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The Effect of an Educational Program on Female Nursing Students' Knowledge of Oocyte Cryopreservation Technology at South Valley University

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ABSTRACT

Background: Women now have more choices for their future reproductive life thanks to significant advancements in ova cryopreservation technology during the past three decades. **Objectives:** Determine the effectiveness of the educational program on female nursing students' knowledge regarding ova cryopreservation technology. **Methods:** A quasi-experimental study with a one-group pretest and posttest design was used in this study. The study was conducted at the Faculty of Nursing, South Valley University, Egypt. It started from the beginning of June 2025 and was completed by the end of December 2025. Purposive sample composed of 150 female nursing students enrolled based on eligibility criteria. Data was collected using a structured interviewing questionnaire that consisted of one tool divided into three parts. Part (I): Demographic profile. Part (II): Background knowledge about ova cryopreservation. Part (III): Knowledge Assessment Tool (pre/post). **Results:** The study findings showed that there was a highly significant difference with $P \leq 0.001$ between the pretest and posttest levels following the program related to level of knowledge regarding ova cryopreservation. There were only 1.3% of students who had good knowledge pre-implementation of the program, which increased to 83.4% post-implementation of the educational program. The mean age of participants was 21.63±0.909 years old. Also, the internet was a main source of knowledge backgrounded about ova cryopreservation. **Conclusion:** Implementation of an education program regarding oocyte cryopreservation significantly improved knowledge of female nursing students.

Keywords: Education Program; Future Fertility; Knowledge; Nursing Students; Ova Cryopreservation Technology

INTRODUCTION

Over the past three decades, women in many countries have increasingly postponed childbearing due to educational, professional, financial, and social factors. Delayed pregnancy may increase the risk of age-related infertility, while certain medical conditions, such as cancer, and their treatments may further compromise future fertility (Akhondi *et al*., 2023). Fertility preservation refers to techniques used to maintain the potential for future biological parenthood. Oocyte Cryopreservation (OC), commonly known as egg freezing, involves collecting and freezing oocytes for future use (Ashour *et al*., 2023). It can be classified into medical ova cryopreservation, indicated for women whose diseases or treatments may impair fertility, and nonmedical ova cryopreservation, undertaken by healthy women for personal or social reasons (Latif *et al*., 2022).

The procedure involves ovarian stimulation using hormonal medications, followed by ova retrieval and cryogenic storage. The two main freezing techniques are slow freezing and vitrification, with vitrification generally preferred because of its improved ova survival rates. The effectiveness of OC depends on several factors, including the woman's age at freezing, the indication for preservation, the number of stored ova, and the cryopreservation technique used (Petersen & Hansen, 2022; Bogiatzi *et al*., 2026).

Despite the growing importance of fertility preservation, studies have reported limited awareness of elective OC among medical and nursing students, highlighting the need for targeted education (Nouh *et al*.,

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2025). Nurses play an essential role in providing patient education and counseling about fertility preservation in collaboration with other healthcare professionals. However, insufficient education and specialized training may limit their ability to explain the indications, procedures, benefits, risks, and ethical considerations of OC (Ramirez & Pavone, 2024; Abdel-Wahab *et al*., 2025).

Therefore, this study aims to improve nursing students' competencies related to oocyte cryopreservation, particularly their knowledge of its indications, procedures, benefits, risks, and ethical considerations; ability to communicate accurate information; and capacity to provide appropriate patient education and counseling. These competencies are essential for preparing nursing students to support informed decision-making and contribute to high-quality care in fertility preservation.

Significance of the Study

Oocyte Cryopreservation Technology (OCT) offers fertility preservation options for women at risk of infertility due to medical conditions or treatments. Appropriate fertility preservation counseling helps women understand reproductive risks and make informed decisions (Belal *et al*., 2023; Gabr *et al*., 2025).

This study may contribute to nursing education and curriculum development by identifying gaps in nursing students' knowledge of OCT and supporting the integration of fertility preservation topics into nursing curricula. It may also help prepare future nurses to provide evidence-based patient education and counseling, enabling women to understand available options and make informed decisions about their reproductive health (American Society for Reproductive Medicine [ASRM], 2026).

Aim of the Study

To determine the effectiveness of an educational program on female nursing students' knowledge of oocyte cryopreservation technology.

Research Hypothesis

It was hypothesized that nursing students' knowledge regarding ova cryopreservation technology would significantly improve after the implementation of the educational program.

