Effectiveness of an Instructional Module Application Regarding Ovarian Cancer on knowledge level among Infertile Women

Samah Mohamed Elhomosy [1], Doaa lotfi afifi elqersh[2,] Hanan Amin Ali Gaafar[3]

[1]Assistant Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Menofyia University, Egypt.
[2]Lecturer of Maternal and Newborn Health Nursing, Faculty of Nursing, Menofyia University Egypt.
[3] Lecturer of Obstetrics and Woman's Health Nursing, Faculty of Nursing, Banha university, Egypt.

Abstract:

Background

Infertility is increasing in the general population and more women are relying on assisted reproductive techniques (ART) to conceive. Based on previous research infertile women have a higher risk of ovarian cancer than women with no infertility related diagnoses. Nurse can play a vital role in infertility by strengthening women's knowledge regarding infertility and related health hazard.

Subject and Methods: Quasi - experimental design (pre-post intervention) was implemented to establish the study. **Settings:** This study was conducted at fertility unit affiliated to El-Husain hospital, Al Azhar University, Cairo governorate, Egypt. **Sample:** A purposive sample of (360) infertile women were recruited in this study (one group pretest-posttest).

Results: The study revealed that there were statistically significant differences between pretest and posttest after implementation of the instructional module manifested by higher knowledge score for infertile women ovarian cancer. Where only1.1% of women had good knowledge score before application of instruction module while, 75.3% had good knowledge score after application of instruction module. The knowledge score increased by 74.2%)

Conclusion: The instructional module had positive effect in improving knowledge level of infertile women regarding ovarian cancer symptoms, risk factors, measures of prevention and early detection.

Recommendations: there was a necessity for program provided to nurses in all infertility centers focus on alerting infertile women to the alarming symptoms, risk factors, prevention and early detection of ovarian cancer.

Keywords: Effectiveness, Instructional Module, Infertile Women, knowledge and Ovarian Cancer

Operational definitions

Effectiveness: In this study, it refers to the extent to which the self-instructional module will achieve desired effect to gaining knowledge regarding risk of ovarian cancer in terms of difference between pretest and posttest knowledge measured by semi structured questionnaire.

An instruction module: In this study it refers information prepared for infertile women to improve the knowledge on relationship between ovarian cancer and infertility, symptoms of ovarian cancer, risk factors, prevention and early detection.

Knowledge: In this study, it refers to the facts, information acquired through education by infertile woman regarding risk of ovarian cancer as elicited through a self-administered questionnaire.

Introduction

Infertility is commonly defined as the inability of a couple to conceive after 1 year of unprotected sexual intercourse. This condition may be further classified as primary infertility, in which no previous pregnancies have occurred, and secondary infertility, in which a prior pregnancy, although not necessarily a live birth, has occurred. Infertility may also be defined according to its specific cause: i.e., ovulatory infertility, tubal infertility, cervical or endometrial infertility, infertility due to a male factor, or unexplained infertility **(Sezgin et al, 2016).**

Male and female infertility is increasing in the general population and more women are relying on assisted reproductive techniques (ART) to conceive **(CDC, 2010)**. Conditions such as being overweight or obesity, excessive smoking, anovulation, endometriosis and nulliparity are also on the rise, and besides being frequent causes of infertility they are also independently related to an increased risk of cancer **(Katzke, Kaaks , and Kühn, 2015)**.

Mechanisms like multiple ovulation and ovarian trauma by oocyte retrieval are also believed to increase the risk of ovarian cancer. Independently of treatment for fertility issues, women with family history or genetic susceptibility to ovarian cancer, infertility and nulliparity, and late menopause, have an increased risk of developing invasive ovarian cancer **(Lundberg, 2018).**

Protective factors are multi-parity, breastfeeding and oral contraceptives which are not frequently used in infertile women. According to a recent systematic review and meta-analysis, ART does not seem to be associated with elevated cervical, ovarian or

endometrial cancer when the confounding effect of infertility is neutralized (**Schuler et al., 2013**).

Incessant ovulation theory states that factors decreasing lifetime ovulation rates, such as multiparity or combined hormonal contraception, reduce ovarian cancer risk. Conversely, the use of fertility medications could increase ovarian cancer risk by promoting multi follicular ovulation (**Romagnolo et al., 2016**). It has been calculated, although inevitably in a very approximate way, that the hormonal stimulation used for a single cycle of IVF results in the production of a number of follicles and in an estrogen exposure similar to what occurs in two years of life (**DEL PUP et al., 2018**).

Exposure to ART/ Controlled ovarian hyper stimulation (COH) is the process of using drugs to obtain several mature oocytes in a single menstrual cycle for use in in vitro fertilization (IVF). Hormone protocols used for COH in ART vary widely, but mostly the standard protocols include the following three medications: gonadotropin-releasing hormone (GnRH) analogues (agonists or antagonists), gonadotropins (follicle-stimulating hormone or human menopausal gonadotropin), and finally human chorionic gonadotropin (hCG) (**Reigstad et al., 2017**)

A continuing expansion of the use of assisted reproductive techniques (ART) means that growing numbers of women are exposed to a variety of fertility drugs (**Ishihara et al., 2015**). Some studies have found associations between fertility drug use and risks of ovarian cancer (**van Leeuwen et al., 2011**) whereas others have not (**Kallen et al., 2011**), including two meta-analyses (**Siristatidis et al., 2013**).

Early detection of ovarian cancer has been a goal of clinical research. However, the underlying biology of the disease and its vague symptoms profile has rendered it difficult to diagnose at early stages. The Gynecologic Cancer Foundation, Society of Gynecology Oncologists, and the American Cancer Society identified 4 symptoms that are more likely to occur in women with ovarian cancer: (1) bloating, (2) pelvic or abdominal pain, (3) difficulty eating or feeling full quickly, and (4) urinary symptoms (ie, urgency or frequency). These symptoms are called the Ovarian Cancer Symptom Index (**Rebecca et al., 2014**).

