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Knowledge, attitude and practice regarding fertility preservations among specialists involved in care of cancer patients in India

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Abstract

Aim: To evaluate knowledge, attitude, and practices (KAP) regarding fertility preservation among various physicians involved in treatment and care of cancer patients and identify the potential barriers for the discussion of fertility preservation.

Settings and Design: It is a survey-based cross-sectional study conducted over a period of 3 months North Indian tertiary care infertility clinic, RISAA IVF, New Delhi.

Materials and Methods: the consent and completed survey consisting of a series of structured questionnaire, responses were obtained online through a link to Google forms. 210 doctors including gynaecologist's infertility specialist and oncosurgeons were sent the form out of which 100 responses were received. The results were analysed by using SPSS software.

Results: The knowledge among respondents from all specialties regarding impact of cancer treatment on fertility was very high. The rates of knowledge regarding various fertility preservation (FP) options were variable, least knowledge regarding the transposition of ovaries/gonads, testicular tissue cryopreservation, fertility-sparing chemotherapy. There were variations in clinician's attitude and practice regarding various fertility issues of the patient and fertility preservation based on the specialty of clinicians. Nearly three-fourth discuss various FP options but only one-third provide written information on the same. The referral practice for FP was variable and was influenced by many factors. The factors considered most important for barriers to fertility preservation are socioeconomic status/cost and affordability issues, prognosis, type of cancer and type of treatment.

Conclusion: The fertility preservation as a concept is relatively evolving and its awareness has increased over the years. However this concept demands more depth, discussion and maybe guidelines and its implementation. This concept requires regular update through informational programs, conferences. There should be more defined guidelines available for the clinicians to treat patients helping them to take decisions regarding treatment and timely referral to fertility preservation centres.

Keywords: Barriers to fertility preservation, fertility preservation, KAP studies regarding fertility preservation, oncofertility

Introduction

Cancer is the second-highest cause of death globally, resulting in millions of deaths all over the world. According to the Global Cancer Observatory (GCO), a platform that follows The World Health Organization (WHO), approximately about 19 million new cancer cases worldwide were recorded in 2020, with 9.9 million deaths across both genders^[1].

Fertility is one of the key aspects of quality of life for young cancer patients and survivors and hence it should be protected and preserved^[2]. Fertility preservation (FP) is receiving increasing attention as an evolving area of reproductive medicine and it aims to protect, preserve, and store gametes and/or reproductive tissue for future use^[3].

Cancer survivors have a great interest in maintaining fertility, and many prefer to have their own children rather than adopt^[4, 5].

In patients whose treatments may lead to infertility, the American Society of Clinical Oncology (ASCO) and the European Society for Medical Oncology (ESMO) have recommended the cryopreservation of sperm and embryos or oocytes in men and women, respectively, as standard strategies for fertility preservation (FP)^[6, 7].

Performing adequate onco-fertility counselling and offering the available strategies for fertility preservation to improve chances of conception following anticancer therapies is now considered a key component in the care of young women with cancer^[8, 9, 10].

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Despite these fertility preservation guidelines and regulations, a large number of previous studies reported that some health practitioners including oncologists are lacking awareness regarding fertility preservation options before cancer treatments. Therefore, the number of patients' referrals to fertility preservation clinics remains low [11, 12, 13].

There is still a huge lacuna in fertility preservation services and so there is an urgent need for priming, spreading awareness, and educating specialist doctors involved in the treatment of cancer about fertility preservation and its advantages.

Aims and Objectives

1. To evaluate knowledge of, attitude to, and practice behaviour regarding fertility preservation among various doctors involved in the treatment and care of cancer patients.
2. To evaluate awareness regarding fertility preservation.

Materials and Method

It is a survey-based cross-sectional study conducted over a period of 3 months from 07/06/22, to 21/09/22 at a North Indian tertiary care infertility clinic, RISSA IVF, New Delhi. The consent and completed survey consisting of a structured questionnaire, responses were obtained online through a link to Google forms sent through a mobile application. The sample size by formula had not been calculated since it was a time-bound survey-based study conducted over a period of 3 months. About 210 gynaecologists, infertility specialists, radiotherapists, general surgeons, and oncologists were sent questionnaires of which 100 responded.

