Sciences (AIIMS), approximately 10% to 15% of couples experience reproductive challenges. The infertility rates in India vary from 3.9% and 16.8% <sup>[2]</sup>. Infertility is a worldwide issue that impacts numerous individuals globally.

Infertility is thought to be influenced by various reasons, including psychological aspects <sup>[3]</sup>. Studies indicate that anxiety, sadness, and stress can influence the quantity of oocytes, embryos, and positive implantation rate, hence altering hormone levels related to human fertility <sup>[4]</sup>. Current practices in infertility treatment emphasis integrative treatments that encompass infertility counseling, psychological therapies and mind body therapies <sup>[5]</sup>.

*In vitro* fertilisation (IVF) is a complex procedure lasting 4 to 6 weeks. Women have physical and mental health challenges, along with significant investments of time and financial resources. Numerous infertile families experience significant stress and distress <sup>[6]</sup>. Uncertainties regarding treatment exacerbate stress and anxiety. The psychoneurological circuits of infertile women are affected by negative mood states. Vasoconstriction diminishes tissue blood flow, impairs egg development and release from the ovary, inhibits fertilisation and implantation, and jeopardises pregnancy <sup>[7]</sup>.

The emotional challenges faced during treatment may reduce the probability of successful implantation. Infertility management should be approached holistically, as the physiological, psychological, spiritual, and socio-cultural dimensions of treatment are interrelated and must be addressed in unison. Domar AD *et al.* (2011) conducted a study examining the impact of a group mind/body intervention on successful pregnancy rates in patients undergoing *in vitro* fertilisation (IVF). The findings revealed that participation in Mindfulness-Based (MB) interventions was associated with increased pregnancy rates during the second cycle <sup>[8]</sup>.

Nurses engage intimately with couples seeking fertility to attend to their physical, emotional, social, and spiritual health requirements. Nurses can provide emotional and social support to women experiencing infertility throughout medical therapy. Nurses in this capacity assess women's medical requirements, identify issues, make decisions regarding care practices, plan and implement treatment, and evaluate care utilising managerial abilities.

Despite a general agreement on the necessity of psychotherapy for patients undergoing *in vitro* fertilisation (IVF), there is a lack of research examining the efficacy of psychological interventions specifically designed for women. To date, only a few rigorously designed studies have been conducted to assess the effects of psychological intervention on implantation and treatment outcome. Furthermore, there exist a limited number of structured combination psychotherapy nursing interventions that employ both individual and group methodologies to alleviate the stress, anxiety, and uncertainty faced by women undergoing IVF therapy.

In order to determine whether or not psychological nursing intervention is effective in increasing the percentage of embryos that successfully implant in women who are undergoing *in vitro* fertilization treatment, this study was carried out.

## Materials and Methods

### Study design

This study employed an experimental, randomized controlled design to examine the effect of psychotherapy nursing intervention and implantation rates in women receiving *in vitro* fertilisation treatment. This randomized controlled experiment was conducted in Chandigarh Tricity from June 2023 to April 2024 with women undergoing *in vitro* fertilisation treatment.

**Study setting:** Final selection comprised of Indira IVF Centres sector -9 and Milann fertility hospital sector-46 Chandigarh.

### Eligibility criteria for the study participants

#### Inclusion criteria

- Women age between 21-45 years.
- Not suffering from any major psychological disorder (as assessed by a physician during initial visit to the hospital).
- Not taking any psychiatric medications.
- Not suffering from any systemic disease.
- Have a stable relationship.
- Able to read and understand English/Punjabi/Hindi.
- Willing to participate.

#### Exclusion criteria

- Attending other counseling sessions on stress and anxiety.
- Women using donor gamete.
- Women using alternative therapies such as acupressure.
- Consulting a psychiatrist/psychologist for one month prior to the study.
- Severe family dispute.
- Death of beloved one.
- Experiencing any tragedy during study.
- Poor respondents.

**Sample size:** The researcher selected women undergoing *in vitro* fertilization to evaluate the impact of psychotherapy on implantation rates. The sample size for the study was calculated using the following formula:

$$\text{Sample size} = \frac{2(Z_{\alpha} + Z_{1-\beta})^2(\sigma)^2}{\Delta^2}$$

$$Z_{\alpha}=5\%=1.96$$

$$Z_{1-\beta}=80\%=0.8416$$

$$\text{Effect Size}=10\%=0.10$$

$$\text{Assuming SD}=0.3$$

$$\begin{aligned} N &= \frac{2(1.96+0.8416)^2(0.3)^2}{(0.10)^2} \\ &= \frac{2(2.80)^2(0.3)^2}{(0.01)^2} \\ &= \frac{2(7.84)(0.09)}{0.01} \\ &= \frac{2(0.70)}{0.01} \\ &= \frac{1.4}{0.01} = 140(\text{each}) \end{aligned}$$

The sample size for both the experimental and control groups was determined to be 140 women each. Given the dropout rate associated with the sample, the researcher plans to pick a total of 300 samples, with 150 designated for each of the experimental and control groups.

