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Effectiveness of Social Media Platforms Based Nursing Education Regarding Cryopreservation on Knowledge, Attitude, and Practice Among Women Having Cancer

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Abstract

Background: Over the past years; major advancements have been made in the field of egg, sperm, and embryo cryopreservation, it is critical to use the new methods of educational resources that improve women's knowledge, attitude, and practice.

The Aim: Evaluate the effectiveness of social media platforms based nursing education regarding cryopreservation on knowledge, attitude, and practice among women having cancer.

Methods: to conduct the study a quasi-experimental design pre-posttest was used.

Setting: The study was applied in the outpatient clinic at Sohag Oncology Institution**.**

Sample: 100 women with cancer were included, and a non-probability purposive sample was used.

Tools: Four tools were used for Data collection: (I) personal data, (II) knowledge assessment sheet (Pre - Post assessment)**,** (III) attitude scale (Pre - Post assessment), and (IV) reported practice assessment sheet (Pre - Post assessment)**.**

Results: a highly statistically significant difference between knowledge, attitude, and reported practice scores pre and post-social media platforms education.

Conclusion: social media platform based nursing education has a positive effect on improving knowledge, attitude, and practice among women having cancer post-education as compared to before. **Recommendations**: Integrating social media platforms based nursing education for teaching as an innovative technology method of guidance in the routine care of women having cancer. The present study can be replicated on a large sample to generalize results.

Keywords: Attitude, Cryopreservation, Knowledge, Practice, Social Media Platforms based nursing nursing, Women having cancer.

Introduction

The procedure of removing ovarian tissues and slowly freezing them at 196 °C (-321 °F) before keeping them in liquid nitrogen is known as cryopreservation. To enable a normal conception, tissue can then be thawed and implanted where it begins to make new ova. Recent advancements in cancer treatment have made chemotherapy and radiation more effective than in the past, and cancer patients frequently have favorable long-term

prognoses that enable them to lead healthy lives. Their desire to have a kid is one of the main components of a healthy life (Dittrich et al., 2020). A potential irreversible reduction or complete loss of ovarian reserve may arise from the gonadotoxic effects of many chemotherapy and radiation treatment regimens (Isachenko & Mallmann 2024).

In young women with lymphoma, leukemia, and other cancers, one of the main long-term side effects of chemotherapy and radiation therapy is loss of fertility, and chemotherapy regimens have varying genotoxic effects (Dittrich et al., 2020). Several pathophysiologic mechanisms could be involved in the effect. Alkylating compounds are the most genotoxic chemotherapeutic drugs, and they can have a toxic effect on tissues with high turnover, like bone marrow and ovarian follicles (Khan-Dawood, 2019). Alkylating agents may cause follicular depletion and direct oocyte destruction, which may result in ovarian cortical fibrosis and ovarian blood vessel damage. Based mostly on the chemotherapeutic doses, the documented incidence of early ovarian failure following various cancer types and chemotherapy regimens can vary in doses used and age range female (Carmeliet, 2023).

The goal of radiation therapy is to destroy cancer cells by using high-energy beams. Women's ovaries can also be harmed by this radiation. Infertility in women undergoing radiation therapy to the abdomen or pelvis is contingent upon the amount of radiation that the ovaries absorb. Excessive dosages might harm the ovaries and eggs, resulting in early menopause and infertility. Fertility is lost in the majority of women who get pelvic radiation. Radiation to the brain can sometimes impact the pituitary gland, which disrupts signals to the ovaries to produce hormones that impact ovulation. The focus and radiation dose may have an impact on fertility (Metzger et al., 2023; National Cancer Institute, 2022).

There is now a lot of interest in preserving fertility among young girls who have received gonadotoxic chemotherapy and radiation therapy due to the recent rise in cancer prevalence and survival rate (Donnez & Jadoul 2019). During cancer treatment, young females may suffer from fertility loss after chemotherapy or radiation therapy (Tschudin & Bitzer, 2023). Recent studies have confirmed that the potential loss of fertility has a significant effect on young women and can occasionally be more severe than the cancer diagnosis itself (Schover, 2020, Partridge et al., 2024). About 120,000 young women in the US receive a cancer diagnosis each year, according to data released by "Surveillance Epidemiology and End Results" SEER (2019)." According to Tschudin et al. (2022), only 34–72% of them participated in a discussion session regarding the detrimental effects of radiation and chemotherapy on future fertility.

Insufficient knowledge of the latest trends in fertility preservation, lack of time to discuss the issue, the belief that women cannot postpone chemotherapy or radiation until fertility preservation is completed, and the belief that women would not be interested in discussion sessions if they did not bring up the topic themselves are some of the reasons given by healthcare providers for the lack of such conversations with female patients (Quinn et al., 2023). Additionally, the majority of women attend these sessions shortly before beginning cancer treatment, leading them to assume that they are unable to see an obstetrician without postponing scheduled chemotherapy (Madrigrano et al., 2020). Premature artificial menopause and the possibility of infertility linked to chemotherapy are therefore major concerns for such a group of females (Carter et al., 2019).

According to recent studies, following receiving a cancer diagnosis and treatment, up to 75% of young female cancer patients express a desire to start a family. Young women may lose the opportunity to preserve their fertility before beginning cancer treatment if they are not informed about the hazards that chemotherapy and radiation bring to their fertility (Lee et al., 2022). Over the past years; considerable improvements have been made in the field of egg, sperm, and embryo cryopreservation. It is necessary to educate young women with cancer about the various options available to preserve their fertility (Letourneau et al., 2021). The American Society of Clinical Oncology advises young women who may wish to have children following cancer treatment to receive counseling regarding different fertility preservation modalities (Lee et al., 2022).

