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ORIGINAL ARTICLE

# Is the Perspective of Radiation Oncologists on Fertility and Contraception in Patients Diagnosed with Breast Cancer in the Reproductive Age Changing? Results of a National Survey

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**OBJECTIVE**

As survival rates improve among reproductive-age breast cancer patients, fertility preservation, pregnancy, and contraception have become increasingly important quality-of-life issues. Radiation oncologists frequently encounter these patients; however, their awareness and clinical practices regarding oncofertility and contraception in Türkiye remain unclear.

**METHODS**

A 15-item national survey was conducted among radiation oncologists practicing in Türkiye to evaluate approaches to fertility preservation, pregnancy counseling, ovarian protection, and contraception in premenopausal breast cancer patients. The survey was distributed electronically, and responses were analyzed descriptively.

**RESULTS**

A total of 131 radiation oncologists viewed the survey, and 29 (22.1%) completed it. None of the respondents routinely contoured ovaries during breast radiotherapy planning. While 71.4% reported that fertility and pregnancy issues had been discussed during prior clinical evaluations, only 42.9% routinely discussed contraception in their own practice. More than one-third of respondents believed that pregnancy could be prevented by concurrent use of GnRH agonists and tamoxifen. Although 92.6% emphasized the importance of a multidisciplinary approach, fertility, pregnancy, and contraception were not consistently integrated into daily radiation oncology practice.

**CONCLUSION**

Despite growing awareness of the importance of fertility-related issues, radiation oncologists in Türkiye do not routinely address fertility preservation, pregnancy, and contraception in young breast cancer patients. Systematic integration of oncofertility counseling into radiation oncology practice and closer multidisciplinary collaboration are essential to meet the evolving expectations of this patient population.

**Keywords:** Breast cancer; contraception; fertility; multidisciplinary approach; radiotherapy.
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## INTRODUCTION

Breast cancer is the most frequently diagnosed cancer among women in Türkiye, with more than 25,000 new cases reported in 2022, in line with global trends.[1,2] The widespread implementation of screening programs has resulted in an increasing number of patients being diagnosed at earlier stages and at younger ages.[3] Although younger age at diagnosis has historically been considered a poor prognostic factor, survival outcomes have improved substantially over the past decade due to advances in diagnostic methods and treatment strategies.

As survival improves, treatment-related adverse effects increasingly influence patients' quality of life. A study conducted by the Dana–Farber Cancer Institute demonstrated that young breast cancer patients have distinct expectations compared with older patients, particularly regarding treatment-related side effects, fertility, and menopausal symptoms.[4] Consequently, fertility preservation and pregnancy-related concerns have become increasingly important issues for radiation oncologists involved in the management of young breast cancer patients.[5]

Contraception is another critical issue that must be addressed in young patients. It is often assumed that tamoxifen and gonadotropin-releasing hormone (GnRH) agonists used during radiotherapy exert a contraceptive effect due to the induction of amenorrhea. Tamoxifen use represents a notable example of this complexity. Contrary to common misconceptions, tamoxifen does not reduce ovarian reserve and should not be considered a contraceptive method.[6] Failure to adequately counsel young patients receiving tamoxifen about contraception may significantly increase the risk of teratogenic effects in the event of an unintended pregnancy.[7] Although GnRH agonists may have a potential contraceptive effect, they may cause insufficient ovarian suppression and are not licensed as contraceptive agents.[8] For these reasons, in patients who complete anticancer treatments and are referred for radiotherapy, the presence of amenorrhea should not be considered a reliable indicator of contraception, and all patients should be referred for gynecologic consultation for appropriate contraceptive counseling. To ensure proper gynecologic consultation, contraception should be systematically discussed with all premenopausal patients.

In addition, modern radiotherapy techniques such as Intensity-Modulated Radiation Therapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT) may unintentionally deliver low doses of radiation to the ovaries and uterus.[9] Therefore, ovarian protection should be considered during radiotherapy planning in patients of reproductive age who may desire future pregnancy.

To date, no comprehensive study has evaluated communication practices between radiation oncologists and young breast cancer patients in Türkiye or assessed radiation oncologists' awareness regarding fertility, pregnancy, and contraception. In light of these considerations, we conducted a national survey to evaluate radiation oncologists' approaches to the evolving expectations of young breast cancer patients.

