

Effect of Collaborative Infertility Counseling on Coping Strategies and Marital Satisfaction among Women Undergoing In Vitro Fertilization a Randomized Control Trial

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Abstract

Background: In Vitro Fertilization (IVF) is the most common procedure of assisted reproductive technologies worldwide. Promoting the health of women undertaking IVF is an important goal for global reproductive health.

Aim: This study aimed to investigate the effect of collaborative infertility counseling on coping strategies and marital satisfaction among women undergoing In Vitro Fertilization. **Design:** A non-blinded randomized controlled trial, pre/post-test with follow-ups. **Setting:** This study was conducted at the Fertility Care Center at Mansoura University Hospitals, Mansoura City, Egypt. **Subjects:** This study included 136 infertile women who were eligible to carry out the IVF procedure randomly assigned to intervention and control groups (68 per group). **Tools:** A structured interview questionnaire, Ways of Coping-Revised (WOC-R) questionnaire, and Marital Satisfaction Index (MSI). **Results:** The mean score of ways of coping and marital satisfaction increased significantly ($p < 0.001$) post-intervention and at follow-ups. Moreover, the ways of coping were correlated significantly and positively with the marital satisfaction post-intervention, at 1-month, and 2-month follow-ups ($r = 0.358, 0.290,$ and 0.270 respectively, $p < 0.05$). **Conclusion:** Collaborative infertility counseling is one of the effective methods to improve coping strategies and marital satisfaction among women undergoing In Vitro Fertilization. There was a highly statistically significant improvement in scores of ways of coping and marital satisfaction in the intervention group compared the to control group post-intervention. **Recommendations:** Providing collaborative counseling should be an integral part of nursing care for women undergoing IVF to foster positive adaptation and increase marital satisfaction.

Keywords: *Counseling, Coping Strategies, Infertility, In Vitro Fertilization & Marital Satisfaction.*

Introduction

Infertility is a global reproductive health problem defined as an inability to conceive after 12 months (or longer) of frequent unprotected intercourse (Dourou, Gourounti, Lykeridou, Gaitanou, Petrogiannis, and Sarantaki, 2023). Women's fertility weakens gradually with age so healthcare providers start to treat infertility earlier for women aged 35 years or older after 6 months of unprotected sex (CDC, 2022). Globally, between 48 million couples have infertility (WHO, 2022). Infertility is considered a stressful life experience commonly associated with emotional stress besides exposure to social pressure (Simionescu et al., 2021).

In vitro fertilization (IVF) is the most popular method of infertility treatment used for more than 40 years in clinical practice (Bapayeva et al., 2021). During the IVF procedure, an egg is retrieved from the woman's ovaries and fertilized with sperm in a laboratory. The fertilized egg (embryo) is then returned to the woman's uterus to grow and develop (Chopra, Budhwar, Sharma, and Chandra, 2023). In vitro fertilization includes injectable medications, multiple blood tests, rigid medication schedules, clinic appointments and procedures, waiting periods, and

complex decision-making. This causes more stress, challenge in mental health and well-being, uncertainty, lack of personal control, low self-esteem, and less marital satisfaction (De Lacey, Sanderman, & Smith, 2021).

Many women fear of carrying out the IVF process due to the emotional distress they experience (De Lacey et al., 2021). Some women may be anxious due to thinking about the complications that arise during the treatment. Moreover, physical signs like mood changes, hot flashes, and headaches which may rarely occur make the women find it difficult to cope during the treatment cycle (Abdelgelel, Muhsib, Abdelaal, & Ibrahim, 2020).

Collaborative infertility counseling is a highly recommended step during the IVF process. It is an approach-considering women's physiological, psychosocial, and personal aspects to manage women's infertility-related emotional problems and relieve their anger, dissatisfaction, and misunderstanding (Sharma & Shrivastava, 2022). It allows a better understanding of woman's choices, offers ways to express their concerns, and encourages them to adapt their feelings. This can be achieved by helping them adopt an effective variety of coping

strategies to deal with stress and stay well-balanced during the IVF entire process (Sorkhani, Ahmadi, Mirzaee, Alidousti, and Habibzadeh, 2021).

Coping strategies are ways people intentionally adopt to cope with stressful situations and reduce unfavorable effects through specific cognitive, emotional, and behavioral efforts (Dahlstrand et al., 2021). These strategies are problem-focused (planful problem solving, positive reappraisal, seeking social support, and accepting responsibility) and emotion-focused (confrontive coping, self-controlling, distancing, and avoidance-escape behaviors) (Lourenção et al., 2022). Coping strategies are suggested to be used by women undergoing IVF to increase their adaptation to infertility-related mental problems and decrease IVF-related stress and anxiety (Sorkhani et al., 2021). Women also can use more than one strategy to be able to cope effectively (Bidgoli & Roudsari, 2018)

Marital satisfaction is an important aspect of the couple's marital life and a crucial index of marital quality. It has positively influenced marital stability, in that a satisfied couple has a stable marriage (Postler, Helms, & Anastopoulos, 2022). Infertility affects the marital relationship, causes disputation between the couples, and makes them unsatisfied with their marriage. Infertility counseling improves sexual activities and marital satisfaction, as well as hope and marital relationship skills (Roudsari & Bidgoli, 2017). Collaborative infertility counseling for women undergoing IVF is important for optimal management of the difficulties they go through. Therefore, the current study was conducted to investigate the effect of collaborative infertility counseling on coping strategies and marital satisfaction among women undergoing IVF.

