e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com doi: 10.25258/ijpqa.16.12.138

International Journal of Pharmaceutical Quality Assurance 2025; 16(12); 867-873

Original Research Article

Clinicopathological Spectrum of Ovarian Tumors Across Different Age Groups: A Study of Clinical Features and Histopathological Patterns

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Received: 10-09-2025 / Revised: 18-10-2025 / Accepted: 28-11-2025

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Conflict of interest: Nil

Abstract:

Background: Ovarian tumors exhibit diverse histopathological patterns and clinical presentations, with age influencing their occurrence and malignancy risk. Understanding these variations aids in diagnosis and management.

Aim: To analyze the clinicopathological spectrum of ovarian tumors across different age groups, correlating clinical features with histopathological patterns.

Methodology: A retrospective observational study was conducted at the Department of Obstetrics and Gynaecology, Netaji Subhas Medical College and Hospital, Bihta, Patna, India, over one year. Seventy-six surgically treated and histopathologically confirmed ovarian tumor cases were reviewed. Clinical data were collected from hospital records, and excised specimens underwent microscopic examination and classification according to WHO (2010).

Results: Benign tumors predominated (58 cases, 76.3%), followed by malignant (13 cases, 17.1%) and borderline tumors (5 cases, 6.6%). Surface epithelial tumors were most common (44 cases, 57.9%), primarily serous and mucinous types. Germ cell tumors (25 cases, 32.9%) were mainly mature cystic teratomas. Sex cord stromal tumors were rare (7 cases, 9.2%), mostly malignant granulosa cell tumors. Benign tumors were frequent in 21–30 years age group, whereas malignancies were more common in 51–60 years.

Conclusion: Ovarian tumors demonstrate wide histopathological diversity with age-related patterns. Benign tumors are prevalent in younger women, while malignancies increase with age, highlighting the importance of age-specific clinicopathological evaluation for accurate diagnosis and management.

Keywords: Ovarian tumors, Histopathology, Age distribution, Surface epithelial tumors, Germ cell tumors, Sex cord stromal tumors.

Introduction

Ovarian tumors are a heterogeneous class of neoplasms, which develop due to different components of ovary cells and are one of the most complicated and tricky conditions that arise during gynecological practice. Ovarian masses are often identified in women with a broad age range, since the time of childhood up to post-menopausal periods. Biological behavior of these tumors differs significantly as it can be benign cystic lesions up to highly aggressive malignant neoplasms. The majority of the ovarian tumors in the reproductive age group are benign; but in the post-menopausal age group, about 30% of all the ovarian tumors are malignant [1]. This difference illustrates the fact that it is crucial to know the clinicopathological peculiarities of ovarian tumors at different ages because the age factor is important in defining the probability of malignancy, clinical presentations, and treatment plans.

Ovarian cancer is one of the significant global health issues and has been linked with significant morbidity and mortality. Ovarian cancer is among the most prevalent gynecological malignancies in India, which often occurs at a late stage, as it has an insidious onset and has no specific early symptoms [2]. Epidemiological research has shown that Asian nations have ovarian cancer incidence of between 2010 and 6.5 new cases per 100,000 women annually [3]. In the world, ovarian cancer is the sixth most prevalent cancer in women and also the fourth most prevalent cause of cancer-related death in women [4]. The reason behind the high mortality rate of ovarian malignancies is mainly because of the delay in

diagnosis since most of the patients do not show any symptoms, or they have vague and nonspecific symptoms at the onset of the disease.

The spectrum of histopathological patterns of ovarian tumor is extensive due to the variety of origins. They can be generated by epithelial surface cells, germ cells, sex cord-stromal stems or metastatic foci of other primary sites. Of these, the most prevalent one in adult women is epithelial tumor and in younger people, germ cell tumor is more commonly found. Histopathological classification of ovarian tumor is considered an important tool in studying the biological behaviour, prognosis and treatment of the tumor. Due to such a large histological diversity, close pathological investigation is necessary in every case of ovarian masses.

The nature of ovarian tumors to be clinically silent in the initial stages is among the greatest problems in managing case of ovarian tumors. Most tumors in the ovary do not give any major symptoms until they become large enough to create any pressure or pain in the abdomen or pelvis or trigger some pressure upon other organs. This has led to a high patient diagnosed with the disease at a late stage [5]. Lack of effective early clinical signs and symptoms further makes it more difficult to detect it at a very young age and also the poor prognosis of malignant ovarian tumors.

