BMC Cancer

RESEARCH

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Knowledge, attitudes, and practices of healthcare providers among women oncofertility in Iran: a cross-sectional study

Marjan Ghaemi[1], Ideh Rokhzadi[2*], Mohadese Dashtkoohi[1], Masoud Doosti[2], Mahroo Rezaeinejad[1], Mamak Shariat[3], Sedigheh Hantoushzadeh[1], Fatemeh Keikha[1], Nasim Eshraghi[1] and Maliheh Fakehi[2*]

Abstract

Background In recent years, Iran has witnessed a remarkable increase in the incidence of cancer. This has led to an emerging challenge in the field of oncofertility, which seeks to address the impact of cancer treatments on fertility and endeavors to preserve reproduction. The study assessed healthcare providers' awareness, attitudes, and practices regarding fertility preservation (FP) in Iran.

Methods A cross-sectional study was conducted to assess healthcare providers' knowledge, attitudes, and practices regarding oncofertility. An online self-made oncofertility survey of twenty-four items was administered to randomly selected participants from a list of healthcare providers registered with the Medical Council. The data were collected anonymously via Google Forms. Descriptive statistics, including number (n), prevalence (%), mean, and standard deviation, were calculated using SPSS 26.0. Additionally, chi-square tests were used to examine associations between categorical variables. Participants were categorized into oncology, obstetrics and gynecology (OB/GYN), and other specialties.

Results A total of 423 responses were received and analyzed. Approximately 60% of the participants were obstetrics and gynecology subspecialists, while the remaining participants represented various disciplines such as surgery (9.7%), radiotherapy (6.4%), nuclear medicine (5.2%), and pediatrics (1.4%). More than 30% of the participants had not received any specific education about oncofertility, and more than 20% stated that FP strategies are not part of their routine treatment plan for young cancer patients. Oncologists had more education than those in the Obstetrics & Gynecology group. Half the participants were unaware of insurance coverage, and FP options were infrequently recommended.

Conclusions These findings highlight the urgent need to enhance healthcare workers' knowledge and attitudes toward FP in Iran and enable them to provide comprehensive support and guidance to cancer patients.

Keywords Fertility preservation, Oncofertility, Health personnel, Gynecologists, Infertility

*Correspondence:
Ideh Rokhzadi
i.rokhzadi@gmail.com
Maliheh Fakehi
maryam.fakehi@gmail.com
Full list of author information is available at the end of the article

Introduction

Iran has witnessed a substantial increase in new cancer cases in recent years. It is projected that by 2025, the incidence of cancer in Iran will rise by 42.6%, reaching an estimated 160,400 cancer patients, compared to 112,473 cases reported in 2016 [1, 2]. Exacerbating cancer burden and remarkable advances in cancer treatments have significantly improved cancer patients' survival rates [3]. This issue has led to the emerging challenge of fertility preservation (FP) for individuals receiving cancer therapies which can potentially damage fertility [4, 5].

Oncofertility, a multidisciplinary field encompassing oncology and reproductive medicine, aims to mitigate the detrimental effects of cancer therapeutic interventions on the reproductive system and fertility in individuals diagnosed with cancer [6, 7]. Chemotherapy, radiation therapy, and surgery, which are integral components of cancer treatment, can cause infertility regardless of sex [8]. Oncofertility interventions encompass various strategies, including the collection and cryopreservation of gametes (eggs and sperm) or ovarian tissue before cancer treatment initiation, as well as the utilization of donor gametes when fertility impairment follows cancer therapy [9].

The American Society of Clinical Oncology (ASCO) [10] and the American Society for Reproductive Medicine (ASRM) [11] jointly address the importance of FP discussions and recommend that healthcare providers (HCPs) initiate discussions regarding FP with all reproductive-age cancer patients before the commencement of cancer treatment. Additionally, they emphasize the importance of timely referrals to reproductive specialists [12].

Previous studies conducted in the Middle East, including Saudi Arabia [13], and Pakistan [14], have revealed a complex landscape regarding FP. Oncologists generally recognize the importance of FP, but knowledge gaps and suboptimal referral practices continue to be prevalent. While these studies offer valuable insights, there is a notable lack of research on oncofertility in Iran. Multiple barriers, including limited awareness and knowledge among HCPs, impede the access of young cancer patients to fertility counseling and preservation strategies [15]. Given the importance of addressing reproductive concerns in this population and the country's recent policies on rejuvenating the population and protecting the family, it is crucial to assess physicians' awareness, attitudes, and current practices regarding FP. This study aimed to investigate these factors in the context of cancer care in Iran, with the ultimate goal of enhancing the integration of FP interventions into routine clinical practice.