Significance of the study

Infertility affects about 48 million couples worldwide (Ombelet, 2020). The percentage of couples seeking infertility treatment has increased significantly in current years because of several successful infertility treatment techniques such as IVF (Simionescu et al., 2021). Women undergoing IVF have more emotional and anxiety disorders at all stages of the treatment cycle (Mitchell, & Norton, 2023). They often conceal their emotions and beliefs and may reduce social interaction, especially with pregnant women and women having children (Alkhubaba, & Alkhateeb, 2023). This negatively affects psychological well-being and treatment retention and success. This impact can be exacerbated by disturbances in daily routine and the financial pressure of IVF costs in addition to exposure to the social pressure of family members or friends (Kato, Sampei, Saito, Morisaki, and Urayama, 2021).

Higher levels of stress and worse mental health have in turn been associated with lower rates of pregnancy in general and specifically within the context of assisted fertility (Fernandez-Ferrera, Llanaez-Suarez, Fernandez-Garcia, Castañon, Llanaez-Suarez, & Llanaez, 2022). Moreover, infertility treatment discontinuation rates are often high because of related psychological and physical burdens. This eventually lowers the rate of success since multiple IVF cycles are often needed to achieve a live birth (Simionescu et al., 2021). As a result, it is important to take care of women's mental as well as physical health during the IVF cycle. The better prepared they are, the smoother the treatment and the higher success will be (Iordachescu et al., 2021).

Most infertile women have problems like anger, frustration, and rejection which are essential to realize and assess. Infertility counseling offers them therapeutic support for their confusion and maturely addresses the problem (Alkhubaba, & Alkhateeb, 2023). Therefore, it is essential for women before initiating the treatment to be psychologically supported at all stages of treatment, have adequate knowledge about the IVF process and its side effects, and get all misbeliefs cleared. However, few studies exist that evaluated the effects of collaborative infertility counseling on coping strategies and marital satisfaction in infertile women. This stimulates the current study to investigate the effect of collaborative infertility counseling on coping strategies and marital satisfaction among women undergoing IVF.

Study aim

This study aimed to investigate the effect of collaborative infertility counseling on coping strategies and marital satisfaction among women undergoing In Vitro Fertilization.

Study hypotheses

To attain the present study's aim, two hypotheses were tested:

1. Women who receive collaborative infertility counseling achieve higher coping strategies scores than those who don't.
2. Women who receive collaborative infertility counseling have higher marital satisfaction scores than those who don't.

Subjects and Method

Study design

A non-blinded Randomized Controlled Trial (RCT), pre/post-test with 1-month and 2-month follow-ups design was utilized. RCT is the best study type established to evaluate the efficacy of a treatment or a specific procedure. The current study used it to evaluate the effect of the independent variable (collaborative infertility counseling) on the dependent variables (coping strategies and marital satisfaction).

The current study adheres to the rules for writing Clinical Trials (CONSORT) statements (Eldridge et al., 2016).

Study setting

This study was conducted at the Fertility Care Center (FCC) at Mansoura University Hospitals, Mansoura City, Egypt. It is a specialized center that provides care related to fertility and its different treatment modalities and offers different family planning methods to women in the surrounding villages. It consists of a reception area, examination room, family planning insertion room, inpatient ward, laboratory room, storage room, waiting area, and staff office. The care is provided by 6 obstetricians and 12 nurses. It is open 5 days weekly from Sunday to Thursday.

Sampling

This study included 136 infertile women recruited from the FCC using the random allocation method between January 2022 to November 2022. Women were considered eligible if they fulfilled these inclusion criteria: (1) aged from 20 to 45 years (2) literate women (3) achieved general health scores below 18 (4) eligible to carry out IVF procedure; while women who have other methods of Assisted Reproductive Technology (ART), previous IVF failure, leaving the treatment for any reason, having a history of psychiatric problems or suddenly experience severe traumatic or psychological events were excluded from the study.

Sample size calculation

Based on data from a study by Bidgoli & Roudsari, (2018) to investigate the collaborative infertility counseling model effect on coping strategies in women undergoing IVF, considering the level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula: $n = [(Z \alpha/2 + Z \beta) \times \{2(SD)^2\}] / (\text{mean difference between the two groups})^2$, where SD = standard deviation obtained from the previous study; $Z \alpha/2$, for 5% this is 1.96; and $Z \beta$, for 80% this is 0.84. Therefore, $n = [(1.96 + 0.84) \times \{2(2.7)^2\}] / (1.3)^2 = 67.6$. Based on the above formula, the sample size required per group is 68, giving a total sample size of 136 women undergoing IVF.

Allocation to the groups

Women were randomly assigned either to the intervention group or the control group. Randomization was done with a 1:1 ratio (i.e., 68 intervention group: 68 control group). Random assignment was performed using a closed envelope that contained two letters (I or C). Women were asked to select one letter. A woman who selected letter (I) was assigned to the intervention group and received the infertility counseling sessions, while a woman who selected letter (C) was assigned to the control group and received the treatment as usual (TAU). The closed envelope was opened after the women performed all the necessary investigations, eligibility for the IVF procedure, and obtaining written informed consent. A consort flow diagram of the study participants is shown in Figure 1.