Radiological studies are also significant to initial diagnosis and testing of ovarian masses. The reason behind the choice of pelvic ultrasonography (USG) as the first-line imaging modality is that it is non-invasive, easily accessible, and highly sensitive in identifying adnexal masses. Pelvic ultrasound identifies about 90 percent of adnexal masses [6]. Ultrasonography can be used to give great information on the size, morphology, internal structure, and laterality of the ovarian lesions. Nevertheless, imaging techniques cannot be used independently in creating a definitive diagnosis, even though they are helpful in determining the nature of adnexal masses and the likely origin of the mass.

The final diagnosis of ovarian tumor is still carried out by histopathology, which is the gold standard in ovarian tumor diagnosis. Microscopic analysis can be used to identify the precise histological type, level of differentiation as well as the presence of malignant changes [7]. Not only does histopathology confirm the type of tumor, but it also gives the necessary details in terms of staging, grading, and the kind of treatment to give a patient. Thus, proper histopathological evaluation is very important to direct clinical management and patient outcomes.

It is important to understand the histological patterns of ovarian tumors because of a number of reasons. The different subtypes of tumors help clinicians to develop the right therapeutic strategies and forecast the development of the disease. Tumor differentiation is a crucial prognostic factor because the worse a tumor is differentiated, the more aggressive it is usually, and the worse prognosis. Moreover, other factors that give valuable leads as to the biological nature of the tumor include tumor stage, size, and laterality among others [8]. All these parameters will help clinicians to decide the prognosis and choose an appropriate treatment intervention.

Previous studies have been able to demonstrate the age-related differences in prevalence and histopathological distribution of ovarian tumors. Some types of tumors are age specific. As an illustration, benign cystic lesions, germ cell tumor are more prevalent in younger girls, and epithelial tumor occurs in more mature and older women. The postmenopausal age group also has a high rate of malignant tumors. The examination of the clinicopathological spectrum of ovarian tumors in individuals of various age groups thus aids in showing age-specific trends and risk profiles which in turn can be used in the early diagnosis and a better treatment of the patients.

Besides histological type, the clinical presentation of ovarian tumors is also of significance in directing diagnosing assessment. It may have such symptoms as abdominal distension, pelvic pain, menstrual irregularities, gastrointestinal disturbances, and urinary complaints, which are often general. The relationship existing between clinical findings and the histopathology results can be very informative on the process of the disease, and it can help the clinicians to design a more precise diagnostic strategy.

Ovarian tumors, even with the innovations in imaging and tumor marker research, remain a problem in terms of their diagnosis and treatment. The clinical appearance differences, overlapping imaging, and heterogeneity of ovarian neoplasms require a full clinicopathological study. Research on the relationship between clinical features and histopathological outcomes is thus needed to further the knowledge on the spectrum of the disease and increase its accuracy of diagnosis.

The current research was carried out to examine the clinicopathological spectrum of ovarian tumors among young age groups with special reference to their clinical picture and morphology. This study will help fill the gap in the available literature on ovarian neoplasms by analyzing the distribution of ovarian tumors in different age groups and comparing them with clinical presentation and microscopic findings. This information could be useful in the enhancement of diagnostic approaches and strategies, in the decision making about treating women with ovarian tumors and in the overall management of patients.

Methodology

Study Design: The present study was a retrospective observational hospital-based study conducted to evaluate the clinicopathological spectrum of ovarian tumors across different age groups, with emphasis on clinical presentation and histopathological patterns. The study involved the review and analysis of hospital records of patients diagnosed with ovarian tumors and treated surgically during the study period.

Study Area: The study was conducted in the Department of Obstetrics and Gynaecology, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India. Histopathological evaluation of the surgical specimens was performed in the Department of Pathology of the same institution.

Study Duration: The study was carried out over a period of one year from October 2023 to September 2024.

Sample Size: A total of 76 cases of ovarian tumors that fulfilled the inclusion criteria were included in the study. These cases represented patients who underwent surgical treatment for ovarian tumors during the study period and whose specimens were sent for histopathological examination.

Study Population: The study population comprised women diagnosed with ovarian tumors who were admitted to the Department of Obstetrics and Gynaecology and underwent surgical management during the study period. Both unilateral and bilateral ovarian tumors were considered. Patients belonged to different age groups, enabling evaluation of the clinicopathological spectrum across age categories.

Data Collection: Data for the study were collected retrospectively from hospital medical records, admission registers, operative notes, and histopathological reports. Relevant clinical information such as age of the patient, presenting symptoms, clinical findings, and type of surgical procedure performed was recorded. The excised ovarian specimens were examined histopathologically in the Department of Pathology. Tissue sections were processed and stained using Hematoxylin and Eosin (H&E) staining, and the histopathological diagnosis was established according to the World Health Organization (WHO) classification of ovarian tumors (2010).