Methods

Study design and setting

This cross-sectional study was approved by the ethics committee of the Tehran University of Medical Sciences (IR.TUMS.IKHC.REC.1401.179). To ensure a representative sample of physicians, we employed random sampling from the Iranian Medical Council registry numbers. The study was conducted among physicians practicing in various healthcare settings in Iran from September 2022 to September 2023.

Participants' selection

Eligible participants were physicians with a valid Medical Council number registered in Iran. A random sample of these physicians was selected from the Medical Council registry. Participants who missed more than 20% of the questions were excluded from the study. An invitation text message, which included information about the study's objectives and a link to the Google Form questionnaire, was sent to the selected physicians.

Questionnaire design

A twenty-four-question survey was administered to healthcare workers involved in cancer care across various healthcare settings in Iran through online forms (Supplementary Table 1). The content analysis consisted of the following steps. First, a comprehensive list of items covering all aspects of FP was compiled. Second, the validity, clarity, and suitability of the content were investigated by a panel of 15 gynecologists and methodologists. Finally, the survey's face validity was assessed by a Persian literature specialist, who evaluated whether the target population understood the items consistent with the researchers' intentions.

The reliability of the questionnaire was assessed by administering it to 15 healthcare providers on two separate occasions, with a two-week interval between the administrations. This approach, known as test-retest reliability, helps to determine the consistency of the responses over time. The Cronbach's alpha coefficient was calculated and found to be 0.74.

The last version of the questionnaire included both, multiple choice and Likert type of questions related to demographic characteristics (sex, specialty, and type of facility), oncofertility knowledge, attitudes, and current practices. In the twenty-four-item questionnaire, the first six questions are general (e.g., "Have you attended theoretical courses on oncofertility?"), the next three questions cover the knowledge of responders (e.g., "To what extent is oocyte cryopreservation recommended for young women with cancer?"), the following four questions aim to understand the participants' current practices (e.g., "Do you use fertility-preserving strategies in

young patients with cancer?"), and the next five questions address the personnel's attitudes toward oncofertility (e.g., "How often do you face religious obstacles regarding oncofertility?"). The final five questions provide additional information related to oncofertility practices and resources (e.g., "Which fertility-preserving techniques does insurance cover?").

Data collection

Data were collected electronically using Google Forms. Participation was anonymous.

Statistical analysis

Data analysis and entry were performed using SPSS 26.0 (SPSS, Inc., IL, USA). The descriptive data are presented as number (n), prevalence (%), mean, and standard deviation. Participants were categorized into the oncology group, the obstetrics and gynecology group (OB/GYN), and others. The oncology group included specialists in surgical oncology, surgical pediatric oncology, radiotherapy, nuclear medicine, and medical oncology. The OB/GYN group had oncology, prenatal, and infertility fellowships. Other specialties were designated as others.

Results

A total of 423 participants were included in the study. The participants were recruited from various departments, including obstetrics and gynecology, surgery, radiotherapy, nuclear medicine, and pediatrics.

Participant's characteristics

The mean age of the participants was 40.47 years, and 74.3% were women. The detailed baseline characteristics of the participants are summarized in Table 1. Of note, more than half of the participants (59.8%) specialized in obstetrics and gynecology, and nonteaching, nonprivate hospitals composed the majority (57.9%) of the practice settings.

Table 1 Baseline characteristics of participants

Characteristics	*N* (%)
Age (years)	
30–35	15 (3.5)
35–40	200 (47.3)
40–45	95 (22.5)
45–50	23 (5.4)
50–55	5 (1.2)
Gender	
Women	316 (74.3)
Men	107 (25.3)
Specialty	
Surgical oncology	34 (8)
Surgical pediatric oncology	7 (1.7)
Radiotherapy	27 (6.4)
Nuclear medicine	22 (5.2)
Medical oncology	22 (5.2)
Obstetrics & Gynecology	253 (59.8)
OB/GYN- oncology[a]	17 (4)
OB/GYN- perinatology[a]	18 (4.3)
OB/GYN- infertility[a]	13 (3.1)
Pediatrics Medical	6 (1.4)
Others	4 (0.9)
Type of facility	
Teaching hospital	63 (14.9)
Private hospital	113 (26.7)
Non-teaching hospital	245 (57.9)
Others	2 (0.5)
	Mean (SD)
Experience (years)	4.6 (3.0)
FP education Time[b] (hours)	219 (639.5)

OB/GYN Obstetrics & Gynecology

[a] Fellowship

[b] The time spent on fertility preservation education during training sessions

Awareness

Approximately 17.2% of participants had attended theoretical courses on oncofertility, and only 14.9% had participated in practical educational programs. More than half of the participants' theoretical and practical education was part of their curriculum (57.7%). The oncology group was significantly more educated than the OB/GYN group, with 35.6% versus 11.0%, respectively ($P<0.001$). In our study, other specialties had not received any relevant theoretical education. Similarly, the oncology group completed more practical courses than the other groups. It is noteworthy that 64.1% of participants acknowledged the importance of oncofertility education.