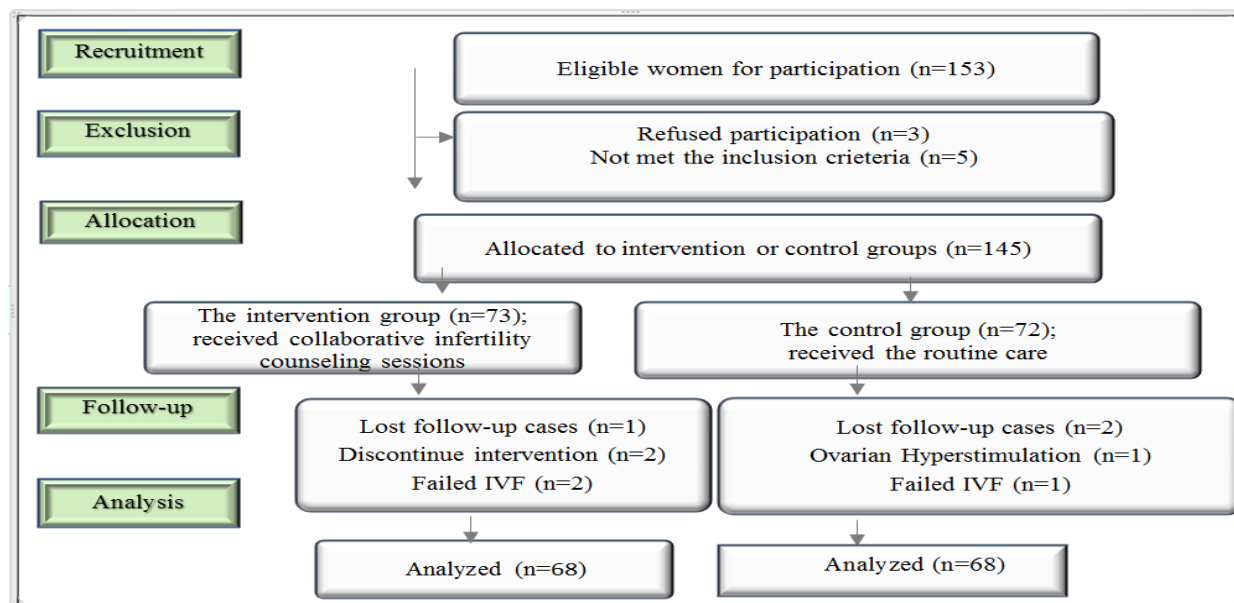


Figure 1. Consort Flow diagram of the study participants

Tools of data collection

Three tools were used for collecting the data: a structured interview questionnaire, Ways of Coping-Revised (WOC-R) questionnaire, and Marital Satisfaction Index (MSI).

Tool I- A structured interview questionnaire: It was developed by the researchers after revising the relevant literature (Bidgoli et al., 2019) and included 2 parts. The first part represented the women's demographic data such as age, education, occupation, residence, and telephone number. The second part comprised the gynecological data as menstrual regularities, duration of menstruation, duration of marriage, pregnancy history, cause of infertility, duration of being infertile, and hope of pregnancy occurrence after the IVF procedure.

Tool II- Ways of Coping-Revised (WOC-R) questionnaire: It was adopted from Folkman, Lazarus, Pimley, & Novacek, (1987) and used to assess the coping strategies of the women. It contained 31 items partitioned into problem-focused and emotion-focused strategies. The problem-focused included 4 subscales with a total of 18 items: planful problem-solving, seeking social support, accepting responsibility, and positive reappraisal. The emotion-focused included 4 subscales with a total of 13 items: confrontive coping, self-controlling, distancing, and escape/avoidance. **A scoring system:** The responses were estimated on a 3-point Likert scale (0= didn't use, 1= not used usually, and 2= used all the time). The minimum to maximum scores ranged from 0 to 62. A higher score indicates a higher level of coping.

Tool III- Marital Satisfaction Index (MSI): It was adopted from Cheung & Hudson, (1982) and used to assess women's level of satisfaction with their marriage. It consisted of 25 items (13 positive words and 12 negative words). **A scoring system:** The responses were estimated on a 5-point Likert scale (1= none of the time, 2= hardly, 3= occasionally, 4= often, and 5= all the time). The minimum to maximum scores were 25 to 125, respectively. A higher score (higher than 30) indicates a higher level of dissatisfaction.

Validity and reliability of the study tools

In this study, the content validity of the questionnaire was confirmed by a panel of 3 experts in the field of woman's health and midwifery nursing to ensure that the questions were consistently conveyed. According to their opinions, the study tools were clear and feasible, and no modifications were suggested. Reliability for internal consistency of the WOC-R and MSI was statistically assessed using Cronbach's alpha coefficient, it was 0.878 and 0.921 respectively, which indicates that the study tools are highly reliable.

Pilot study

It was carried out on 14 women to test the applicability, feasibility, and completeness of the study tools and to estimate the required time to fill in. Based on the finding, no modifications were made as the tools were clear, understandable, and objective. So, the women who shared in the pilot study were not excluded from the main sample.

Ethical considerations

Ethical approval was obtained from the research ethics committee, Faculty of Nursing, Mansoura University to perform the current study (P.0335). Furthermore, official permission has been taken from the head of the Fertility Care Center. Before recruiting, a clear explanation of the study's aim and approach was applied to every woman. Each woman signed informed written consent for voluntary participation. All eligible cases were asked if they needed any further explanation, and their inquiries were answered satisfactorily. The women were told that they had the right to withdraw from the study at any time without jeopardizing their treatment plans. Safety and confidentiality of the women's data were assured throughout the whole study. This study was registered at the ClinicalTrials.gov website under the code NCT05658848. Registration date: December 21, 2022. ClinicalTrials.gov Id: NCT05658848.

Research process

This study was conducted throughout three phases: baseline assessment, implementation, and follow-up and evaluation phase.

Baseline assessment phase

- At the initial stage of the IVF procedure (the second and third day of the menstrual cycle), the researcher identified the included women, introduced herself, and interviewed them. Women's general health was assessed by using the general health questionnaire (GHQ-28). Women with a general health score below 28 were involved in the study.
- The researcher explained the study's aim and scope to the eligible women. Written informed consent was obtained from women who accept to participate in this study.
- Before the group assignment, all women completed the study questionnaires (a structured interview questionnaire, WOC-R questionnaire, and MSI which assessed women's personal and gynecological history, coping strategies, and level of marital satisfaction respectively) as baseline data.
- Eligible women were allocated to two groups either control group (TAU group) or intervention group (infertility counseling group), according to their choices of the selected letters.
- Contents of the infertility counseling sessions were designed, methods of teaching were determined, and an Arabic booklet was prepared as an

educational media covering all the sessions' contents. The content validity of the booklet was checked by faculty members who confirmed its clarity and comprehensiveness.