METHODOLOGY

Study Design and Setting

A quasi-experimental, one-group pretest–posttest design was used. Lecture hall during the pretest and clinical labs during the posttest and follow-up phase at the Faculty of Nursing, Qena University (formerly South Valley University), Egypt. The study setting was explicitly specified in the research protocol approved by the Assuit University Research Ethics Committee.

Sampling Technique

A purposive sample composed of 150 female nursing students was recruited according to the following inclusion criteria: Female nursing students aged 18–22 years and female nursing students willing to participate in the research. The study was conducted from June to December 2025. The pretest was conducted in June 2025, followed by the educational intervention, which was finished at the end of August 2025. The posttest was administered in October 2025, and the follow-up assessment was conducted in December 2025.

Sample Size

The current study was conducted on a sample of 150 female nursing students from the third and fourth academic levels. The sample was calculated according to the Herbert Arkin equation:

$n = [DEFF*Np\ (1-p)]/\ [(d2/Z21-\alpha/2*(N-1) + p*(1-p)]$

DEFF (Design effect) = 1

N (population) = 578 female nursing students

p (Hypothesized %) = 10%+/-5

d (tolerated margin of error) = 0.05

Z (level of confidence) = 1.96 α (Alpha) = 0.05

n = [1*578 *10%+/-5 (1-10%+/-5)/ [(0.05)2/ (1.96)21-0.05*(578-1) + 10%+/-5 (1-10%+/-5)]

n = 110 female nursing students.

The sample size was increased to 150 for statistical purposes.

Data Collection Tools

The researcher developed the questionnaire after reviewing the relevant literature. It was written in English to collect data aligned with the study objectives and comprised three parts:

Part I: Demographic profile that consisted of the following: age, academic year, residence, marital status, and pre-university qualification.

Part II: Background Knowledge about Ova Cryopreservation: This part was used to assess students' background knowledge of ova cryopreservation and the source of this knowledge of ova cryopreservation, whether from the internet, books, friends, healthcare providers, or television, and the duration since background knowledge was acquired.

Part III: The Knowledge Assessment Tool (pre/post) was adopted from Mohamed *et al*. (2023) to test students' knowledge of ova cryopreservation. It consisted of 21 multiple-choice questions on topics such as definition, types, indication, suitable age for freezing, number of eggs to freeze, the ova cryopreservation procedure, including egg retrieval procedures, the temperature required for the egg storage process, needed laboratory tests, hormonal therapy for ova cryopreservation, complications, and statements from Dar Al-Iftaa that permit using ova cryopreservation.

Scoring System

It was adopted from Abd-Elfattah *et al*. (2025). The total questions will include 21; for each correct answer, one score will be given, and a score of 0 will be given for incorrect answers or "don't know" answers. The total scores (0-21) will be graded as

- <50 % (< 10.5 marks) will be poor knowledge
- From 50-75% (from 10.5-16) will be moderate
- >75% (> 16) will be good knowledge

Validity of the Tools

The knowledge assessment tool was adapted from Mohamed *et al*. (2023). It was reviewed and modified as necessary to ensure its relevance to the current study objectives and the assessment of nursing students' knowledge regarding OCT. The adapted tool was reviewed by five professors with competence in maternity nursing to assess the clarity, relevance, and appropriateness of its items.

Reliability

The internal consistency of the adopted questionnaire was assessed in the current study using Cronbach's alpha coefficient. The obtained coefficient was 0.728.

Pilot Study

10% of the study sample (15 students) was taken to test the clarity, feasibility, and objectivity of the study tool.

Procedure

Formal approval was obtained from the Dean of the Faculty of Nursing, South Valley University, Egypt in May 2025. The study included 150 female nursing students (the 15 pilot-study participants were included in the final sample of 150 students), equally distributed between the third and fourth academic levels (75 each). The

study objectives, confidentiality, and anonymity were explained, and clarification was provided when necessary.

The pretest was administered in June 2025 (included 150 participants), requiring approximately 20–25 minutes to complete. The educational program comprised three weekly, one-hour interactive sessions delivered to groups of 15 students using lectures, discussions, PowerPoint presentations, videos, and graphics. Educational materials were also shared via WhatsApp.

The program was based on Mohamed *et al*. (2026) and covered the following topics:

Session 1: It addressed the definition and types of OC, its medical and nonmedical indications, the suitable age for oocyte freezing, and the number of oocytes required.

Session 2: It covered preparation for the procedure, laboratory investigations, ovarian stimulation, oocyte retrieval, cryopreservation methods, and storage temperature.

Session 3: It addressed the duration of egg freezing, infection control, success rates, advantages and complications, religious perspectives, and students' opinions regarding the future practice of OC.