Inclusion Criteria

1. All gynaecologists, infertility specialists, radiotherapists, general surgeons, and oncologists that gave consent to participate in the study.
2. The minimum qualification was post-graduation (completed or pursuing). The designation of the respondents was categorized into junior resident (those who were pursuing post-graduation), senior resident (pursuing residency after completion of post-graduation for 3 years), junior consultant (designation after completing 3 years of senior residency for 7 years or assistant professor in a medical college), senior consultant (associate professor, professor in a medical college or 7 years post junior consultancy in a private hospital), and head of the institute/unit (head of the department or unit in a medical college or private hospital).

Study Questionnaire

The survey included a questionnaire evaluating awareness, attitude, knowledge of, and practice behaviour toward fertility preservation among these specialists. After requesting participation in the survey, the questionnaire was circulated to more than 210 specialists.

In this study, 18 point questions were selected to fit the following three domains other than participant's demographics: Knowledge and Awareness, Attitude and Practice behaviour. A questionnaire was developed based on items from various sources. Selected items were adapted to fit in the setting of the current study. Two senior

gynaecologist and infertility specialists reviewed the questionnaire to evaluate its validity leading to some additional modifications.

Knowledge and awareness were assessed by six items that measure knowledge about the risk of infertility because of cancer treatment, need for fertility preservation in male and female cancer patients, various fertility preservation methods, and awareness regarding the American Society of Clinical Oncology (ASCO) guidelines on Fertility preservation. Response alternatives were categorized into "Not at all Knowledgeable," "Aware but do not know well," "Slightly knowledgeable," "Knowledgeable," and "Very knowledgeable."

Practice behaviour of the clinicians was evaluated using eight items. Physicians indicated the level of agreement with the statements based on their clinical practice. The items evaluate how frequent and the extent to which physicians explained to their patients the gonadotropic impact of cancer treatment and risk of infertility; to what extent they discussed various fertility preservation options available and if they provided any written information on the same. It enquired participants to what extent they considered fertility as an important quality of life issue and; how considerate were they of patient's desire for future fertility while planning cancer treatment regimen. It tends to assess that to what extent is fertility preservation a high priority for their cancer patients. It interrogated how frequently they consulted specialists from other fields with queries about fertility issues of their cancer patients and how frequently they referred patients who have queries regarding fertility or want fertility preservation to a fertility specialist. Responses were given on a 5-point Likert scale ranging from "Never" to "Always" with the additional alternative "Not applicable". Responses were categorised into "Never," "Rarely," "Sometimes," "Usually," and "Always" in order to facilitate the analysis and interpretation of the results.

Attitudes were measured by asking physicians to indicate their level of agreement with four questions that enquire if they think that more information regarding fertility preservation is not required; whether they think that setting up of fertility preservation centre is necessary; is fertility preservation a high priority for them to discuss with newly diagnosed cancer patients and whether they think that fertility preservation will compromise cancer treatment. Responses ranged from 1 ("Strongly disagree") to 5 ("Strongly agree"), and were categorized into "Disagree, Neutral, and Agree."

Data about the participants' demographics and clinical background included name, age, sex, marital status, having children or not, specialization, years of experience, designation, type of hospital, and level of care.

Statistical Analysis

The data were collected using Google Spreadsheets for all participants and was described in terms of range frequencies (number of cases) and relative frequencies (percentages) as appropriate after the division of the participants into various categories depending upon age, sex, marital status, having children, specialty, designation, type and level of care at hospital, and duration of the experience. As the responses of participants were nonmetric category, these were compared using a Cross-tab method with Pearson chi-square test. All *P* values are two-sided, with a statistical level of significance set at $P < 0.05$. All statistical calculations were

done using SPSS 28.0 (Statistical Package for the Social Science) for Microsoft Windows.

The demographic profile of 100 respondents are as follows in Fig1.

