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Retrospective Study on the Histopathological Spectrum of Ovarian Neoplasms in a Tertiary Care Hospital

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ABSTRACT

Background: Ovarian tumours are associated with higher mortality and late diagnosis due to the inaccessibility of the ovary to routine screening methods. Therefore, maintaining a high index of suspicion in the high-risk patients is imperative. Accurate histopathological diagnosis is required for prognosis and treatment. Therefore, the present study was conducted to assess the histopathological spectrum.

Methods: A retrospective study was conducted from July 2022 to June 2025 at a tertiary care centre, including 125 cases of ovarian neoplasms. Clinical details were retrieved from records, and histopathological examination was performed using hematoxylin and eosin staining. Tumours were classified as per WHO criteria, and data were analysed using SPSS.

Results: The mean age of patients was 39.55±14.03 years. Benign ovarian tumours (78.40%) were more prevalent than malignant tumours (19.20%) and had a peak age distribution in the reproductive age group compared to the menopausal age distribution of malignant tumours. Surface epithelial tumours (SET) were the commonest type (80%), followed by germ cell tumours (GCT) (15.20%) and sex cord stromal tumours (SCST) (4.80%). Among the surface epithelial tumours, the serous type was more common than the mucinous type (56% vs 16.80%).

Conclusion: Ovarian neoplasms present a wide spectrum of disease with distinct peak age distributions. Therefore, the high-risk population can be targeted for screening programmes to facilitate early diagnosis. Histopathology provides the definitive diagnosis, helps predict prognosis, and guides treatment planning.

Key-words: Germ cell tumours, Histopathology, Ovarian lesions, Neoplasms, Sex cord stromal tumours, Surface epithelial tumours

INTRODUCTION

Ovarian neoplasms have a prevalence of 3% of all malignancies, which rises to 25% of all malignancies of the female genital tract [1-3]. According to GLOBOCAN 2022 data, the crude rate for ovarian cancer is 100.4 per 100,000 population. Ovarian cancer was ranked the third most common cancer in women, after breast and cervical cancer [4].

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Ovarian cancer is of particular interest due to the inaccessibility of the ovaries to the routine screening tests. Therefore, ovarian cancer may become evident only once it is large enough to be symptomatic. Ovarian cancer often presents with vague symptoms, leading to further delay in diagnosis. By that time, the cancer may have already advanced and metastasized. Thus, the diagnosis of ovarian cancers is usually delayed. Ovarian cancers are often labelled as “silent killers” [5] and have the worst prognosis and high mortality [6].

Ovarian neoplasms encompass a wide spectrum of lesions ranging from benign cystic tumours to highly aggressive malignant neoplasms, each with distinct histopathological features and biological behaviour. The variability in presentation and progression of these tumours poses a significant challenge in clinical diagnosis

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and management. Furthermore, differences in age distribution, tumour origin, and morphological characteristics necessitate a comprehensive understanding of their pathological spectrum for effective patient care.

Histopathological evaluation remains the gold standard for the definitive diagnosis of ovarian tumours and plays a crucial role in differentiating benign, borderline, and malignant lesions. It not only aids in accurate classification but also provides essential information for prognosis and therapeutic decision-making. The clinical spectrum also enables the gynecologist to maintain a high degree of suspicion in target populations and to plan appropriate screening and management strategies.

Therefore, the present study was conducted to evaluate the histopathological spectrum of ovarian neoplasms in a tertiary care centre.

MATERIALS AND METHODS

Research Design- This retrospective study was conducted from July 2022 to June 2025 at the Department of Pathology, Indira Gandhi Government Medical College, Maharashtra, India. Data was collected from the records of the Department of Pathology.

Methodology- Data were obtained from the records maintained in the Department of Pathology. A total of 125 records were included. Baseline demographic characteristics were noted from all the records. Gross findings were noted from the records.

As per the protocol, specimens from surgical resection were immediately fixed in 10% neutral buffered formalin to preserve the cell morphology. After fixation, the sample is dehydrated, cleared in xylene and infiltrated with molten paraffin wax before being embedded in paraffin blocks. Thin sections (4 to 5 µm) were taken from the blocks. A minimum of five sections were taken, which included sections from capsule, solid, papillary, cystic areas and areas of hemorrhage and necrosis. In case of mucinous tumour and germ cell tumour, extensive sampling was done due to the heterogeneity of tumour. These were mounted on a glass slide and stained with hematoxylin and eosin stain. Hematoxylin stained the nuclei blue-black, while the eosin stained the cytoplasm and stromal components in shades of pink. The histopathological diagnosis as per the World Health Organization (WHO) classification was noted [7].

