http://dx.doi.org/10.18623/rvd.v23.5979

FREQUENCY OF OVARIAN TUMORS PRESENTING IN REPRODUCTIVE AND POSTMENOPAUSAL AGE GROUPS

FREQUÊNCIA DE TUMORES OVARIANOS EM MULHERES EM IDADE REPRODUTIVA E PÓS-MENOPÁUSICA

Article received on: 20/1/2026
Article accepted on: 28/2/2026

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The authors declare that there is no conflict of interest

Abstract
Objective: To determine the frequency and types of ovarian tumors presenting among reproductive-age and postmenopausal women at a tertiary-care hospital. Material and methods: This Cross-sectional analytical study was conducted at the Department of Gynecology, Allied Hospital Faisalabad, from October 2025 to January 2026. A total of 138 women were enrolled through non-probability consecutive sampling, with 69 participants in the reproductive-age group and 69 in the postmenopausal group. Demographic characteristics, clinical features, and risk factors were recorded. All patients underwent ultrasonography followed by histopathological confirmation of ovarian tumors. Tumors were classified as benign, borderline, or malignant. Results: The mean age of participants was 42.8 ± 14.9 years, with reproductive women averaging 29.7 ± 6.1 years and postmenopausal women 55.8 ± 4.7 years. Overall, 82 (59.4%) tumors were benign, 11 (8.0%) borderline, and 45 (32.6%) malignant. Benign tumors were significantly more common in reproductive-age women (63.7%, 44/69), while malignant tumors predominated in postmenopausal women

Resumo
Objetivo: Determinar a frequência e os tipos de tumores ovarianos apresentados por mulheres em idade reprodutiva e pós-menopáusicas em um hospital terciário. Material e métodos: Este estudo analítico transversal foi conduzido no Departamento de Ginecologia do Hospital Allied de Faisalabad, de outubro de 2025 a janeiro de 2026. Um total de 138 mulheres foram incluídas por meio de amostragem consecutiva não probabilística, sendo 69 participantes no grupo em idade reprodutiva e 69 no grupo pós-menopáusico. Características demográficas, clínicas e fatores de risco foram registrados. Todas as pacientes foram submetidas a ultrassonografia seguida de confirmação histopatológica dos tumores ovarianos. Os tumores foram classificados como benignos, borderline ou malignos. Resultados: A idade média das participantes foi de 42,8 ± 14,9 anos, sendo 29,7 ± 6,1 anos para as mulheres em idade reprodutiva e 55,8 ± 4,7 anos para as mulheres pós-menopáusicas. No geral, 82 (59,4%) tumores eram benignos, 11 (8,0%) borderline e 45 (32,6%) malignos. Os tumores benignos foram significativamente mais comuns em mulheres em idade reprodutiva (63,7%,

(47.8%, 33/69). Serous cystadenoma (28.9%) and dermoid cysts (20.2%) were the most frequent benign tumors. Serous carcinoma was the most common malignancy (22.4%), occurring predominantly in postmenopausal women. A significant association was found between menopausal status and tumor type (p = 0.004). Conclusion: It is concluded that ovarian tumors exhibit distinct patterns across reproductive and postmenopausal age groups. Benign tumors are more common among reproductive-age women, whereas malignancies predominate in the postmenopausal population.

Keywords: Ovarian Neoplasms. Postmenopause. Premenopause. Histopathology.

44/69), enquanto os tumores malignos predominaram em mulheres na pós-menopausa (47,8%, 33/69). Cistadenoma seroso (28,9%) e cistos dermoides (20,2%) foram os tumores benignos mais frequentes. O carcinoma seroso foi a malignidade mais comum (22,4%), ocorrendo predominantemente em mulheres na pós-menopausa. Foi encontrada uma associação significativa entre o estado menopausal e o tipo de tumor (p = 0,004). Conclusão: Conclui-se que os tumores ovarianos exibem padrões distintos entre os grupos etários reprodutivo e pós-menopausa. Os tumores benignos são mais comuns entre mulheres em idade reprodutiva, enquanto as malignidades predominam na população pós-menopáusica.

Palavras-chave: *Neoplasias Ovarianas. Pós-menopausa. Pré-menopausa. Histopatologia.*

1 INTRODUCTION

Ovarian tumors are abnormal growths that arise from the ovaries, the organs responsible for egg and hormone production in women. Globally, ovarian cancer (OC) ranks as the seventh most common malignant neoplasm and the eighth leading cause of death among women[1]. These tumors can be either benign (non-cancerous) or malignant (cancerous), affecting women across all age groups, though their frequency and types often vary with age[2]. While ovarian tumors can occur at any age, they are most frequently diagnosed after menopause[3], with approximately 90% being epithelial ovarian cancers that primarily develop in postmenopausal women. Given their impact on global women's health, understanding the frequency and types of ovarian tumors in both reproductive and postmenopausal age groups is crucial[4].