Results

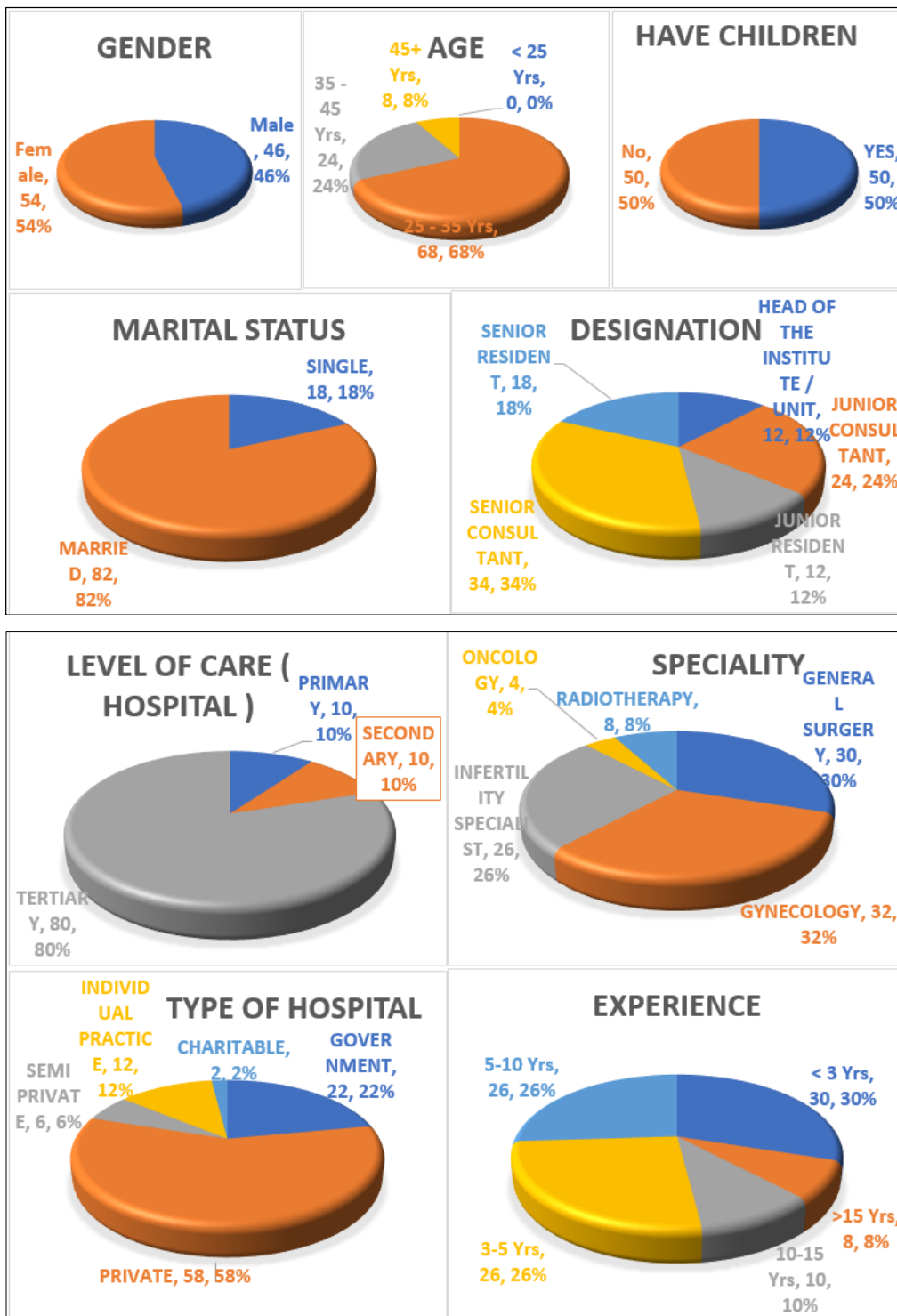


Fig 1: Demographic profile of respondents.

Table 1: Responses to questions evaluating knowledge and awareness regarding fertility preservation

Indicators	Not at all knowledgeable	Aware but do not know well	Slightly knowledgeable	Knowledgeable	Very knowledgeable
Do you acknowledge that radiotherapy and chemotherapy can affect patient’s fertility?	0	12	8	52	28
Are you aware of the need of fertility preservation in male cancer patients?	2	16	18	44	20
Are you of the need of fertility preservation in female cancer patients?	0	16	14	46	24

Knowledge and awareness regarding fertility preservation Table 1.

Knowledge among the respondents about radiotherapy and chemotherapy affecting patients fertility was high (52%) and 28% were very knowledgeable.

The respondents were knowledgeable (44%), very knowledgeable (20%) about the need of fertility preservation in male patients. Similarly 46% of respondents were knowledgeable and 25% were very knowledgeable

regarding need for fertility preservation in female cancer patients. The respondents were very knowledgeable about IVF and embryo cryopreservation (36%), sperm cryopreservation (36%) followed by oocyte cryopreservation (30%) and radiation shielding (30%). Whereas physicians who had no knowledge about radiation shielding was 6% and sperm cryopreservation was 8%.