The educational program was completed at the end of August 2025. The post-test was administered in October 2025 to evaluate the effectiveness of the intervention. All 150 students completed the post-test (n = 150). In December 2025, a follow-up assessment was conducted to evaluate knowledge retention, using a questionnaire distributed via Google Forms. All 150 students completed the follow-up assessment (n = 150).

The study was conducted from June to December 2025. All 150 students completed the pretest, post-test, and follow-up assessment, resulting in a denominator of 150 at each assessment, with no loss to follow-up.

Statistical Design

The collected data was organized, categorized, coded, tabulated, and analyzed using the Statistical Package for Social Sciences (SPSS) version 28. Data was presented in tables and figures using numbers, percentages, means, and standard deviation, and the McNemar and chi-square tests were used in order to find an association between variables. Statistical significance was considered at a *P*-value < 0.05.

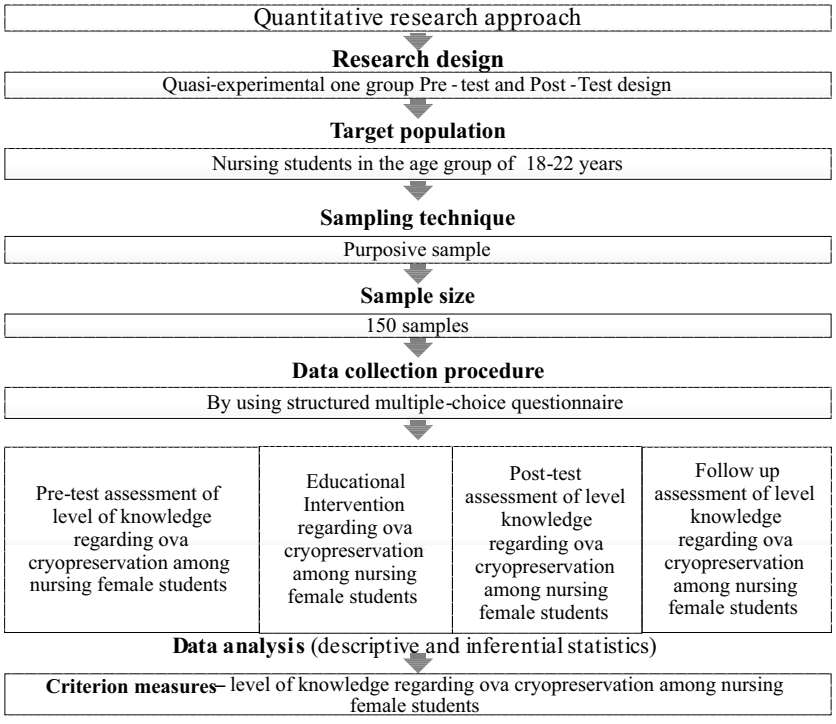


Figure 1: Schematic Representation of Research Methodology

Ethical Consideration

The research obtained ethical clearance from the Research Ethics Committee, Assiut University, Egypt with reference number 1120251107 on 25th May 2025.

RESULTS

Table 1: Distribution of Nursing Students According to Demographic Data (n=150)

Demographic Data	N	Percentage (%)
Age (mean±SD)		
	21.63±0.909	
Grade		
3rd year	75	50.0
4th year	75	50.0
Marital Status		
Married	7	4.7
Single	142	94.6
Divorced	1	0.7
Residence		
Rural	91	60.7
Urban	59	39.3
Pre-University Qualification		
Secondary school	105	70.0
Technical institute of health/nursing	45	30.0

As shown in Table 1, the participants' mean age was 21.63 years (SD = 0.91). Most students were single (94.6%), 60.7% lived in rural areas, and 70.0% had completed secondary school as their pre-university qualification.

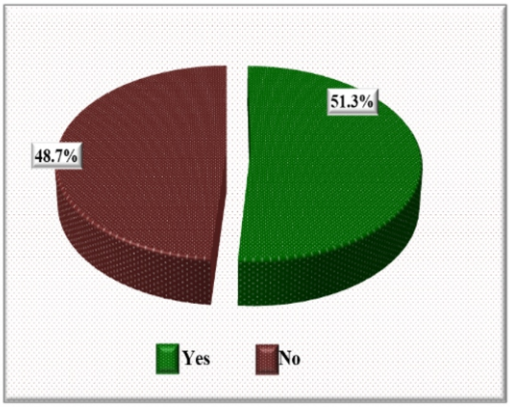


Figure 2: Background Knowledge about Ova Cryopreservation (n=150)

Figure 2 depicts that more than half of the students (51.3%) reported having prior information about oocyte cryopreservation.