Numerous strategies have been suggested for preserving fertility in women receiving gonadotoxic chemotherapy or radiation treatments. These include embryo freezing, ovarian tissue cryopreservation, unfertilized metaphase-II ova, and ovarian translocation of the ovaries (Weissman & Gotlieb 2019). For women who had gonadal-toxic chemotherapy, ovarian tissue cryopreservation with the potential for retransplantation is an effective strategy to maintain fertility (Wood & Montali 2019). Live births following re-transplantation from cryopreserved ovarian tissue have been documented in numerous cases worldwide in recent years (Isachenko & Isachenko, 2023).

The first ovarian transplant using cryopreserved ovarian tissue was performed by Dr. Kutluk Oktay in 1999. Prof. Donnez of Belgium reported the first successful birth from frozen ovarian tissue in 2004, five years later. Tiny ovarian cortex samples were taken from a lady who had Hodgkin's lymphoma in 1997. They were cryopreserved in a rate freezer (Planer, UK) and then kept in liquid nitrogen. In 2003, chemotherapy was initiated for a woman who experienced premature ovarian failure. Laparoscopy was used to do an auto-transplantation of ovarian cortical tissue. Investigations revealed that regular ovulatory cycles had been established five months after re-implantation. "Tamara" was born alive after the pregnancy was confirmed 11 months later. Additionally, Chronopoulou et al. (2021) reported that fertility preservation entails utilizing a sophisticated, specific method to preserve eggs from the ovary to have biological children in the future. According to Muaygil (2023), egg freezing is done for both "medical" and "non-medical or social" reasons. She also gives labels for both purposes. To preserve virginity until marriage, Hasab Allah et al. (2021) suggested that oocyte retrievals be carried out trans-anally or via a laparoscope rather than the vagina.

Accordingly, cryopreservation is a unique and significant advanced reproductive method for fertility preservation, according to Walker et al. (2022). The egg harvesting procedure, however, involves "2-4 weeks of self-administered hormone injections and birth control pills to temporarily turn off natural hormones" and "10–14 days of hormone injections to motivate the ovaries and ripen numerous eggs" (Nicolette, 2021). Thus, to have a higher than 50% chance of a live delivery at age under 35, a woman needs to freeze at least 10 oocytes.

By improving their knowledge, changing their attitude, and practicing cryopreservation, nurses can help women with cancer make changes in their health-related behaviors. Education is the use of interactive processes aimed at the health needs or problems of the individual and significant others to improve or support coping with disease or health problems (EdwinFrancis et al., 2019).

Education for cancer patients is seen to be one of the best ways to increase understanding, attitudes, and cryopreservation practices. Without adequate education, women might not be aware of the possibility of freezing a portion of their ovarian tissues to maintain their fertility. The opportunity to preserve fertility may be lost due to illiteracy. For the purpose of delivering the best possible therapeutic services, healthcare professionals—particularly nurses who work with cancer patients—should be knowledgeable about the latest developments in fertility preservation techniques (Shayo (2021) and McLeod (2023).

The media exposure that women receive from reading newspapers, watching TV, and listening to the radio may lead them to look for maternity healthcare services. The phrase "mass media" describes any written, spoken, or broadcast communication intended for a larger audience. The media is a vital tool for integrating society (Viswanath et al., 2020). Mobile health services may be a component of innovative methods to modify behavior for improved health in addition to face-to-face interactions. Numerous apps are available on smartphones, such as Instagram, WhatsApp, email, short message service (SMS), and more, based on the needs of the user. Dewi et al. (2019) state that although WhatsApp media has replaced SMS and MMS, medical practitioners can still use SMS to remind patients to take their prescriptions at a fair price. A popular app that facilitates communication is WhatsApp. The term "mobile health" or "mHealth" refers to the application of wireless and mobile communication technology to improve healthcare delivery, outcomes, and research. Traditional obstacles to knowledge of geography, economics, and literacy can be addressed with the aid of digital technology (Ouedraogo, 2021).

It has been demonstrated that utilizing mHealth to enhance and increase knowledge of them is among the most economical approaches available globally, especially for low- and middle-income countries (LMICs) (Aung et al, 2020). In addition to or instead of in-person services, a range of single or combination mobile phone interventions, such as voice messages, SMS, videos, and applications, have been employed **(Hill et al, 2020).**

Significance of the Study:

Over time, the prevalence of reproductive cancer is rising. The American Society of Clinical Oncology (ASCO) has developed guidelines for oncology healthcare providers regarding potential fertility preservation modalities and related issues due to the increased incidence and significant complications resulting from treatment options (Lee et al., 2022). The guidelines state that healthcare providers should first and foremost explain the possibility of infertility to young females during treatment planning and be prepared to discuss potential fertility preservation methods or refer appropriate and interested females to reproductive specialists as soon as possible.

According to studies, there are encouraging outcomes when seeking fertility preservation and obtaining targeted counseling regarding the reproductive loss brought on by chemotherapy or radiation therapy for the treatment of reproductive cancer. Few cancer patients are aware of this possible advantage of counseling, even though the results include improved quality of life and decreased melancholy. Young women should receive appropriate counseling and be allowed to actively choose how to preserve their fertility (Canada & Schover, 2024).