Inclusion criteria

- ✓ Records of ovary specimens of neoplastic etiology received in laboratory irrespective of age.
- ✓ Records of incidental ovarian tumours.
- ✓ Complete records.

Exclusion criteria

- ✓ Incomplete records.
- ✓ Records of tumour like lesions and non-neoplastic lesions (like cysts and polycystic ovaries).
- ✓ Records of specimen with inconclusive results.
- ✓ Records of patients having recurrence of tumour after previous treatment of ovarian tumours.

Statistical Analysis- The data were analysed using the Statistical Package for the Social Sciences (SPSS) software version 22.0. For qualitative data, results were reported as numbers and percentages, while quantitative data were expressed as measures of central tendency, including the mean and standard deviation.

Ethical Approval- The ethics approval was waived on account of the retrospective nature of the study. Furthermore, all possible steps were taken to prevent the inclusion of any identifying patient information in the study.

RESULTS

A total of 125 female patient records were included in the study. The mean age of the patients was 39.55±14.03 years with an age range of 17 to 77 years. 78.40% of patients had benign tumours, while 19.20% had malignant tumours. Borderline tumours were reported in 2.40% patients. Benign tumours showed peak incidence at 30 to 39 years of age, while malignant tumours peaked at 50 to 59 years (Table 1).

When assessed according to the WHO classification, surface epithelial tumours (SET) were the most common (80%), followed by germ cell tumours (GCT) (15.20%) and sex cord stromal tumours (SCST) (4.80%). The peak incidence of SET and GCT was 30 to 39 years, while for SCST was 50 to 59 years (Table 2).

On histopathological assessment, it was noted that amongst the SET, serous tumours were more common than mucinous tumours. Mature teratoma was the commonest GCT, while fibroma was the commonest SCST (Table 3).

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Table 1: Distribution of nature of tumours according to age (in years)

Parameter	Benign		Borderline		Malignant		Total	
	N	%	N	%	N	%	N	%
10-19	2	1.60	0	0	1	0.80	3	2.40
20-29	27	21.60	2	1.60	0	0	29	23.20
30-39	35	28	1	0.80	5	4	41	32.80
40-49	16	12.80	0	0	4	3.20	20	16
50-59	10	8	0	0	10	8	20	16
60-69	4	3.20	0	0	2	1.60	6	4.80
70-80	4	3.20	0	0	2	1.60	6	4.80
Total	98	78.40	3	2.40	24	19.20	125	100

Table 2: Distribution of type of tumours (as per WHO classification) according to age (in years)

Parameter	Surface epithelial tumour (SET)		Germ cell tumour (GCT)		Sex cord stromal tumour (SCST)		Total	
	N	%	N	%	N	%	N	%
10-19	1	0.80	2	1.60	0	0	3	2.40
20-29	24	19.20	5	4	0	0	29	23.20
30-39	34	27.20	7	5.60	0	0	41	32.80
40-49	15	12	5	4	0	0	20	16
50-59	15	12	0	0	5	4	20	16
60-69	6	4.80	0	0	0	0	6	4.80
70-80	5	4	0	0	1	0.80	6	4.80
Total	100	80	19	15.20	6	4.80	125	100

Table 3: Distribution of histopathological spectrum of tumours

Type	No. of cases	Percentage (%)
Surface epithelial tumours (SET)		
Serous tumour	70	56
Mucinous tumour	21	16.80
Seromucinous tumour	5	4
Clear cell tumour	2	1.60
Brenner tumour	2	1.60
Germ cell tumours (GCT)		
Mature teratoma	15	12
Immature teratoma	2	1.60
Dysgerminoma	2	1.60
Sex cord stromal tumours (SCST)		
Fibroma	4	3.20
Thecoma	1	0.80
Adult granulosa cell tumour	1	0.80

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The serous tumour was identified by papillary growth and solid areas interspersed with extensive areas of necrosis (Fig. 1). Histopathological examination of the serous tumour showed complex branching papillary pattern lined by cells with marked nuclear atypia and pleomorphism (Fig. 2). Histoapthological examination of mucinous tumour showed a cyst lined by mucinous epithelium (Fig. 3). Malignant changes in mucinous tumour were identified by marked glandular crowding with little intervening stroma on histopathological examination. These glands were filled with mucin (Fig. 4). On histopathological examination, the mature teratoma showed a cyst lined by stratified squamous epithelium with underlying tissue showing cutaneous adnexal structures and adipose tissue (Fig. 5).