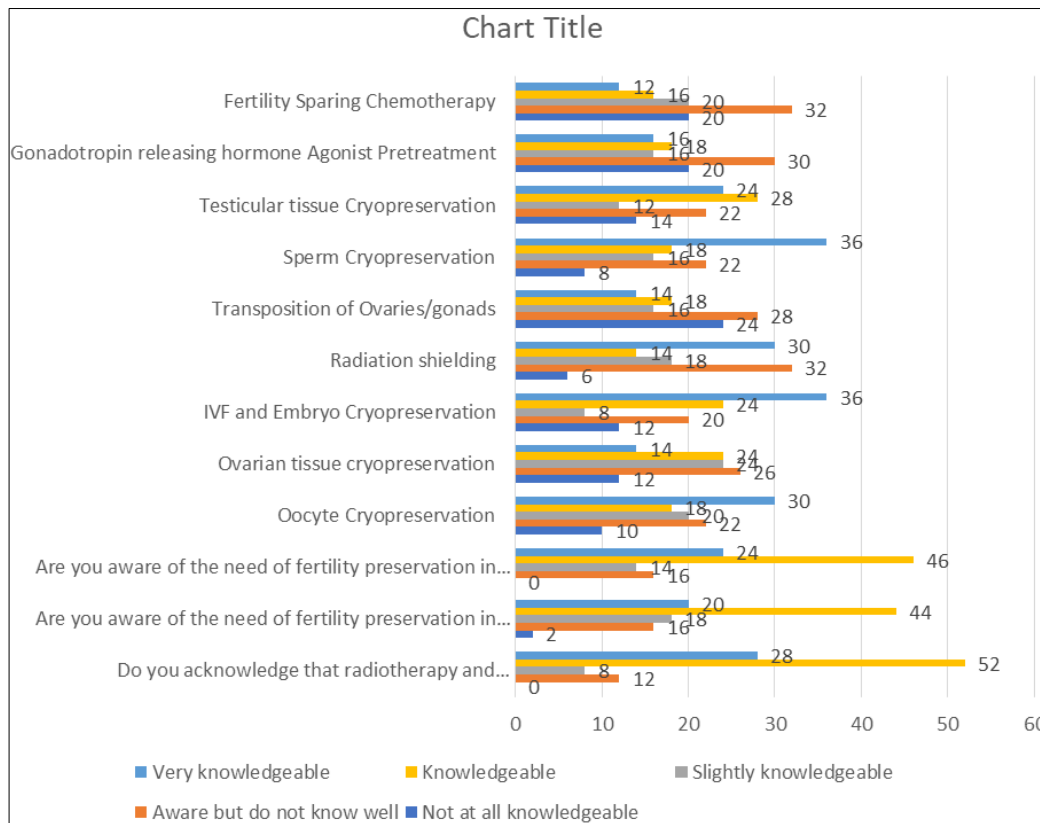


Fig 2: Awareness regarding fertility preservation option

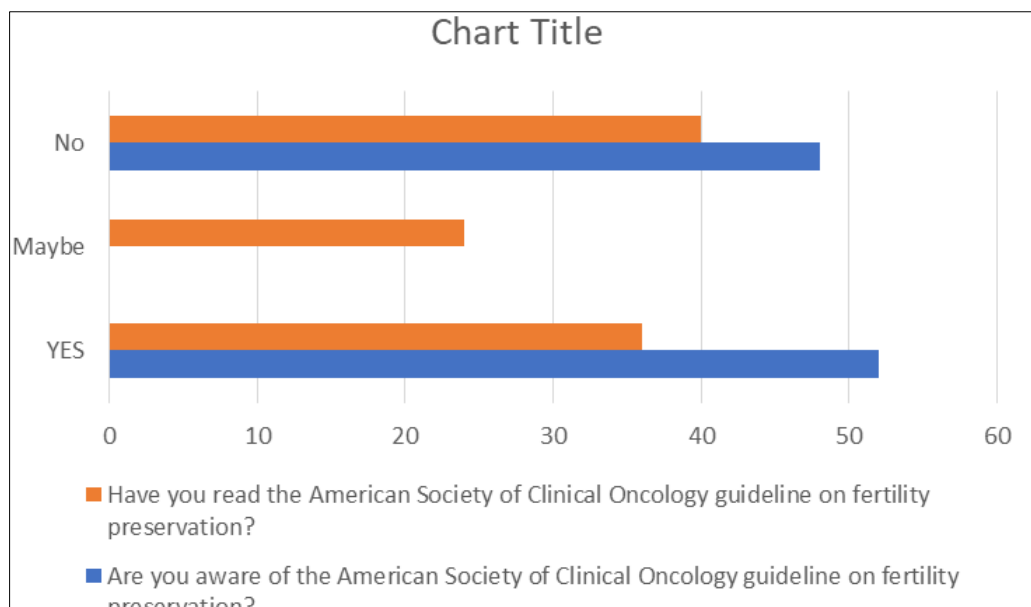


Fig 3: Awareness regarding guidelines of fertility preservation. ASCO, American Society of Clinical Oncology.

Awareness regarding guidelines by ASCO Figure 3.

The respondents who were aware of ASCO guideline on fertility was 52% and 48% were not aware of it. 36%

respondents had read the guidelines, 40% didn't know the guidelines.

Table 2: Responses evaluating Practice behaviour of respondents regarding fertility preservation

Indicators	Never	Rarely	Sometimes	Usually	Always
Do you explain to the patients that the cancer treatment is gonadotropic and can cause infertility?	2	6	12	36	44
Do you discuss with the patients various fertility preservation option available?	2	12	28	26	32
Do you provide patients with the written information on fertility preservation (as per American Society of Clinical Oncology guidelines)?	16	32	22	20	10
Do you consider fertility as important quality of life issue?	2	4	22	16	56
Do you plan the cancer treatment regime (surgery, radiotherapy or chemotherapy) of patient taking into consideration their desire of future	2	6	26	36	30
Is fertility preservation a high priority for your cancer patients?	2	14	44	12	28
Do you consult a fertility specialist/Medical oncologist/Surgical Oncologist/ Surgeon with queries about potential fertility issue of your patient?	4	8	28	26	34
Do you refer patients who have queries about fertility or want fertility preservation to fertility specialist/centres for the same?	4	6	26	32	32

Practice Behaviour Table no 2.

On asking about practice behaviour it was observed that 44% respondents (Always), 36% (Usually) and 2% (Never), explained about gonad toxicity caused by cancer treatment to the patients. About discussing various available fertility preservation option with the patients, it was observed that 32% (always), 26% (usually) and 2% (never) discussed the options. It was observed that 16% (never), 32% (rarely), 22% (sometimes) provided patients with written information on fertility preservation. About 56% respondents (always), 22% (sometimes) and 2% (never) considered fertility as

important quality of life issue.