Social media platforms such as Facebook, Instagram, WhatsApp, Snapchat, and Twitter have made it possible to communicate consistently and efficiently by eliminating the barriers associated with in-person conversations. Social media is seen by patients as a means of learning about their conditions, facilitating rapid and efficient communication with others, and sharing medical records with other patients experiencing comparable difficulties (Alduraywish et al., 2020). The fact that social media platforms, together with mobile applications and communication technologies, are at the forefront of healthcare innovation is becoming more and more evident. This has been demonstrated to have a significant impact on women's health outcomes is limited. Thus, the purpose of this study is to evaluate the effectiveness of social media platform based nursing education regarding cryopreservation on knowledge, attitude, and practice among women having cancer.

Operational Definition:

Social media Platform education:

Making an "online community for us all" and fostering social relationships were the initial goals of social media marketing. Postpartum mothers in the current study were instructed on how to utilize contraceptive techniques through social media (either Facebook, Viber, or What's App), and they had internet access on their phones (either mobile data or WiFi at home). Direct calls from mobile phones, messages sent via the WhatsApp app, interactive materials, images, videos, and answering questions, in addition to the vision calls for taking part in online forums.

Cryopreservation:

The procedure involves removing ovarian tissue and slowly freezing it at 196 °C (-321 °F) before storing it in liquid nitrogen. Normal conception can then take place by thawing the tissue and implanting it where it begins to create new ova.

Aim of the Study

This study aimed to evaluate the effectiveness of social media platforms based nursing education regarding cryopreservation on knowledge, attitude, and practice among women having cancer.

Research Hypotheses

H1: There was an improvement in knowledge, attitude, and practice among women having cancer following the adoption of social media platforms based nursing education.

Subject and Methods

Research Design

To conduct the study a quasi-experimental design pre-posttest on group was used.

Setting:

Setting: The study was applied in the outpatient clinic at Sohag Oncology institution

Sample Type:

A non-probability purposive sample was utilized.

Sample Size Calculation:

Using paired sample t-testing and G*power, the sample size was determined to be 90 women with a medium-low effect size of 0.15, a power of 0.95, and a p-value of 0.05. Up to 100 women will be included in the sample to guarantee a representative sample.

Sampling Technique:

Study Subjects:

One hundred women having cancer were recruited from the previously mentioned setting to share in this study according to the following:

Inclusion and Exclusion Criteria:

The current study's subjects were recruited based on the following criteria:

Women with cancer who have a smartphone and internet connection, who can read and write, who use social media (such as Facebook, Viber, or What's App), and who have access to the internet through their phone (either domestic Wi-Fi or mobile data). Received no prior cryopreservation instruction. Women who were excluded from the current study have been diagnosed with learning difficulties such as dementia or vision impairment.

Data Collection Tools

Four tools were used for Data collection:

Data collection tools were developed after an extensive review of the literature **(Khattak et al. (2022); Nicolette, 2021**; Shayo, 2021)

Tool: (I) personal data, **It covered data related to personal data such as telephone Mobil number, age, educational level, occupation, and residence**.

Tool: (II) knowledge assessment sheet (Pre - Post assessment). It included knowledge about cryopreservation: used to assess women's knowledge about cryopreservation before and after education. It consisted of ten closed-ended

questions. It Included the Definition of cryopreservation, the fertility preservation techniques, the advantages of cryopreservation, the benefits of cryopreservation, and the importance of cryopreservation as a modality for fertility preservation. Also, general knowledge about cancer and its effect on fertility, the Definition of cancer Fertility issues, Effect of cancer on fertility, Effect of chemotherapy on fertility, Effect of radiotherapy on the pelvic region on fertility, fertility preservation techniques in general, Cryopreservation of unfertilized human oocytes Ovarian tissue cryopreservation, Embryo cryopreservation Fertility-sparing surgery Transposition of the ovaries, cryopreservation Process and steps.
The instrument was scored as: 2 for correct answer, 1 for do not know, and 0 for wrong answer. The total score ranged from 0 to 20. Satisfactory knowledge was more than 60% and unsatisfactory knowledge was less than 60%

Tool: (III) attitude scale (Pre - Post assessment) It involved Attitude toward cryopreservation: used to assess women's attitude toward cryopreservation such as I am concerned about preserving my fertility before starting chemotherapy/ radiotherapy**,** Without cryopreservation/ radiotherapy I will be childless**,** I think that having cryopreservation will hurt my relationship with future spouse? If I have cryopreservation, I will inform my friends and relatives. If one needs cryopreservation, the decision should be taken by self, parents, and physician only, A future child should never know that he/she is born after fertility preservation, It is necessary to have psychological education before cryopreservation, and cryopreservation, I think that I will preserve fertility through cryopreservation**. It was a three-point Likert Scale: (0) disagree, (1) neutral and (2) agree. It consisted of ten statements. The total score ranged from 0 to 20. A total score of 0 to 10 indicated a negative attitude and a total score of 10 to 20 indicated a negative attitude.**

Tool: (IV) reported practice assessment sheet (Pre - Post assessment). It is used to assess women's practice toward cryopreservation summarize the procedures and the factors affecting sperm quality in cryopreservation, and discuss the standardization of cryopreservation procedures. A "yes answer" received one point, while a "no answer" received zero. It ranged from 0 to 6. The final score was divided into "adequate and inadequate practices" in the following manner: adequate practices were more than 60% and inadequate practices were less than 60%.

Procedure:
The current investigation was carried out from June 2023 to the end of October 2023. Three days a week, from 9 a.m. to 1 p.m., the researchers were present at the aforementioned location until the determined sample size of women was reached. Preparation, implementation, and evaluation were the three phases of the study.