- This phase took about one month from January to February 2022.

Implementation phase:

It took place from February 2022 to November 2022. It entailed the care provided to both the control group (TAU group) and the intervention group (infertility counseling group) as the following:

Care for the Control Group (TAU Group)

Treatment as usual (TAU) was provided to the control group entailed the routine medical and nursing interventions provided at the center. It focused on specific examinations, investigations, medication regimens, daily nursing care, time of egg retrieval and embryo transfer, taking injections at home, and regular follow-up.

Care for the Intervention Group (Infertility Counselling Group)

Besides the routine care, the intervention group received the infertility collaborative counseling in the form of 4 sessions starting from the first day of the basic sonography (second or third day of the menstrual cycle) until the embryo transfer procedure (8-9 weeks later).

First session

- It was conducted on the end of the first day that the women visited the center. After carrying out the necessary examinations and investigations, the researcher met the eligible participants in the conference hall at the FCC.
- In the beginning, the researcher greeted the women and introduced them to each other. This session aimed to provide introductory information about the IVF procedure and present the Jacobson exercise. The definition and stages of the IVF procedure were clearly explained. Instructions before, during, and after the procedure were discussed. Moreover, the researcher presented the technique of the Jacobson exercise to the women as the following:

At the beginning sit comfortably in the bed, tense each muscle group - hands, biceps, triceps, shoulders, neck, mouth, jaw, eyes and forehead, chest, abdomen, back, thighs, legs, and feet muscles- for 5 to 7 seconds and then relax for 20–30 seconds, after that, take a deep breath, hold it during muscle tension for 10 seconds, and then exhale from pursed lips slowly during relaxation, imagine the negative energy is squeezed outside the body leaving it relaxed. This exercise is performed for 30 min duration and repeated 3 times/day.

- The researcher repeated the Jacobson exercise technique many times until ensuring that the women were able to practice it effectively. The researcher

asked the women to feel free for asking questions and express their feelings and concerns. At the end of this session, educational Arabic booklets were distributed among women. A checklist was provided for women to record the frequency of Jacobson exercise at the home. As well as the researcher gave the women her telephone number to keep in contact with them between the sessions and to confirm the time of the next sessions.

Second session

- It was conducted about 2 weeks later from the first session during the second visit of the women to the center (18-20 days from the first cycle). It aimed to provide psychological support to the women and counseling about coping strategies with stressful situations
- At the beginning, the researcher reviewed the previous session content and asked every woman to practice the Jacobson exercise. After that, the women were encouraged to express their feelings and thoughts about infertility. False beliefs and negative thoughts about infertility were identified. The researcher also encouraged women to talk about their interactions with their husbands, families, and community. The definition of marital satisfaction and its components were explained to women. The researcher also provided measures to strengthen husband relationships and highlighted the unique impact of their empathy and support beyond that of family and friends.
- Finally, the researcher offered problem-focused coping strategies for infertility-related issues to help women find an effective support system.

Third session

- It was conducted on the second day of the next cycle (approximately 10 days after the previous session). It concerned reviewing problem-focused coping strategies and presenting effective communication skills and stress reduction techniques.
- The researcher started by reviewing the problem-focused coping strategies and receiving feedback from the women regarding the earlier contents. Moreover, the researcher discussed effective communication skills and how to apply them in real-life situations. In addition, stress reduction techniques were clearly explained to women. In the end, the researcher answered all women's inquiries related to the previously discussed topics.

Fourth session

- It is the last session that is carried out in the 10-12 days of the second cycle.
- It focused on decreasing women's perceived stress and providing comprehensive information regarding oocyte retrieval and embryo transfer procedures using assisted learning videos to enhance women's

understanding. The researcher focused on the importance of the regular practice of Jacobson exercise and controlling any perceived stress before the procedure. The researcher discussed the importance of being relaxed before the IVF procedure.

- Every session consisted of a combination of group discussion, questions and answers, and role-playing and lasted from 45 to 60 minutes.

Follow-up and evaluation phase

Between the sessions, the researcher remained in contact with the women by phone calls to answer any related concerns, ensure the regular practice of the Jacobson exercise, remind them to record their performance in the checklist, and tell them the time of the next appointment. After the embryo transfer procedure and before the women were discharged home, a posttest was performed using WOC-R questionnaire and MSI. Then, an evaluation was performed one and two months after the IVF procedure through a telephone interview.

Data analysis

All statistical analyses were performed using SPSS version 20.0 (SPSS, Chicago, IL). All continuous data were normally distributed and expressed in mean±SD. Categorical data were expressed in numbers and percentages. The comparisons were determined using Student's t-test for two variables with continuous data and ANOVA test for more than two variables with continuous data. The mean difference and the 95% confidence interval (CI) of the mean difference were calculated. Chi-square test was used for comparison of variables with categorical data. The correlation coefficient test was used to test for correlation between two variables with continuous data. The internal consistency of the study tools was tested using Cronbach's alpha test. Statistical significance was valuated at $p < 0.05$.