Development of an effective strategy for early detection of ovarian cancer is very important. Two stage strategies that combine serum markers and TVS (transvaginal ultrasound) promise to be cost-effective. Bimanual examination diagnoses early stage ovarian cancer and/or recurrent disease (**Carter et al., 2014**). Instructional module is a

method that is used by the instructor to design the instructional activities that guide the adolescent girls to achieve the objectives of learning effectively and can be offered in the form of work stations, study guides, work books, video tapes, computer programs and internet package to a large number of adolescent girls in a cost effective and consistent manner which permit the adolescent girls to be an active participant in the learning process (Martin and Gribbins., 2017).

Significance of the study

Infertile women have a higher risk of ovarian cancer than women with no infertility related diagnoses. In addition, ovulatory disorders may be associated with a higher risk of ovarian cancer specifically among nulliparous women **(Lundberg, 2018).**

Ovarian cancer is known as ''the silent killer,'' because some patients do not show disease-specific symptoms for ovarian cancer at an early stage. so that, knowledge related to risk factors, measures of prevention and early detection of ovarian cancer is very important (Rebecca et al., 2014). In fact, more than 80% of ovarian cancer patients actually showed symptoms, even while the disease was still limited to the ovaries (Rebecca et al., 2014). Among other health care professionals, nurse can play a vital role in infertility by strengthening women's knowledge regarding infertility and other health hazard **(Anwar, 2016).**

According to **Gilson, (2016)** health education by an instructional module is one of the key components of primary health care and one of the most vital health care requirements for women that must be considered much more in the primary health care system.

Based on extensive review related to the study area the previous research focus on knowledge of ovarian cancer symptoms and risk factors of women (survey study), or if there are risk of ovarian cancer in women treated with drugs for subfertility, but this study focus on specific group of women had high risk of ovarian cancer. So these women need knowledge and awareness related to ovarian cancer for prevention and early detection of this dangerous cancer. Consequently, this study will be conducted aiming to evaluate the effectiveness of an instructional module application regarding ovarian cancer on knowledge level of infertile women

.

Aim of the study:

The aim of this study was to investigate effectiveness of an instructional module application regarding ovarian cancer on knowledge level of infertile women

Research hypothesis:

- The instructional module will have positive effect on knowledge score of infertile women regarding the risk of ovarian cancer.

- infertile women will have higher knowledge score regarding ovarian cancer after application the instructional module than pre intervention.

Methodology

Design: Quasi - experimental design was used to conduct this study.
Setting: The present study was conducted at fertility unit in El-Husain hospital, Al Azhar University, Cairo Governorate, Egypt. El-Husain hospital considers one of the most important and large hospital in Cairo. The number of women's flow at study time was between 200-300 women per week. It is an important unit for all IVF procedure steps and pre implantation genetic testing.

1- Subjects

Research Sample: purposive sample consisted of (360) infertile women (one group pretest-posttest) were recruited in this study.

Inclusion criteria of the sample: Participants were recruited according the following inclusion criteria:

- Infertile women even primary or secondary
- Were undergoes infertility treatment as IVF or ICSE.

The exclusion criteria were as follows:

- Women who refused to participate in the study

Sample size estimation

Based on review of past literature **Asente A. et al. 2013.** Infertile women who used fertility drugs were at increased risk of developing ovarian tumors compared with infertile women who did not use fertility drugs; the adjusted odds ratio was 0.64 (95% CI, 0.37, 1.11). Based on this results sample size was calculated at power 80%, margin of error 5% and confidence interval 95%. The calculated sample was **360 participants.**

- **Tools of data collection:**

Based on the review of the related literature, two tools were utilized by the researcher as the following:

Tool I: A structured Interviewing Questionnaire:

It was developed by the researcher after reviewing of the related literature. It comprised three   parts.

Part I: Socio-demographic characteristics of the study participants. It included information about women's age, duration of marriage, level of education, and level of husband education, occupation, income and residence

Part II: Medical and surgical history: It contained questions about any medical or surgical history.

Part III: history of infertility: It contained questions about type of infertility, causes of infertility, duration of infertility, period of infertility treatment.

Part IV: Family history: It includes questions about family history of cancer, degree of relevance, Genetic counseling or screening for ovarian cancer

Tool II: Knowledge Assessment: It contained questions to assess women's knowledge about concerning relationship between ovarian cancer and infertility, ovarian cancer symptoms, risk Factors, and measures of prevention and early detection

Scoring System:

Total score ranged from 5 – 10. The answer was classified as completely correct, incompletely correct, and incorrect answer. Each item in the sheet was given a score of two marks for complete right answer, one mark for incomplete right answer and zero mark for. Then the score will be summed up and illustrated into three categories: a score range from 65% to 100% illustrated that patients have good knowledge; while a score from 50% to less than 65% illustrated average and a score less than 50% illustrated that women have poor knowledge.

Validity of instruments:

The validity of instrument established by five qualified experts (three experts from Maternal and Newborn Health Nursing department of Faculty of Nursing and two Physicians from Obstetrics and Gynecology Department at Faculty of Medicine). They reviewed the instrument for content accuracy and internal validity. Also, they asked to

judge the items for completeness and clarity (content validity). Suggestions were incorporated into instrument and modifications made

Reliability of instruments:

Reliability of the instruments was computed by the researcher for testing the internal consistency of instruments by using test retest reliability. This method took place through the administration of the same instrument to the same participants under similar conditions on one or more occasions. Results from repeated testing compared

II. Method:

Written Approval: Permission to carry out the study was taken from responsible authorities after explanation of the purpose of the study. A formal letter from Faculty of Nursing, Menoufia University was directors of the above-mentioned setting. submitted to El-Husain hospital, Al Azhar University in Cairo Governorate, Egypt. An officially permission was obtained to carry out the study from the

Protection of Human Rights: At the initial interview each woman was informed about the purpose and benefits of the study and informed that their participation is voluntary. Also confidentiality and anonymity of the participants were assured.

Tools Development: All tools were developed by the researcher after extensive review of the relevant literature. All tools were tested for its content validity and reliability

Pilot Study:

A pilot study was conducted on (36women)10% of study sample to evaluate the developed tools for clarity and applicability then necessary modification was carried out.

