Effect of Nurse-Led Instructional Protocol on Practices and Pregnancy Rate of Women during Waiting Period after Embryo Transfer

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Abstract

Background: It's time to wait two weeks once the embryo transfer is finished. Most IVF patients dread this period of time. They saw the doctor almost daily up until this point. They will now need to wait 10–14 days before they are able to take a pregnancy test. It's critical that patients minimize stress and resume their regular life as much as possible during the two-week wait. **Aim**: to determine the effect of nurse-led instructional protocol on practices and pregnancy rate of women during waiting period after embryo transfer. **Methods**: Research design: quasi experimental design was used to carry out the study. **Setting**: Private infertility center (El-Nada center), Menoufia governorate. **Sample**: nonprobability convenient sampling of 88 women were recruited for this study. **Instruments**: three instruments were used for data collection a) structured interviewing questionnaire schedule b) Knowledge assessment questionnaire c) Practice assessment questionnaire. **Results**: According to this study, there was a substantial difference between the groups' post-intervention pregnancy rates, women's knowledge levels, and certain healthy practices. **Conclusion**: Implementation of nurse-led instructional protocol was efficient in enhancing knowledge, practices, and pregnancy outcomes among women during waiting period after embryo transfer. **Recommendations**: Infertile women should be adequately informed about the waiting period following embryo transfer, and the use of such a nurse-led instructional strategy should be mandated to improve assisted reproductive technology (ART) outcomes.

Keywords: Nurse-led Instructional Protocol, Practices, Pregnancy Rate, Assisted Reproductive Technology, Waiting Period, and Embryo Transfer.

Introduction

The failure to conceive after a year of consistent, unprotected sexual activity without use of contraceptives is known as infertility **(WHO, 2019)**. Its prevalence is rising due to factors like delayed childbearing and increasing male infertility issues **(Tannus and Dahan, 2019)**. Studies suggest that around 7-9% of couples in their reproductive years struggle to conceive despite consistent attempts **(Kremer et al., 2023)**. Infertility can be a significant burden for couples, often requiring medical interventions for diagnosis and treatment. However, many couples can successfully utilize assisted reproductive technologies (ART) to overcome infertility and achieve their dream of starting a family (**Praba et al., 2022)**.

ART involves manipulating eggs, sperms, or embryos in a laboratory setting, and may include procedures like in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), and freezing of eggs or embryos. ART also involves the utilization of fertility drugs and extensive support services, including counseling **(Newman et al., 2022)**. Couples undergoing ART may experience significant stress and require effectively deal

with their emotional, mental, and behavioral responds to diagnosis and management of infertility **(Hamzehgardeshi, 2022)**.

"Infertility treatments can be a challenging and stressful process. Patients often face daily injections, frequent blood tests, hormone fluctuations, invasive procedures like laparoscopic surgery, anxious waits for test results, and significant financial burdens **(Wischmann et al., 2019)**. The success of these treatments, particularly ICSI, is typically evaluated by achieving a clinical pregnancy or a live birth **(Woodland E, Carroll M, 2022).**

Patient-centered care in ART increasingly emphasizes the importance of nurses' humanistic skills and the ability to understand patients' narratives. By carefully assessing patients' needs and concerns, nurses can identify key areas for intervention and provide more effective care. This patient-centered approach leads to improved quality of life and reduced stress for infertile couples **(Mo et al., 2024)**. Research indicates that mental, emotional, and care-related factors are significant challenges for infertile patients. Nurses are well-positioned to address these challenges by providing mental and emotional support alongside physical care **(Hasanbeigi et al., 2017).**

Nurse practitioners play a crucial role in supporting patients with emotional and psychological difficulties. They can offer counselling, coping mechanisms, and couple-based therapies. This highlights the importance of ongoing treatment and careful monitoring both before and after specialist referrals. In a primary care setting, nurse practitioners make ensuring that patients receive timely follow-up and continuous contact. This addresses a common barrier identified in the literature – difficulty accessing specialist care **(Thable et al., 2020).**

Assisted reproductive nurses play a critical role in ART success. Their expertise and compassionate support significantly impact patient outcomes and overall wellbeing, contributing to both successful treatments and the holistic health of patients undergoing these procedures **(Mo et al., 2024)**

Significance of the Study

Being childless is frequently viewed as a crisis in life, with an emotional cost comparable to that of a catastrophic experience. According to research, those who are having trouble becoming pregnant are more likely to suffer from mental health issues like anxiety and sadness. Studies have shown a correlation between high levels of stress and anxiety and lower success rates in assisted reproductive technologies (ART). This emphasizes the crucial role of stress management and emotional support in improving the chances of pregnancy for individuals undergoing infertility treatment **(Abdolahi et al., 2019; Rasoulzadeh Bidgoli et al., 2020).**

A major global health issue that affects millions of couples worldwide is infertility, with roughly one in six struggling to conceive. This issue disproportionately impacts developing countries. In Egypt, a study by the Egyptian Fertility Association found that 12% of couples face infertility, with 4.3% experiencing primary infertility (never having conceived) and 7.7% experiencing secondary infertility (previously having conceived but now unable) **(El-Sherif et al., 2021)**.

A significant number of couples facing infertility turn to assisted reproductive technologies (ART) for treatment. However, many infertile women referred to fertility clinics lack a clear understanding of these procedures. This often leads to unanswered questions and a sense of uncertainty about

their treatment journey **(Dumbala et al., 2020).**

According to a study by **Rich and Domar (2016)**, psychological interventions can significantly increase pregnancy rates in infertile women. Their research demonstrated that women who received such interventions were twice as likely to conceive compared to those in a control group. A quick, sympathetic phone contact from a doctor during the waiting period for medical results significantly lessened patient worry and suffering. Since these calls often lasted only 5 minutes, it would be possible to deploy this intervention in clinical practice, which might greatly enhance the waiting period experience for patients **(Shah et al., 2022)**.