Attitude

Around 70% of the participants reported that the time spent on fertility preservation (FP) methods could significantly impact the prognosis of cancer patients by delaying their cancer treatment. A delay in cancer treatment due to referral to a clinic or fertility counseling service was reported by 88.1% of the participants in the oncology field and 96.3% in the obstetrics and gynecology field. Among healthcare providers in the oncology group, 55.1% reported having access to psychologists during fertility treatments, whereas in the obstetrics and gynecology group, this access was reported by 34.6%. The difference between the two fields was statistically significant (p-value < 0.001).

Practice

Despite the acknowledged importance of oncofertility education, 65.5% of participants did not follow any specific guidelines for FP. Healthcare workers in the field of oncology demonstrated significantly greater usage of guidelines compared with those in the OB/GYN group (18.3% vs. 6.3%; p-value < 0.001), but other specialties did not use any guidelines regarding FP. Among the participants, 23.9% reported that FP strategies were not included in their routine treatment plans. Within the oncology group, consultations were predominantly conducted by obstetrics and gynecology specialists, specifically those with expertise in infertility fellowships (57.6%). However, 7.1% of the participants stated that oncofertility consultations were not provided for any of their patients. More than one-third of the patients who underwent FP were in the early stages of their disease course (38.1%). Regarding insurance coverage for fertility-preserving techniques, about half of the participants (45.9%) reported no information on the subject.

FP options in women

The recommended FP options for women encompassed various techniques such as embryo and oocyte cryopreservation, ovarian tissue freezing, and surgical operations. The frequency of strongly recommended preservation techniques can be found in Fig. 1. The figure illustrates that embryo and oocyte cryopreservation are strongly recommended for about 52% of patients, while ovarian tissue freezing is the least favored method.

Barriers toward oncofertility

Among the medical staff participants, more than 65% lacked knowledge regarding legal issues related to FP of cancer patients. However, approximately 1% of the participants acknowledged the presence of legal barriers, with most of these individuals belonging to the OB/GYN group.

Regarding cultural and religious matters, only around 1% of the medical staff reported no barriers to fertility maintenance in cancer patients.

Discussion

As an integrated oncology and FP approach, oncofertility provides comprehensive care that considers cancer survivors' long-term reproductive goals and quality of life in the aftermath of the cancer. Incorporating oncofertility into routine clinical practice requires adequate awareness and positive attitudes among HCPs [7]. The topic of oncofertility warrants evaluation in low- and middle-income countries (LMICs) due to several factors, including the rising incidence of cancer, sociocultural considerations, and limited resources [16–18]. To achieve this goal, we conducted a survey-based assessment of oncofertility awareness and attitudes among HCPs in Iran.

According to the survey, Iranian HCPs have varying levels of awareness regarding oncofertility. Although oncology field healthcare participants thoroughly understood oncofertility practices and principles, others have