Data Collection:

- Data collection was extended from August 2019to January 2020
- Each woman who agreed to participate in the study and fulfilling the inclusion criteria has been interviewed at fertility unit in El-Husain hospital, Al Azhar University, Cairo governorate, Egypt.
- Purposive sample of 360 infertile women were selected randomly from previous study setting (one group pretest-posttest)
- • The study was conducted in three phases namely: assessment, implementation and evaluation.
- • **Assessment Phase:**

- The aim of this phase was to assess woman's sociodemographic data, fertility and family history, knowledge related to ovarian cancer symptoms, risk Factors, and measures of prevention and early detection

- **Implementation phase:**

- In this phase subjects were interviewed at fertility unit in El-Husain hospital.

- The researcher went to El-Husain hospital 3 days weekly from 10 am to 3 pm (Sunday, Monday and Tuesday). These days were known to have high flow rate. The researcher interviewed 5 women per day.

- At the time of initial contact, the researcher greeted the woman, introduced herself to her. The participants telephone number was recorded to facilitate communication and follow up.

- The researcher used questionnaires to assess the women's knowledge about ovarian cancer (symptoms, risk factors, and measures of prevention and early detection). Each woman took a form to answer (the questionnaires) under observation of the researcher. While illiterate women the researcher wrote their answers and each woman took about 10-15 minute to answer the questionnaire.

- Based on the results obtained during assessment phase an instructional module developed and constructed to satisfy infertile women knowledge deficit.

- An instructional module was designed by the researcher based recent related literature using different teaching methods, different instructional media, and illustrative pictures in order to facilitate women's understanding its contents. It consisted of an introduction, overall aim, general objectives, specific objectives and contents which composed of:

- Health teaching about definition, symptoms, risk factors of ovarian cancer

- Education about measures of prevention and early detection.

- An instructional module implemented for groups of women who fulfilled the inclusion criteria each group consisted from 5to 7 infertile women.

- one sessions implemented in this study. This session took from 30 to 40 minute. The content of session covered definition, symptoms, risk factors of ovarian cancer, measures of prevention and early detection.

Teaching sessions

- Health teaching about definition, symptoms, and risk factors of ovarian cancer

- Health education regarding measures of prevention and early detection of ovarian cancer

- **Session Objectives**

- To assess and increase knowledge of infertile women regarding definition, symptoms, and risk factors of ovarian cancer

- To assess and increase knowledge of infertile women regarding measures of prevention and early detection of ovarian cancer.

Intended Learning Outcomes(ILOS)

- **A- Knowledge and Understanding Skills**

- A1. State the meaning of ovarian cancer.

- A2. Explain predisposing factors of ovarian cancer.

- A3. Illustrate symptoms of ovarian cancer.

- A4. State the measures for prevention of ovarian cancer

- A5. Explain measures of early detection of ovarian cancer.

- A6. Illustrate effect of preventive and early detection measures on avoidance of ovarian cancer complications

- **B-Intellectual Skills**

- B1. Create plan for increasing knowledge of infertile women regarding ovarian cancer.

- B2. Analyze signs, symptoms and risk factors of ovarian cancer.

- B3. Analyze measures for prevention of ovarian cancer.

- B4. Prioritize evidence based practice in measures for prevention of ovarian cancer

- B5. Evaluate methods of early detection of ovarian cancer

- **C-Professional and Practical Skills**

- C1. Plan for infertile woman to increase knowledge about symptoms of ovarian cancer.

- C2. Use methods to increase knowledge about several risk factors of ovarian cancer.

- C3. Use methods to increase knowledge about measures of prevention and early detection of ovarian cancer

- **D-General and Transferable Skills**

- D1. Communicate effectively with infertile woman and health care team.

- D2. Appreciate importance of the teaching session about symptoms and risk factors, preventive and early detection measures of ovarian cancer.

- **Session Outline**

- Definition of ovarian cancer.

- Risk factors of ovarian cancer

- Symptoms of ovarian cancer

- Preventive measures of ovarian cancer

- Measures of early detection of ovarian cancer

- **Teaching Methods**

- One to one class

- Group discussion

- Computer based learning

- **Teaching Aids**

- Pictures

- Procure

- Computer

-The effect of an instructional module assessed at the end of session through posttest using the same questionnaire of pretest.

- also, at the end of the session, a brochure was given to each infertile women as a teaching media and reference.

- Follow up was done through phone after three months to assess retention knowledge concerning ovarian cancer, measures of prevention and early detection.

• **Evaluation phase:**

The researchers evaluated the level of infertile women's knowledge three times: The first evaluation was in the assessment phase. The second evaluation was done at post intervention. Then follow up was after three months to assess retention knowledge.

Statistical analysis:

Upon completion of data collection, the collected data were organized, tabulated; each answer sheet was coded and scored. The researcher coded the data into a coding sheet so that data could be prepared for computer use statistically analyzed using SPSS software (statistical Package for the Social Sciences, Data were collected, tabulated, statistically analyzed using an IBM personal computer with Statistical Package of Social Science (SPSS) version 22 (SPSS, Inc, Chicago, Illinois, USA). Where the following statistics were applied:

Analytical statistics:

It used to find out the possible association between studied factors and the targeted disease. The used tests of significance included:

- Descriptive statistics: in which qualitative data were presented in the form numbers and percentages.

-   **McNemar's test** assess the significance of the difference between two correlated proportions where the two proportions are based on the same sample of subjects or on matched-pair samples.

P value of >0.05 was considered statistically non-significant.

P value of <0.05 was considered statistically significant.

 P value of <0.001 was considered statistically highly significant.

 Table (1) Showed socio-demographic data of studied women. Most women were 25-29 years old and were married for 1-4 years. More than half of women have higher education and were house wives.

Table (2) displayed medical and surgical history of studied women. Most women had no medical disease or previous surgery.

Table (3) showed obstetric history of infertile women. More than three quarters of women have age of menarche 12-16 years and have primary infertility. More than half of the women were infertile for 5-9 years, were being treated for 5-9 years, and had a male cause of infertility. As regard female factors causing infertility, more than half of women had problems in fallopian tubes. More than half of women had previous IVF or ICSI, most of them had 1-3 times previous IVF or ICSI.