Results

Table (1): Sociodemographic characteristics and gynecological history of the studied women

	Intervention group		Control group		Chi-square/Fischer exact test	
	N	%	N	%	X ²	P
Age (years)						
< 30	29	42.6	27	39.7		
30-35	34	50.0	38	55.9		
> 35	5	7.4	3	4.4	0.794	0.672
Mean ±SD	30.6 ±3.4		30.7 ±3.1		0.106	0.915
Education level						
Read and write	6	8.8	6	8.8		
Basic	24	35.3	22	32.4		
Secondary	28	41.2	30	44.1		
Higher	10	14.7	10	14.7	0.156	0.984
Occupation						
Employed	33	48.5	28	41.2		
Housewife	35	51.5	40	58.8	0.743	0.389
Residence						
Urban	30	44.1	27	39.7		
Rural	38	55.9	41	60.3	0.272	0.602
Menstrual regularity						
Regular	28	41.2	27	39.7		
Irregular	40	58.8	41	60.3	0.031	0.861
Duration of marriage (years)						
1-5	4	5.9	11	16.2		
6-10	24	35.3	25	36.8		
More than 10	40	58.8	32	47.1	4.176	0.124
Previous pregnancy history						
No	31	45.6	26	38.2		
Yes	37	54.4	42	61.8	0.755	0.385

	Intervention group		Control group		Chi-square/Fischer exact test	
	N	%	N	%	X ²	P
Period of infertility (years)						
1-3	5	7.4	7	10.3		
4-6	33	48.5	38	55.9		
7-10	30	44.1	23	33.8	1.610	0.447
Cause of infertility						
Male	7	10.3	9	13.2		
Female	50	73.5	47	69.1		
Combined	4	5.9	7	10.3		
Unknown	7	10.3	5	7.4	1.494	0.684
Hope of pregnancy occurrence after IVF						
To a large degree	55	80.9	54	79.4		
To a small degree	13	19.1	14	20.6	0.046	0.830

Table (2): Comparison of problem-focused ways of coping between intervention and control group

	Intervention group	Control group	Mean difference	Student's T-test	
	Mean \pm SD	Mean \pm SD	(95% CI)	T	P
Planful problem-solving					
Pre-intervention	5.2 \pm 0.9	5.4 \pm 1.1	0.20 (0.54 to 0.14)	1.160	0.248
Post-intervention	6.5 \pm 1.9	5.6 \pm 2.0	0.90 (0.24 to 1.56)	2.690	0.008
1-month follow-up	7.2 \pm 4.4	5.0 \pm 1.2	2.20 (1.11 to 3.29)	3.978	<0.001
2-month follow-up	6.0 \pm 0.9	5.3 \pm 1.9	0.70 (0.19 to 1.20)	2.747	0.007
Seeking social support					
Pre-intervention	7.2 \pm 0.9	7.1 \pm 0.9	0.10 (0.21 to 0.41)	0.648	0.5182
Post-intervention	10.4 \pm 0.9	7.6 \pm 1.5	2.80 (2.38 to 3.22)	13.199	<0.001
1-month follow-up	8.5 \pm 1.9	7.3 \pm 1.8	1.20 (0.57 to 1.83)	3.781	<0.001
2-month follow-up	8.9 \pm 1.7	7.5 \pm 1.5	1.40 (0.86 to 1.94)	5.092	<0.001
Accepting responsibility					
Pre-intervention	6.5 \pm 0.9	6.4 \pm 1.0	0.10 (0.22 to 0.42)	0.613	0.5410
Post-intervention	5.4 \pm 1.0	6.6 \pm 0.9	1.20 (1.52 to 0.88)	7.355	<0.001
1-month follow-up	5.2 \pm 1.2	7.4 \pm 1.9	2.20 (2.74 to 1.66)	8.073	<0.001
2-month follow-up	5.7 \pm 1.6	7.1 \pm 1.9	1.40 (1.99 to 0.80)	4.648	<0.001
Positive reappraisal					
Pre-intervention	11.4 \pm 1.1	11.6 \pm 1.4	0.20 (0.63 to 0.22)	0.926	0.3560
Post-intervention	14.5 \pm 1.2	11.9 \pm 1.7	2.60 (2.10 to 3.10)	10.303	<0.001
1-month follow-up	13.1 \pm 2.8	11.6 \pm 1.7	1.50 (0.71 to 2.29)	3.776	<0.001
2-month follow-up	13.9 \pm 2.9	11.8 \pm 1.6	2.10 (1.31 to 2.89)	5.228	<0.001

Table (3): Comparison of emotion-focused ways of coping between intervention and control group

	Intervention group	Control group	Mean difference	Student's T-test	
	Mean \pm SD	Mean \pm SD	(95% CI)	T	P
Confrontive coping					
Pre-intervention	3.7 \pm 0.6	3.6 \pm 0.7	0.10 (0.12 to 0.32)	0.894	0.373
Post-intervention	3.3 \pm 0.9	3.7 \pm 1.1	0.40 (0.741 to 0.059)	2.321	0.022
1-month follow-up	3.5 \pm 1.3	4.4 \pm 0.9	0.90 (1.28 to 0.52)	4.693	<0.001
2-month follow-up	3.4 \pm 1.4	4.1 \pm 0.9	0.70 (1.10 to 0.30)	3.468	<0.001
Self-controlling					
Pre-intervention	5.8 \pm 0.8	5.9 \pm 0.8	0.10 (0.37 to 0.17)	0.729	0.467
Post-intervention	7.4 \pm 1.9	6.1 \pm 2.7	1.30 (0.51 to 2.09)	3.247	0.002
1-month follow-up	7.9 \pm 1.0	5.5 \pm 1.2	2.40 (2.03 to 2.78)	12.670	<0.001
2-month follow-up	7.8 \pm 1.8	5.3 \pm 1.5	2.50 (1.94 to 3.06)	8.799	<0.001