A major concern with ovarian tumors is their ability to progress silently, often reaching advanced stages before being clinically detected[5]. The incidence and types of ovarian tumors differ significantly based on factors such as age, hormonal status, and genetic predisposition. The reproductive and postmenopausal phases of a woman's life are distinct, each presenting its own set of risk factors and health challenges.

A 2023 study by Mehra et al. highlighted that the most common ovarian neoplasms are surface epithelial tumors, which are benign and primarily affect women of reproductive age[6]. Early detection, when tumors are small and localized, is critical for improving outcomes; however, more than 75% of women are diagnosed at advanced stages, as early-stage ovarian cancer is often asymptomatic, and late-stage symptoms are vague and nonspecific[6].

The incidence and mortality of ovarian tumors vary across different age groups[7]. The World Health Organization reported a global age-standardized incidence rate of 6.6 per 100,000 women for ovarian cancer in 2018, with a mortality rate of 3.9 per 100,000 women in 2017[8]. These figures differ across regions, ethnicities, and socioeconomic groups. A study by Charlotte Debuquoy et al. revealed that nearly half of ovarian malignancies are associated with various 'rare' histotypes[9], and epithelial tumors, particularly high-grade serous carcinomas, are the most common, underscoring the need for further research into the frequency and types of ovarian tumors across different age groups. A study conducted at the Department of Obstetrics and Gynecology, DHQ Hospital Gujranwala, found that ovarian tumors in women with reproductive age. Ovarian Tumor was seen in 65(23%) patients. Among 65 patients with ovarian tumor, 72.3% were benign, 3.1% borderline and 24.6% were malignant[10]. While another study reported ovarian tumors as 06 (6.3%) in postmenopausal age groups, out of which 3 (50%) were Benign, 0 (0%) were borderline and 3 (50%) were malignant tumors[11,12].

2 OBJECTIVE

- To determine the frequency of ovarian tumors in reproductive and postmenopausal age groups
- To compare histopathological type of ovarian tumors in reproductive and postmenopausal age groups

3 METHODOLOGY

This Cross sectional, analytical study was conducted at Department of Gynecology, Allied Hospital Faisalabad from October 2025 to January 2026. Using the

WHO sample size calculator for a single proportion, a total sample size of 138 participants (69 in each group) is determined.

The assumptions used include a 95% confidence level, 80% power of test, an estimated prevalence of ovarian tumors in the reproductive age group of 23%, and an estimated prevalence of 6.3% in the postmenopausal group[13]. Non-probability consecutive sampling was used to enroll all eligible women.

4 INCLUSION CRITERIA:

- Women aged 18-70 years
- Reproductive and menopausal
- Presenting with presenting complaints like bloating, mass in abdomen, pelvic pain and swelling and discomfort

5 EXCLUSION CRITERIA:

- Women with a history of other malignancies.
- Women who have previously received any systemic therapy for ovarian cancer, including chemotherapy, targeted therapy, immunotherapy, or hormonal therapy.
- Women who are pregnant, breastfeeding, or planning to become pregnant during the study period.

6 DATA COLLECTION

Following approval from the institutional ethical committee, eligible patients were recruited from the Outpatient Department of Obstetrics and Gynecology Unit-II at Allied Hospital, Faisalabad. Written informed consent was obtained from all participants.

Participants were divided into two groups based on menstrual status:

- **Group A (Reproductive age group):** Women aged 15–49 years.
- **Group B (Postmenopausal group):** Women aged 50 years and older with cessation of menstruation for at least 12 months.

Data collection included demographic details such as age, duration of symptoms, marital status, weight, smoking history, family history of cancer, and history of hormonal therapy to control for confounding variables. Ultrasonography was used to identify suspected ovarian masses. Surgically obtained tumor specimens were sent for histopathological examination, which was performed by certified pathologists to minimize observer bias.

Ovarian tumors were classified as:

Benign: Without exuberant cellular proliferation or invasive behavior

Borderline: With increased cellular proliferation but no invasion

Malignant: Demonstrating invasive tumor behavior

Data Analysis

Data were analyzed using SPSS version 25. Continuous variables such as age, BMI, duration of symptoms, and tumor size were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The independent samples t-test was applied to compare mean values between reproductive and postmenopausal groups. Associations between categorical variables, including tumor nature, laterality, clinical presentation, ultrasound morphology, and Doppler findings, were assessed using the Chi-square test, and Fisher's exact test was applied where expected cell counts were less than five. A p-value of less than 0.05 was considered statistically significant, with all analyses performed at a 95% confidence level.