This study provides valuable support to women undergoing fertility treatment. Researchers will conduct two home visits: the first between the fifth and seventh day after embryo transfer, and the second on the 15th day, coinciding with the pregnancy test. This frequent contact offers significant support and may be highly beneficial for the women participating in the study.

Definition of variables

Waiting period after embryo transfer refers to the interval between the embryo transfer process and the pregnancy test, typically lasting around 14 to 15 days. During this period, the fertilized embryo is expected to implant itself into the uterine lining and begin developing. It is often considered an emotionally sensitive phase, as individuals or couples await confirmation of a successful pregnancy. During this time, adherence to healthy lifestyle practices—such as avoiding strenuous activities, managing stress, following medical advice, and seeking emotional and social support—is crucial for optimizing implantation success and overall well-being.

Aim of the Study

The study aimed to determine the effect of nurse-led instructional protocol on practices and pregnancy rate of women during waiting period after embryo transfer.

Research Hypotheses

H1: Women who receive the nurse-led instructional protocol are expected to have a higher level of knowledge about the waiting period after embryo transfer compared to those in the control group.

H2: Women who follow the nurse-led instructional protocol are anticipated to demonstrate better practices during the waiting period after embryo transfer compared to the control group.

H3. Women who undergo the nurse-led instructional protocol are expected to achieve a higher pregnancy rate compared to those in the control group.

Subjects and Methods

Research Design:

The current study was carried out using quasi-experimental methodology.

Settings:

The current study was carried out at El Nada IVF center in Shebin El Koom, Menoufia Governorate. El Nada center is considered one of the most important centers in Shebin El Koom, also is one of the most famous centers in Egypt. It is not only an important center for all IVF/ICSI procedure steps and preimplantation genetic testing but also contains all obstetric needs. The researcher chose this center because the University Hospital & Shebin El Koom Teaching Hospital had no department /or unit for IVF/ICSI. It has high flow and success rate.

Sampling:

Sample: 88 women were selected by nonprobability convenient sampling method.

Sample size calculation:

The sample size was calculated based on data from literature ***(Abd-Elhamed et al., 2019)***, considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula:

$$n = \frac{2(Z\alpha/2 + Z\beta)^2 \times p\,(1-p)}{(d)^2}$$

where, p = pooled proportion obtained from previous study; d = expected difference in proportion of events; $Z_{\alpha/2}$ =1.96 (for 5% level of significance) and Z_{β} = 0.84 (for 80% power of study). Therefore,

$$n = \frac{2(1.96 + 0.84)^2 \times 0.524\,(1-0.524)}{(0.30)^2} = 43.5.$$

Accordingly, 44 woman per group are needed for the sample.

Inclusion Criteria:

- Women who are available during the period of data collection
- Women undergoing IVF or ICSI for the first time or multiple attempts.
- Women who agree to be included in the study.

Exclusion Criteria:

- Women who performed intrauterine insemination

Data Collection Tools: All tools were developed by researchers after reviewing literature.

Tool I. Structured Interviewing Questionnaire

This tool was employed to assess A) socio demographic characteristics such as age, education, residence, occupation, income B) BMI C) obstetric history D) present history E) Common symptoms after few days of embryo transfer F) pregnancy test after 15 days of embryo transfer.

Tool II. Knowledge Assessment Questionnaire regarding Infertility.

Part I evaluates women's knowledge about infertility. It included questions about: definition, causes, and types of infertility, investigations for diagnosis, and management of infertility, Embryo transfer, and Waiting period after embryo transfer.

Women responses were measured by giving a score of (2) for the complete correct response and (1) for the incomplete correct response, and (zero) for incorrect response. Knowledge scoring was categorized into three levels as the following: Poor knowledge < 50% (scored from 0-4)- Fair (average) knowledge 5075% (scored from 5-7)- Good knowledge > 75% (scored from 8-10).

Part II assesses awareness about healthy practices during waiting period such as use of healthy distractions, use of drugs, activity level, taking Shower, use of social support, diet, and management of stress.

The scoring system for assessing awareness about healthy practices during the waiting period involves scoring each item based on the participant's level of awareness: "fully aware" scores (3) points, "partially aware" scores (2) points, and "not aware" scores (1) point. The items include healthy distractions, medication adherence, activity level, personal hygiene (e.g., taking regular showers), use of social support, diet, and stress management. The total possible score depends on the number of items, with a maximum score of 3 points per item. Scores can be interpreted as follows: 18– 21 points indicate high awareness, 14–17 points indicate moderate awareness, and 13 points or below indicates low awareness. This system provides a structured way to measure participants' understanding and engagement with healthy practices during the waiting period.

Tool III. Practice Assessment Questionnaire. It included 12 questions

regarding actual usage or practice during waiting period after embryo transfer: healthy distractions, compliance with medications – feeling motivated to take medications, moderate activity, having regular shower, using shampoo or deodorants, assuming supine position most of times, conducting social relations for support, eating healthy balanced diet, drinking coffee or tea, feeling stress and anxious, nature of the relationship with the husband after embryo transfer, searching for information on internet, seeking spiritual support with prayer.

The practice assessment questionnaire is scored by categorizing responses as either satisfactory or unsatisfactory. Each item is scored as 1 point for satisfactory practice (responses of "all the time" or "sometimes") and 0 points for unsatisfactory practice (responses of "never"). The questionnaire covers 13 items, including healthy distractions, medication adherence, physical activity, personal hygiene (baths, showers, use of shampoo), supine position, social support, diet, coffee or tea consumption, stress management, relationship with husband, internet use for health information, and spiritual support. The total possible score is 13 points, with scores of 9 or more indicating satisfactory practice (≥70% of the maximum score) and scores below 9 indicating unsatisfactory practice. This system provides a simple method to assess adherence to healthy practices after embryo transfer and highlights areas requiring improvement.