	Intervention group	Control group	Mean difference (95% CI)	Student's T-test	
	Mean ±SD	Mean ±SD		T	P
Distancing					
Pre-intervention	2.8 ±0.7	2.9 ±0.7	0.10 (0.34 to 0.14)	0.833	0.406
Post-intervention	4.6 ±3.7	3.1 ±2.6	1.50 (0.42 to 2.59)	2.735	0.007
1-month follow-up	4.4 ±0.9	2.7 ±0.9	1.70 (1.40 to 2.01)	11.014	<0.001
2-month follow-up	4.7 ±1.0	2.5 ±0.6	2.20 (1.92 to 2.48)	15.556	<0.001
Escape-Avoidance					
Pre-intervention	6.8 ±0.8	6.9 ±0.8	0.10 (0.37 to 0.17)	0.729	0.467
Post-intervention	5.8 ±0.6	7.2 ±1.0	1.40 (1.68 to 1.12)	9.899	<0.001
1-month follow-up	6.0 ±1.2	6.7 ±0.8	0.70 (1.05 to 0.35)	4.002	<0.001
2-month follow-up	6.1 ±0.9	6.9 ±0.7	0.80 (1.07 to 0.53)	5.786	<0.001

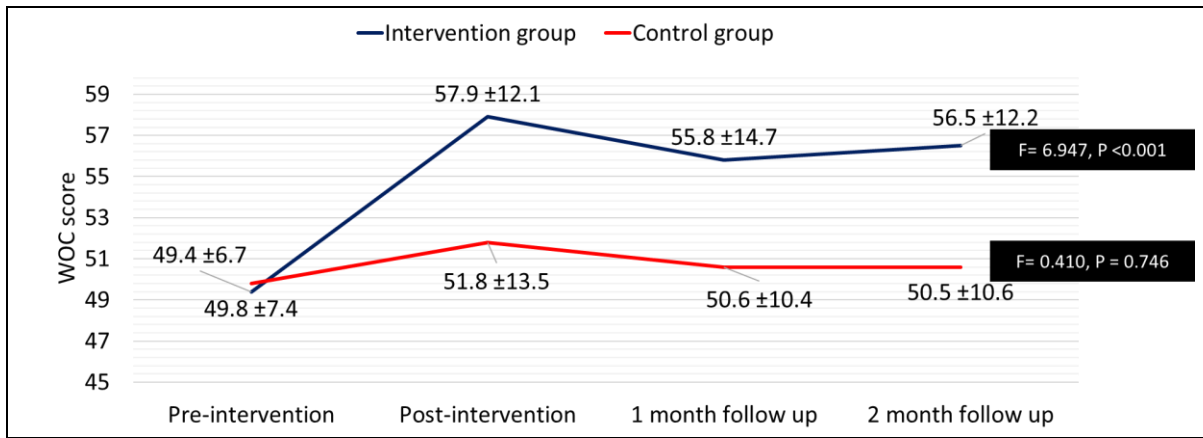


Figure (2): Comparison of the WOC score along the study period in both groups

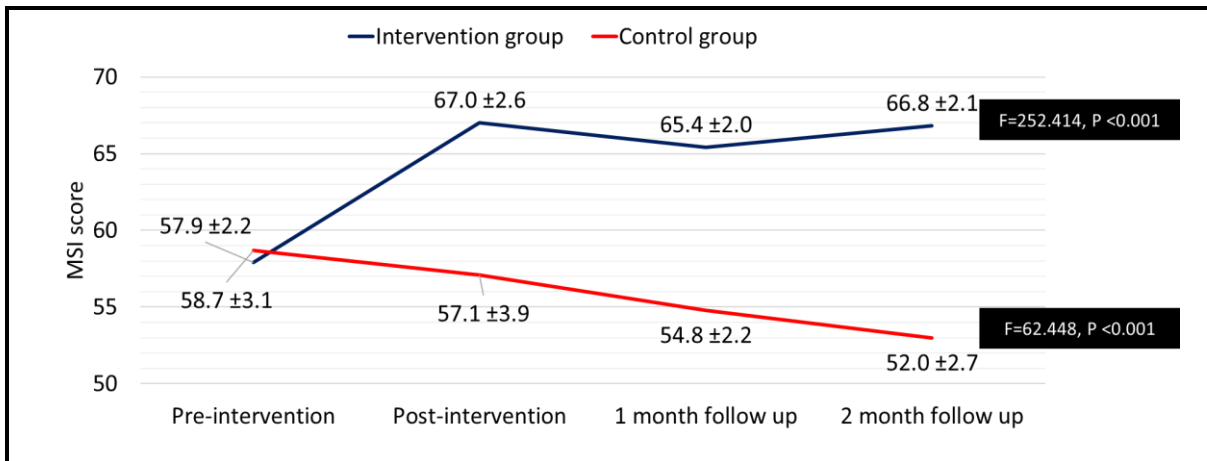


Figure (3): Comparison of the MSI score along the study period in both groups

Table (4): Correlation between WOC and MSI in the intervention and control group

	Intervention group		Control group	
	r	P	r	p
Pre-intervention	0.083	0.499	0.052	0.673
Post-intervention	0.358	0.003*	0.017	0.891
1-Month follow-up	0.290	0.017*	0.020	0.872
2-Month follow-up	0.270	0.026*	0.055	0.659

Table (1): Shows the sociodemographic characteristics and gynecological history of the studied women; half of the women (50.0 % and 55.9 %) aged group of 30-35 years with mean \pm SD 30.6 \pm 3.4 and 30.7 \pm 3.1 in the intervention and control groups respectively. Less than half of them in both groups had secondary education. More than half of them were housewives and from rural residences in both groups. As regards the gynecological history, 58.8% and 47.1% of women in the intervention and control groups respectively had more than 10 years duration of marriage. As shown, the most common cause of infertility was the female cause (73.5% and 69.1%) in intervention and control groups respectively. The majority of women in both groups had a large degree of hope to achieve pregnancy after IVF. There was no statistically significant difference between both groups ($p>0.05$).