## MATERIALS AND METHODS

A 15-item survey was designed for radiation oncologists practicing in Türkiye. Survey questions addressed ovarian contouring practices, fertility preservation, pregnancy counseling, hormonal therapy, contraception, and breastfeeding. Each question allowed only one response. The survey was distributed electronically via email and online professional communication platforms. Typeform survey software was used for survey creation and data analysis. Since the study was a survey study, no ethics committee approval was required.

## RESULTS

Survey questions, response options, and the statistical distribution of responses are summarized in Table 1. A total of 131 participants viewed the survey, 64 (48.85%) participants start to answer, of whom 29 (45.3%) completed. The highest dropout rate occurred after the third question (17%). Among 131 participants who viewed the survey, only 22.13% of participants completed the survey.

All respondents reported that they did not routinely contour the ovaries during breast cancer radiotherapy planning (100%, n=29). It was found that 71.4% of participants answered "yes" to whether fertility and pregnancy issues had been discussed in the clinics where premenopausal patients had previously been evaluated at their first outpatient visit (Fig. 1).

It was determined that 42.9% (n=12) of radiation oncologists who completed the survey discussed contraception with patients presenting to the Radiation Oncology outpatient clinic. While 21.4% (n=6) reported that they never discussed this issue, 35.7% (n=10) stated that they discussed it occasionally.

**Table 1**. Survey questions, answer options, and statistical distribution of answers

| Questions | Answers' distribution |
|---|---|
| 1. Do you conduct ovarian contouring as part of breast cancer radiotherapy? (PwA: 29) | a. Yes (0% , n=0)<br>b. No (100%, n=29)<br>c. Occasionally (0% , n=0) |
| 2. If you answered "Yes" to the first question, do you discuss pregnancy intentions with young patients after considering the ovarian dose received? (PwA:13) | a. Yes (7.7%, n=1)<br>b. No (76.9%, n=10)<br>c. Occasionally (15.4%, n=2) |
| 3. If a patient wishes to conceive, do you refer them to a gynecology clinic for fertility preservation procedures along with ovarian preservation during planning? (PwA:29) | a. Yes (69%, n=20)<br>b. No (27.6%, n=8)<br>c. Occasionally (3.5%, n=1) |
| 4. If you answered "No" to the third question, do you believe that ovarian preservation alone during the planning phase would be sufficient? (PwA:15) | a. Yes (26.7%, n=4)<br>b. No (60%, n=9)<br>c. Occasionally (13.3%, n=2) |
| 5. Do you have information about the most commonly used method for ovarian protection in our country? (PwA:27) | a. Oocyte/embryo cryopreservation (81.5%, n=22)<br>b. Ovarian tissue preservation (7.4%, n=2)<br>c. Ovarian suppression with GNRH agonist (11.1%, n=3) |
| 6. In your opinion, which medical department should be consulted regarding fertilization-related issues? (PwA:27) | a. Breast Surgeon (0% , n=0)<br>b. Medical Oncologist (7.4%, n=2)<br>c. Radiation Oncologist (0% , n=0)<br>d. All (92.6%, n=25) |
| 7. When young patients are referred to your clinic, do you check if fertility and pregnancy have been discussed with the specialists they previously consulted? (PwA:28) | a. Yes (71.4%, n=20)<br>b. No (14.3%, n=4)<br>c. Occasionally (14.3%, n=4) |
| 8. Do young patients ask you questions about contraception from you when they are referred to your clinic? (PwA:28) | a. Yes (39.3%, n=11)<br>b. No (28.6%, n=8)<br>c. Occasionally (32.1%, n=9) |
| 9. Do you offer information about contraception to your young patients? (PwA:28) | a. Yes (42.9%, n=12)<br>b. No (21.4%, n=6)<br>c. Occasionally (35.7%, n=10) |
| 10. Do you believe that pregnancy can be prevented in patients who are using GnRH agonists and tamoxifen? (PwA:28) | a. Yes (35.7%, n=10)<br>b. No (64.3%, n=18) |
| 11. Do you inform patients using hormonal contraception methods about the need for a gynecological consultation before breast cancer diagnosis and treatment? (PwA:29) | a. Yes (55.2%, n=16)<br>b. No (13.8%, n=4)<br>c. Occasionally (31%, n=9) |
| 12. Do you recommend pregnancy for your patients who express concerns after treatment? (PwA:26) | a. Yes (34.6%, n=9)<br>b. No (15.4%, n=4)<br>c. Dependent on hormone receptor status (50%, n=13) |
| 13. If you do not recommend pregnancy, what is the main reason for that? (PwA:19) | a. Due to complications such as preterm births and low birth weight (5.3%, n=1)<br>b. Because the risk of recurrence may increase in hormone-positive patients (52.6%, n=10)<br>c. Other (42.1%, n=8) |
| 14. Do you assess BRCA1 and BRCA2 carriers for potential risks related to pregnancy? (PwA:25) | a. Yes (64%, n=16)<br>b. No (28%, n=7)<br>c. Occasionally (8%, n=2) |
| 15. Do you recommend breastfeeding after undergoing breast radiotherapy? (PwA:29) | a. Yes (27.6%, n=8)<br>b. No (51.7%, n=15)<br>c. Occasionally (20.7%, n=6) |