Validity and Reliability:

The Tools (I-III) were reviewed and their content validity evaluated by five obstetric and maternity nursing specialists. Relevance and completeness were taken into consideration when making the changes. Test-retest reliability was used. Using Cronbach's alpha coefficients, the tools' internal consistency was assessed. Cronbach's alpha for Study Tools showed that it was dependable at 0.861 for Tool I, 0.902 for Tool II, and 0.897 for Tool III. Cronbach (1951) stated that scores of 0.70 or higher were deemed satisfactory.

Ethical Considerations:

On June 21, 2023, ethical permission was received from Menoufia University's Faculty of Nursing's Scientific Ethical Committee. Each lady received an explanation of the study's purpose and provided their informed consent to take part. Confidentiality of personal information and women's privacy were completely guaranteed. Before volunteering to take part in the trial, each woman received a brief explanation of the intervention and was made aware that they might leave the study whenever. There was no need for an invasive operation.

Pilot Study:

A pilot study was carried out to determine the feasibility of the study, assess the tools' applicability, and gauge the amount of time required for data collecting. Ten women, or 10% of the entire sample, participated in the study. The researcher changed some of the questions based on the findings of the pilot study. Therefore, the women selected for the pilot study were excluded from the study sample.

Maneuvers of Intervention

Preparation, assessment and interviewing, planning, implementation, and evaluation were the five successive phases that made up the current study. The fieldwork was conducted over a sixmonth period, from the beginning of December 2023 to the end of June 2024. **The Preparatory phase:** The study design and tools of data collection were created based on an analysis of recent and historical local and international related literature by using magazines, books, periodicals, journals and computer search.

Assessment and interviewing phase: Both the study and control groups are assessed and interviewed at this phase. In order to collect baseline data, this phase involved interviewing the women who satisfied the inclusion criteria in a private, comfortable room within the medical unit. To guarantee that the chosen interventions were followed, the researcher met each woman, introduced herself, and explained the goal of the study, and also the times and duration of the sessions, to all of the chosen women.

Following oral consent, each woman was interviewed one-on-one utilizing a faceto-face interviewing technique. A knowledge assessment questionnaire was used to provide a pretest to those women and assist them in completing out structured interviewing questionnaires. The researchers recorded the answers to the questions, which were posed in Arabic.

Three to four women were questioned each week. Depending on the women's responses, filling out the sheets took an average of 25 to 30 minutes. Every lady was given the certainty that any information they provided would be preserved private and used only to further the study's objectives.

Planning phase: Based on pre-test evaluation results, nurse-led instructional protocol was prepared.

The instructions covered **A)** definition, causes, and types of infertility, investigations for diagnosis, Management of infertility, Embryo transfer, and Waiting period after embryo transfer. **B)** Healthy Practices during waiting period, including engaging in healthy distractions, proper use of prescribed drugs and vitamins, assuming moderate activity, regular shower and personal hygiene, social support from religious person or any loved person, eating healthy balanced diet, management of stress using muscle relaxation and laughter therapy. The study group with receive implementation phase but the control group will not.

Implementation phase:

The nurse-led instructional procedure sessions were carried out by the researchers at the El-Nada center in the Menoufia governorate. Three days a week, from 9:00 am to 2:00 pm, the researchers were in the aforementioned location. The researchers conducted two counseling sessions. A variety of instructional techniques, including interactive lectures, discussions, and demonstrations, were employed to meet the goals of each session. A PowerPoint presentation served as a visual aid to assist make the information being delivered more understandable. Each session ended with the distribution of Arabic pamphlets that included a synopsis of the material covered in the session along with colorful illustrations.

First session of the instructional protocol was conducted at the IVF center and focused on giving information about; definition, causes, and types of infertility, investigations for diagnosis, management of infertility, Embryo transfer, and waiting period after embryo transfer.

Second session of the instructional protocol was conducted at the IVF center and focused on teaching women healthy practices during waiting period such as using healthy distractions, proper use of prescribed drugs and vitamins, assuming moderate activity, regular shower and personal hygiene, Social support from religious person or any loved person, eating healthy balanced diet, management of stress using muscle relaxation and laughter therapy.

Evaluation phase: is conducted for both study and control group**.** It is divided to two sessions**.**

The third session at home on day 5-7 after embryo transfer. The researchers used tool I (Part E) to assess symptoms women

suffer during that time, and tool II, and tool III to assess the impact of intervention on women's knowledge, and practices.

The fourth session was conducted at home during the day of pregnancy test using tool I (part F) to assess the outcome of pregnancy test.

Statistical Analysis

All statistical analyses were performed using SPSS for Windows 20.0 (SPSS, Chicago, IL). Continuous data with a normal distribution was expressed as mean ± SD. Categorical data were represented using numbers and percentages. To compare variables using categorical data, the chi-square test (or Fisher's exact test, if applicable) was used. The reliability (internal consistency) test was performed on the questionnaires used in the study. Statistical significance was defined as $p < 0.05$.

Results

Table 1 displays the sociodemographic characteristics of the studied groups. It shows that the majority of the studied groups' age being under 35 years old, were secondary educated, housewives with insufficient income, had average body weight and rural residents with no difference between the studied groups.

Table 2 represents obstetric and infertility history among the studied groups. Regarding type and duration of infertility, most of the groups under study had primary infertility for a period ranging from (1-5 years). As for number of living children and gravidity, the majority of the studied groups were nulligravida and had no children. In terms of the reason for infertility there was no statically significance difference among the studied groups and nearly half of them had female causes of infertility.

Table 3 shows present history of assisted reproductive technology among the studied groups. As shown, the majority of the studied groups were undergoing IVF process and had one embryo transferred on the 5th day and exposed to the second time for assisted reproductive technology.

Table 4 presents common symptoms after a few days of embryo transfer among the studied groups. The table revealed that cramping or pelvic pain is the most symptom experienced among the studied groups followed by light bleeding and breast tenderness. Also, there are statistically significance differences between the experimental and control group regarding feeling of fatigue, tiredness and nausea (P-value 0. 001 -0. 047) respectively.