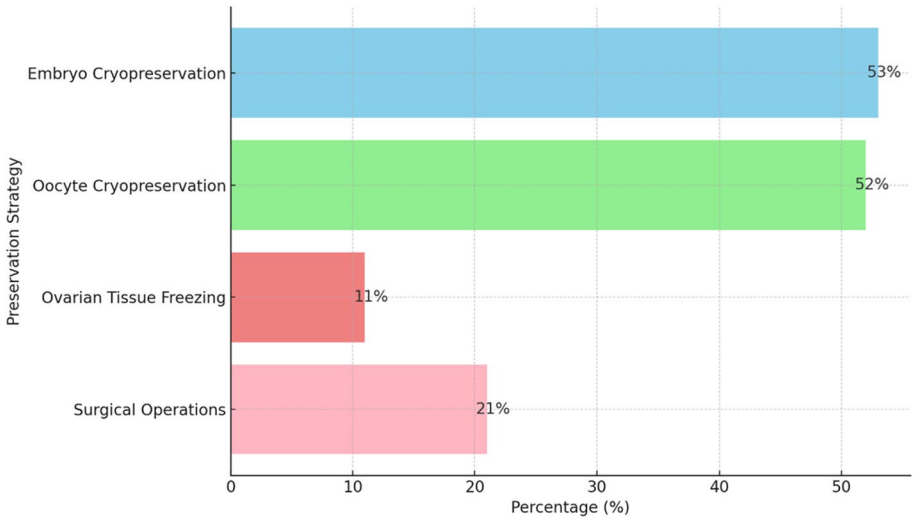

Fig. 1 Medical practitioners' recommended preservation strategies among young women. This figure was created using Python 3.9 with the Matplotlib library

demonstrated limited knowledge. Discrepancies in knowledge levels highlight the need for targeted education and intervention programs. Several factors may contribute to the observed variance in oncofertility awareness. Lack of awareness among HCPs may be due to the lack of formal training and educational opportunities specific to oncofertility in medical curricula and residency programs, which can result in suboptimal care for cancer patients [15, 19]. According to different studies, oncofertility education should be included in medical training to ensure comprehensive care for cancer patients [20]. The development and implementation of oncofertility education programs for HCPs in Iran are therefore necessary.

Moreover, attitudes toward oncofertility play an essential role in integrating FP services into cancer treatment. While some participants expressed positive attitudes toward oncofertility and recognized its importance, others were skeptical. There may be misconceptions associated with negative attitudes, such as concerns regarding treatment delays or a lack of awareness of available FP techniques. This negative attitude impedes patients from taking necessary FP strategies, ruins their possible opportunity for childbearing, and can hamper referrals [15, 21, 22].

Many barriers hinder the implementation of oncofertility practices in different settings, especially in developing countries. These barriers include delays in the management of cancer due to time-consuming fertility procedures, limited awareness among HCPs and patients about the fertility risks of specific treatments, and lack of knowledge about available FP methods [18]. Several studies have investigated educational programs targeting HCPs regarding FPs for cancer patients. These studies consistently indicate that such programs can improve healthcare personnel's knowledge and attitudes toward oncofertility [23]. For example, Zhang et al. [24] systematically reviewed five educational programs for HCPs. Four significantly increased medical staff's understanding of FP, but only one improved their clinical practice.

Additionally, Tholeti et al. [22] reported that 60% of primary care physicians in India had inadequate knowledge of FP options, and only 26–32% were aware of international guidelines recommending FP for cancer patients. According to the article, increasing awareness of FP in India may facilitate successful referrals to oncofertility clinics. This is supported by the findings of our study, where a significant number of cases described delays in cancer treatment precisely due to referrals to clinics or fertility counseling services. More than 88% of oncology and OB/GYN participants reported such delays. In addition to a lack of knowledge, poor inter-institutional communication may contribute to this prolonged referral process. In combination, these factors may prevent timely transitions of patients from primary care settings to specialized oncofertility clinics [22].

Moreover, a study by Zhao et al. assessed oncofertility awareness and attitudes among oncologists in China and found that 84.8-88.7% of oncologists reported positive attitudes about oncofertility and discussing fertility-sparing options. In comparison, only 11.8% of oncologists reported frequently referring their patients to fertility preservation facilities [23]. Our study also showed that this discrepancy emphasizes the difficulty of translating knowledge and positive attitudes into routine clinical practice.

Multiple studies have shown that knowledge and attitudes toward oncofertility vary across different regions of the world, with some regions facing major barriers to oncofertility practice, such as cultural or religious restrictions. The lack of insurance coverage and funding for oncofertility services may also contribute to high patient costs. Another barrier to the successful implementation of fertility preservation techniques is the availability of specialized laboratories, equipment, and personnel in LMICs, as observed in a similar study [18].

Aside from healthcare-related barriers, there are also critical patient-specific factors to consider. Many patients, especially adolescents, may lack the cognitive maturity and awareness to entirely understand the implications of infertility and the available fertility preservation opportunities. This can impede informed decision-making and even delay referrals. Additionally, some patients may feel unpleasant discussing fertility issues, particularly when facing a cancer diagnosis. Furthermore, fertility considerations often compete with the urgent concerns related to cancer treatment itself, further complicating the decision-making process [25].