Table (2): Represents a comparison of domains of problem-focused ways of coping between both groups. There was no significant difference regarding domains of problem-focused ways of coping before intervention. While after the intervention, there was a significant difference between both groups in the domains: planful problem solving, seeking social support, accepting responsibility, and positive reappraisal (where mean \pm SD in the intervention group 6.5 \pm 1.9, 10.4 \pm 0.9, 5.4 \pm 1.0, 14.5 \pm 1.2 compared to 5.6 \pm 2.0, 7.6 \pm 1.5, 6.6 \pm 0.9, 11.9 \pm 1.7 in the control group respectively). At 1-month and 2-month follow-ups, there were significant differences in all domains between both groups ($p<0.001$).

Table (3): Depicts that there was no significant difference between the two groups regarding emotion-focused ways of copying before intervention. While after the intervention, there was a significant difference between both groups in the following domains: confrontive coping, self-controlling, distancing, and escape/avoidance (where mean \pm SD in the intervention group 3.3 \pm 0.9, 7.4 \pm 1.9, 4.6 \pm 3.7, 5.8 \pm 0.6 compared to 3.7 \pm 1.1, 6.1 \pm 2.7, 3.1 \pm 2.6, 7.2 \pm 1.0 in the control group respectively). At 1-month and 2-month follow-ups, there were significant differences in all domains between both groups ($p<0.001$).

Figure (2): Describes that the mean score of ways of coping pre-intervention didn't differ significantly between the two groups. Post-intervention, there was a highly statistically significant difference among both groups ($p<0.001$) where it was 57.9 \pm 12.1 in the intervention group in comparison to 51.8 \pm 13.5 in the control group. Also, it was 55.8 \pm 14.7 and 56.5 \pm 12.2 in the intervention group compared to 50.5 \pm 10.6 and 50.6 \pm 10.4 in the control group at 1-month and 2-month follow-ups. This difference was also statistically significant ($p<0.001$).

Based on the results displayed in **Figure (3)**, there was no significant difference between the mean score of marital satisfaction pre-intervention among the two groups while post-intervention, it differs highly significantly among them ($p<0.001$). It was 67.0 \pm 2.6 in the intervention group compared to 57.1 \pm 3.9 in the control group. Moreover, it was 65.4 \pm 2.0 and 66.8 \pm 2.1 in the intervention group compared to 54.8 \pm 2.2 and 52.0 \pm 2.7 in the control group at 1-month and 2-month follow-ups respectively. This difference was also highly statistically significant ($p<0.001$).

According to **Table (4)**. The ways of coping in the intervention group were correlated significantly and positively with the marital satisfaction post-intervention, at 1-month, and 2-month follow-ups ($r=0.358, 0.290, \text{ and } 0.270$ respectively, $p<0.05$).

Discussion

The present study aimed to investigate the effect of collaborative infertility counseling on coping strategies and marital satisfaction among women undergoing In Vitro Fertilization. The study findings showed that collaborative infertility counseling improved coping strategies and marital satisfaction of women undergoing IVF. So, the research hypotheses were confirmed.

This result agrees with **Hamzehgardeshi et al. (2019)** who identified the effect of counseling programs on the perceived stress of women undergoing assisted reproductive technology and reported that group counseling is effective to reduce women's stress. In the same line, **Ibrahim, Hagrasy, Ali, & Elagamy, (2020)** revealed statistically significant differences and reductions in stress levels of infertile women after the intervention compared to before. Furthermore, **Shokhmgar, Rajaei, Beyazi, and Teimour, (2020)** determined the effect of cognitive-behavioral group therapy on marital satisfaction in infertile women applying for IVF and concluded that the group training improved women's marital satisfaction.

Another study reported that collaborative infertility counseling increased marital satisfaction in females undergoing in vitro fertilization (**Roudsari & Bidgoli, 2017**). The improvement in the present study may be due to the beneficial effect of the counseling which offered women support at a critical time and helped them to understand the implications of treatment. The researcher in a non-judgmental way allowed women to freely ask questions and clearly express their feelings in a confidential environment.

Concerning problem-focused ways of coping, there was a significant difference between both groups after intervention in all domains: planful problem-solving, seeking social support, accepting responsibility, and

positive reappraisal. In the same line, a Canadian study was conducted by **Arpin, Brassard, El Amiri, & Péloquin, (2019)** to test the efficacy of a novel group intervention on 29 couples seeking fertility treatment reported that women after the intervention practiced a higher degree of seeking social support. Additionally, **Bidgoli & Roudsari, (2018)** found a significant increase in planful problem-solving and seeking social support in the intervention group.

The difference in the present study might be due to women seeking social support to get a sense of connection and informational support. It is known that social support increases psychological well-being through the provision of stability. Planful problem-solving was used by women in the intervention group post-intervention and at follow-up. This might be attributed to the women trying to analytically solve the problem and alter the situation. They also used positive reappraisal to find a positive meaning in their negative experiences. Actually, viewing the stressful event as more positive is useful for successful adaptation. In addition, the women start to pray and close to God to ask for help. Indeed, practicing positive reappraisal is associated with improved mental health and reduced distress because of its religious dimension.

As shown in the present study, there was a decrease in accepting responsibility in the intervention group. This result is similar to the finding of **Bidgoli & Roudsari, (2018)** who reported that the counseling model reduced self-criticism in the intervention group. This finding disagrees with **Arpin, Brassard, El Amiri, & Péloquin, (2019)** who showed that women practiced more accepting responsibility after the intervention. The finding in the present study may be because the women believed that stopping accusing themselves of the problem will prevent or decrease the feeling of shame. In fact, having underlying emotions such as self-blame, shame, and low self-esteem weakens the sense of security and decreases optimistic thoughts.