About taking cancer treatment regime of the patient into consideration their desire for future, 30% (always), 36% (usually) and 26% (sometimes) considered the same. 28% (always), 44% (sometimes) considered fertility preservation a high priority in cancer patients. 34% (always), 28% (sometimes) and 26% (usually) consulted other specialty with queries about potential fertility issue of patients. 32% (always), 32% (usually) and 26% (sometimes) referred their patients who had queries about fertility or want fertility preservation to fertility specialist or centre.

Table 3: Responses evaluating Attitude towards fertility preservation.

Indicators	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Do you think that more information regarding fertility preservation is not required?	32	30	16	12	10
Do you think setting up of fertility preservation centre is necessary?	0	0	18	40	42
Is fertility preservation a high priority for you to discuss with newly diagnosed cancer patients?	2	6	16	40	36
Do you think fertility preservation will compromise the treatment of cancer?	14	32	32	18	4

Attitude towards Fertility Preservation Table 3.

Regarding attitude towards fertility preservation, 32% (strongly disagree), 30% (agree) and 10% (strongly agree) that more information about preservation is required. Whereas 42% (strongly agree), 40% (agree) for setting up fertility preservation centre necessary. 40% (agree) to discuss fertility preservation in newly diagnosed cancer patient as high priority. 32% (disagree), 32% (neutral) to think that fertility preservation will compromise the treatment of cancer.

Discussion**Knowledge and Awareness Regarding Fertility Preservation**

In our study knowledge of participants regarding the impact of radiotherapy and chemotherapy was high (52%), Huang *et al.* in 2018 found that 95% of specialist knowledgeable about cancer treatments affecting fertility [14]. Wadhwa ni *et al.* in their study indicated that the knowledge of participants regarding the impact of radiotherapy and chemotherapy on fertility was very high [15]. Sindi *et al.*, study revealed that 90% of the respondents need to raise their knowledge about fertility preservation in comparison to 10% who declared that they are knowledgeable. In addition, 51% of the participated health practitioners confirmed that they might be aware of fertility preservation, but they need to be knowledgeable about it. In contrast, 35% of respondents

declared that they are knowledgeable or had adequate knowledge regarding fertility preservation [16].