Table (4) showed family history of cancer. Nearly all women had no family history of cancer except 5 women. One woman had family history of ovarian cancer and she had no genetic screening for it.

Table (5) shows comparison between pre and post intervention knowledge level of women regarding relationship between ovarian cancer and infertility, ovarian cancer symptoms, risk factors, measures of prevention and early detection. There was a highly significant difference between pre and post intervention knowledge level of women regarding relationship between ovarian cancer and infertility (2.8% answered yes before instruction module while, 100% answered yes after instruction module. The knowledge level increased by 97.2%), ovarian cancer symptoms (1.4% of women answered yes before instruction module while, 94.4% answered yes after instruction module. The knowledge level increased by 93%), risk factors (2.50% answered yes before instruction module while, 91.7% answered yes after instruction module. The knowledge level increased by 89.2%), measures of prevention (4.20% answered yes before instruction

module while, 97.2% answered yes after instruction module. The knowledge level increased by 93%)and early detection (2.8% answered yes before instruction module while, 98.1% answered yes after instruction module. The knowledge level increased by 95.3%)

Table (6) showed comparison between pre and follow up knowledge of women regarding relationship between ovarian cancer and infertility, ovarian cancer symptoms, risk factors, measures of prevention and early detection. There was a highly significant difference between pre intervention and follow up knowledge level of women regarding relationship between ovarian cancer and infertility (2.8% answered yes before instruction module while, 100% answered yes after instruction module. The knowledge level increased by 97.2%), ovarian cancer symptoms (1.4% answered yes before instruction module while, 94.4% answered yes after instruction module. The knowledge level increased by 93%), risk factors (2.5% answered yes before instruction module while, 100% answered yes after instruction module. The knowledge level increased by 90.6%), measures of prevention (4.2% answered yes before instruction module while, 93.1% answered yes after instruction module. The knowledge level increased by 88.9%), and early detection (2.8% answered yes before instruction module while, 97.2% answered yes after instruction module. The knowledge level increased by 94.4%).

Table (7) and figure (1) demonstrated total knowledge score at pre, post and follow up intervention regarding relationship between ovarian cancer and infertility, ovarian cancer symptoms, risk factors, measures of prevention and early detection. There was a highly significant difference in the comparison between pre and post intervention (1.1% had good knowledge before instruction module while, 75.3% had good knowledge after instruction module. The knowledge increased by 74.2%) and in the comparison between pre and follow up intervention (1.1% had good knowledge before instruction module while, 73.9% had good knowledge in the follow up after instruction module. The knowledge increased by 72.8%), but there was no significant difference in the comparison between post and follow up intervention 75.3% had good knowledge after instruction module while, 73.9% had good knowledge in the follow up after instruction module. The knowledge decreased by 1.4%).

Results

Table (1): Socio-Demographic Data of Studied Group (N=360):

Studied variables	No.	%
Age / years		
Less than 25 years	41	11.4
25 – 29 years	121	33.6
30 – 34 years	99	27.5
34 -40 years	81	22.5
More than 40 years	18	5.00
Duration of marriage / years		
1 - 4 years	171	47.5
5 -9 years	99	27.5
10 - 15 years	70	19.4
More than 15 years	20	5.60
Educational level		
Illiterate	5	1.40
Read and write	16	4.40
Secondary school	100	7.8
University	219	60.8
Post graduate	20	5.60
Occupation		
House wife	220	61.1
Employee	120	33.3
Health related career	20	5.60

Table (2): Medical and Surgical History among Studied Group (N=360):

Studied variables	No.	%
Medical diseases		
Yes	**20**	5.60
Heart disease	1	0.30
Hypertension	15	4.20
DM	2	0.60
Kidney	1	0.30
Liver	1	0.30
No	**340**	94.4
Previous surgery		
Yes	**40**	11.1
Appendectomy	10	2.80
Tonsillectomy	20	5.60
Cholecystectomy	10	2.80
No	**320**	88.9

Table (3): History of Infertility among Studied Group (N=360):

Studied variables	No.	%
Age of menarche		
<12years	10	2.80
12 – 16 years	300	83.3
More than 16 years	50	13.9
Type of infertility		
Primary	279	77.5
Secondary	81	22.5
Duration of infertility / years		

1 – 4 years	130	36.1
5 – 9 years	200	55.6
10 – 15 years	20	5.60
More than 15 years	10	2.80
Duration of infertility treatment / years		
1 – 4 years	110	30.6
5 – 9 years	220	61.1
10 – 15 years	20	5.60
More than 15 years	10	2.80
Causes of infertility		
Male factors	200	55.6
Female factors	140	38.9
Both	20	5.60
Medical causes of infertility	**N= 160**	
Problems in fallopian tubes	100	62.5
Problems in ovaries	60	37.5
Previous IVF or ICSI		
Yes	200	55.6
No	160	44.4
Number of previous IVF	**N=200**	
1 – 3 times	150	75.0
4 – 6 times	48	24.0
More than 6 times	2	1.00

Table (4): Family History of Cancer among Studied Group (N=360):

Studied variables	No.	%
Family history of cancer		
Yes	5	1.40
Breast cancer	2	0.60
Colon cancer	2	0.60
Ovarian cancer	1	0.30
No	**355**	98.6

Degree of relevance	N=5	
Mother	3	60.0
Sister	2	40.0
Genetic counseling or screening in ovarian cancer	N=1	
Yes	0	0.00
No	1	100

Table (5): Knowledge of Women Regarding Ovarian Cancer Symptoms, Risk Factors, Measures of Prevention and Early Detection at Pre and Post Intervention (N=360):

Studied variable	Pre intervention		Post intervention		Mc Nemar test	P value
	No.	%	No.	%		
Is there is a relationship between ovarian cancer and infertility?					681.0	<0.001**
Yes	10	2.80	360	100		
No	30	8.30	0	0.00		
Don't know	320	88.9	0	0.00		
Do you know ovarian cancer Symptoms?					624.5	<0.001**
Yes	5	1.40	340	94.4		
No	355	98.6	20	5.60		
If yes, what is it?	N=5		N=340			
Wrong answer	1	20.0	10	3.00	13.2	0.001**
Incomplete right answer	4	80.0	90	26.5		
Right answer	0	0.00	240	70.5		