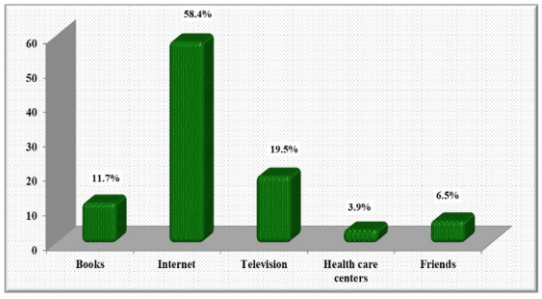


Figure 3: Source of Knowledge of Ova Cryopreservation (n=77)

The internet was the most common source of prior information (58.4%), followed by television (19.5%).

Table 2: Distribution of Studied Students According to Total Knowledge Level about Ova Cryopreservation before, after, and at Follow-up of the Program (n = 150)

Level of Knowledge	Pretest		Posttest		Follow up	
	N	%	N	%	N	%
Good	2	1.3	125	83.4	118	78.7
Moderate	72	48.0	23	15.3	29	19.3
Poor	76	50.7	2	1.3	3	2.0

Note: The Friedman test was applied to the repeated total knowledge scores. A statistically significant difference was observed across the three assessments (Friedman $\chi^2(2) = 221.136$, $p < 0.001$).

Table 2 shows that the proportion of students with a good level of knowledge increased from 1.3% at pre-test to 83.4% at post-test and 78.7% at follow-up. The proportion with a poor level of knowledge decreased from 50.7% at pre-test to 1.3% at post-test and 2.0% at follow-up. These findings indicate a marked improvement in the distribution of knowledge levels following the educational program.

Table 2a: Distribution of the Students according to Knowledge about Ova Cryopreservation Pre, Post, and at Follow-up of the Program (n = 150)

Item	Pre-test Correct n (%)	Pre-test Incorrect n (%)	Post-test Correct n (%)	Post-test Incorrect n (%)	Follow-up Correct n (%)	Follow-up Incorrect n (%)	Cochran's Q	*P*-value
Ova cryopreservation (OC) is a	39 (26.0)	111 (74.0)	117 (78.0)	33 (22.0)	112 (74.7)	38 (25.3)	95.317	0.001**
Types of ova cryopreservation	80 (53.3)	70 (46.7)	136 (90.7)	14 (9.3)	132 (88.0)	18 (12.0)	66.545	0.001**
Indications for medical ova cryopreservation	79 (52.7)	71 (47.3)	135 (90.0)	15 (10.0)	129 (86.0)	21 (14.0)	25.159	0.001**
Indications for nonmedical ova cryopreservation	103 (68.7)	47 (31.3)	127 (84.7)	23 (15.3)	122 (81.3)	28 (18.7)	46.422	0.001**
The suitable age for ova cryopreservation	90 (60.0)	60 (40.0)	130 (86.7)	20 (13.3)	127 (84.7)	23 (15.3)	34.628	0.001**
Number of ova required for ova cryopreservation	33 (22.0)	117 (78.0)	118 (78.7)	32 (21.3)	113 (75.3)	37 (24.7)	101.86	0.001**
Time required for ova retrieval from the ovaries	44 (29.3)	106 (70.7)	119 (79.3)	31 (20.7)	117 (78.0)	33 (22.0)	89.089	0.001**
Temperature required for the ova storage process	32 (21.3)	118 (78.7)	126 (84.0)	24 (16.0)	123 (82.0)	27 (18.0)	139.23	0.001**
Complications of ova cryopreservation	41 (27.3)	109 (72.7)	121 (80.7)	29 (19.3)	119 (79.3)	31 (20.7)	111.50	0.001**
Laboratory tests needed for ova cryopreservation	105 (70.0)	45 (30.0)	118 (78.7)	32 (21.3)	103 (68.7)	47 (31.3)	4.374	0.112
Hormonal therapy required to stimulate ovulation	84 (56.0)	66 (44.0)	131 (87.3)	19 (12.7)	136 (90.7)	14 (9.3)	64.130	0.001**
Vitrification is essential for ova cryopreservation	84 (56.0)	66 (44.0)	143 (95.3)	7 (4.7)	143 (95.3)	7 (4.7)	96.694	0.001**
A woman's fertility decreases with advanced age	93 (62.0)	57 (38.0)	144 (96.0)	6 (4.0)	147 (98.0)	3 (2.0)	87.714	0.001**
Ova cryopreservation can prolong a woman's fertility	62 (41.3)	88 (58.7)	140 (93.3)	10 (6.7)	138 (92.0)	12 (8.0)	123.58	0.001**
Overall health and fitness level is a better indicator of fertility than age	78 (52.0)	72 (48.0)	88 (58.7)	62 (41.3)	77 (51.3)	73 (48.7)	1.982	0.371
There is a significant decrease in a woman's ability to become pregnant over 37 years	71 (47.3)	79 (52.7)	145 (96.7)	5 (3.3)	141 (94.0)	9 (6.0)	120.837	0.001**