**Sampling technique:** City of Chandigarh, Mohali, and Panchkula comprise the Chandigarh tricity. Simple random sampling (Computer-generated number) was employed to select Chandigarh as the subject of the investigation from the three cities. Eight infertility centres were identified in Chandigarh. Simple random sampling (computer-generated numbers) was employed to select two of these centres for the investigation. Indira IVF Centres and Milann fertility facility were designated as Centre-1 and Centre-2, respectively, among the two infertility centres. I selected Centre-1 to collect data from the experimental group, and Centre-2 to collect data from the control group. Simple random sampling was implemented to implement the selection procedure, which involved the coin flipping method. Included in the investigation were all eligible women who underwent *in vitro* fertilisation at each site. 150 women from each centre were selected using a randomised table.

A close ended questionnaire was developed by the researcher to collect the information regarding socio demographic data and obstetrical profile of the women. Women were attending infertility centers after registration

for IVF treatment was approached, and written informed consent was obtained from them. Initially, women from both the Study group and Control group were provided with a socio-demographic and obstetrical data sheet. An individualized method was employed to ascertain the women for this. The study commenced after receiving approval from the institutional ethical committee, Indira IVF hospital in Chandigarh, and the director of the department at Milann IVF centre in Chandigarh and was prospectively registered in the clinical trial registry India (CTRI/2023/04/051434 dated 10 April 2023).

### Intervention details

The intervention was designed after thoroughly reviewing the literature and also obtaining the validation from the experts in different field including nursing, obstetrics and gynecology, infertility specialist and clinical psychologist.

- After baseline assessment, structured intervention was implemented in experimental group.
- **Session 1 (1<sup>st</sup> day of IVF treatment)**  
It includes the information concerning stress, anxiety, and their effects on fertility, as well as strategies for psychologically preparing women for IVF therapy. Women were advised to openly acknowledge and validate their emotions. They were provided with a range of techniques to manage their emotions, such as self-monitoring, blocking negative thoughts, seeking support from a group, using distraction methods, practicing mindfulness, and engaging in positive affirmations. All of these factors contribute to the women's psychological adaptation to the IVF treatment procedure. The initial session lasted approximately 50 to 60 minutes. An individualized strategy was adopted. Participants were invited to seek clarification for any uncertainties they had. After the session concluded, the participants were provided with a link to a video that explained coping strategies and several techniques for modifying behavior.
- **Session 2 (1 Week interval of first session):** The session incorporated techniques for achieving mental and physical relaxation in order to alleviate stress, anxiety, and uncertainty. The session employed a group approach. A cohort of 5-6 women convened in a designated room supplied by the centre. A live demonstration was conducted for women, showcasing diaphragmatic breathing, pranayama techniques such as Bhramari Pranayama or Bee Breath, Paschimottanasana or Seated Forward Fold, Supta Baddha Konasana or Reclining Bound Angle, Viparita karani or legs up the wall, as well as meditation practices including mindfulness activities, self-affirmation, gratitude writing, and Mantra Meditation for Fertility. This took about 30 to 40 minutes. The researcher also disseminated informational brochures to women, containing instructions, recommendations for practicing yoga and pranayama, as well as the benefits of engaging in these activities during the treatment process. Women were assisted in resolving their doubts. The group was strongly encouraged to engage in daily self-practice at home.
- **Session 3 (on the day of embryo transplantation)**

This specific session includes the practice of different relaxation techniques, such as meditation and mini relaxation techniques. The primary objective of the session was to assess the performance of women on a daily basis and to encourage women to engage in relaxation techniques on a regular basis. This might contribute to improving the psychological well-being of women and promoting relaxation in their bodies during embryo transplantation. It took around 20-30 minutes.

- **Session 4 (1 Week before pregnancy test):** Reviewing and practicing the content of first two sessions. It involves promoting positivism and resilience in women who are undergoing *in vitro* fertilisation (IVF). The session utilised a group approach. The process of evaluating the past sessions with women took approximately 20-30 minutes. Following the review, women, together with the researcher, have engaged in the practices of yoga and meditation. Women were advised to continue practicing these coping skills, as well as yoga, pranayama, and meditation at home.

**Routine care in control group:** At the same time that the experimental group was provided with four sessions of Nursing based psychotherapy intervention, the control group was provided with routine care throughout the course of the treatment.