Our study suggests that 44% were knowledgeable regarding FP in male cancer patients and 46% were knowledgeable in female cancer patients. Study by Chung *et al.* suggested that less than 50% respondents were knowledgeable about fertility preservation [17]. Study by Wadhwa Ni *et al.* suggested that 76.6% had a high level of knowledge regarding FP in male cancer patients and 86.6% for FP in female cancer patients [15].

In our study regarding various fertility preservation methods, the respondents were very knowledgeable about IVF and embryo cryopreservation (36%), sperm cryopreservation (36%) followed by oocyte cryopreservation (30%) and radiation shielding (30%). Whereas respondents had no knowledge about radiation shielding 6% and sperm cryopreservation 8%. Study conducted by Duffy *et al.* revealed awareness to be 22.5% for IVF (*In vitro* fertilisation), 24.4% for oocyte cryopreservation, and 18.2% for ovarian tissue cryopreservation [18]. Study by Wadhwa Ni *et al.* suggested awareness regarding various fertility preservation methods was moderate to high [15].

Awareness regarding ASCO Guidelines

The respondents who were aware of ASCO guideline on fertility was 52% and 48% were not aware of it. 36%

respondents had read the guidelines, 40% didn't know the guidelines.

Study by Wadhvani *et al.* indicated that awareness regarding ASCO guidelines on FP was moderate [15].

Practice behaviour

In our study we found that 44% (Always) physician, 36% (Usually) and 2% (Never), explained about gonadotoxicity caused by cancer treatment to the patients, Duffy *et al.* had nearly 77% of the participants discuss with patients their fertility issues that may arise out of cancer treatment and felt that it was their responsibility to discuss fertility issues [18].

Prepubertal *et al.* observed 80% of the physicians usually or always inform the possibility of infertility with the gonadotropic cancer treatment [19].

Regarding discussion about fertility preservation option with the patients, it was observed that 32% (always) respondents, 26% (usually) and 2% (never) discussed the options. Study by Salem *et al.* shows that approximately one third (35%) of their respondents reported discussing the possibility of FP before beginning cancer treatment and 26% seldom discussed if at all [20]. Wadhvani *et al.* in their study report 65% respondents who discussed various fertility preservation option available with the patients.

In our study it was observed that 16% (never), 32% (rarely), 22% (sometimes) provided patients with written information on fertility preservation. Study by Preaubart *et al.* suggested that nearly 3-4th of the physicians often inform the patients about the FP option before the commencing treatment. [19] Study by Wadhvani *et al.* had 13.5% of respondents provide the patient with educational material regarding cancer and FP [15]. In a survey of Iranian oncologists, only 11% of male oncologists and 16.3% of female oncologists reported that they provided their patients with written information about FP [21].

In our study 56% (always) respondents, 22% (sometimes) and 2% (never) considered fertility as important quality of life issue. Wadhvani *et al.* in their study had nearly 3/4th of respondents who considered fertility as important quality of life issue [15].

A study done in Netherlands indicated that 59% of the physicians considered fertility as an important quality of life issue and 93% considered quality of life in general after gonadotropic treatment to be important [22].

About taking cancer treatment regime of the patient into consideration their desire for future, 30% (always), 36% (usually) and 26% (sometimes) considered the same.

Wadhvani *et al.* in their study reported that 53.7% would always plan cancer treatment regimens taking into consideration the patient's desire for future fertility and 26.9% would usually do that [15].

28% respondents (always), 44% (sometimes) considered fertility preservation a high priority in cancer patients. Study by Zhang *et al.* study showed that instead of choosing a lower infertility-damage regimen, 68.9% of physicians altered the treatment with a higher survival rate [23].

34% respondents (always), 28% (sometimes) and 26% (usually) consulted other speciality with queries about potential fertility issue of patients. Study by Vesely *et al.* in Iran showed that the majority, 73.3% male oncologists, and 71.4% female oncologists, referred cancer patients to reproductive specialists [21].