PwA: Number of participants who answered the question.

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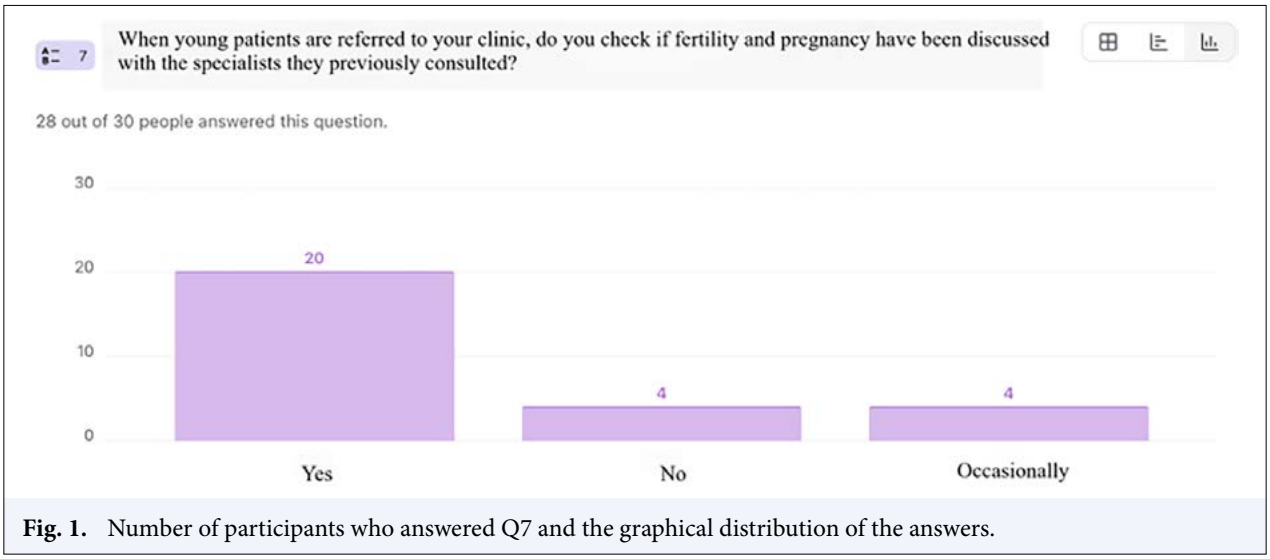