Table 5 represents comparison between women's knowledge regarding infertility and waiting period after embryo transfer on pre and post intervention. As shown, there are improvements in all determinants of women's knowledge regarding infertility and waiting period post intervention between the experimental and control group ($p< 0.001$). As indicated, there are statistically significance differences among the studied groups post intervention regarding total knowledge level compared to pre intervention about (<0.001 Vs 0.634) respectively as presented in **Fig. (1).**

Table 6 displays comparison of awareness about healthy practices during waiting period among the studied groups pre the intervention. The table revealed no statistically significant differences between the experimental and control group regarding awareness about healthy practices during waiting period pre the intervention.

Table 7 shows comparison of healthy practices level during waiting period among the studied groups after the intervention. As indicated, there are statistically significance differences among the studied groups post intervention regarding compliance with medications, taking hot baths and shower, remaining in supine position most of times

and taking a healthy diet. While The table revealed highly statistically significant differences between the experimental and control group regarding drinking of coffee or tea , feeling of stress and being anxious post intervention ($p< 0.001$).

Figure 2 reveals comparison of total healthy practices level during waiting period among the studied groups post the intervention. It was obvious that there was a statistically significant difference in total healthy practices level during the waiting period among the studied groups post the intervention. ($P = 0.031$), indicating that the nursing instructional protocol was an effective method to improve women's practices during waiting period after embryo transfer.

Figure 3 displays comparison of pregnancy test results among the studied groups post the intervention. It was obvious that nearly two third (65.9%) of the experimental group had a positive pregnancy test compared to approximately over one third (40.9%) of the control group. So, there was a statistically significant difference of pregnancy test results between the experimental and control group ($P = 0.019$) indicating that the nursing instructional protocol improved women's practices during waiting period and potentially leading to better pregnancy outcomes.

Table 1: Sociodemographic Characteristics and BMI of the Studied Groups (N=88).

Variables	Experimental group (n=44)		Control group (n=44)		Chi – Square / Fisher's Exact Test	
	n	%	n	%	X_2	P
Age (Years)						
<35	34	77.3	30	68.2		
>35	10	22.7	14	31.8	0.917	0.338
Education						
Primary Education	5	11.4	6	13.6		
Secondary Education	26	59.1	22	50.0		
University Education	13	29.5	16	36.4	0.735	0.693
Residence						
Urban	17	38.6	12	27.3		
Rural	27	61.4	32	72.7	1.286	0.257
Occupation						
Employee	19	43.2	27	61.4		
Housewives	25	56.8	17	38.6	2.915	0.088
Income						
Sufficient	18	40.9	15	34.1		
Insufficient	26	59.1	29	65.9	0.436	0.509
BMI						
Underweight	3	6.8	2	4.5		
Normal	28	63.6	20	45.5		
Overweight	8	18.2	13	29.5		
Obese	5	11.4	9	20.5	3.867	0.276

Table 2: Obstetric and Infertility History among the Studied Groups(N=88).

Variables	Experimental group (n=44)		Control group (n=44)		Chi – Square / Fisher's Exact Test	
	n	%	n	%	%	n
Type of Infertility						
Primary Infertility	38	86.4	35	79.5		
Secondary Infertility	6	13.6	9	20.5	0.723	0.395
Duration of Infertility (Years)						
1 – 5	29	65.9	26	59.1		
5 – 10	15	34.1	18	40.9	0.436	0.509
Gravidity						
Nulligravida	38	86.4	35	79.5		
Primigravida	4	9.1	6	13.6		
Multigravida	2	4.5	3	6.8	0.723	0.697
Number of Living Children						
None	39	88.6	37	84.1		
One	4	9.1	5	11.4		
Two or more	1	2.3	2	4.5	0.497	0.780
Infertility Cause						
Female causes	21	47.7	19	43.2		
Male factor	5	11.4	3	6.8		
Female and male factors	15	34.1	17	38.6		
Unexplained infertility	3	6.8	5	11.4	1.225	0.747

Table 3: Present History of Assisted Reproductive Technology among the Studied Groups (N=88).

Variables	Experimental group (n=44)		Control group (n=44)		Chi – Square / Fisher's Exact Test	
	n	%	n	%	X^2	P
ART Technique						
IVF	33	75.0	31	70.5		
ICSI	11	25.0	13	29.5	0.229	0.632
ART Times						
One	16	36.4	15	34.1		
Two	19	43.2	22	50.0		
Three or more	9	20.5	7	15.9	0.502	0.778
Days of embryo transfer						
3	13	29.5	15	34.1		
5	31	70.5	29	65.9	0.210	0.647
Number of embryos transferred						
One	36	81.8	34	77.3		
Two	8	18.2	10	22.7	0.279	0.597

Table 4: Common Symptoms after Few Days of Embryo Transfer among the Studied Groups (N=88).

Variables	Experimental group (n=44)		Control group (n=44)		Chi – Square / Fisher's Exact Test	
	n	%	n	%	X^2	P
Light bleeding or spotting	12	27.3	10	22.7	0.242	0.622
Cramping or pelvic pain	30	68.2	25	56.8	1.212	0.271
Fatigue and tiredness	5	11.4	19	43.2	11.229	<0.001**
Tender and sore breasts	11	25.0	8	18.2	0.604	0.437
Nausea	4	9.1	11	25.0	3.938	0.047*
Increased urination frequency	5	11.4	6	13.6	0.104	0.747
Altered vaginal discharge	7	15.9	5	11.4	0.386	0.534
No symptoms at all	13	29.5	17	38.6	0.809	0.368

Table 5: Women's Knowledge regarding Infertility and Waiting Period after Embryo Transfer among the Studied Groups on Pre and Post Intervention (N=88).