Inclusion Criteria

- Women diagnosed with ovarian tumors who underwent surgical management (ovariotomy alone or along with hysterectomy).
- Patients with histopathologically confirmed ovarian tumors.
- Cases admitted and treated during the study period.

Exclusion Criteria

- Patients with ovarian masses managed conservatively without surgical intervention.
- Cases with incomplete clinical or histopathological records.
- Patients who did not undergo histopathological examination.

Study Procedure: All patients admitted with suspected ovarian tumors underwent clinical evaluation and appropriate investigations before surgical intervention. During surgery, the ovarian masses were removed and sent for histopathological examination. The pathological analysis determined the type and nature of the tumor. The histopathological findings were then correlated with clinical data such as age, presenting symptoms, and surgical details to study the clinicopathological spectrum of ovarian tumors across different age groups.

Statistical Analysis: The collected data were entered into Microsoft Excel spreadsheets for organization and analysis. Categorical variables such as age groups, clinical symptoms, and histopathological types of tumors were presented as frequency and percentage (%). Continuous variables were expressed as mean ± standard deviation (SD) and median where appropriate. The analyzed data were presented in the form of tables and charts to illustrate the distribution and patterns of ovarian tumors across different age groups."

Result

Table 1 summarizes the histological categories of ovarian tumors in the study population of 76 cases. Surface epithelial tumours were the most common, accounting for 44 cases (57.9%), including 34 benign (58.6%), 3 borderline (60%), and 7 malignant (53.8%). Germ cell tumours comprised 25 cases (32.9%), predominantly benign (22 cases, 37.9%) with only 3 malignant cases (23.1%) and no borderline cases. Sex cord stromal tumours were the least frequent with 7 cases (9.2%), including 2 benign (3.5%), 2 borderline (40%), and 3 malignant (23.1%). Overall, benign tumors predominated (58 cases, 76.3%), while malignant tumors accounted for 13 cases (17.1%), and borderline tumors for 5 cases (6.6%).

Table 1: Histological categories of ovarian tumors								
Histological types of tumours	**Benign**		**Borderline**		**Malignant**		**Total**	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Surface epithelial tumours	34	58.6	3	60	7	53.8	44	57.9
Germ cell tumours	22	37.9	0	0	3	23.1	25	32.9
Sex cord stromal tumours	2	3.5	2	40	3	23.1	7	9.2
Total	**58**	**76.3**	**5**	**6.6**	**13**	**17.1**	**76**	**100**

Table 2 shows the distribution of histopathological types of surface epithelial ovarian tumours. Among 44 cases, 34 (77.3%) were benign, 3 (6.8%) were borderline, and 7 (15.9%) were malignant. Serous tumours were the most common overall, with 18 benign (40.9%) and 4 malignant (9.1%) cases, totaling 22 cases (50%). Mucinous tumours accounted for 14 benign (31.8%), 3 borderline (6.8%), and 2 malignant (4.5%), making 19 cases (43.2%). Endometrioid tumours were rare, with only 1 malignant case (2.3%), while Brenner tumours were benign in 2 cases (4.5%). Overall, benign serous and mucinous tumours predominated in the study population.

Table 2: Distribution of histopathological types of surface epithelial tumours								
Types of epithelial tumour	**Benign**		**Borderline**		**Malignant**		**Total**	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Serous	18	40.9	0	0	4	9.1	22	50
Mucinous	14	31.8	3	6.8	2	4.5	19	43.2
Endometrioid tumour	0	0	0	0	1	2.3	1	2.3
Brenner tumour	2	4.5	0	0	0	0	2	4.5
Total	**34**	**77.3**	**3**	**6.8**	**7**	**15.9**	**44**	**100**

Table 3 presents the distribution of histopathological types of germ cell tumours. Out of 25 cases, 22 (88%) were benign and 3 (12%) were malignant. The most common tumour was mature cystic teratoma, accounting for 22 cases (88%), all of which were benign. Among malignant tumours, immature teratoma constituted 2 cases (8%), while dysgerminoma accounted for 1 case (4%). Overall, benign germ cell tumours predominated in the study population.