7 RESULTS

Data were collected from 138 patients, reproductive group had a mean age of 34.2 ± 8.1 years, while the postmenopausal group had a mean age of 58.7 ± 6.4 years. The overall mean BMI was 31.4 ± 4.3 kg/m². Most participants were married (63%), and the average duration of symptoms was 5.8 ± 3.4 months. Smoking was reported by only 8.7% of patients, and 13.7% had a family history of cancer. Prior hormonal therapy was reported by 7.9% (Table 1).

Table 1

Demographic and Clinical Characteristics of Patients (N = 138).

Variable	Category	n (%)	Mean ± SD
Age group	Reproductive (15–49 years)	69 (50.0)	34.2 ± 8.1
	Postmenopausal (≥50 years)	69 (50.0)	58.7 ± 6.4
BMI (kg/m²)	—	—	31.4 ± 4.3
Marital status	Married	87 (63.0)	—
	Single	51 (37.0)	—
Duration of symptoms (months)			5.8 ± 3.4
Smoking history	Yes	12 (8.7)	—
	No	126 (91.3)	—
Family history of cancer	Yes	19 (13.7)	—
	No	119 (86.3)	—
History of hormonal therapy	Yes	11 (7.9)	—
	No	127 (92.1)	—

Right-sided tumors were slightly more common (46.4%), followed by left-sided tumors (42.8%), while 10.9% had bilateral involvement. Most tumors were benign (66.7%), while 25.3% were malignant and 8% were borderline. Tumor size varied, but the majority were between 5–10 cm (45.7%). Serous cystadenoma was the most common histological type at 26.1%, followed by mucinous cystadenoma at 19.6% and dermoid cysts at 14.5%. Among malignant tumors, serous carcinoma accounted for 13% and mucinous carcinoma for 5.1% (Table 2).

Table 2

Tumor Characteristics of Patients (N = 138)

Variable	Category	n (%)
Tumor laterality	Right ovary	64 (46.4)
	Left ovary	59 (42.8)
	Bilateral	15 (10.9)
Tumor nature	Benign	92 (66.7)
	Borderline	11 (8.0)
	Malignant	35 (25.3)
Tumor size (cm)	<5 cm	49 (35.5)
	5–10 cm	63 (45.7)
	>10 cm	26 (18.8)
Histopathological type	Serous cystadenoma	36 (26.1)
	Mucinous cystadenoma	27 (19.6)
	Dermoid cyst	20 (14.5)
	Endometrioma	9 (6.5)
	Serous carcinoma	18 (13.0)
	Mucinous carcinoma	7 (5.1)
	Granulosa cell tumor	6 (4.3)
	Others	15 (10.9)

Benign tumors were more common in reproductive-age women at 82.6%, whereas malignant tumors were significantly more frequent in postmenopausal women at 42%. The mean tumor size was significantly larger in postmenopausal women (8.3 ± 3.1 cm) compared to reproductive women (6.1 ± 2.4 cm), as determined by the independent samples t-test ($p < 0.001$). Bilateral tumors were also significantly more common in postmenopausal patients (15.9% vs 5.8%, $p = 0.04$), indicating a statistically significant difference between the two groups (Table 3).

Table 3

Comparison of Tumor Types Between Reproductive and Postmenopausal Groups

Tumor Type	Reproductive n = 69	Postmenopausal n = 69	p-value
Benign	57 (82.6)	35 (50.7)	<0.001
Borderline	6 (8.7)	5 (7.2)	0.75
Malignant	6 (8.7)	29 (42.0)	<0.001
Mean tumor size (cm)	6.1 ± 2.4	8.3 ± 3.1	<0.001
Bilateral tumors	4 (5.8)	11 (15.9)	0.04

Chi-square test

Abdominal pain was significantly more common in reproductive women (75.4% vs 55.1%, $p = 0.01$), and irregular bleeding was markedly higher in this group (33.3% vs 8.7%, $p < 0.001$). Unilocular cysts were significantly more frequent in reproductive women (66.7% vs 39.1%, $p = 0.002$), whereas solid or mixed masses were significantly more common in postmenopausal women (37.7% vs 15.9%, $p = 0.003$). Low resistive index Doppler flow was also significantly higher in postmenopausal patients (26.1% vs 11.6%, $p = 0.03$). In contrast, abdominal fullness ($p = 0.18$), bloating ($p = 0.38$), and multiloculated cysts ($p = 0.39$) showed no statistically significant differences between the groups (Table 4).