Variables	Experimental group (n=44)						Control group (n=44)						Chi – Square / Fisher's Exact Test	
	Incorrect answer		Incomplete answer		Complete answer		Incorrect answer		Incomplete answer		Complete answer			
	n	%	n	%	n	%	n	%	n	%	n	%	X^2	P
Pre – intervention														
Definition of infertility	8	18.2	29	65.9	7	15.9	10	22.7	25	56.8	9	20.5	0.769	0.681
Causes of infertility	18	40.9	19	43.2	7	15.9	19	43.2	17	38.6	8	18.2	0.205	0.903
Types of infertility	15	34.1	21	47.7	8	18.2	13	29.5	24	54.5	7	15.9	0.410	0.815
Investigations for diagnosis	5	11.4	30	68.2	9	20.5	7	15.9	26	59.1	11	25.0	0.819	0.664
Management of infertility	16	36.4	22	50.0	6	13.6	15	34.1	24	54.5	5	11.4	0.210	0.900
Embryo transfer	11	25.0	28	63.6	5	11.4	12	27.3	26	59.1	6	13.6	0.208	0.901
Waiting period after embryo transfer	18	40.9	23	52.3	3	6.8	20	45.5	20	45.5	4	9.1	0.457	.0796
Post – intervention														
Definition of infertility	6	13.6	8	18.2	30	68.2	8	18.2	21	47.7	15	34.1	11.113	0.004*
Causes of infertility	7	15.9	11	25.0	26	59.1	14	31.8	18	40.9	12	27.3	9.181	0.010*
Types of infertility	5	11.4	10	22.7	29	65.9	8	18.2	23	52.3	13	29.5	11.909	0.003*
Investigations for diagnosis	5	11.4	8	18.2	31	70.5	4	9.1	24	54.5	16	36.4	12.898	0.002*
Management of infertility	8	18.2	12	27.3	24	54.5	7	15.9	27	61.4	10	22.7	11.601	0.003*
Embryo transfer	5	11.4	11	25.0	28	63.6	9	20.5	27	61.4	8	18.2	18.991	<0.001*
Waiting period after embryo transfer	3	6.8	7	15.9	34	77.3	15	34.1	21	47.7	8	18.2	31.095	<0.001**

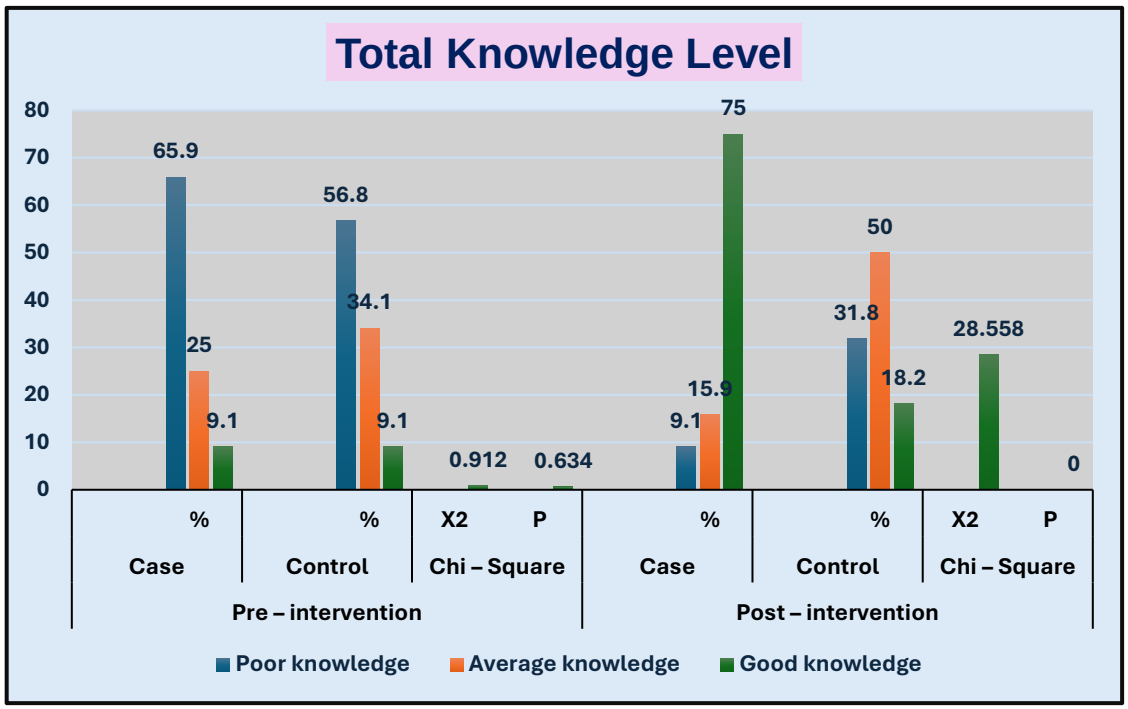

Figure (1): Comparison of Total Knowledge level among the Studied Groups on Pre and Post Intervention.

Table 6: Comparison of Awareness about Healthy Practices during Waiting Period among the Studied Groups at Pre - Intervention (N=88).

Variables	Experimental group (n=44)						Control group (n=44)						Chi – Square / Fisher's Exact Test	
	Incorrect answer		Incomplete answer		Complete answer		Incorrect answer		Incomplete answer		Complete answer			
	n	%	n	%	n	%	n	%	n	%	n	%	X^2	P
Healthy Distractions	8	18.2	30	68.2	6	13.6	10	22.7	26	59.1	8	18.2	0.794	0.672
Drugs	7	15.9	25	56.8	12	27.3	8	18.2	22	50.0	14	31.8	0.412	0.814
Activity	4	9.1	26	59.1	14	31.8	3	6.8	25	56.8	16	36.4	0.296	0.863
Shower	2	4.5	19	43.2	23	52.3	7	15.9	17	38.6	20	45.5	3.098	0.212
Social Support	12	27.3	20	45.5	12	27.3	10	22.7	19	43.2	15	34.1	0.541	0.763
Diet	15	34.1	19	43.2	10	22.7	19	43.2	11	25.0	14	31.8	3.271	0.195
Management of stress	12	27.3	17	38.6	15	34.1	10	22.7	21	47.7	13	29.5	0.746	0.689

Table 7: Comparison of Healthy Practices Level during Waiting Period among the Studied Groups at Post - Intervention (N=88).