*Note: **Statistically significant ($p \leq 0.001$)*

Table 2b: Distribution of the Students according to Knowledge about Ova Cryopreservation Pre, Post, and at Follow-up of the Program (n = 150)

Items	Pre-test Correct n (%)	Pre-test Incorrect n (%)	Post-test Correct n (%)	Post-test Incorrect n (%)	Follow-up Correct n (%)	Follow-up Incorrect n (%)	Cochran's Q	*P*-value
Ova cryopreservation knowledge is important for me as a healthcare provider	86 (57.3)	64 (42.7)	145 (96.7)	5 (3.3)	140 (93.3)	10 (6.7)	91.743	0.001**
The process of freezing and storage of ova must be followed up	91 (60.7)	59 (39.3)	150 (100.0)	0 (0.0)	144 (96.0)	6 (4.0)	103.70	0.001**
Ova cryopreservation banks should be accredited and follow standards	97 (64.7)	53 (35.3)	149 (99.3)	1 (0.7)	142 (94.7)	8 (5.3)	79.633	0.001**
Infection control precautions must be used during the ova cryopreservation procedure	105 (70.0)	45 (30.0)	146 (97.3)	4 (2.7)	143 (95.3)	7 (4.7)	56.982	0.001**
Dar Al-Ifta statements that ova cryopreservation is permissible	82 (54.7)	68 (45.3)	143 (95.3)	7 (4.7)	138 (92.0)	12 (8.0)	90.55	0.001**

*Note: Cochran's Q test was used to compare students' knowledge across the three assessment periods. A p-value < 0.05 was considered statistically significant. ** indicates a highly statistically significant result (reported p = 0.001*)

Tables 2a and 2b describe that post-implementation of an educational program, there was a remarkable improvement in students' knowledge with a highly significant difference ($P \leq 0.001$) as evidence, (26.0% and 29.3%), respectively, of students having correct knowledge about the definition of ova cryopreservation and the time required for ova retrieval from the ovaries pre-implementation of the program. While improved to 78.0% and 79.3%, respectively, post-program. Also, 62% and 54.7%, respectively, of students have correct knowledge about women's fertility decreasing with advanced age and Dar Al-Ifta statements that ova cryopreservation is permissible, pre-implementing the program. While improved to 96.0% and 95.3%, respectively, post implementing the program.

DISCUSSION

Ova Cryopreservation (OC) is an advanced reproductive health technology that is gaining increasing attention worldwide for both medical and nonmedical purposes. This technology offers women the opportunity to preserve their fertility, whether for medical reasons that may affect their reproductive potential or for personal reasons, such as postponing marriage and childbearing (Al Ghaithi *et al*., 2023). Future nurses should possess adequate knowledge about fertility preservation technologies to provide appropriate information and counseling to women interested in these services. Therefore, the present study was conducted to evaluate the effectiveness of an educational program in improving nursing students' knowledge regarding ova cryopreservation. The study included female nursing students from the Faculty of Nursing at South Valley University, Egypt. Half of the participants were in the third academic level, while the other half were in the fourth level. Their ages ranged between 21 and 22 years. The students showed considerable interest in the study, as many had previously heard about ova cryopreservation through mass media and had limited background knowledge about the technology. They also expressed curiosity and enthusiasm to gain further information about this topic.

The main finding of the present study demonstrated a significant improvement in the students' overall knowledge of ova cryopreservation following the implementation of the educational program, with the improvement generally maintained at follow-up. These findings are consistent with Gouda Ahmed *et al*. (2025), who reported substantial improvements in nurses' knowledge and attitudes following an educational intervention, with the positive changes maintained during the follow-up phase. Similarly, Ashour *et al*. (2023)

reported that healthy women had limited knowledge about oocyte cryopreservation before an educational intervention, whereas their knowledge improved considerably afterward. Also, Mohamed *et al*. (2026) likewise reported improved knowledge after an educational intervention, highlighting the importance of integrating oocyte cryopreservation education into premarital counseling. In contrast, Akhondi *et al*. (2023) found that more than half of the students had a moderate level of knowledge, which may reflect differences in participants' backgrounds and previous exposure to reproductive health information.