**Fig. 1.** Number of participants who answered Q7 and the graphical distribution of the answers.

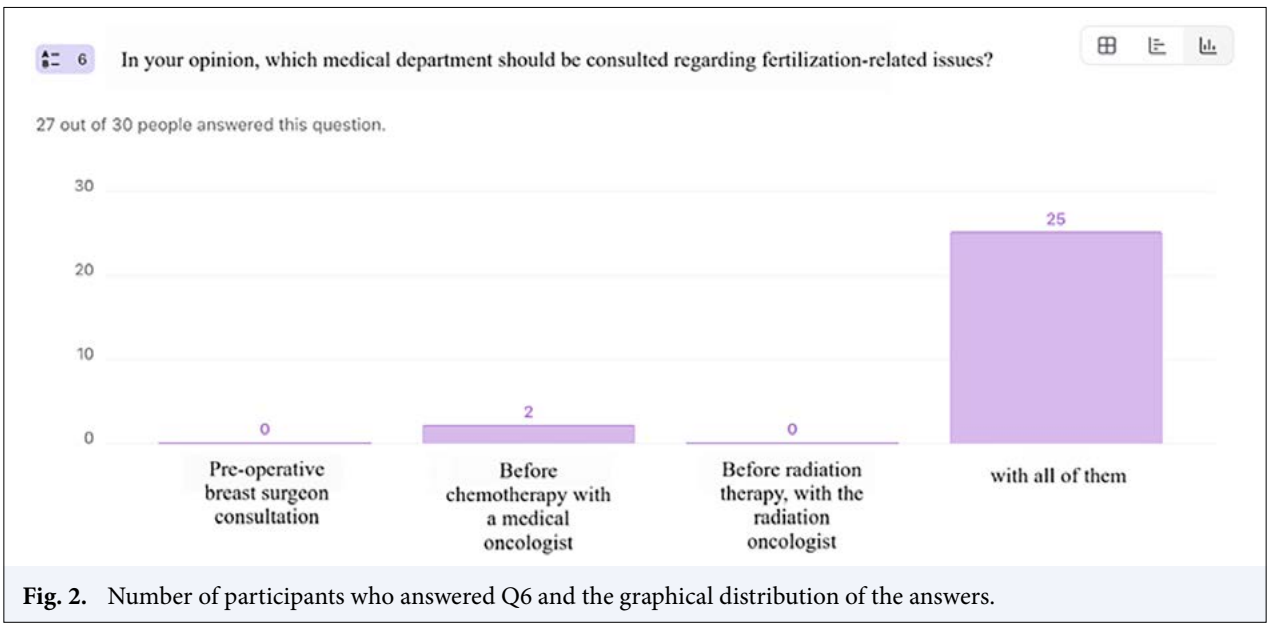


**Fig. 2.** Number of participants who answered Q6 and the graphical distribution of the answers.

Regarding contraception counseling, 55.2% of participants (n=16) stated that they routinely consult gynecology for young breast cancer patients, whereas 13.8% (n=4) reported that they do not address this issue at all. Notably, 35.7% of respondents (n=10) believed that pregnancy could be prevented in patients receiving both GnRH agonists and tamoxifen.

A large majority of participants (92.6%, n=25) indicated that fertility-related issues should be addressed within a multidisciplinary framework (Fig. 2). However, when the survey results were evaluated collectively, it became evident that fertility, pregnancy, and contraception issues are not routinely integrated into daily radiation oncology practice in Türkiye.

## DISCUSSION

Due to widespread mammography screening, the number of patients diagnosed with breast cancer at an early stage has been increasing. In parallel, the proportion of patients diagnosed at a younger age has also risen as a result of changes in dietary habits, lifestyle factors, and genetic predisposition.[10] Consequently, young patients diagnosed at an early stage with curative intent increasingly seek information and solutions regarding fertility preservation, pregnancy desire, and contraception during outpatient visits.

Evaluation of the results of our survey suggests that, in Türkiye, radiation oncologists generally do

not proactively address these issues during treatment initiation or follow-up unless specifically raised by the patient. Although this interpretation may be influenced by the low response rate—of the 131 radiation oncologists who viewed the survey, only 29 completed it, and none answered all questions. 25 respondents (92.6%) expressed the opinion that fertility-related issues should be discussed within a multidisciplinary framework. This finding is consistent with the global literature, where clinicians treating this patient population acknowledge the importance of oncofertility, yet their approaches often remain suboptimal.[11,12] Notably, most studies on this topic have been conducted by medical oncologists rather than radiation oncologists.[5]

Because fertility desire, fertility preservation, and contraception are not routinely integrated into radiation oncology practice, perspectives and reviews from this discipline are limited in the existing literature. However, many young patients diagnosed at an early stage—often treated with breast-conserving surgery and receiving hormonal therapy without chemotherapy—are directly referred to radiation oncology clinics. These patients frequently direct their questions regarding fertility and pregnancy to radiation oncologists. To ensure appropriate counseling, it is essential that radiation oncologists are familiar with the hormonal therapies initiated and provide patient-specific information accordingly. Tamoxifen, one of the most commonly used agents during and after radiotherapy, is known not to negatively affect ovarian reserve, and studies have demonstrated no significant change in anti-Müllerian hormone levels.[13]

When ovarian suppression with a GnRH agonist is administered during chemotherapy, the rate of premature ovarian insufficiency decreases from 30.9% to 14.1%. However, the risk of premature ovarian insufficiency when aromatase inhibitors are used in combination with GnRH agonists remains unclear.[13]