Study by Preaubart *et al.* reported 72% of the physicians had referred patients to an onc-fertility consultation in 2015 compared with 46% in 2012, showing a dramatic increasing trend [19]. Study by Forman *et al.* suggested that nearly 45% never referred patients for FP [24]. Study by Wadhvani *et al.* showed that practice of consulting a specialist from another field regarding fertility issues of the patient and referring the patients for FP was moderate to high [15]. Study by Goodwin *et al.* reported that 34.6% of providers consulted with specialists regarding fertility issues [25]. Study by Shimizu *et al.* showed that female and younger oncologists (age less than 50 years) had a significantly higher probability of referring patients to reproductive specialists [26].

Attitude

Regarding attitude towards fertility preservation, 32% (strongly disagree), 30% (agree) and 10% (strongly agree) that more information about preservation is required.

a study in China indicated that oncology physicians had an optimistic attitude toward FP but knowledge regarding the same was insufficient and they would appreciate and welcome training programs [23]. Turkish haematologists in a survey that reported and opined on publishing a guidebook on FP and holding regular sessions in the congress to create awareness and acquire more knowledge that would be helpful in their clinical practice [27].

Study by Wadhvani *et al.* indicates majority (81.6%) of physicians agree or strongly agree that more information regarding FP is required [15].

In our study, 42% respondents (strongly agree), 40% (agree) for setting up fertility preservation centre necessary. Study in Hongkong suggested (94%) agreed to set up a dedicated referral center with government funding and 73.4% believed that FP should be available as a government-funded service for medical indications [28].

40% (agree) to discuss fertility preservation in newly diagnosed cancer patient as high priority. Duffy *et al.* in his study had widespread agreement among participants in our study that discussing FP with a newly diagnosed cancer patient is a high priority for them. Similarly, the clinicians in this study reported a high sense of responsibility toward patients for discussing fertility issues and FP [18].

Conclusion

The fertility preservation as a concept is relatively evolving and its awareness has increased over the years.

However this concept demands more depth, discussion and maybe guidelines and its implementation. This maybe be achieved by having speciality or super-speciality course or fellowships. This concept requires regular update through informational programs, conferences. There should be more defined guidelines available for the clinicians to treat patients helping them to take decisions regarding treatment and timely referral to fertility preservation centres. This concept demands integration of various multidiscipline in order to make it a successful and more effective one.

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Nil.

Conflicts of interest

there are no conflicts of interest.