Regarding emotion-focused ways of coping, there was a significant difference between both groups after intervention in domains of confrontive coping, self-control, distancing, and escape/avoidance. This may be supported by the emotion-focused ways of coping may reduce stress outcomes in medical stressful events. After intervention and at follow-up, the women used distancing probably to take time to react and control the situation. As well, they used self-controlling to manage stress by regulating their personal feelings and emotions. There was a significant decrease in domains of escape/avoidance and confrontive coping in the intervention group post-intervention and at follow-up. Along the same line, **Bidgoli & Roudsari, (2018)** concluded a

statistically significant decline in the use of escape/avoidance and confrontive coping after the intervention. The finding in the present study may be attributed to the women trying to deal with the stress rather than avoiding it. They also may refrain from aggressive efforts and risk-taking because they don't want to grow the problem that causes stress and creates conflicts in their relationships.

The present study revealed a highly statistically significant difference between both groups in ways of coping scores after the intervention and at follow-up evaluation. In the same context, quasi-experimental research carried out by **Abdelgelel et al. (2020)** evaluated the effect of nursing guidelines on coping of infertile couples' undergoing IVF and showed a highly statistically significant improvement in women's positive coping after the intervention. This finding was consistent with **Heredia, Padilla, Castilla, & Garcia-Retamero, (2020)** in a randomized control trial study that provided psychological, coping skills, and relaxation training. They reported that women who received the intervention experienced lower levels of emotional imbalance. They concluded that the psychological intervention based on stress management before IVF can promote the psychological adjustment of women.

As reported by **Monirian, Khodakarami, Tapak, Kimiaei Asadi, & Aghababaei, (2022)**, there were statistically significant differences before and after the intervention; the mean infertility stress scores decreased, the mean scores of coping increased, and compliance for infertility treatments increased after the intervention. The finding in the present study may be attributed to the offered counseling as the support provided women with a trusted source of information and coping strategies building. Moreover, Jacobson's exercise which was practiced in the counseling was beneficial in managing the physical effects of stress and achieving a state of relaxation. Furthermore, the present study showed a significant difference between the intervention and the control group in marital satisfaction scores after the intervention and at follow-up evaluation. This result was confirmed by **Hosseinpour, Masoumi, Kazemi, Soltani, & Ahmadpanah, (2022)** who reported that the mean marital intimacy scores were significantly higher in the intervention group post-intervention which help women to cope with relationship problems and consequently satisfied with marriage.

Similarly, **Poorheidari, Ganji, Hasani-Moghadam, Azizi, & Alijani, (2021)** applied a relationship enrichment program in the Imam Khomeini Hospital of Sari City in the north of Iran and reported that the program was effective in improving marital satisfaction among infertile couples. **Erdemoğlu, & Aksoy Derya, (2022)** conducted a randomized

controlled trial assessed the effect of hypofertility on stress and coping in women undergoing IVF and reported that the intervention group had lower levels of infertility stress and higher levels of effective coping strategies compared to the control group.

In addition, **Arpin et al. (2019)** concluded an improvement in marital benefits and fertility-related quality of life after the intervention. In another study, a significant increase in marital intimacy and marital satisfaction of infertile couples after a marital enrichment program was reported (**Masoumi et al., 2017**). This finding is contrary to what was reported by **Ying, Wu, Wu, Shu, & Loke, (2018)**; the coping enhancement program had no significant effects on marital satisfaction and marital adjustment of the infertile couples. The result of the present study might be due to the positive effect of collaborative counseling on improving marital satisfaction through building marital relationship skills and marital intimacy.

The present study showed that the ways of coping were correlated significantly and positively with marital satisfaction in the intervention group post-intervention and at follow-up evaluation. This finding is similar to that of **Koleshtajani, Zabihi, & Yekta, (2022)** which reported that the intervention significantly improved the sexual satisfaction and marital intimacy of infertile women. An empirical study conducted in Pakistan by **Rahman, (2019)** assessed the impact of coping mechanism on the marital quality of dual-career couples and revealed that overall coping mechanism is significantly and positively associated with marital satisfaction. The finding in the present study is expected because marital satisfaction is affected by women coping with difficult situations. Women who cope more effectively experience greater marital satisfaction.

Limitation of the study

There was a certain limitation that faced the researcher during this study. Culture media that have been used during the IVF procedure was not available during the initial period of the data collection. To overcome this limitation, the researcher extended the data collection period as soon as the media was available to be able to collect the required sample size.

Conclusion

This study concluded that collaborative group counseling is an effective method to improve coping strategies and marital satisfaction among women undergoing In Vitro Fertilization. As there was a highly statistically significant difference in ways of coping and marital satisfaction scores between the intervention and control group post-intervention. Moreover, ways of coping were correlated

significantly and positively with marital satisfaction in the intervention group post-intervention and during the follow-up evaluation.

Recommendations:

This study recommended the following:

1. Providing collaborative counseling should be an integral part of nursing care for women undergoing IVF to foster positive adaptation and increase marital satisfaction.
2. Safeguarding women's psychological well-being during the IVF cycle is crucial to improve treatment outcome.
3. Encouraging infertile women to practice Jacobson exercise during the IVF process to decrease infertility-related stress and create a sense of relaxation.
4. Including both husbands and families in the counseling process because their support is important in coping with infertility.

Further studies are recommended to:

- Assess effectiveness of group counseling provided by healthcare professionals for infertile women receiving different infertility treatments.
- Assess effect of psycho-cognitive therapy for women undergoing infertility treatment on pregnancy outcome.

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Conflicts of interest

The researchers declare no conflict of interest.

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