**Post test in both experiment and control group:** The implantation rate was determined by analyzing the laboratory findings report of women and also consulting with an obstetrician.

### Results

**Demographic characteristics:** Total sample was 300 and 150 each in experimental and control group. Majority of participants fall within the 36-40 age range, accounting for 45.3% in the experimental group and 48.7% in the control group. Other demographic details are described in Table 1.

**Obstetric profile characteristics:** Majority of women marrying between the ages of 28-32, with 62.7% in the experimental group and 67.3% in the control group. Duration of marriage reveals that the largest proportion of women has been married for 6 to 10 years, accounting for 45.3% of both groups. Regarding the type of infertility, primary infertility is predominant, affecting 85.3% of the experimental group and 86.7% of the control group. Other obstetric profile characteristics details in table 2.

Table 3 compares the results of the Implantation rate among women undergoing *in-vitro* fertilization (IVF) treatment in the experimental and control groups, each with 150 participants. The data shows that 71.3% of women in the experimental group had a positive implantation result compared to 52.7% in the control group. Conversely, 28.7% of women in the experimental group had a negative implantation result, compared to 47.3% in the control group. The chi-square value 10.314 ( $p= 0.001$ ), indicating a statistically significant difference between the groups at the 0.01 level. This suggests that the experimental group had a significantly higher implantation success rate compared to the control group.

**Table 1:** Socio-demographic profile of women undergoing in-vitro fertilization treatment at selected infertility centres in Chandigarh Tricity. N=300

S. No.	Variables	Exp. (n=150)		Ctrl. (n=150)		$\chi^2$ value	df	P value
		f	%	f	%			
<b>Age (years)</b>								
1.	26-30	11	7.3	4	2.7	3.479	3	.323 <sup>NS</sup>
	31-35	52	34.7	53	35.3			
	36-40	68	45.3	73	48.7			
	41-45	19	12.7	20	13.3			
<b>Religion</b>								
2.	Hindu	54	36.0	39	26.0	3.636	2	.162 <sup>NS</sup>
	Sikh	67	44.7	80	53.3			
	Others	29	19.3	31	20.7			
<b>Education</b>								
3.	Illiterate	20	13.3	16	10.7	.593	3	.898 <sup>NS</sup>
	Primary	11	7.3	12	8.0			
	Secondary	20	13.3	19	12.7			
	Graduate and above	99	66.0	103	68.7			
<b>Occupation</b>								
4.	Self-employee	20	13.3	18	12.0	6.414	3	.093 <sup>NS</sup>
	Govt. Employee	33	22.0	43	28.7			
	Private employee	48	32.0	58	38.7			
	Home maker	49	32.7	31	20.7			
<b>Education of husband</b>								
5.	Illiterate	20	13.3	17	11.3	4.164	3	.244 <sup>NS</sup>
	Primary	15	10.0	26	17.3			
	Secondary	22	14.7	16	10.7			
	Graduate and above	93	62.0	91	60.7			
<b>Occupation of husband</b>								
6.	Self employee	19	12.7	10	6.7	4.976	3	.163 <sup>NS†</sup>
	Govt. Employee	61	40.7	55	36.7			
	Private employee	66	44.0	82	54.7			
	Others	4	2.7	3	2.0			
<b>Family income (Rs/month)</b>								
7.	10001-20000	1	.7	1	.7	1.517	2	.570 <sup>NS†</sup>
	20001-30000	16	10.7	10	6.7			
	>30000	133	88.7	139	92.7			
<b>Type of family</b>								
8.	Joint	56	37.3	55	36.7	.367	2	.832 <sup>NS</sup>
	Nuclear	82	54.7	80	53.3			
	Extended	12	8.0	15	10.0			
<b>Residence</b>								
9.	Urban	84	56.0	78	52.0	1.430	2	.698 <sup>NS</sup>
	Semi urban	39	26.0	41	27.3			
	Rural	27	18.0	31	20.7			

NB: NS= Non-significant, S= Significant, †= Fisher Exact Test

**Table 2:** Obstetrical profile of women undergoing in-vitro fertilization treatment. N=300

S. No.	Variables	Exp. (n=150)		Ctrl. (n=150)		$\chi^2$ value	df	P value
		f	%	f	%			
<b>Age at marriage (years)</b>								
1.	18-22	11	7.3	5	3.3	2.701	3	.434 <sup>NS†</sup>
	23-27	42	28.0	42	28.0			
	28-32	94	62.7	101	67.3			
	33 and above	3	2.0	2	1.3			
<b>Duration of marriage (years)</b>								
2.	1 to 5	49	32.7	36	24.0	4.135	3	.247 <sup>NS</sup>
	6 to 10	68	45.3	68	45.3			
	11 to 15	27	18.0	38	25.3			
	>15	6	4.0	8	5.3			
<b>Type of infertility</b>								
3.	Primary	128	85.3	130	86.7	.111	1	.739 <sup>NS</sup>
	Secondary	22	14.7	20	13.3			
<b>Cause of infertility</b>								
4.	Female only	57	38.0	65	43.3	31.325	3	.001 <sup>S</sup>
	Male only	22	14.7	49	32.7			
	Male and female	19	12.7	21	14.0			