Preparation phase:
Following a comprehensive examination of the literature, the data collecting procedures were developed, and the study sample was engaged with the educational media's content (videos, eye-catching images, and application groups for social media platforms like Facebook, Instagram, or WhatsApp) and Viber. Women received an introduction, questions, and an explanation of the study's goal. After verifying the participant's eligibility, the researchers acquired their signed consent to take part in the study. Demographic information was gathered using Tool I. Women with cancer had their knowledge, attitudes, and practices assessed using Tools II, III, and IV (pretest).

Tools Validity
Community health nursing, pediatric nursing, maternity nursing specialists, medical and nursing personnel, and five certified subject area experts evaluated the tool for content validity in order to determine the validity of the instruments. Additionally, they were asked to evaluate the items' clarity and completeness. The instruments were updated using suggestions.

Reliability of the Tools:
The researchers used test-retest reliability to assess the instruments' internal consistency. For internal consistency of participant knowledge, the Cronbach alpha coefficient was 0.895; for Likert scale statements used to gauge participants' attitudes, it was 0.877; and for practice, it was 0.924. It was discovered that the surveys were very trustworthy.

Pilot study
To determine the viability of the research procedure, the objectivity and application of the study tools, and the time required to complete them, a pilot study was carried out on 10% of the entire study population. The viability of data collection procedures and the schedule of sessions were designed by the researchers based on the findings of the piloting. Among the study sample were the women who participated in the pilot study.

Ethical considerations:
The research was approved by the Sohag University Hospital's director and the Sohag University Faculty of Nursing's Research Ethics Committee. Every

participant in the study signed a consent form after being informed of the goal and methods of the research. The confidentiality of the data collected was guaranteed to each woman. The choice to withdraw from the study was also allowed. Before beginning the study, all the ladies gave their verbal agreement. The confidentiality of personal information was guaranteed, and it was only utilized for the study.

Implementation Phase:
The researchers added women having cancer to the designed Social Media Platform education groups What's App, Viber, Facebook, and Instagram) as they preferred any applications that can be used by women and pushed information about cryopreservation education on women's knowledge, attitude, and practice.

Social media platforms' educational sessions included: the purpose of the study, steps of intervention, obtaining an oral informed consent, sitting time for other social media platforms educational sessions, and identifying methods of contacting the researchers. Using study instruments I, II, and III the pre-test of knowledge, attitude, and practice was done. At the end of the session, the guiding booklet was given to women. The outlines of the social media platforms educational session included: general knowledge about cancer and its effect on fertility, and fertility preservation techniques in general. Cryopreservation includes items related to the Definition of cryopreservation, the fertility preservation techniques, the advantages of cryopreservation, the benefits of cryopreservation, and the importance of cryopreservation as a modality for fertility preservation. Also, general knowledge about cancer and its effect on fertility, the Definition of cancer Fertility issues, the Effect of cancer on fertility, the Effect of chemotherapy on fertility, the Effect of radiotherapy on pelvic region on fertility, fertility preservation techniques in general, Cryopreservation of unfertilized human oocytes Ovarian tissue cryopreservation, Embryo cryopreservation Fertility-sparing surgery Transposition of the ovaries, cryopreservation Process and steps

Then videos, PowerPoint, and text messages through instant messaging software applications such as Viber, What App, and Facebook-messenger to the content of information displayed by using interactive visualized and animated instructions. Women may see, hear, and communicate with researchers and with one another thanks to the mobile communication health education features. Following the consultation. As needed, the women were contacted by phone or, if they preferred, via social media to discuss the strategy. The session lasted 30 to 40 minutes, and there were roughly 10 sessions overall for everyone who participated in various social media platform groups.

Evaluation Phase:
Using the same instruments as the pre-test, women were interviewed at the end of the fifth week of follow-up in outpatient clinics to evaluate the effectiveness of social media platforms based nursing education regarding cryopreservation on knowledge, attitude, and practice among women having cancer.

Statistical analysis
Version 20 of the statistical package for the social sciences (SPSS) software was used on an IBM-compatible computer to tabulate and analyze the currently gathered data. The standard deviation (X±SD) and mean were used to express quantitative data. Comparing categorical variables was done with the Chi-square ($\chi 2$) test. Using the paired t-test, continuous quantitative variables were compared. The Pearson (r) correlation coefficient for two large continuous variables was computed. To determine significance, the P-value at 0.05 was utilized. A P-value of >0.05 was considered statistically insignificant (NS), a P-value of ≤0.05 was considered statistically significant (S), and a P-value of ≤0.001 was considered highly statistically significant (HS).

Results:
According to **Table 1**, the average age of the studied women was 23.7±2.9 years. Sixty percent of the cancer-stricken women in the study had Secondary education. Of those living there, 77% were housewives and 65% were from rural areas.

The data presented in **Figure 1** indicates that none of the studied women had previously received any instruction on cryopreservation.
As compared to previously, **Table 2** demonstrates a statistically significant improvement in all knowledge items following social media platform instruction (P<0.001). Before studying social media platforms, the average and standard deviation of the total knowledge score was 4.87±2.25, but after learning about social media platforms based nursing education, the score improved to 16.8±2.9.

As seen in **Figure 2**, 95% of the women in the study had satisfactory knowledge after using social media platforms for their education, while 97% had unsatisfactory knowledge at the time of the pretest.
Following instruction on social media platforms, all measures of attitude showed a statistically significant improvement (P<0.001), as seen in Table 3. Prior to studying social media platforms, the

average and standard deviation of the total knowledge score was 8.76±2.82, but after social media platforms based nursing education, the score improved to 14.44±2.3.

Figure 3 demonstrates that just 30% of the women in the study had a positive attitude towards cryopreservation. 85% of the studied women have a positive attitude as a result of social media platforms based nursing education.