Regarding sources of background knowledge, the internet was the most frequently reported source, followed by television, books, friends, and healthcare centers. These findings are consistent with Giannopapa *et al*. (2022) and Mohamed *et al*. (2026), who identified the internet and social media as important sources of information about fertility preservation. However, Sandhu *et al*. (2023) reported that healthcare professionals were the preferred source of information. This difference may be related to variations in the study populations and their access to professional healthcare advice.

Concerning specific knowledge items, the present study showed considerable improvement in students' understanding of the definition of ova cryopreservation and its medical indications following the educational program. These findings are consistent with Abdel-Wahab *et al*. (2025) and Mohamed *et al*. (2023), who reported improved knowledge following educational interventions. Furthermore, Gambadauro *et al*. (2023) found that Swedish female university students expressed acceptance of oocyte cryopreservation for medical indications and age-related reproductive concerns. In contrast, Nouh *et al*. (2025) reported that less than half of the participants were aware of the medical indications for oocyte cryopreservation. The improvement observed in the present study may be attributed to the structured educational content, which provided students with relevant information about the procedure and its applications.

The present study also demonstrated improved awareness among female nursing students regarding the relationship between advancing age and declining female fertility after implementation of the educational program. This finding is in line with Sayegh *et al*. (2023), who reported an association between age and consideration of ova cryopreservation. However, Wainwright *et al*. (2025) reported incomplete awareness of age-related fertility decline among women. This difference may be attributed to the nursing students' academic background and their exposure to reproductive health-related information.

Regarding nonmedical indications, students demonstrated better knowledge following the educational program. This finding is consistent with Alzahrani *et al*. (2025) and Saadia *et al*. (2024), who discussed women's awareness and perceptions of oocyte cryopreservation for nonmedical reasons. Furthermore, students' understanding of the religious permissibility of ova cryopreservation improved following the educational intervention, which is consistent with Mohamed *et al*. (2023). However, this finding differs from Alzahrani *et al*. (2025), who reported that religious concerns were among the issues influencing participants' perceptions of oocyte cryopreservation.

It is important to note that the improvement was not consistent across all individual knowledge items. In particular, no statistically significant differences were observed across the assessment periods regarding knowledge of the laboratory tests required for ova cryopreservation or the belief that overall health and fitness are better indicators of fertility than age. These findings indicate that, although the educational program was effective in improving overall knowledge and most individual knowledge areas, certain concepts may require further clarification and more focused educational strategies. Additional emphasis on the medical investigations required before the procedure and the factors influencing female fertility may help address these knowledge gaps.

Overall, the findings support the effectiveness of the educational program in improving nursing students' overall knowledge of ova cryopreservation. Nevertheless, the variation in results across individual knowledge items highlights the importance of providing comprehensive and focused educational content to ensure that nursing students develop a well-rounded understanding of fertility preservation technology.

Nursing students should receive structured educational programs and counseling regarding ovary

cryopreservation to enhance their knowledge and support informed reproductive health decisions. Information about ova cryopreservation should be incorporated into nursing curricula. Simplified, comprehensive, evidence-based educational booklets should be provided to medical and nonmedical students. Mass media platforms, including the internet, television, and radio, should be utilized to disseminate accurate information and increase public awareness.

Limitations

This study faced challenges that may have affected the generalizability of the results. First, the sample was limited to female nursing students meeting specific inclusion criteria. Second, students' lecture schedules and activities made gathering them difficult, so a WhatsApp group was created to share educational videos and media.

Future Scope

Further research should use larger, more representative samples from multiple educational institutions to enhance generalizability. Future studies should consider controlled or comparative designs to evaluate educational interventions' effectiveness in improving knowledge, attitudes, and awareness regarding ova cryopreservation. Additionally, research should explore effective strategies for providing accurate and accessible information to females from diverse educational and social backgrounds.

Conclusion

The findings demonstrated that the educational program regarding oocyte cryopreservation significantly improved female nursing students' knowledge, as assessed before, after, and at follow-up, providing evidence of knowledge improvement and retention. These findings highlight the value of structured educational programs in enhancing nursing students' understanding of oocyte cryopreservation.

Based on these findings, the study aim was achieved, and the research hypothesis was supported, emphasizing the importance of incorporating evidence-based educational content about oocyte cryopreservation into nursing education.