Do you know risk factors of the ovarian cancer?						
Yes	9	2.50	330	91.7	574.4	**<0.001****
No	351	97.5	30	8.30		
If yes, what is it?	**N=9**		**N=330**			
Wrong answer	0	0.00	0	0.00	13.3	**<0.001****
Incomplete right answer	9	100	130	39.4		
Right answer	0	0.00	200	60.6		
Do you know methods of prevention of the ovarian cancer?						
Yes	15	4.20	350	97.2	623.5	**<0.001****
No	345	95.8	10	2.80		
If yes, what is it?	**N=15**		**N=350**			
Wrong answer	10	66.7	10	2.90		
Incomplete right answer	5	33.3	40	11.4	125.3	**<0.001****
Right answer	0	0.00	300	85.7		
Do you know methods of early detection of the ovarian cancer?						
Yes	10	2.80	353	98.1	653.6	**<0.001****
No	350	97.2	7	1.90		
If yes, what is it?	**N=10**		**N=353**			
Wrong answer	10	100	3	0.80		
Incomplete right answer	0	0.00	50	14.2	276.8	**<0.001****
Right answer	0	0.00	300	85.0		

Table (6): Knowledge of Women Regarding Ovarian Cancer Symptoms, Risk Factors, Measures of Prevention and Early Detection at Pre and Follow up (N=360):

Studied variable	Pre intervention		Follow up after 3 months		Mc Nemar test	P value
	No.	%	No.	%		
Is there is a relationship between ovarian cancer and infertility?						
Yes	10	2.80	360	100	681.0	**<0.001****
No	30	8.30	0	0.00		
Don't know	320	88.9	0	0.00		
Do you know ovarian cancer Symptoms?						
Yes	5	1.40	340	94.4	624.5	**<0.001****
No	355	98.6	20	5.60		
If yes, what is it?	**N=5**		**N=340**			
Wrong answer	1	20.0	5	1.50	16.0	**0.001****
Incomplete right answer	4	80.0	115	33.8		
Right answer	0	0.00	220	64.7		
Do you know risk factors of the ovarian cancer?						
Yes	9	2.50	335	93.1	591.5	**<0.001****
No	351	97.5	25	6.90		
If yes, what is it?	**N=9**		**N=335**			
Wrong answer	0	0.00	0	0.00	7.15	**0.007****
Incomplete right answer	9	100	185	55.2		

Right answer	0	0.00	150	44.8		
Do you know methods of prevention of the ovarian cancer?					569.3	**<0.001****
Yes	15	4.20	335	93.1		
No	345	95.8	25	6.90		
If yes, what is it?	**N=15**		**N=335**			
Wrong answer	10	66.7	20	6.00		
Incomplete right answer	5	33.3	55	16.4	75.7	**<0.001****
Right answer	0	0.00	260	77.6		
Do you know methods of early detection of the ovarian cancer?					642.2	**<0.001****
Yes	10	2.80	350	97.2		
No	350	97.2	10	2.80		
If yes, what is it?	**N=10**		**N=350**			
Wrong answer	10	100	6	1.70	221.1	**<0.001****
Incomplete right answer	0	0.00	84	24.0		
Right answer	0	0.00	260	74.3		

Table (7): Total Knowledge Score Regarding Ovarian Cancer of the Studied Group at Pre, Post and follow up Intervention

Studied variable	Pre intervention		Post intervention		Follow up		Mc Nemar test	P value
	No.	%	No.	%	No.	%		
Knowledge Score								
Poor	300	83.3	9	2.50	12	3.30	537.5	**P1:<0.001****
Average	56	15.6	80	22.2	82	22.8	524.9	**P2:<0.001****
Good	4	1.10	271	75.3	266	73.9	0.50	**P3:778**

Figure (1): Total Knowledge Score Regarding Ovarian Cancer of the Studied Group at Pre, Post and follow up Intervention (N=360): (N=360):

	Pre intervention	Post intervention	Follow up	
■ Good	1.10%	75.30%	73.90%	
■ Average	15.60%	22.20%	22.80%	
□ Poor	83.30%	2.50%	3.30%	
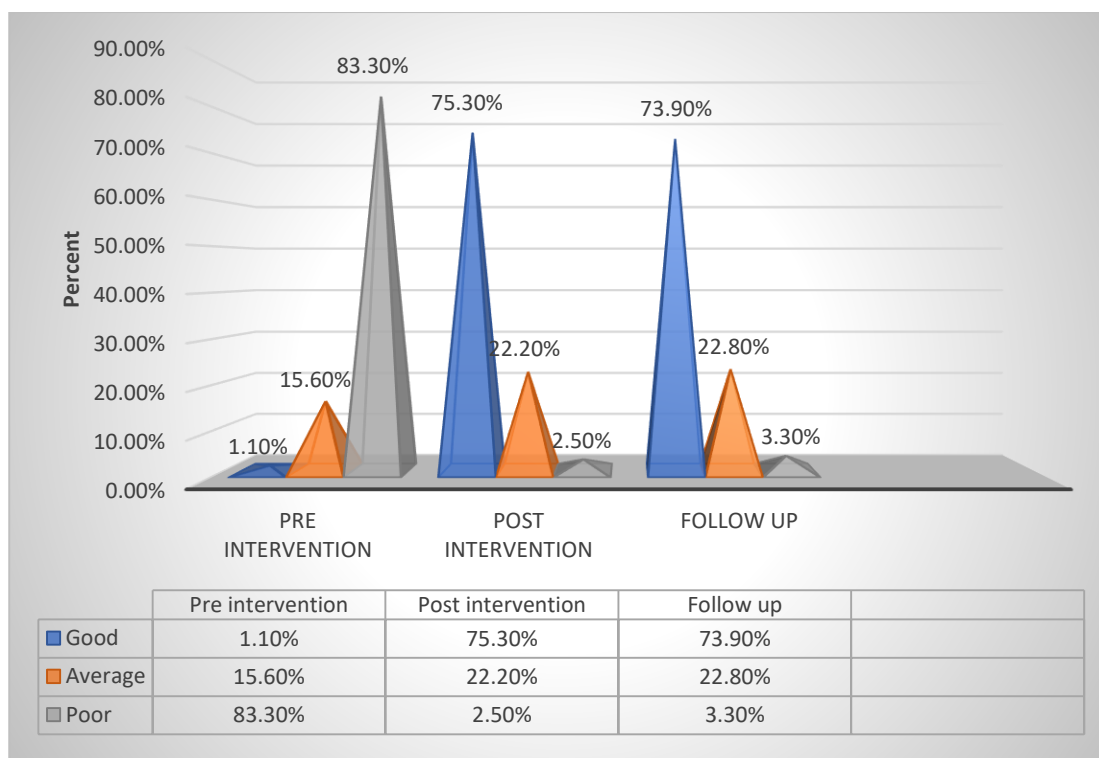
Discussion