Variables	Experimental group (n=44)		Control group (n=44)		Chi – Square	
	n	%	n	%	X^2	P
Find Positive and Healthy Distractions						
All the time	22	50.0	13	29.5		
Sometimes	18	40.9	24	54.5		
Never	4	9.1	7	15.9	3.990	0.136
Compliance with medications – feel motivated to take medications						
All the time	29	65.9	17	38.6		
Sometimes	12	27.3	21	47.7		
Never	3	6.8	6	13.6	6.585	0.037*
Activity						
No activity	25	56.8	19	43.2		
Activity of daily living	18	40.9	22	50.0		
Hard activity – vigorous	1	2.3	3	6.8	2.218	0.330
Hot Bathes and Shower						
All the time	7	15.9	11	25.0		
Sometimes	12	27.3	20	45.5		
Never	25	56.8	13	29.5	6.678	0.035*
If yes, use shampoo or deodorants	**(n=19)**		**(n=31)**			
All the time	4	21.1	6	19.4		
Sometimes	14	73.7	21	67.7		
Never	1	5.3	4	12.9	0.764	0.682
Supine position most of times						
All the time	30	68.2	18	40.9		
Sometimes	11	25.0	22	50.0		
Never	3	6.8	4	9.1	6.810	0.033*
Conduct social relations for support						
All the time	25	56.8	18	40.9		
Sometimes	14	31.8	20	45.5		
Never	5	11.4	6	13.6	2.289	0.318
Diet						
Healthy	30	68.2	16	36.4		
Unhealthy	9	20.5	9	20.5		
Normal	5	11.4	19	43.2	12.428	0.002*
Drink coffee or tea						
All the time	7	15.9	10	22.7		
Sometimes	16	36.4	29	65.9		
Never	21	47.7	5	11.4	14.131	<0.001**
Feel stress and anxious						
All the time	8	18.2	9	20.5		
Sometimes	9	20.5	28	63.6		
Never	27	61.4	7	15.9	21.580	<0.001**
Relation with husband						
Good	17	38.6	14	31.8		
Bad	7	15.9	6	13.6		
Neutral	20	45.5	24	54.5	0.731	0.694
Search for information on internet						
All the time	18	40.9	14	31.8		
Sometimes	16	36.4	22	50.0		
Never	10	22.7	8	18.2	1.670	0.434
Spiritual support with prayer						
All the time	30	68.2	26	59.1		
Sometimes	14	31.8	17	38.6		
Never	0	0.0	1	2.3	1.576	0.455

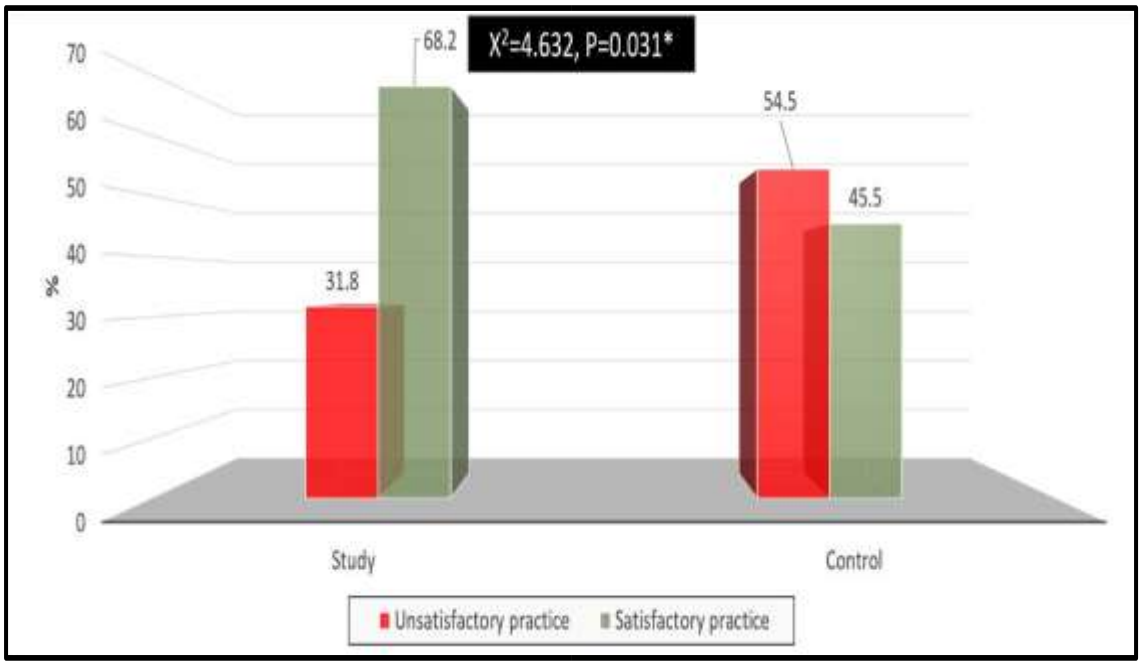

Figure 2: Comparison of Total Healthy Practices Level during Waiting Period among the Studied Groups at Post - Intervention (N=88).