Ovarian risk assessments in radiotherapy are primarily performed in patients receiving pelvic irradiation, and ovaries are not routinely contoured as organs at risk in breast cancer radiotherapy. In a dosimetric study by Oonsiri et al.,[9] left breast radiotherapy planning using standard two-dimensional tangential fields, IMRT, and VMAT resulted in ipsilateral ovarian doses of 42 centigray (cGy), contralateral ovarian doses of 31 cGy, and uterine doses of 38 cGy. Similarly, Aral et al.[14] evaluated eight breast cancer patients treated with modern radiotherapy techniques and observed zero ovarian dose with three-dimensional conformal planning. In helical IMRT plans, ipsilateral ovarian doses were calculated as 12 cGy (range 10–30 cGy) and contralateral ovarian doses as 8 cGy (range 5–13 cGy). In patients who underwent breast-conserving surgery and IMRT planning, the ipsilateral ovarian dose was 15 cGy (range 12–30 cGy).

Ovarian reserve decreases markedly with radiotherapy. Radiation-induced ovarian follicle loss occurs at doses below 2 Gray (Gy), while LD5 and LD50 values for infertility are reported as 2–3 Gy and 6–12 Gy, respectively.[15] Kerr et al.[16] demonstrated a significant reduction in primordial follicles following exposure to 45 cGy of gamma radiation. Although ovarian doses during breast radiotherapy generally remain within acceptable limits, patient- and treatment-related factors—particularly age at diagnosis and treatment protocol—may alter ovarian sensitivity.

In the present survey, responses to the twelfth question indicated that four respondents (15.4%) did not recommend pregnancy, while 13 (50%) based their recommendation on hormone receptor status. Considering that many radiation oncologists reviewed the survey but did not respond, it appears that a substantial proportion may feel hesitant to address pregnancy-related issues. Medical oncologists, similar to radiation oncologists, may prioritize oncologic outcomes over fertility concerns or may express concerns regarding increased recurrence risk in hormone-positive patients.

As the number of young patients diagnosed at an early stage with long-term survival continues to increase, fertility, pregnancy, and contraception issues should be systematically incorporated into routine clinical practice. Until these topics are fully embedded within multidisciplinary care, oncofertility boards should be implemented, and patients should undergo comprehensive multidisciplinary evaluation. In the interim, radiation oncologists managing patients who have not received counseling on these issues should request gynecological consultations, assess anti-Müllerian hormone levels, and reconsider radiotherapy planning techniques for patients desiring pregnancy.[17]

Although hypofractionated regimens are increasingly used, patients typically attend radiation oncology clinics daily for at least 20 treatment days. This frequent interaction allows for closer communication between patients and physicians and may prompt more questions regarding contraception. Nevertheless, a considerable proportion of respondents reported that patients did not raise contraception-related

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questions. One possible explanation is treatment-related amenorrhea, leading patients to assume that pregnancy is not possible.

Patients may concurrently receive tamoxifen or GnRH analogues during radiotherapy. While tamoxifen does not alter ovarian reserve, pregnancy occurring under tamoxifen exposure may result in teratogenic effects, and GnRH analogues are not licensed as contraceptive agents.[13] Therefore, updating clinicians' knowledge on this issue is critically important.

Hormonal contraceptive methods are contraindicated in breast cancer patients. Even intrauterine levonorgestrel, although protective for the endometrium, may increase the risk of breast cancer recurrence. Lambertini et al.[18] reported that 54.2% of breast cancer patients were using hormonal contraceptive methods at diagnosis. Consequently, discussing contraception with patients and requesting gynecological consultations are essential components of clinical follow-up.

Although the majority of respondents indicated that fertility-related discussions should be conducted within a multidisciplinary framework, the overall responses suggest that oncofertility and contraception are not routinely addressed in clinical practice. These findings are consistent with previous studies involving other oncology disciplines, where awareness of the importance of oncofertility exists but clinical implementation remains suboptimal.[5] As diagnosis and survival rates increase among reproductive-age breast cancer patients, fertility and contraception issues must be systematically incorporated into routine clinical care to improve quality of life.