	Unknown	52	34.7	15	10.0			
<b>Duration of infertility treatment</b>								
5.	1 to 5	72	48.0	58	38.7	3.594	3	.309 <sup>NS</sup>
	6 to 10	62	41.3	73	48.7			
	11 to 15	11	7.3	10	6.7			
	>15	5	3.3	9	6.0			
<b>Number of IVF done</b>								
6.	1 <sup>st</sup>	87	58.0	91	60.7	.221	1	.638 <sup>NS</sup>
	2nd and more	63	42.0	59	39.3			
NB: NS= Non-significant, S= Significant, †= Fisher Exact Test								

**Table 3:** Comparison the Implantation Test among women undergoing in-vitro fertilization treatment in experimental and control group. N=300

Variable	Experimental		Control		$\chi^2$ value	Df	P value
	F	%	F	%			
Yes	107	71.3	79	52.7	10.314	1	.001 <sup>S</sup>
No	43	28.7	71	47.3			

**Discussion**

The current study's findings indicate that the experimental group had a markedly higher implantation success rate than the control group. Numerous other studies have been conducted to evaluate the impact of various therapeutic procedures on implantation rates in women undergoing *in vitro* fertilisation, and the results align with the findings of the current study. Research by Domar *et al.* (2011) on mind-body interventions <sup>[8]</sup>, Czamanski-Cohen *et al.* (2016) regarding cognitive behavioural therapy in IVF <sup>[9]</sup>, and Gorayeb *et al.* (2012) <sup>[10]</sup> on cognitive behavioural interventions in groups yielded results compatible with the current study.

The study conducted by Domar *et al.* (2011) on the effects of group mind/body intervention on pregnancy rates in IVF patients revealed that the pregnancy rate for the second cycle of mind/body therapy was 52% in the experimental group, compared to 20% in the control group. It was concluded that MB participation correlated with elevated pregnancy rates <sup>[8]</sup>.

Czamanski-Cohen *et al.* (2016) conducted a study titled "Practice Makes Perfect." The impact of cognitive behavioral interventions during IVF procedures on women's perceived stress, plasma cortisol levels, and pregnancy rates indicated that women who consistently practiced cognitive behavioral intervention experienced considerably greater pregnancy rates than those who did not <sup>[9]</sup>.

Gorayeb *et al.* (2012) <sup>[10]</sup> shown in their study titled Brief Cognitive Behavioral Intervention in Groups within a Brazilian Assisted Reproduction Program that participants in the psychological intervention achieved a pregnancy rate of 39.8%, markedly surpassing the 23.2% rate of nonparticipants <sup>[10]</sup>.

Psychological nursing interventions can be an effective approach to addressing emotional distress and other psychological issues that are associated with infertility and linked therapies. The intervention encompasses coping strategies, meditation, and relaxation techniques that assist individuals in overcoming the challenges of infertility treatment, as well as increase focus and maintain healthy body chemistry. Given this, it is logical to infer that psychotherapeutic nursing intervention can contribute to the enhancement of fertility or implantation rates.

**Limitations**

- The extended period of the study resulted in participants experiencing fatigue and a lack of cooperation. The researcher sought other methodologies to motivate participants to persist in the study.
- The study is limited by the complicated nature of fertility, which is influenced by multiple factors beyond the control of the researcher.

**Conclusion**

The study determined that it is possible to create a successful intervention in this particular context. A study has demonstrated that implementing Psychotherapeutic nursing intervention is an effective strategy to enhancing the success rate of implantation in women who are receiving *in vitro* fertilization treatment. Psychotherapeutic intervention or psychological counselling sessions can be regularly incorporated into the treatment of *in vitro* fertilization to address the psychological concerns of women undergoing treatment.

**Financial support and sponsorship**

Nil

**Conflicts of interest**

There are no conflicts of interest.

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**How to Cite This Article**

Kaur A, Dr. Madaan D, Dr. Sardana P. Impact of nursing-based psychotherapy intervention on implantation rate in women undergoing *in vitro* fertilization: A randomized controlled trial. *International Journal of Obstetrics and Gynaecological Nursing*. 2025;7(1):36-41.

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