Table (4) shows that the mean scores of practical knowledge about cryopreservation before and after social media platform based nursing education showed a significant statistical difference and improvement (p≤0.001).

Compared to 95% of the nurses before the social media platforms based nursing **education**, 10% of them had inadequate practical knowledge of cryopreservation (Figure 4). On the other hand, 90% of nurses reported a statistically significant improvement in their practice score after completing the social media platform based nursing **education**.

From Table 5. In terms of cryopreservation, it was evident that the correlation between the women's overall knowledge, attitude, and practice scores before and after social media platform education were r=0.343 and 0.679, respectively, and 0.262** and 0.563**, respectively.

Table 1: Personal data among women having cancer

Items	Mean ± SD	
Age	23.7±2.9	
Level of education	No	%
Basic	23	23%
Secondary	60	60%
University	17	17%
Residence		
Urban	35	35%
Rural	65	65%
Occupation		
Working	23	23%
Not working	77	77%

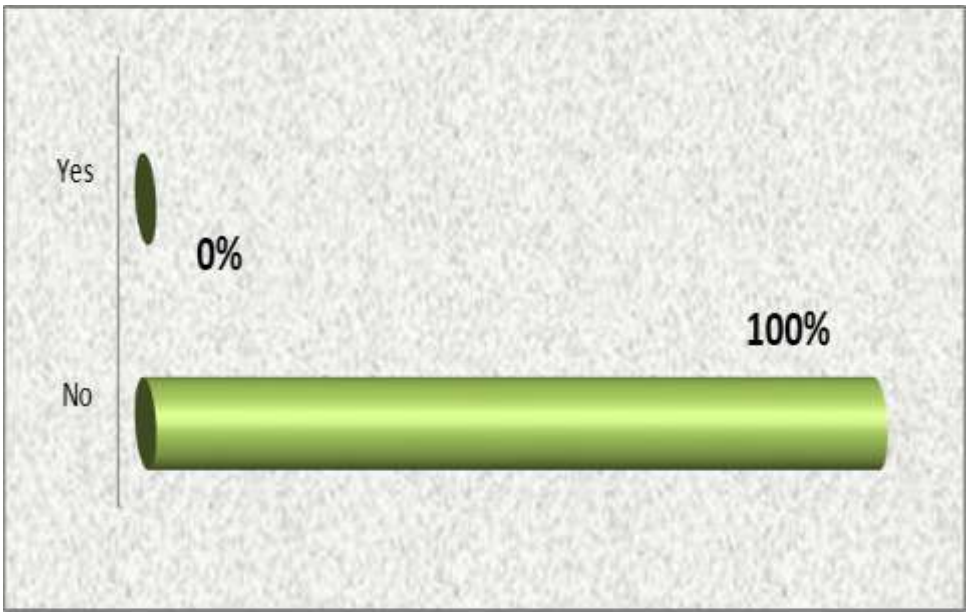

Figure 1: Previous training sessions regarding cryopreservation among women having cancer (N=100)

Table 2: Comparison between women having cancer **total Knowledge mean scores about cryopreservation pre and post**-social media platforms based nursing education **(N = 100)**

Women' knowledge	**Study Group (n= 100)**		**t-test**	**P-value**
	Pre- social media platforms based nursing education	**Post-** social media platforms based nursing education		
Total Knowledge score	4.87±2.25	16.8±2.9	χ^2=34.4**	P<0.001*

(*) Statistically significant at p≤0.001, (**) Paired t- test

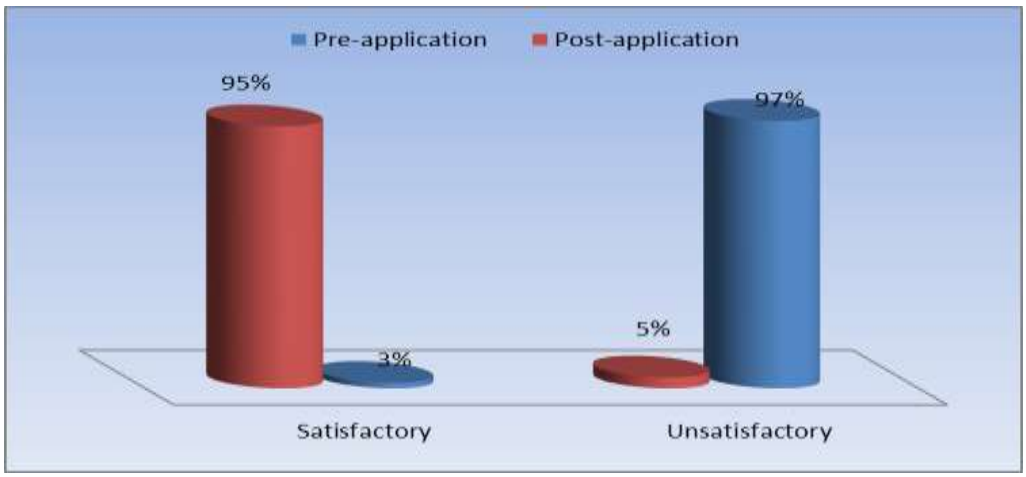

Figure (2): Total knowledge level among the studied women pre and post-social media platforms based nursing education **(N = 100)**

Table 3: Comparison between women having cancer **total** Attitude **mean scores** toward **cryopreservation pre and post**-social media platforms based nursing education **(N = 100)**

Women' Attitude	**Study Group (n= 100)**		**t-test**	**P-value**
	Pre- social media platforms based nursing education	**Post-** social media platforms based nursing education		
Total Attitude **score**	8.76±2.82	14.44±2.3	χ^2=35.14**	P<0.001*