CRediT Authorship Contribution Statement

E.A.M.: Conceptualization, Methodology, Writing – original draft. **A.F.A.:** Visualization, Formal Analysis. **N.H.A.:** Data Curation, Supervision. All authors contributed to data analysis, writing – review and editing, approved the final version of the manuscript for publication, and agreed to be accountable for all aspects of the work.

AI Assistance Declaration

The authors declare that generative AI tools (ChatGPT and Microsoft Copilot) were used only for language enhancement and grammar collection during the preparation of this manuscript. The authors have carefully reviewed and revised the content and taken full responsibility for the final revision of the manuscript.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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REFERENCES

Abd-Elfattah, N., Mohamed, A. S. A. E., & Hassan, H. (2025). Effect of an Educational Program on Women's Intention Regarding Oocyte Cryopreservation. *Journal of Comprehensive Nursing Research and Care, 10*(2), 1-8. https://doi.org/10.33790/jcnrc1100221.

Abdel-Wahab Afifi Araby, O., Gamal El-said, G., Ramadan Mohammed Abd-Elwahab, A., & Hashem Elsalous, S. (2025). Effect of Nano-Educational Sessions on Awareness, Willingness and Barriers toward Elective Oocyte Cryopreservation among Unmarried Females. *Journal of Nursing Science Benha University, 6*(1), 100-131. https://doi.org/10.21608/jnsbu.2025.405110

Akhondi, M. M., Ardakani, Z. B., Warmelink, J. C., Haghani, S., & Ranjbar, F. (2023). Knowledge and beliefs about oocyte cryopreservation for medical and social reasons in female students: a cross-sectional survey. *BMC Women's Health, 23*(1), 336. https://doi.org/10.1186/s12905-023-02481-2

Al Ghaithi, A., Al Rashdi, E., Al Shukri, M., Al Ghabshi, R., & Albalushi, H. (2023). Oncologists' knowledge, practice and attitude toward fertility preservation: A ational survey. *Life, 13*(3), 801. https://doi.org/10.3390/life13030801

Alzahrani, F. A., Al-Jaroudi, D., Alsufyan, H. A., Alzahrani, A. A., Alshehri, S. A., Jalwi, S. S., & Miskeen, E. (2025). Experiences and perspectives of women undergoing oocyte cryopreservation in Riyadh, Saudi arabia: A Mixed-Methods study. *International Journal of Women's Health*, 879-895. https://doi.org/10.2147/IJWH.S496633

American Society for Reproductive Medicine (ASRM), Practice Committee. (2026). Fertility preservation in patients with medical indications: A committee opinion. *Fertility and Sterility, 125*(2), 247–259. https://doi.org/10.1016/j.fertnstert.2025.12.001

Ashour, E. S., Khalil, A. K., Soliman El-Hosary, E. A., Ali Abd El-Salam, A., & Abu Setta, S. (2023). Effect of an educational intervention on knowledge, attitude, and beliefs of unmarried healthy females regarding oocyte cryopreservation. *Egyptian Journal of Health Care, 14*(1), 1420–1433. https://doi.org/10.21608/ejhc.2023.361374

Belal, G. A. E. S., El Mezayen, S. E. S., & El-Nagar, A. E. (2023). Effect of Virtual Educational Program on Female Faculty Nursing Students' Perception toward Egg Freezing Technology and their Fears regarding it. *Tanta Scientific Nursing Journal, 31*(4), 103-125. https://doi.org/10.21608/tsnj.2023.328664

Bogiatzi, I., Kyrkou, G., Gourounti, K., Bothou, A., Tsoukala, E., Dourou, P., Petrogiannis, N., Jotautis, V., & Sarantaki, A. (2026). Awareness and Decisions Regarding Elective Oocyte Cryopreservation (EOC) in Greece: *A Cross-Sectional Study on Generation Z. Reproductive Medicine, 7*(1), 15. https://doi.org/10.3390/reprodmed7010015

Gabr, E. M. M., El-leithy, W. I., Ahmed, H. M. M., Mohamed A, N. A., Ayed, M. M. A., Elshafiae, E. M. H., Deyab, B. A., Ali Abd Alla, H. G. A., Elshafie, W. H. K., Murad, M. A., Habadi, M. I., & Ragab, A. S. A. (2025). Effectiveness of social media platforms-based nursing education regarding cryopreservation on knowledge, attitude, and practice among women having cancer. *American Journal of Psychiatric Rehabilitation, 28*(2), 68-82. https://doi.org/10.69980/ajpr.v28i2.351