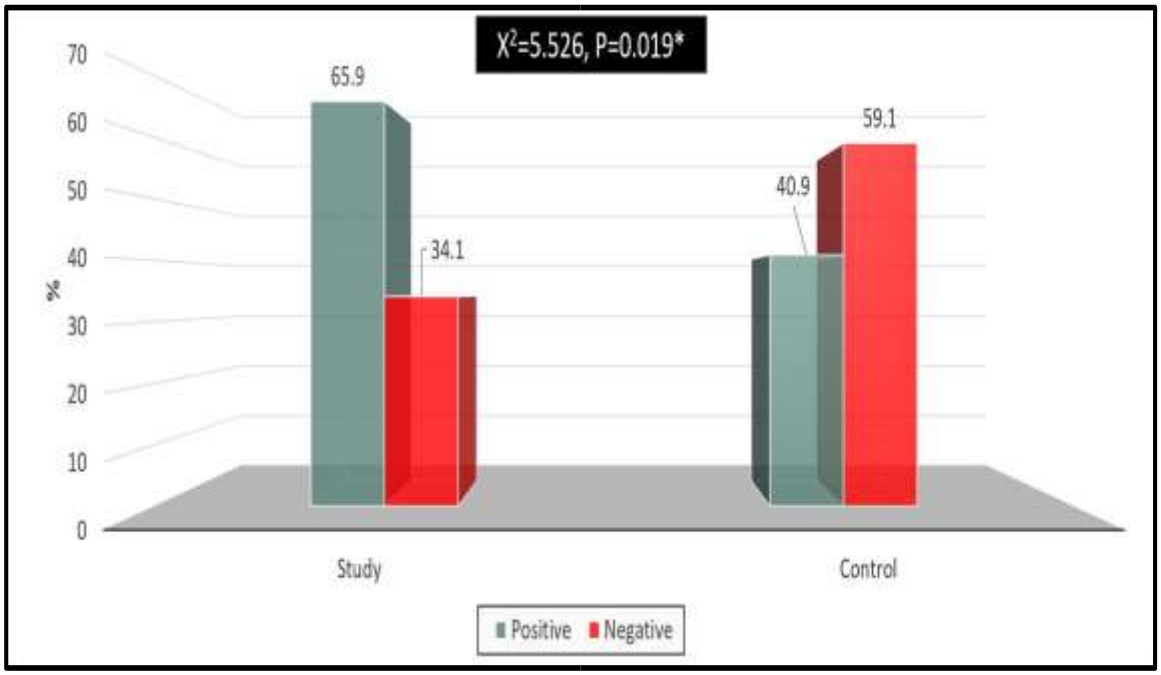

Figure 3: Comparison of Pregnancy Test Results among the Studied Groups at Post - Intervention (N=88).

Discussion

Our study examines women's experiences with embryo transfer up to pregnancy. The waiting period after embryo transfer can have both positive and negative effects on women's psychological, emotional, physical, and spiritual wellbeing. Women reported the transfer moment as a unique experience that evoked emotions such as excitement, stress, curiosity, worry, happiness, and grief simultaneously. They characterized the transfer process as being pregnant and seeing their baby on ultrasound **(Şahiner& Boz, 2022).** Therefore, the present study assessed the influence of nurse-led protocol upon women's practices as well as pregnancy rates during waiting period after embryo transfer.

Regarding the infertile women's personal traits, it has been determined as most of the studied groups were younger than 35, secondary educated, housewives with insufficient income, had average body weight and rural residents. In this regard, **Mohamed et al., (2018)** who studied "Physical and psychological factors and the reproductive outcomes of women undergoing in-vitro fertilization treatment at woman's health hospital", Assiut University, Egypt and noted that the average age of the women examined was 30.1±4.6, with the majority being housewives and more than a third having only a basic education.

Regarding infertility data, the present research found that nearly all of the examined groups were nulligravida and had no children, they experienced primary infertility for a duration ranging from (1-5 years) and nearly half of them had female reasons of infertility. That's the consequence was in line with **Abdelhamied et al., (2023)** who researched "Effect of social mediabased intervention on adjustment, anxiety and pregnancy rate among infertile women undergoing assisted reproductive technology" at Nile Center for IVF (NIC, Minia, Egypt) and revealed that more than 75% of the studied samples were found to have primary infertility, diagnosed with infertility between one to five years, and the cause of infertility was female causes. Additionally, **Aimagambetova et al.,2020** who studied "The effect of psychological distress on IVF outcomes" in Kazakhstan and revealed that the median duration of infertility was her 5.9 years, over and half of the cases of infertility were assigned to a female aspect, nullipara and had primary infertility.

These results contrasted with **Ahmed et al. (2019)** who studied the effect of counseling about assisted reproductive technology on reducing the levels of anxiety for infertile women and noted that infertility's primary cause was male (48.5%), followed by ovaries (14.5%). Additionally, **Allow et al., (2016)** who examined "Distribution of infertility factors among infertile couples" in Yemen reported that the most frequent causes of infertility were still male factors. Furthermore, **MalekiSaghooni et al., (2017)** studied "The effectiveness of infertility counseling on pregnancy rate in infertile patients undergoing assisted reproductive technologies" reported that the average period of infertility was 10.34 years.

According to the results of the present study, the majority of the groups under examination had undergone IVF process and had one embryo transferred on the 5th day and exposed to 2 times for assisted

reproductive technology. This piece of result agreed on by **Abdelhamied et al., (2023)** who studied " Effect of social media-based intervention on adjustment, anxiety and pregnancy rate among infertile women undergoing assisted reproductive technology" and clarified that greater than one-third of the group under study had undergone assisted reproduction twice.

These results were also consistent with **Aimagambetova et al., (2020)** who studied "The effect of psychological distress on IVF outcomes: Reality or speculations?" and found that more than a quarter of the women had previously tried IVF cycle. Additionally, **Yurci et al., (2021)** studied "The comparison of immediate versus delayed frozen embryo transfer on reproductive outcome" and reported that, compared to the group that had embryo transfers on the third or fourth day, the cases of live births involving embryo transfers on the fifth or sixth day were shown to be highly significant and were correlated with embryo quality.

According to the study's findings, the most symptoms experienced among the studied groups after a few days of embryo transfer are cramping or pelvic pain followed by light bleeding and breast tenderness. Also, there were differences that are of statistical significance among the experimental and control groups concerning feelings of fatigue, tiredness, and nausea, which clarifies the instructions and cautions given to the study group to limit activity during the period after embryo transfer. This result was in line with **Suthersan, Kennedy & Chapman (2011)** who studied physical symptoms throughout IVF and reported that at oocyte retrieval, symptoms became more severe; the main ones were exhaustion, cramping or pain in the abdomen, and bloating. Women may also be advised to limit their stress and activity during this period, given the impact of symptoms, especially following oocyte retrieval.