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## REFERENCES

1. Filho AM, Laversanne M, Ferlay J, Colombet M, Piñeros M, Znaor A, et al. The GLOBOCAN 2022 cancer estimates: Data sources, methods, and a snapshot of the cancer burden worldwide. Int J Cancer 2025;156:1336–46.
2. Ferlay J, Ervik M, Lam F, Laversanne M, Colombet M, Mery L, et al. Global Cancer Observatory: Cancer Today. Lyon: International Agency for Research on Cancer; 2024.
3. Bleyer A, Welch HG. Effect of three decades of screening mammography on breast-cancer incidence. N Engl J Med 2012;367:1998–2005.
4. Ruddy KJ, Greaney ML, Sprunck-Harrild K, Meyer ME, Emmons KM, Patridge AH. Young women with breast cancer: A focus group study of unmet needs. J Adolesc Young Adult Oncol 2013;2:153–60.
5. Nardin S, Arecco L, Delucchi V, Blondeaux E, Stana M, Leite LM, et al: Physicians' knowledge, practice, and attitudes on fertility and pregnancy-related issues in young women with advanced breast cancer: Results of the ABC6 and ABC7 survey. Breast 2025;82:104479.
6. Paluch-Shimon S, Cardoso F, Partridge AH, Abulkhair O, Azim Jr. HA, Bianchi-Micheli G, et al. ESO–ESMO 4th International Consensus Guidelines for Breast Cancer in Young Women (BCY4). Ann Oncol 2020;31:674–96.
7. Jyoti B, Bharat C, Ankita N, Munita B, Sudeep G. Pregnancy on tamoxifen: Case report and review of literature. South Asian J Cancer 2016;5:209–10.
8. Lambertini M, Moore HCF, Leonard RCF, Loibl S, Munster P, Bruzzone M, et al. Gonadotropin-releasing hormone agonists during chemotherapy for preservation of ovarian function and fertility in premenopausal patients with early breast cancer: A systematic review and meta-analysis of individual patient-level data. J Clin Oncol 2018;36:1981–92.
9. Oonsiri P, Vannavijit C, Wimolnoch M, Suriyapee S, Saksornchai K. Estimated radiation doses to ovarian and uterine organs in breast cancer irradiation using radio-photoluminescent glass dosimeters (RPLDs). J Med Radiat Sci 2021;68:167–74.
10. Cathcart-Rake EJ, Ruddy KJ, Bleyer A, Johnson RH. Breast cancer in adolescent and young adult women under the age of 40 years. JCO Oncol Pract 2021;17:305–13.
11. Masciello MC, Bartholomew AJ, Haslinger M, Bozzuto LM, Tung SS, Thibodeau R, et al. Physician perspectives on fertility preservation discussions with premenopausal breast cancer patients: Results from a multihospital health care system. Ann Surg Oncol 2019;26:3210–15.

12. Lambertini M, Di Maio M, Poggio F, Pagani O, Curigliano G, Del Mastro L, et al. Knowledge, attitudes and practice of physicians towards fertility and pregnancy-related issues in young BRCA-mutated breast cancer patients. Reprod Biomed Online 2019;38:835–44.
13. Razeti MG, Spinaci S, Spagnolo F, Lambertini M. How I perform fertility preservation in breast cancer patients. ESMO Open 2021;6:100112.
14. Aral IP, Inan GA, Beyaz H, Karadeniz HG, Arpacı E, Eser MK, et al. Evaluation of ovary radiation dose in breast cancer radiotherapy with modern techniques: A prospective pilot study. Clin Exp Obstet Gynecol 2024;51:138.
15. Duncan FE, Kimler BF, Briley SM. Combating radiation therapy-induced damage to the ovarian environment. Future Oncol 2016;12:1687–90.
16. Kerr JB, Hutt KJ, Michalak EM, Cook M, Vandenberg CJ, Liew SH, et al. DNA damage-induced primordial follicle oocyte apoptosis and loss of fertility require TAp63-mediated induction of Puma and Noxa. Mol Cell 2012;48:343–52.
17. Lambertini M, Peccatori FA, Demeestere I, Amant F, Wyns C, Stukenborg JB, et al. Fertility preservation and post-treatment pregnancies in post-pubertal cancer patients: ESMO clinical practice guidelines. Ann Oncol 2020;31:1664–78.
18. Lambertini M, Massarotti C, Havas J, Pistilli B, Martin AL, Jacquet A, et al. Contraceptive use in premenopausal women with early breast cancer. JAMA Netw Open 2022;5:e2233932.