Gambadauro, P., Bränn, E., & Hadlaczky, G. (2023). Acceptance and willingness-to-pay for oocyte cryopreservation in medical versus age-related fertility preservation scenarios among Swedish female university students. *Scientific Reports, 13*(1), 5325. https://doi.org/10.1038/s41598-023-32538-z

Giannopapa, M., Sakellaridi, A., Pana, A., & Velonaki, V. S. (2022). Women electing oocyte cryopreservation: characteristics, information sources, and oocyte disposition: a systematic review. *Journal of Midwifery & Women's Health, 67*(2), 178-201. https://doi.org/10.1111/jmwh.13332

Gouda Ahmed, E. A. G., Mohamed Hables, R. M., & Fathy Ali, F. T. (2025). Efficacy of Educational Package on

Oncology Nurses' Knowledge and Attitude towards Oocyte Cryopreservation. *Assiut Scientific Nursing Journal, 13*(52), 245-260. https://doi.org/10.21608/asnj.2025.390789.2103

Latif, S., Martins Da Silva, S., Davies, M., Mavrelos, D., Foo, X., Sangster, P., Lane, S., & Yasmin, E. (2022). Fertility preservation provision in the NHS: A national assessment of care policies. *Human Fertility, 26*(3), 433-438. https://doi.org/10.1080/14647273.2022.2045519

Mohamed, A. S. A. F., Hassan, P., & Abd Alfatah, N. H. (2026). Oocyte Cryopreservation Knowledge, Attitude, and Intention: Effect of an Educational Program on Working Females at Beni-Suef University. *Journal of Health Care Research, 3*(1), 199-221. https://doi.org/10.21608/JHCR.2026.410856.1070

Mohamed, E. E., Gad, A. H., Hussein, A. A., & Attia, N. M. (2023). Effect of educational program on university nursing students' knowledge regarding ova cryopreservation technology. *Zagazig Nursing Journal, 19*(2), 39–56. https://doi.org/10.21608/znj.2023.303882

Nouh, F. M., Abualruz, H., Khalil, A. K., Ezzat El-Gobashy, R., Alasser, A. M. F., Shaban Abdullah, A. I., Al Hrinat, J., Ghaleb Hendi, A., AL-Zoubi, M., Al Rahbeni, T., Al-Mugheed, K., Farghaly Abdelaliem, S. M., & Ahmed Shahin, H. E. (2025). Assessing the knowledge, attitudes, and perceptions of ovarian cryopreservation technology among women with ovarian diseases. *Frontiers in Public Health, 13*, 1612492. https://doi.org/10.3389/fpubh.2025.1612492

Petersen, T. S., & Hansen, R. (2022). Company-sponsored egg freezing: An offer you can't refuse? *Bioethics, 36*(1), 42–48. https://doi.org/10.1111/bioe.12966

Ramirez, T., & Pavone, M. E. (2024). Exploring the frontiers of ovarian tissue cryopreservation: A review. *Journal of Clinical Medicine, 13*(15), 4513. https://doi.org/10.3390/jcm13154513.

Saadia, Z., Alharbi, R. M., Alanazi, N. K., Alabdulaaly, G. S., Alsaqabi, M. S., Alharbi, W. A., Albarrak, R. M., & Alrubaish, Y. F. (2024). Knowledge, attitudes, and perceptions of women of reproductive age regarding fertility and elective oocyte cryopreservation: A study from the Al-Qassim region. *Cureus, 16*(9), e69903. https://doi.org/10.7759/cureus.69903

Sandhu, S., Hickey, M., Braat, S., Hammarberg, K., Lew, R., Fisher, J., ... & Eggsurance Collaborative Group Agresta F Lieberman D Anderson R Norman R Hart R Johnson L Michelmore J Parle A Summers F Allingham C. (2023). Information and decision support needs: a survey of women interested in receiving planned oocyte cryopreservation information. *Journal of Assisted Reproduction and Genetics, 40*(6), 1265-1280. https://doi.org/10.1007/s10815-023-02796-x

Sayegh, L., Coussa, A., Kadhom, M., Neinavaei, N., & Hasan, H. (2023). Knowledge and attitude of reproductive-aged women towards planned oocyte cryopreservation in the United Arab Emirates. *Journal of Assisted Reproduction and Genetics, 40*(3), 609–616. https://doi.org/10.1007/s10815-023-02715-0

Wainwright, E., Ali, Z., Lawrie, L., Getreu, N., & O'Neill, H. C. (2025). Fertility awareness in 97,414 women trying to conceive: gaps, misconceptions, and implications for reproductive education. *Reproductive Health, 22*(1), 152. https://doi.org/10.1186/s12978-025-02079-x