The study findings supported research hypothesis and revealed that the instruction module had highly significant effect on increasing knowledge of infertile women regarding the risk of ovarian cancer.

The researcher selected the sample of the study from infertile women because his assured knowledge that infertility is one of most significant risk factors of ovarian cancer. There are many applied studies assure the researcher's previous point of view. For example, a study conducted by **Jiang et al (2020)** about "Infertility and ovarian cancer risk: Evidence from nine prospective cohort studies" in USA and other western countries which showed that infertility was significantly associated with a 51% increase in the risk of ovarian cancer. Moreover, **Harris , Terry (2016)** said that several hypotheses, including increased oxidative stress, changes in the microenvironment that promotes carcinogenesis, and increased levels of androgens might explain the relationship between infertility and ovarian cancer risk. In the same year similar findings are resulted from a study by **Cirillo (2016)** about "Irregular menses predicts ovarian cancer" and showed that there was a clear increase in ovarian cancer risk for women with an infertility-associated diagnosis. In addition, **Reigstad (2015)** conducted a study about " Cancer risk among parous women following assisted reproductive technology " and concluded that women with unexplained infertility, parous women with only one delivery as opposed to multiple deliveries following reproductive technology, women with polycystic ovarian syndrome (PCOS), and women who had used progesterone therapy as part of their fertility treatment appear to be at higher risk for subsequent ovarian cancer. On contrary no strong correlations can be made relating infertility and ovarian cancer. this is reported by **Wang (2014)** in his study about" BRCA1 germline mutations may be associated with reduced ovarian reserve"

Also, **Trabert et al (2013)** conducted a study about Ovulation-inducing drugs and ovarian cancer risk which included 9.825 women who were referred for infertility, found that the risk for invasive ovarian cancer following the utilization of gonadotropins or Clomiphene Citrate(CC) did not increase, except for 517 women who were still childless after the use of Clomiphene Citrate (RR 3.63, 95% CI 1.36-

9.72)

Also, Johnson et al (2017) summarized that the underlying mechanisms involved in the association between infertility and ovarian cancer are diverse; however, no strong correlations can be made. A potential common mechanism might be the presence of genetic mutations associated with DNA repair, which may increase the risk of both conditions. Women with the BRCA1 or BRCA2 mutation have a lower anti-Mullerian hormone, which is associated with ovarian cancer susceptibility.

In the current study, the majority of women were in the reproductive age (20-35 y). This was in the same line with **Murugappan etal (2019)** who stated in his study about "Risk of cancer in infertile women" and ascertained that infertility positively associated with the risk of ovarian cancer in studies of follow-up periods >10 years. The majority of participants in these studies were enrolled at reproductive ages.

Regarding level of education more than half of the sample had university education so there are able to understand information regarding risk of ovarian cancer. This was result in concern, follow up for prevention or early detection of ovarian cancer and better treatment outcomes. This was in accordance with **Alberg et al (2016)** who reported that the result of a case-control study named "Socioeconomic status in relation to the risk of Ovarian cancer in African-American Women" showed a negative relationship between educational level and the risk of ovarian cancer.

Most women in the current study had primary infertility so, raising their knowledge about risk of ovarian cancer is very important. This is in accordance with **Sung et al (2016)** who revealed that the first birth and breastfeeding for less than 6 months is associated with low risk of epithelial ovarian cancer. They added that as a modifiable reproductive risk factor, two childbirths and additional breastfeeding, regardless of breastfeeding duration, can reduce Epithelial ovarian cancer (EOC) risk by 50% in their study about The effect of breastfeeding duration and parity on the risk of epithelial ovarian cancer in Korea

Also, **Liat et al (2012)** mentioned that ovarian cancer is a rare and, at the same time, a fatal disease. Regardless of infertility treatments, nulliparity itself and infertility are

risk factors of ovarian cancer, so it is difficult to investigate the relationship between infertility treatment and ovarian cancer.

Most women in the current study had IVF one to three times, and took more doses of ovulation induction drugs so they are at a greater risk for ovarian cancer. This is assured by **Ali (2018)** who reported that women who used fertility drugs and did not conceive had a higher risk of developing ovarian cancer, compared to women who used fertility drugs and conceived and delivered successfully in his study about Fertility drugs and ovarian cancer.

Also, **Reigstad el al (2017)** showed that women failing to conceive after clomiphene citrate therapy, have a higher risk of ovarian cancer warranting further investigation of this subgroup of women in their study about Cancer risk in women treated with fertility drugs according to parity status

In the same line, **Romagnolo et al (2016)** stated that the use of fertility medications could increase ovarian cancer risk by promoting multi follicular ovulation in their study about CA125 and risk of ovarian malignancy algorithm (ROMA) as diagnostic tools for ovarian cancer in patients with a pelvic mass in Italy.

On contrary, the previous result is contradicted by other studies. As study conducted **by Lerner et al (2012)** who reported that a risk for ovarian cancer not increased with the use of Clomiphene Citrate, gonadotropins, combined therapy, or other drugs for infertility in their study about . Are infertility treatments a potential risk factor for cancer development?