Despite these challenges, there are many opportunities to improve oncofertility practices and patients' outcomes in different contexts, for instance, increasing education and training for HCPs and patients on oncofertility issues using various modalities such as online courses, workshops, and seminars. Moreover, adding oncofertility subjects to the medical school curriculum might be beneficial. In addition, multidisciplinary teams and networks can also be established to collaborate and coordinate oncofertility care across different specialties and institutions [18]. Furthermore, implementing system-based solutions facilitates the identification and referral of patients who may benefit from oncofertility services [20, 26, 27]. Therefore, advocating for policy changes and funding support would help patients in developing countries such as Iran.

Other studies have assessed knowledge and attitudes among healthcare providers in Iran [28, 29]. However,

these studies have focused primarily on specialties such as oncology, gynecology, obstetrics, and embryology, which naturally possess more information about FP. Incorporating perspectives from diverse healthcare specialties is necessary because effective FP care requires a multidisciplinary approach. Different healthcare providers have unique perspectives and expertise and provide holistic care to patients.

Another essential aspect that deserves attention is the limited prevalence of well-established official national oncofertility registries worldwide. The findings from a pilot study revealed a remarkably limited number of countries that have successfully established national oncofertility registries. Specifically, the study identified Australia, Germany, and Japan as the exclusive countries with such registries in place, underscoring this achievement's rarity [30].

Recommendations

Education enhancement: Targeted educational programs and resources could be developed to ensure that HCPs are well-informed about oncofertility options and can effectively communicate these options to their patients.

Policy making and insurance: Efforts should be made to include oncofertility in government and insurance policies. This approach would help secure the necessary funding and infrastructure for fertility preservation programs.

Patient counseling: It is crucial to address well-known negative attitudes toward FP methods among both HCPs and patients and implement comprehensive counseling services to support patients in informed decision-making about fertility preservation options.

Monitoring: Establishing a framework for longitudinal and long-term monitoring, including the development of national registries or collaborative studies to assess the impact of interventions aimed at improving oncofertility awareness and attitudes.

By addressing these fundamental areas, it is possible to make substantial strides in improving the landscape of oncofertility in Iran. This approach will ultimately enhance the available support for cancer patients.

Limitations

There are several limitations to consider in our study. Due to the self-reported nature of the survey, it may not fully reflect actual FP practices among HCPs, and such surveys are an acceptable compromise due to the lack of objective measures. The study also did not examine the reasons behind the low attitudes of HCPs. Furthermore, participants may have provided responses influenced by their social desires or other circumstances, and data reliability and accuracy could be affected. A more comprehensive understanding of this topic requires further research to address these limitations.

Conclusion

In conclusion, while the study reveals deficiencies in knowledge and practices, the acceptable attitude among HCPs toward oncofertility in Iran provides a foundation for progress. By addressing the identified gaps through education and interdisciplinary collaboration, we can enhance the oncofertility care landscape in Iran. Appropriate recommendations will empower cancer patients, improve their quality of life, and ensure that they have access to comprehensive reproductive health options throughout their cancer journey.

Abbreviations

FP	Fertility Preservation
OB/GYN	Obstetrics and gynecology group
HCPs	Healthcare providers
ASRM	American Society for Reproductive Medicine
ASCO	American Society of Clinical Oncology

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12885-024-12821-6.

Supplementary Material 1.

Acknowledgements

Not applicable.

Authors' contributions

M.G., M Dashtkoohi. and S.H. conceptualized and designed the study. M.G., M Doosti., and M.F. contributed to data acquisition. I.R., M Dashtkoohi., and M.S. were involved in the analysis and interpretation of the data. M Dashtkoohi., F.K., and N.E. were contributors to the writing of the manuscript. All authors, M.G., I.R., M Dashtkoohi., M Doosti., M.F., M.S., S.H., F.K., N.E., and M.R., critically reviewed and approved the final manuscript.

Funding

This study was conducted without receiving any external funding or financial support.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol received ethical approval from the Ethics Committee of Tehran University of Medical Sciences. The approval reference number is IR.TUMS.IKHC.REC.1401.179. Participants were provided with comprehensive information about the study objectives through a text message. Informed consent was obtained from all individual participants included in the study. Anonymity was rigorously maintained throughout the data collection process to protect the privacy of participants.

Consent for publication

Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Vali-E-Asr Reproductive Health Research Center, Family Health Research Institute, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran. [2]Department of Obstetrics and Gynecology, School of Medicine, Akbar Abadi Hospital, Iran University of Medical Sciences, Tehran, Iran. [3]Fetal & Neonatal Research Center, Family Health Research Institute, Tehran University of Medical Sciences, Maternal, Tehran, Iran.

Received: 24 January 2024 Accepted: 19 August 2024
Published online: 24 August 2024

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