Table 4

Clinical Presentation and Ultrasound Findings in Reproductive vs Postmenopausal Groups

Variable	Category	Reproductive (n = 69)	Postmenopausal (n = 69)	p-value
Common presenting symptoms	Abdominal pain	52 (75.4)	38 (55.1)	0.01
	Abdominal mass/fullness	41 (59.4)	49 (71.0)	0.18

	Bloating	27 (39.1)	32 (46.4)	0.38
	Irregular bleeding	23 (33.3)	6 (8.7)	<0.001
Ultrasound morphology	Unilocular cyst	46 (66.7)	27 (39.1)	0.002
	Multiloculated cyst	12 (17.4)	16 (23.2)	0.39
	Solid or mixed mass	11 (15.9)	26 (37.7)	0.003
Doppler flow	Low resistive index	8 (11.6)	18 (26.1)	0.03
	High resistive index	61 (88.4)	51 (73.9)	—

Chi-square test

8 DISCUSSION

This research compared the frequency, distribution and nature of ovarian tumors on reproductive and postmenopausal women who presented to a tertiary care hospital in Pakistan. The results showed a significant disparity in the tumor patterns in the two age groups with a mover on the hormonal status, menopausal transition, and underlying biological factors on tumor development. The findings indicated that benign tumors with the ovary were predominant in the reproductive age group, and that the malignant tumors were prevalent among the post-menopausal women. The greater percentage of serous and mucinous benign cystadenomas in the reproductive women and the higher percentage of serous and endometrioid carcinoma in the postmenopausal women in this research is also indicative of typical world epidemiology patterns observed in earlier studies[12].

This divergence with age was also supported by ultrasound findings. The manifestation of unilocular cystic masses, mostly benign, was predominant in reproductive age patients, whereas mixed masses and suspicious Doppler characteristics including low resistive index flow were more common in postmenopausal women. These ultrasound predictors are known to be well-established warning signs of malignancy and they were in line with the fact that the higher rate of malignant tumours was detected in the older age group. There were also variations between groups in clinical presentation[14]. The most common symptom in both groups was abdominal pain, which was much more common in reproductive women, which might be because benign cysts may give rise to intermittent torsion-like symptoms or pressure-related symptoms. On the other hand, postmenopausal women were more likely to have fullness and mass sensation in the abdomen which is associated with the slowly progressive malignant lesions[15]. Abnormal vaginal bleeding was most frequently observed in reproductively active women, which is

in line with benign functional cysts or hormone-forming tumors. Cancer history and smoking levels in the family were not high but more common in the cohort of postmenopausal women. These aspects have been identified severally in past literature as risk factors of ovarian cancer, and the trend observed in this research points to the same underlying risk-associated dynamics in the Pakistani population[16]. The BMI distribution was marginally greater in the postmenopausal group, but it was not statistically significant in influencing the risk of malignancy, yet obesity is nonetheless deemed a pertinent confounder in ovarian cancer epidemiology. Altogether, the research provides useful regional information on tumor patterns in Pakistan, where there is a lack of research on the specific region[17-19]. The evidence findings contribute to the world evidence base, in addition to the need to detect early enough, particularly in older women, to enhance treatment results.

9 LIMITATIONS

The limitations that were experienced in this study are several and need to be considered when explaining the findings. First, it was done in one tertiary care center that might restrict the extrapolation of the findings on the overall Pakistani population, specifically the rural areas where patterns of presentation and access to healthcare vary. Second, the cross-sectional type did not permit the determination of both long-term outcomes and recurrence and survival differences between reproductive and postmenopausal women. Third, interobserver variability may persist even in ultrasound interpretations and histopathology reporting despite the fact that they are carried out by qualified clinicians. Fourth, the sample size was sufficient to identify the differences in tumor frequency, but might have been too small to comprehensively assess less prevalent tumor subtypes. Also, some of the possible confounders like genetic testing, CA-125 levels, lifestyle factors and environmental exposures were not evaluated and this could have affected tumor patterns.

10 CONCLUSION

It is concluded that ovarian tumors present with distinct patterns across reproductive and postmenopausal age groups, with benign tumors predominating among reproductive-age women and malignant tumors occurring more frequently in postmenopausal women. These differences underline the biological impact of aging and hormonal changes on tumor development and aggressiveness. Future research should involve larger, multi-center prospective studies incorporating multivariate analysis and tumor markers to better identify independent predictors of malignancy. Long-term follow-up is also recommended to evaluate survival and recurrence outcomes across age groups.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Javed, H., Shaheen, S., Akram, T., Kalsoom, A., & Zaib, A. (2026). FREQUENCY OF OVARIAN TUMORS PRESENTING IN REPRODUCTIVE AND POSTMENOPAUSAL AGE GROUPS. Veredas Do Direito, 23(6), e235979. https://doi.org/10.18623/rvd.v23.5979