Lundberg et al (2019) reported that women who have gone through ART have a higher risk of ovarian cancer and borderline ovarian tumer(BOT). At least part of that risk seems to be due to the underlying infertility and not the treatment. They also recommended conducting larger studies with longer follow-up in order to confirm or refute our findings in their study about " Assisted reproductive technology and risk of ovarian cancer and borderline tumors in parous women" in Sweden

This study revealed that the instruction module had highly significant effect on increasing knowledge of infertile women regarding the risk of ovarian cancer. This is in accordance with **Carter et al (2014)** who confirmed the relatively poor public knowledge of ovarian cancer among the US population, thereby highlighting the need

for increased awareness towards the disease. They added that Increased public awareness and a broader spread of knowledge are expected to promote early diagnoses rates in their study about "Crowdsourcing awareness: exploration of the ovarian cancer knowledge gap through amazon mechanical turk" in USA.

Knowledge about symptoms of ovarian cancer were low before instruction module in the current study. Similar study findings are reported by **Baldwin et al (2012)** who reported that ovarian cancer symptoms can be misdiagnosed or dismissed by both patients and even some health professionals. They added that there is a critical knowledge gap amongst both the general public and practicing physicians concerning ovarian cancer and its indicative symptoms

Knowledge of women during follow up after 3 months were low compared with their knowledge in the post test. This is confirmed by a recent survey out of the University College of London, which surveyed exclusively United Kingdom women on their levels of symptom awareness by **Low et al (2013); Simon et al (2012)** determined that women among their sample population were unable to recall any ovarian cancer symptoms. The researcher point of view is that life experience, family history and stories about family history play a key role in constructed awareness of cancer risk among individuals from hereditary cancer families and this sample had no family history of cancer, this explain the cause of lack knowledge.

Knowledge regarding early detection of ovarian cancer increased significantly post intervention and this is the remote goal of the study to detect the disease in the early stage. This result is supported by **Köbel et al (2010)** who assured that the distribution of ovarian cancer malignancies diagnosed at an early stage are fundamentally different than that of tumors present with advanced-stage disease in their study about Diagnosis of ovarian carcinoma cell type is highly reproducible in Canada.

In addition, **Momenimovahed et al (2019)** who assured that considering the heavy burden of ovarian cancer on women's health, preventive measures as well as health education and early detection in high risk groups of women are highly recommended in their study about Ovarian cancer in the world: epidemiology and risk factors in Iran.

Finally, it can be said that the result that the researcher concluded in this

research is the lack of knowledge of women with infertility and therefore they are more susceptible to cancer, although it is not necessary, and this explains the confirmation of most studies that there is a relationship between infertility and having cancer, but the few From those studies indicates that there is a relationship between infertility and this disease, but that relationship is not certain because of the presence of many causes associated with the two diseases, and it also resulted that increasing knowledge through the instruction module will lead to an increase in the interest of these patients in ways of preventing cancer and frequent follow-up from time to time and thus they are less liable to complications.

Conclusion:

The instructional module was very effective in improvement of infertile women knowledge score regarding ovarian cancer symptoms and risk factors, measures of prevention and early detection. This can be illustrated as follow

- Infertile women had a very low knowledge score regarding ovarian cancer (symptoms, risk factors, measures of prevention, early detection) at pre intervention.
- After intervention infertile women had good knowledge score regarding ovarian cancer (symptoms, risk factors, measures of prevention, early detection).

Recommendations:

Based on previous research infertile women have a higher risk of ovarian cancer than women with no infertility related diagnoses so that:

- Replication of study to further setting using a large sample.
- There was a necessity for program provided to nurses in all infertility centers focus on alerting infertile women to the alarming symptoms, risk factors, prevention and early detection of ovarian cancer.
- Ovarian cancer awareness should be a part of health teaching for infertile women at all fertility centers.

References:

1- Alberg, A.J., Moorman, P.G., Crankshaw, S. et al. (2016): Socioeconomic status in relation to the risk of Ovarian cancer in African-American Women: a population-based case-control study. Am J Epidemiol,184 (4):274–283.

2- Ali, A. T. (2018): Fertility drugs and ovarian cancer. *Current Cancer Drug Targets*, *18*(6), 567-576

3- Anwar, S., & Anwar, A. (2016): Infertility: A review on causes, treatment and management. Womens Health Gynecol, 5, 2-5.

4- Baldwin, L. M., Trivers, K. F., Matthews, B., Andrilla, C. H. A., Miller, J. W., Berry, D. L., ... & Goff, B. A. (2012): Vignette-based study of ovarian cancer screening: do US physicians report adhering to evidence-based recommendations?. Annals of internal medicine, 156(3), 182-194.

5- Carter, R. R., DiFeo, A., Bogie, K., Zhang, G. Q., & Sun, J. (2014): Crowdsourcing awareness: exploration of the ovarian cancer knowledge gap through Amazon Mechanical Turk. PLoS One, 9(1), e85508.

6- Centers for Disease Control (2010): Outline for a national action plan for the prevention, detection and management of infertility.

7- Cirillo, P. (2016): Irregular menses predicts ovarian cancer. Int J Cancer.

8- Del Pup, L., Peccatori, F. A., Levi-Setti, P. E., Codacci-Pisanelli, G., & Patrizio, P. (2018): Risk of cancer after assisted reproduction: a review of the available evidences and guidance to fertility counselors. Eur Rev Med Pharmacol Sci, 22(22), 8042-8059.

9- Gilson, L., (2016): A Methodology Reader Health Policy and Systems Research, WHO Document, Production Services, Geneva, Switzerland.

10- Harris, H.R., Terry, K.L. (2016): Polycystic ovary syndrome and risk of endometrial, ovarian, and breast cancer: a systematic review. Fertil Res Pract, 2: 14.

11- Ishihara, O., Adamson, G. D., Dyer, S., de Mouzon, J., Nygren, K. G., Sullivan, E. A., ... & Mansour, R. (2015): International committee for

monitoring assisted reproductive technologies: world report on assisted reproductive technologies, 2007. Fertility and sterility, 103(2), 402-413.