(*) Statistically significant at p≤0.001, (**) Paired t- test

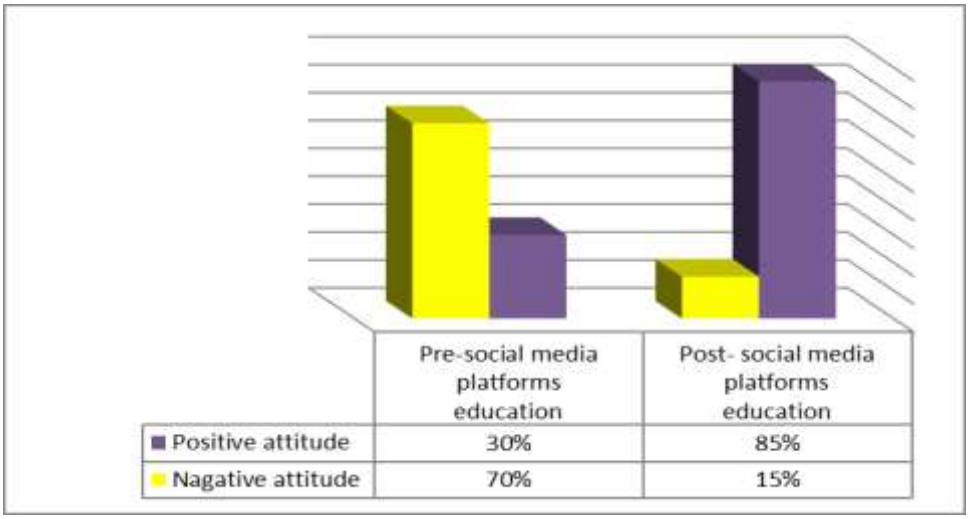

Figure (3): Total attitude level among the studied women pre and post-social media platforms based nursing **education (N = 100)**

Table 4: Comparison between women having cancer **total** practical knowledge **mean scores** toward **cryopreservation pre and post**-social media platforms based nursing education **(N = 100)**

Women **practical knowledge**	**Study Group (n= 100)**		**t-test**	**P-value**
	Pre- social media platforms based nursing education	**Post-** social media platforms based nursing education		
Total practical knowledge score	**17.86±4.04**	**33.06± 2.78**	**26.03**	**< 0.001****

High statistical significant at ** **p value <0.001**

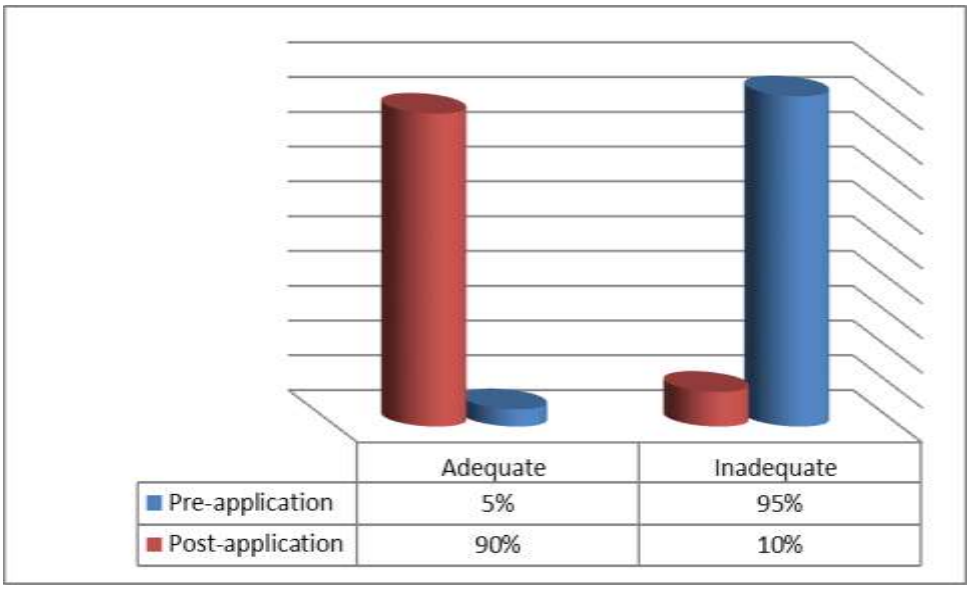

Figure (4): Total practical knowledge level regarding cryopreservation among the studied women pre and post-social media platforms based nursing **education (N = 100)**

Table 5: Correlation between the study's women's total knowledge, attitude, and practice scores regarding cryopreservation pre and post-social media platforms based nursing **education (N = 100)**

	Total knowledge			
	Pre- social media platforms based nursing education		**Post social media platforms based nursing education.**	
	R	**P value**	**r**	**P value**
Total attitude	**0.343**	**0.063**	**0.262****	**< 0.001****
Total practice	**.0685**	**0.067**	**0.563****	**< 0.001****

(**) Pearson's correlation, (**) Statistically significant at p≤0.001

Discussion:

Fertility preservation is a cutting-edge, newly developed reproductive health technology area that is gaining popularity worldwide for both non-medical and medical reasons. In addition to non-healthy women who have illnesses or treatments that can reduce their fertility, this technique has enabled childbearing for healthy women who wish to postpone marriage and having children (Al Ghaithi et al., 2023).

It is well-recognized that cancer and the treatments that are associated with it (such as chemotherapy or radiation) can cause infertility. There weren't many options for women to maintain their fertility in the past. Many methods are now available to shield ovarian tissue from the harmful effects of radiation and chemotherapy (Meirow, 2022).