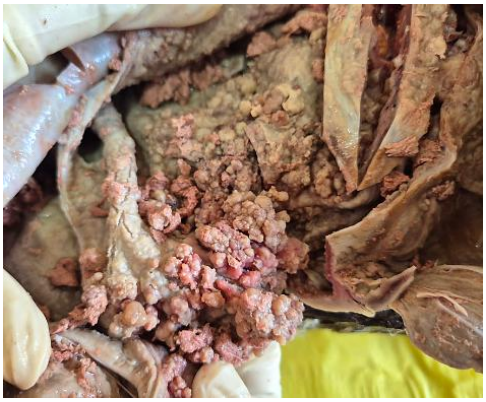

Fig. 1: Gross appearance of serous ovarian tumour

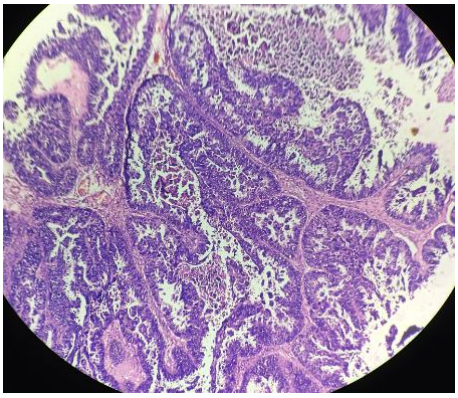

Fig. 2: Histopathology of serous tumour (H&E, 100×)

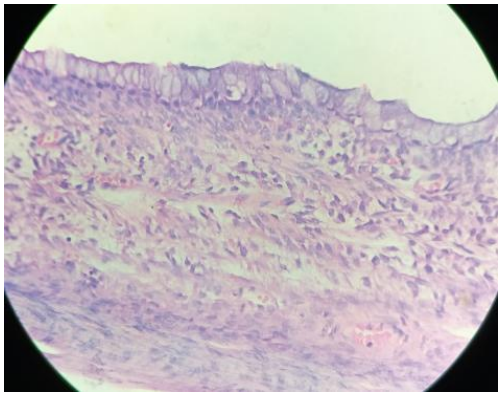

Fig. 3: Histopathology of mucinous tumour (H&E, 400×)

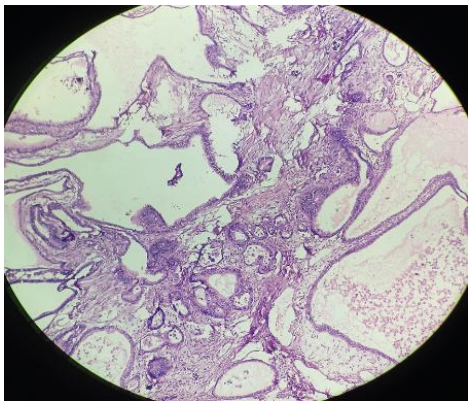

Fig. 4: Malignant features in mucinous tumour (H&E, 100×)

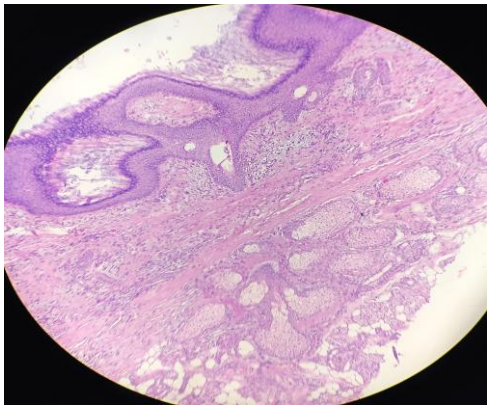

Fig. 5: Histopathology of mature teratoma (H&E, 100×)

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DISCUSSION

In the present study, 125 records were included. The mean age of the patients was 39.55±14.03 years. It was noted that benign tumours were more common than malignant tumours, with peaks in the fourth and sixth decades, respectively. SET were the commonest, while SCST were the least common. SET and GCT had peaks in the fourth decade, while SCST had a peak in the sixth decade. Amongst the SET, serous tumour was the commonest, while clear cell tumour and Brenner tumour were the least common. Mature teratoma was the commonest type of GCT. Fibroma was the most common type of SCST, while thecoma and adult granulosa cell tumour were the least common.