12- Jiang, Y. T., Gong, T. T., Zhang, J. Y., Li, X. Q., Gao, S., Zhao, Y. H., & Wu, Q. J. (2020): Infertility and ovarian cancer risk: Evidence from nine prospective cohort studies. International Journal of cancer

13- Johnson, L., Sammel, M., Domchek, S., Schanne, A., Prewitt, M., Gracia, C. (2017): Antimullerian hormone levels are lower in BRCA2 mutation carriers. Fertil Steril, 107: 1256- 1265.e6

14- Källén, B., Finnström, O., Lindam, A., Nilsson, E., Nygren, K. G., & Otterblad Olausson, P. (2011): Malignancies among women who gave birth after in vitro fertilization. Human reproduction, 26(1), 253-258.

15- Katzke, V. A., Kaaks, R., & Kühn, T. (2015): Lifestyle and cancer risk. The Cancer Journal, 21(2), 104-110.

16- Köbel M, Kalloger SE, Baker PM, Ewanowich CA, Arseneau J, et al. (2010): Diagnosis of ovarian carcinoma cell type is highly reproducible: A transcanadian study. Am J Surg Pathol 34: 984–993

17- Lerner-Geva, L., Rabinovici, J., Olmer, L., Blumstein, T., Mashiach, S., Lunenfeld, B. (2012): Are infertility treatments a potential risk factor for cancer development? Perspective of 30 years of follow-up. Gynecol Endocrinol, 28: 809-814.

18- Liat, L., Jaron, R., Liraz, O., Shlomo, M., Bruno, L. (2012): Are infertility treatments a potential risk factor for cancer development? Perspective of 30 years of follow-up. Gynecol Endocrinol, 28(10):809–814.

19- Low E, Waller J, Menon U, Jones A, Reid F, et al. (2013): Ovarian cancer symptom awareness and anticipated time to help-seeking for symptoms among UK women. J Fam Plann Reprod Health Care 39: 163–71.

20- Lundberg, F. E. (2018): Impact of infertility and assisted reproductive technology on cancer risk. Inst för medicinsk epidemiologi och biostatistik/Dept of Medical Epidemiology and Biostatistics.

21- Lundberg, F. E., Johansson, A. L., Rodriguez-Wallberg, K., Gemzell-Danielsson, K., & Iliadou, A. N. (2019): Assisted reproductive technology and risk of ovarian cancer and borderline tumors in parous

...

women: a population-based cohort study. European journal of epidemiology, 34(11), 1093-1101.

22- Martin, M and Gribbins, A., (2014):Learning module in nursing education: Reviving the past ,Nurse Edu Pract;10(3):164-169.

.   23- Momenimovahed, Z., Tiznobaik, A., Taheri, S., & Salehiniya, H. (2019): Ovarian cancer in the world: epidemiology and risk factors. International journal of women's health, 11, 287.

.   24- Murugappan, G., Li, S., Lathi, R., Baker, V., Eisenberg, M. (2019): Risk of cancer in infertile women: analysis of US claims data. Hum Reprod. 34: 894- 902.

25- Rebecca R. Carter, Analisa DiFeo, Kath Bogie, Guo-Qiang Zhang, Jiayang Sun, Crowdsourcing Awareness: Exploration of the Ovarian Cancer Knowledge Gap through Amazon Mechanical Turk, PLOS ONE | www.plosone.org January 2014 | Volume 9 | Issue 1 | e85508

26- Reigstad, M. (2015): Cancer risk among parous women following assisted reproductive technology. Hum Reprod, 30(8):1952–63.

27- Reigstad, M. M., Storeng, R., Myklebust, T. Å., Oldereid, N. B., Omland, A. K., Robsahm, T. E., ... & Larsen, I. K. (2017): Cancer risk in women treated with fertility drugs according to parity status—a registry-based cohort study. Cancer Epidemiology and Prevention Biomarkers, 26(6), 953-962.

28- Romagnolo, C., Leon, A. E., Fabricio, A. S., Taborelli, M., Polesel, J., Del Pup, L., ... & Bandiera, E. (2016): HE4, CA125 and risk of ovarian malignancy algorithm (ROMA) as diagnostic tools for ovarian cancer in patients with a pelvic mass: an Italian multicenter study. Gynecologic oncology, 141(2), 303-311.

29- Schüler, S., Ponnath, M., Engel, J., & Ortmann, O. (2013): Ovarian epithelial tumors and reproductive factors: a systematic review. Archives of gynecology and obstetrics, 287(6), 1187-1204.

30- Sezgin, H., Hocaoglu, C., & Guvendag-Guven, E. (2016): Disability, psychiatric symptoms, and quality of life in infertile women: a cross-sectional study in Turkey. Shanghai archives of psychiatry, 28(2), 86.

31- Simon A, Wardle J, Grimmett C, Corker E, Menon U, et al. (2012): Ovarian and cervical cancer awareness: Development of two validated

measurement tools. J Fam Plann Reprod Health Care 38: 167–174.

32- Siristatidis, C., Sergentanis, T. N., Kanavidis, P., Trivella, M., Sotiraki, M., Mavromatis, I., ... & Petridou, E. T. (2013): Controlled ovarian hyperstimulation for IVF: impact on ovarian, endometrial and cervical cancer—a systematic review and meta-analysis. Human reproduction update, 19(2), 105-123.

33- Sung, H. K., Ma, S. H., Choi, J. Y., Hwang, Y., Ahn, C., Kim, B. G., ... & Kim, T. J. (2016): The effect of breastfeeding duration and parity on the risk of epithelial ovarian cancer: a systematic review and meta-analysis. Journal of preventive medicine and public health, 49(6), 349.

34- Trabert, B., Lamb, E.J., Scoccia, B., Moghissi, K.S., Westhoff, C.L., Niwa, S., Brinton, L.A. (2013): Ovulation-inducing drugs and ovarian cancer risk: results from an extended follow-up of a large United States infertility cohort. Fertil Steril,100: 1660-1666.

35- Van Leeuwen, F. E., Klip, H., Mooij, T. M., Van De Swaluw, A. M. G., Lambalk, C. B., Kortman, M., ... & Willemsen, W. N. P. (2011): Risk of borderline and invasive ovarian tumours after ovarian stimulation for in vitro fertilization in a large Dutch cohort. *Human reproduction*, *26*(12), 3456-3465.

36- Wang, E. (2014): BRCA1 germline mutations may be associated with reduced ovarian reserve. Fertil Steril, 102(6):1723–8.

-