Table 3: Distribution of histopathological types of germ cell tumours						
Types of Germ Cell Tumours	**Benign**		**Malignant**		**Total**	
	No	**%**	**No**	**%**	**No**	**%**
Mature cystic teratoma	22	88	0	0	22	88
Immature teratoma	0	0	2	8	2	8
Dysgerminoma	0	0	1	4	1	4
Total	**22**	**88**	**3**	**12**	**25**	**100**

Table 4 shows the distribution of histopathological types of sex cord stromal tumours. A total of 7 cases were reported, of which 2 (28.6%) were benign and 5 (71.4%) were malignant. Fibroma was the only benign tumour observed, accounting for 2 cases (28.6%). Among malignant tumours, granulosa cell tumour was the most common with 3 cases (42.8%), followed by sex cord tumour with annular tubules with 2 cases (28.6%). Overall, malignant sex cord stromal tumours constituted the majority of cases in this group.

Table 4: Distribution of histopathological types of sex cord stromal tumours						
Types of Stromal Tumours	**Benign**		**Malignant**		**Total**	
	No	**%**	**No**	**%**	**No**	**%**
Fibroma	2	28.6	0	0	2	28.6
Granulosa cell tumour	0	0	3	42.8	3	42.8
Sex cord tumour with annular tubules	0	0	2	28.6	2	28.6
Total	**2**	**28.6**	**5**	**71.4**	**7**	**100**

Table 5 shows the age distribution of ovarian tumors among the study population. Out of 76 cases, 58 (76.3%) were benign, 5 (6.6%) were borderline, and 13 (17.1%) were malignant. Benign tumors were most commonly seen in the 21–30 years age group (27.6%), followed by 31–40 years (24.1%) and 41–50 years (20.7%). Borderline tumors were relatively few and were most frequently observed in the 51–60 years age group (40%). Malignant tumors were more common in older age groups, with the highest

occurrence in 51–60 years (30.8%), followed by 41–50 years (23.1%). Overall, the 21–30 years age group (23.7%) constituted the largest proportion of ovarian tumor cases in the study.

Table 5: Age distribution of ovarian tumors

Age groups (years)	Benign (n=58)		Borderline (n=5)		Malignant (n=13)		Total (n=76)	
	No	%	No	%	No	%	No	%
11–20	4	6.9	0	0	1	7.7	5	6.6
21–30	16	27.6	1	20	1	7.7	18	23.7
31–40	14	24.1	1	20	2	15.4	17	22.4
41–50	12	20.7	1	20	3	23.1	16	21.1
51–60	8	13.8	2	40	4	30.8	14	18.4
61–70	4	6.9	0	0	2	15.4	6	7.9
Total	**58**	**100**	**5**	**100**	**13**	**100**	**76**	**100**

Discussion

The findings of the current research indicated that there are 76 ovarian tumors and out of this entire sample there were benign lesions (76.3%), malignant lesions (17.1%), and borderline lesions (6.6%). This is generally similar to previous literature in the Indian subcontinent. Sheikh et al. (2017) [9] found 80.3, 15.5 and 4.1 percent benign, malignant and borderline tumors, respectively, in 193 cases, and found 78.6, 20.65, and 0.75 percent benign, malignant and borderline tumors, respectively, in 402 cases. Equally, Wills and Mathew (2016) [10] have reported that among 140 ovarian lesions, benign tumors amounted to 96.4, and only 2.8 and 0.7 had malignant and borderline lesions respectively. These comparisons show that benign tumors of the ovary always prevail with the malignant tumor exhibiting a slight geographical variation (Gupta et al., 2007) [11] in the various populations. The similarity in the prevalence of benign tumors highlights the significance of early diagnosis and close histopathological evaluation to determine malignant potential."

Epithelial tumors of the surface were the most common histological category in the study in 57.9% of all, which is consistent with the world experience. According to Sheikh et al. (2017) [9], 54.8% of the ovarian tumors were epithelial, next were germ cell tumors (31.1) and sex cord stromal tumors (3.1%). In our investigation, 58.6% of the epithelial tumors were benign, 60% borderline and 53.8% malignant in accordance with trends reported by Yogambal et al. (2014) [8] where the same was the case with epithelial tumors. The large percentage of epithelial tumors, especially serous and mucinous, is in line with Wills and Mathew (2016) [10] who cited the serous tumors as the most prevalent and the mucinous tumors as the second most prevalent epithelial tumors (46.4 and 23.2 percent, respectively). The majority of benign serous cystadenomas (40.9) and mucinous cystadenomas (31.8) in our study is comparable to those of Ahmad et al. (2000) [12] and Sheikh et al. (2017) [9] where benign serous tumors and mucinous tumors constituted the major part of the epithelial lesion. Interestingly, other regional studies, including Thanikasalam et al. (1992) [14], had reported serous cystadenomas to be more prevalent in Indian populations and mature cystic teratomas to be more prevalent in Malay and Chinese populations, so geographic variations have been detected in the spectrum of tumors.