The current research findings declared that nurse-led instructional protocol was beneficial in enhancing women's knowledge regarding infertility and waiting period after intervention between the experimental and control group as there were differences that are of statistical significance among the studied groups post intervention regarding total knowledge level compared to pre intervention about (<0.001 Vs 0.634) respectively. This may be clarified as nurseled instructional protocol has a major impact on improving women's knowledge regarding infertility and waiting period post intervention. This result was in harmony with **Ramadan& Said, (2018)** who studied "The effect of an educational intervention for infertile women regarding fertility methods" at Benha University Hospital, Egypt and revealed that following the implementation of the intervention, women's knowledge of fertility and infertility measures improved in both subtotal and total knowledge scores in a higher statistically significance way (P<0.01). On the other hand, knowledge about infertility treatment improved statistically significantly (P<0.05).

After an embryo transfer can significantly impact the chances of a successful pregnancy. It's a critical period, so the instructional nurse-led instructional protocol was focused on teaching women healthy practices during waiting period such

as using healthy distractions, proper use of prescribed drugs and vitamins, assuming moderate activity, regular shower and personal hygiene, social support from religious person or any loved person, eating healthy balanced diet, and management of stress using muscle relaxation and laughter therapy. Such instructions were essential as eating healthy nutrients and keeping the body hydrated help to support the implantation of the embryo. Additionally, if the body loses water, it minimizes the chances of the implantation working successfully. Also creating a chart for daily medication, a void heavy lifting, hot baths and rigorous exercise, try not to worry and following these dos and don'ts of embryo transfer can help increase chances of successful implantation and a healthy pregnancy.

Regarding awareness about healthy practices during waiting period among the studied groups before the intervention, The results of our study showed no differences that are statistically significant between the experimental and control group regarding awareness about healthy practices during waiting period pre the intervention . In this regard, **Xu et al., (2024)** who studied "knowledge, attitude, and practice of embryo transfer among women who underwent in vitro fertilization-embryo transfer" and reported that insufficient knowledge and unfavorable attitudes and behaviors regarding embryo transfer were seen among women who had IVF-ET, necessitating the ongoing enhancement of women's education in order to enhance embryo transfer management.

In relation to the effectiveness of nurseled instructional protocol on practices of women (as; healthy distractions, drugs intake, activity allowed, showering, social support, healthy diet and management of stress) during waiting period after embryo transfer post the implementation of the nursing protocol, there were statistically significant differences among the groups that were studied post intervention concerning compliance with medications, taking warm baths and shower, remaining in supine position most of times and taking a healthy diet. Also, a statistically significant improvement was observed in the overall healthy practices level during the waiting period among the studied groups post the implementation of the nursing instructional protocol (P = 0.031) , indicating that the nursing instructional protocol improved women's practices and pregnancy outcomes during the waiting period after embryo transfer.

This finding is supported by a study about "Effect of comprehensive nursing intervention on the outcomes of in vitro fertilization in patients with polycystic ovary" by **Zhang et al., (2023)** who reported that the study group received comprehensive nursing intervention, including pre fertilization embryo transfer care, ovulation promotion, egg retrieval, and embryo transfer, provided by psychological counseling, and monitoring of health. They are also educated on medication methods, dosages, and potential adverse reactions. After transfer, they are advised to maintain good dietary habits, avoid sexual life, and conduct regular reexamination. These

measures improved treatment compliance and pregnancy outcomes.

Additionally, this finding is supported by a study about "Effectiveness of progressive muscle relaxation and laughter therapy on mental health and treatment outcomes in women undergoing in vitro fertilization" by **Kiyak & Kocoglu (2021)** who reported that Laughter therapy and gradual relaxing of muscles can provide psychological benefits to women receiving IVF treatment. Also, women receiving IVF treatment who engaged in integrated bodymind-spirit practices, such as practicing relaxation techniques, demonstrated a reduction in both anxiety disorders and traits improved the psychosocial and spiritual well-being , reducing physical distress, marital satisfaction, and spiritual disorientation, promoting a holistic approach to medical care and positive pregnancy outcomes as reported by **Chan et al., (2012).**

Another study conducted by **Budani & Tiboni (2023)** who studied "Nutrition, female fertility and in vitro fertilization outcomes" reported that healthy diet represents a changeable factor that can affect female fertility and IVF outcomes. Another study contracting this finding and reported that there was no evident link between adhering to a Mediterranean diet and effective in vitro fertilization as reported by **Ricci et al (2019)** who studied "Mediterranean diet and outcomes of assisted reproduction".

Supporting the study hypothesis the findings of the current research revealed that approximately two third of the experimental group had a positive pregnancy test in comparison with nearly more than a third of the control group and there was a difference that is statistically significant of pregnancy findings between the study and control group after the intervention (P = 0.019) indicating that the nursing instructional protocol improved women's practices and pregnancy outcomes. This result was consistent with **Abdelhamied et al., (2023)** who revealed that in excess of half of the samples were pregnant following the intervention. These findings were also supported by **Katyal et al., (2021)** comprehensive review and metaanalysis of randomized controlled trials recommending a minimum of 15 days of psychological intervention and finding a positive correlation between infertility and pregnancy rates. The efficacy of therapy in reducing anxiety and improving adaptations that increase infertile women's chances of conception can be utilized to explain these outcomes. Meanwhile, results contradicted **Maroufizadeh et al. (2019),** who showed no difference in clinical IVF pregnancy rates following the intervention.

Conclusion

In overall, the current study's findings concluded that implementation of nurse-led protocol was successful in enhancing knowledge, practices, and pregnancy outcomes among women during waiting period after embryo transfer. This supports all previously mentioned research hypotheses.

Recommendations

Given the study's conclusions, the following ought to be taken:

- The application of such nurse-led instructional protocol in all infertility centers should be enforced to improve outcomes of ART.
- Infertile women undergoing ART should be provided with adequate knowledge regarding waiting period after embryo transfer that can affect management in effective manner.
- Indorse stages of ICSI or IVF in nursing curriculum.
- The current study needs to be replicated in different contexts and with an even larger probability sample.

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