The current study's findings showed that the women under investigation were, on average, 23.7±2.9 years old. In the survey, three-fifths of the

women had finished high school. Of the population, around two-thirds came from rural areas. Based on the results of the study, the average age of the participants was 23.7±2.9 years. The surge in women with higher levels of education and the importance placed on a career as a source of income in this uncertain economic climate may be the reasons for this, as the average age of first-time mothers has increased. Another recent issue that has contributed is the incredibly expensive cost of marriage in Egypt, which has only gone up with the depreciation of the Egyptian Pound to the country's rising female and marital ages. Over two-thirds of them originated from rural regions.

El-Adham and Shaban (2023) and Fahmy and Mohammed (2021) investigated the knowledge, attitudes, and barriers of unmarried female bridging intervention nurses about egg freezing at South Valley University in Egypt. They also looked at the impact of the educational intervention on the intentions, knowledge, and attitudes of healthy, single females about oocyte cryopreservation in Tanta, Egypt. These findings are in line with the findings of these studies. With a mean age of 25, they said that more than half of them live in rural regions and are younger than 25.

The study conducted in Italy by Tozzo et al. (2019), which examined female students' understanding of social oocyte freezing, contradicts these findings. Most of the people who responded were between the ages of 18 and 22.

Three-fifths of the women in the study had secondary education, and almost three-quarters were housewives, according to the occupation and education findings of the current study. The results of Hasab Allah et al. (2021) and El-Adham and Shaban (2023) do not support this. According to their findings, the majority of study participants had doctorate degrees or higher education levels, and just over half were staff members.

None of the women in the current study had ever been taught cryopreservation techniques, according to the study's findings. It supported the necessity for the women under study to take part in this study, according to the researchers.

Following social media platform education, all knowledge items showed a statistically significant improvement, according to the current study's findings. It demonstrated the benefits of social media platform education, according to the researchers, which enhanced the investigated women's understanding of cryopreservation. When it came to accessing healthcare information, there was a discernible movement towards digital media (Kaya, 2020). In a recent study, influencers and social media accounts related to fertility were found; 23.7% of these accounts were from fertility awareness and support groups, 59% were from personal stories or promotions, and 20.2% were from accredited research and education groups (Blakemore et al., 2020).

After using social media platforms based nursing education, the majority of the women in the study had satisfactory knowledge, according to the study's findings, however at the time of the pretest, their knowledge was nearly insufficient. The success of social media platform based nursing education in meeting the needs of the women under study and enhancing their understanding of cryopreservation was validated by the researchers. Given that none of the study participants had children and that the majority had any prior knowledge or experience with these topics, these findings may be explained. Another explanation for this can be the cultural norm that treats fertility issues as sensitive and seldom discusses them in public.

The findings of Revel and Laufer (2022) regarding the protection of female fertility from cancer therapy corroborated this conclusion. Only one-fourth of the sample had good knowledge scores, according to the previously cited study, and nearly half had bad knowledge scores. Goldfarb et al.'s (2023) study on "Female knowledge, attitude, and practices regarding fertility preservation" was likewise consistent with this finding. This study demonstrated that just half of the population under observation knew what fertility preservation was, indicating a low level of awareness among this group. The fact that fertility preservation is a relatively new trend and is still not well understood among young women is thought to be the cause of the stated low levels of knowledge and awareness in various research.

This aligns with the findings of Mohammed et al. (2023) and El-Adham and Shaban (2023). According to the findings, the majority of the sample under study provided accurate and comprehensive answers to knowledge questions on the previously mentioned topics before the intervention was put into place, and one month later, almost two-thirds of them did so. On the other hand, over 75% of the women in the study were unaware of the procedures involved in oocyte cryopreservation, the duration of an ovum's survival following cryopreservation, its benefits, factors that influence it, the laboratory tests necessary before the procedure, complications, and the impact of aging on a woman's fertility.

The current findings were in conflict with studies conducted in the UK, USA, and Denmark by Khattak et al. (2022) and Egypt by Hasab Allah et al. (2021). Less than one-fourth and nearly one-fourth,

respectively, of the study participants correctly answered the pretest questions, which included why oocyte cryopreservation is required, how aging impacts a woman's fertility, what advantages oocyte cryopreservation offers, how many eggs should be saved for future conception, and what risks or challenges oocyte cryopreservation presents.

According to the current study's findings, all attitude indicators improved statistically significantly after receiving training on social media platforms based nursing education. After learning about social media platforms, the average and standard deviation of the overall knowledge score increased to 14.44±2.3 from 8.76±2.82 before studying social media platforms based nursing education. This can be explained by the notion that attitude changes were the outcome of getting thorough explanations via a series of instructional sessions on social media platforms. A study by Gerber et al. (2021) concerning conflicts in attitudes regarding ovarian function preservation and fertility in patients with breast cancer concurred with this conclusion and found that the group under study had a positive attitude toward ovary function preservation at the post-test. Also, Collins et al.'s (2021) study on "Strategies for fertility preservation after chemotherapy: awareness among Irish cancer women" discovered that the use of counseling sessions improved the participants' attitudes regarding the subject matter examined.

Abbas et al. (2023) confirmed these results, reporting that when an educational intervention was put into place, there was a highly statistically significant change in the overall improvement of students' attitudes toward ova cryopreservation. Preceding an educational intervention, 42 percent of the students under investigation had positive opinions of ova cryopreservation; following the intervention, the majority of the students had improved opinions.
The results of the current study demonstrated that, for the majority of variables in the educational intervention implementation, there was a highly statistically significant difference between the pre- and post-tests. These variables included: I find information about ovum freezing important; freezing and storage operations need to be monitored; and ovum freezing banks need to be certified and have standards. These results relate to the study sample's attitudes about cryopreservation.