Our study identified 32.9 percent of the germ cell tumor category with most of them being benign mature cystic teratomas (88 percent). This is in line with Sheikh et al. (2017) [9], who cited 96.4% of germ cell tumors as teratomas, all benign with an exception of a few dysgerminomas. Germ cell tumors are also noted to be mostly benign cystic teratoma (Wills and Mathew 2016) [10]. The immature teratomas and dysgerminomas were infrequent, indicating their established malignant character. The fact that in our study, benign teratomas prevailed in the reproductive age group (2130 years old) is not an isolated case, as Ahmad et al. (2000) [12] and Yogambal et al. (2014) [8] also noticed that germ cell tumours are most prominent in young women, as opposed to epithelial malignant tumours, which can happen much later in life.

The least prevalent sex cord stromal tumors were found in our cohort (9.2%) and were mostly malignant with 42.8% of these being granulosa cell tumors. Annular tubule sex cord tumors were also malignant whereas fibromas were benign. The same pattern was observed by Sheikh et al. (2017) [9], where granulosa cell tumor had malignancy and fibromas were benign. Wills and Mathew (2016) [10] discovered that sex cord stromal tumors, such as fibromas and granulosa cell tumors, are rare and fewer. These results highlight the heterogeneity and changing clinical presentation of sex cord stromal tumors in contrast to epithelial or germ cell tumors.

Our study of age distribution indicated that people aged between 21 and 30 years (23.7%) were the most affected by the ovarian tumors; ages 31 to 40 years (22.4) and 41 to 50 years (21.1) came closely second and third respectively. Most of the reproductive age groups (21 40 years old) had benign tumors whereas 5160 years (30.8%), and borderline tumors were the most common in the same age group (40). They are more or less in line with Sheikh et al.

(2017) [9], who reported the highest occurrence of ovarian tumors in women between the ages of 21 and 30 years, with more frequent appearances of malignant neoplasms between the age groups 40 and 60. The same researchers (Wills and Mathew, 2016) [10] also reported more benign tumors in the age groups of reproduction and at the age of perimenopause, and malignant tumors were only observed in old women (41-60 years). Murthy et al. (2009) [15] also found that about 26.7 percent of malignant surface epithelial at any age reported in women younger than 30 years which is an emerging trend of the earlier onset of the malignancy which might be related to environmental and lifestyle factors.

The current research validated the preponderance of serious and mucinous tumors of the epidermal neoplasms, and serous tumors are the most frequent (50%), and mostly benign. The next most frequent followed at 43.2% were mucinous tumors with borderline and malignant cases. Endometrioid and Brenner tumors were infrequent as per the worldwide trends reported by Sheikh et al. (2017) [9] and Ellenson et al. (2010) [16]. Malignant epithelial tumors were serous cystadenocarcinomas, which were also in agreement with Pachori et al. (2016) [17] and Yogambal et al. (2014) [8]. These results indicate the histopathologic heterogeneity and the need to consider a specific microscopic examination of the case as a means of planning the proper management.

Overall, our analysis shows that ovarian tumors are mostly benign with surface epithelial tumors the most prevalent, followed by germ cell and sex cord stromal tumors. The benign tumor is seen mostly in women who are within reproductive age where the malignant tumor is seen among older age group. These data are in line with the earlier research in India and in the surrounding areas, underlining the universal trends and slight regional differences in ovarian tumor histopathology and age distribution. This research supports the role of histopathological analysis in the correct diagnosis of tumors of the ovary and in the clinical management of these tumors.

Conclusion

The current paper has shown the clinicopathological spectrum of ovarian tumors in various age groups, which have shown that the benign tumors form the majority, then malignant and borderline tumors are found. Surface epithelial tumors were the most common histological type, and the most common types in the category were serous and mucinous tumors, whereas endometrioid and Brenner tumors were not common. Germ cell tumors formed the second most common category, largely represented by mature cystic teratomas, whereas malignant germ cell tumors such as immature teratoma and dysgerminoma were less frequent. Sex cord stromal tumors were comparatively rare, with granulosa cell tumors and sex cord tumors with annular tubules contributing mainly to the malignant group. The age distribution indicated that benign tumors were more commonly observed in younger and reproductive age groups, whereas malignant tumors were relatively more frequent in the later decades of life. Overall, the study emphasizes the wide histopathological diversity of ovarian tumors and underscores the importance of age-related patterns and histopathological evaluation for accurate diagnosis and appropriate clinical management.

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