References

- GOC. The global cancer observatory," 2020 <https://gco.iarc.fr/today/data/factsheets/cancers/39-All-cancers-fact-sheet.pdf>. View at: Google Scholar.
- Ben Charif A, Bouhnik AD, Courbière B, *et al.* Sexual health problems in French cancer survivors 2 years after diagnosis-the national VICAN survey. *J Cancer Surviv* 2016;10:600-9.
- Radon CM, Borkar AA, Homburg RR. Female fertility preservation: a fertile future? *Obstet Gynaecol* 2015;17:116-24.
- Johnson JA, Tough S, Sogc Genetics C (2012) Delayed child-bearing. *J Obstet Gynaecol Can.* 34:80-93.
- Gorman JR, Bailey S, Pierce JP, Su HI How do you feel about fertility and parenthood? The voices of young female cancer survivors. *J Cancer Surviv.* 2012;6:200-209.
- Loren AW, Mangu PB, Beck LN, Brennan L, Magdalinski AJ, Partridge AH, *et al.* Fertility preservation for patients with cancer: American Society of Clinical Oncology clinical practice guideline update. *J Clin Oncol.* 2013;31:2500-2510.
- Peccatori FA, Azim HA Jr, Orecchia R, Hoekstra HJ, Pavlidis N, Kesic V *et al.* Cancer, pregnancy and fertility: ESMO clinical practice guidelines for diagnosis, treatment and follow-up. *Ann Oncol.* 2013;24(Suppl 6):vi160-vi170.
- Oktay K, Harvey BE, Partridge AH, *et al.*: Fertility preservation in patients with cancer: ASCO clinical practice guideline update. *J Clin Oncol.* 2018;36:1994-2001.
- Lambertini M, Peccatori FA, Demeestere I, *et al.* Fertility preservation and post-treatment pregnancies in post-pubertal cancer patients: ESMO clinical practice guidelines[†]. *Ann Oncol.* 2020;31:1664-1678.
- ESHRE Guideline Group on Female Fertility Preservation, Anderson RA, Amant F, *et al.*: ESHRE guideline: Female fertility preservation. *Hum Reprod Open*; c2020:hoaa052.
- Sallem J, Shore I, Ray-Coquard *et al.*, Fertility preservation in women with cancer: a national study about French oncologists awareness, experience, and feelings. *Journal of Assisted Reproduction and Genetics.* 2018;35(10):1843-1850.
- Chung JP, Lao TT, Li T. Evaluation of the awareness of, attitude to, and knowledge about fertility preservation in cancer patients among clinical practitioners in Hong Kong, Hong Kong Medical Journal. 2017;23(6):556-561.
- Ghazeeri G, Zebian D, assar AH, *et al.* Knowledge, attitudes and awareness regarding fertility preservation among oncologists and clinical practitioners in Lebanon," *Human Fertility.* 2016;19(2):127-133.
- Li Q, Huang C, Gong D, Lan Q, Liu G, Liu A. Knowledge, attitudes, and intentions toward fertility preservation awareness among oncologists in China. *J Clin Oncol.* 2018;36:e18537.
- Wadhvani S, Jindal UN, Maheshwari S. Knowledge, Attitude and Practice regarding fertility preservation among specialist involved in the care of cancer patients. *Fertil Sci Res.*2020;7:212-22.
- Ramya Ahmad Sindi, Marwah Salem Bagabas, Leen Mamdoh Al-Manabre, Raghad Zahi Al-Sofee, Raneem Yousef Rednah, Shrooq Meshal Al-Jahdali. Evaluation of Knowledge, Attitude, and Practice of Health Practitioners towards Fertility Preservation in Cancer Patients in an Environmental Region of Saudi Arabia. *Journal of Environmental and Public Health.* 2022;2022:11.
- Chung JP, Lao TT, Li TC. Evaluation of the awareness of, attitude to, and knowledge about fertility preservation in cancer patients among clinical practitioners in Hong Kong. *Hong Kong Med J* 2017;23:556-61.
- Duffy C, Allen SM, Dube C, Dickersin K. Oncologists' confidence in knowledge of fertility issues for young women with cancer. *J Cancer Educ.* 2012;27:369-76.
- Preaubert L, Pibarot M, Courbiere B. Can we improve referrals for fertility preservation? Evolution of practices after the creation of a fertility network. *Future Oncol.* 2016;12:2175-7.
- Sallem A, Shore J, Ray-Coquard I, *et al.* Fertility preservation in women with cancer: a national study about French oncologists awareness, experience, and feelings. *J Assist Reprod Genet.* 2018;35:1843-50.
- Vesali S, Navid B, Mohammadi M, Karimi E, Omani SR. Little information about fertility preservation is provided for cancer patients: a survey of oncologists' knowledge, attitude and current practice. *Eur J Cancer Care.* 2019;28:12947.
- Louwé LA, ter Kuile MM, Hilders CG, *et al.* Oncologists' practice and attitudes regarding fertility preservation in female cancer patients: a pilot study in the Netherlands. *J Psychosom Obstet Gynaecol.* 2013;34:129-32.
- Zhang H, Wang G, Jiang B, Cao M, Jiang Q, Yin L, *et al.* The knowledge attitude and self-reproductive behaviours of oncology physicians regarding fertility preservation in adult cancer patients. *J Cancer Educ* 2019;35:1119-27.
- Forman EJ, Anders CK, Behera MA. Pilot survey of oncologists regarding treatment-related infertility and fertility preservation in female cancer patients. *J Reprod Med* 2009;54:203-7.
- Goodwin T, Elizabeth Oosterhuis B, Kiernan M, Hudson MM, Dahl GV. Attitudes and practices of pediatric oncology providers regarding fertility issues. *Pediatr Blood Cancer.* 2007;48:80-85.
- Shimizu C, Bando H, Kato T *et al.* Physicians' knowledge, attitude, and behavior regarding fertility issues for young breast cancer patients: a national survey for breast care specialists. *Breast Cancer.* 2013;20:230-40.
- Kucuk M, Yavaşoğlu I, Bolaman AZ, Kadıköy G. Knowledge, attitudes, and practices of hematologists regarding fertility preservation in Turkey. *Turk J Haematol.* 2013;30:269-74.
- Yeung SY, Ng EYL, Lao TTH, Li TC, Chung JPW. Fertility preservation in Hong Kong Chinese society: awareness, knowledge, and acceptance. *BMC Womens Health.* 2020;20:86.