These findings were supported by studies conducted by Hasab Allah et al. (2021) and El-Adham and Shaban (2023). The results showed that slightly less than 75% of the students who took part in the study thought that egg preservation should be encouraged, more than two-thirds thought that freezing eggs might be a good way to do it, and more than half thought that egg preservation is very expensive and out of reach for everyone. However according to a nationwide survey conducted in the USA by Esfandiari et al. (2019), even though the participants wanted to have cryopreservation, they were concerned about the expense, the duration of the procedure, the actual surgery, and the possible risks of freezing oocytes.

The present study's findings showed that slightly less than one-third of the women who were the subject of the investigation had positive attitude about cryopreservation. The instruction provided by social media platforms based nursing education has resulted in a good attitude among the majority of the women under study. This is in line with studies by Khattak et al. (2022), Hasab Allah et al. (2021), and El-Adham and Shaban (2023). According to their findings, just one-fourth of the students in the study had positive attitudes toward egg freezing on the pretest; however, on the posttest, those attitudes increased to over half and showed statistically significant improvements.

Given the influence of social media as a widely accessible source of health information, the shift in understanding of fertility may not come as a surprise. This contrasts with research conducted nearly ten years ago that indicated the preferred source of information on reproductive health for women was their healthcare provider (Hodes-Wertz et al., 2023).

Additionally, similar findings were confirmed by research conducted in Houston, USA, in Egypt by Mohammed et al. in 2023. They reported that the overall posttest scores of the study participants about attitudes significantly increased after the educational intervention was put into place. Only 25% of respondents had positive opinions about oocyte cryopreservation in the pretest; by the posttest, the majority had done so. The researchers speculate that this may be due to the effectiveness of instructive guidelines in changing students' attitudes, beliefs, and knowledge regarding egg freezing.

This is in contrast to the descriptive research designs used by Fahmy and Mohamed (2021), Johnston et al. (2020), and Shimizu et al. (2019), who examined fertility-related practices for young breast cancer patients and assessed healthcare provider factors that influence physicians' behavior toward fertility preservation in Japan. There was no significant correlation between attitudes about cryopreservation and age or educational attainment, and less than two-thirds of the sample

under research had a positive attitude toward cryopreservation.

The results of the current study revealed that the mean scores of practical knowledge about cryopreservation before and after social media platform based nursing education showed a significant statistical difference and improvement. From the researchers' point of view, it reflected the good effectiveness and the desire of the studied women to improve their knowledge and attitude which is associated with practical knowledge improvement. Accordingly, a study by **Farag et al., (2021)** found that information derived from mobile communication could be utilized to assist women in meeting their contraceptive needs, remind them to start using a method on time, offer a straightforward method for answering any questions they may have while using a method, and promote the continuation of a method. Additionally, **Shaaban et al. (2020)** found that women in Kenya's peri-urban public facilities were more likely to use family planning and seek postpartum care while using a short messaging service (SMS). According to the researcher, simple, low-cost SMS treatments that are adapted to particular stages of the women can help women learn more, and seek care for them.

According to the current study's findings, there was a clear correlation between the women's general knowledge, attitude, and practice ratings before and following social media platform based nursing education in terms of cryopreservation. This could lead to an increase in the participants' understanding of cryopreservation, which could improve their attitudes and methods. This is due to the fact that increasing awareness can aid participants in dispelling myths, resolving any misunderstandings they may have about the topic, and improving their familiarity with and proficiency with contemporary technologies.

This result was consistent with the findings of **Hasab Allah et al. (2021) and Mohammed et al. (2023**). They demonstrated a statistically significant correlation between the research participants' overall knowledge and attitude ratings during the intervention phase. As the study participants' general knowledge grew, so did their attitude score on the posttest.

In their study of women's attitudes and practices toward fertility preservation, **Arafa & Rabah** (**2022**) found a positive correlation between knowledge and attitude. The study "Fertility Preservation in oncology patients: a national study of Practice Behaviors" by **Quinn et al. (2024)** found a similar relationship between attitude and knowledge scores. The findings of the study "Female fertility preservation: Knowledge, attitude, practical and ethical considerations of an underused procedure" by **Jennings et al. (2023**) conflict with the findings of the present investigation. Given that the aforementioned study reported recruiting females from a variety of ethical backgrounds, some of whom believed that any fertility preservation technology went against Good's well and was ethically forbidden, the discrepancy in the results could be the result of a varied sample nature.

However these findings contradicted a study by **El-Adham and Shaban (2023**) that found no statistically significant difference between the participants' total knowledge, total attitude, and total intention about cryopreservation before and after the implementation of the educational intervention.

Conclusion:

The present study's findings support the following conclusion that social media platform based nursing education has a positive effect on improving knowledge, attitude, and practice among women having cancer post-education as compared to before.

Recommendations:

The researchers made the following recommendations in light of the findings of the current study:

- Integrating social media platforms for nursing education is an innovative methods technological approach to providing routine treatment for women having cancer.
- All women should be given access to health education programs about cryopreservation so they may make an informed choice about preserving their fertility.
- Including innovative teaching strategies in standard medical care, particularly for Egypt's rural areas.
- In order to spread awareness of cryopreservation among women, educational initiatives for oncology staff nurses should be put into place.
- To generalize the findings, the current investigation can be repeated with a sizable sample.

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