Upreti *et al.* conducted their study on 172 ovarian tumours [8]. They reported that 82.60% of tumours were benign, while 12.80% were malignant. The age distribution showed a peak of 21 to 40 years for benign tumours (49.30%) and a peak of 51 to 60 years for malignant tumours (36.30%). When assessed by tumour type, epithelial tumours (61.60%) were more prevalent than GCT (36.60%) and SCST (2.80%). Amongst the epithelial tumours, serous tumours were more prevalent than mucinous tumours (47.10% vs 32.00%, respectively). Among the germ cell tumours, mature teratoma was the most common. Amongst the SCST, granulosa cell tumour was the commonest. These findings were like those of the present study.

In another study, Das *et al.* examined 850 ovarian specimens and reported that 140 were neoplastic [9]. Amongst the neoplastic specimens, 82% were benign and 14.50% were malignant. The peak age for benign tumours was 31 to 40 years, while for malignant tumours it was 51 to 60 years. Upon histopathological analysis, epithelial tumours were the most common, accounting for 62.86% of the tumours. They further reported that, amongst epithelial ovarian tumours, serous tumours were more common than mucinous tumours. These findings are similar to those of the present study.

Neelima *et al.* conducted a study on 71 patients with ovarian tumours [10]. They noted that 85.91% of patients had benign tumours while 12.68% patients had malignant tumours. Borderline tumours were observed in 1.41% patients. They also observed that, for benign tumours, the peak incidence was in the age group of 20 to 50 years (80.32%), while for malignant tumours, the peak age was 40 to 60 years (77.78%). When assessed for tumour type, they reported a prevalence of epithelial tumours of around 92.96%, which was significantly higher than GCT (5.63%) and SCST (1.41%). Among the epithelial tumours, serous tumours were more prevalent than mucinous tumours. GCT was a mature cystic teratoma and SCST included fibroma/thecoma. These findings were like the present study. Similar findings were reported in the studies by Gupta *et al.* [11] and Batool *et al.* [12].

The benign ovarian tumours show a peak age distribution in the reproductive age group (30 to 39 years). In comparison, the malignant ovarian tumours show a peak age distribution in the 50-59 years age group. Various hypotheses have been postulated. The reproductive age group is characterized by estrogen predominance, which stimulates cell proliferation [13]. This can sometimes go into overdrive, particularly in susceptible individuals. While younger cells have an active cell repair mechanism that prevents progression to malignant tumours, benign tumours may form, leading to a peak age in the reproductive age group.

It has also been hypothesized that every ovulation during the lifetime is associated with physical trauma to the epithelial cells. This trauma is initially repaired immediately. Repetitive trauma with each cycle of ovulation accumulates over time and, along with impaired repair mechanisms in older age, leads to deoxyribonucleic acid (DNA) damage, making the cells susceptible to formation of inclusion cysts. This leads to malignant changes in cells and may account for the peak age of malignant ovarian tumours in the late 50s [14,15].

Another mechanism for the development of malignancy in menopausal age involves pituitary secretion of follicle-stimulating hormone (FSH) and luteinizing hormone (LH). Normally, these hormones lead to proliferation of ovarian tissue and secretion of 17β-estradiol (E2) by the ovaries. This, in turn, inhibits the secretion of FSH and LH through the negative feedback loop. However, with advancing age, the feedback system weakens, leading to increased secretion of pituitary hormones: FSH and LH [16]. After menopause, these may stimulate and result in hyperproliferation of residual ovarian tissue, causing the formation of cysts and potentially leading to the development of malignant lesions.

The inclusion cysts forming during ovulation give rise to epithelial serous tumours [17]. Due to the repetitive nature of the process and its prevalence throughout life,

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epithelial tumours, especially serous types, are the most common. Furthermore, mucinous ovarian tumours often involve endocervical cells or intestinal cells. These cells are not naturally found in the ovary and may require metaplasia [18,19]. Therefore, mucinous ovarian tumours might be less prevalent than serous tumours. The present study was a single-center study and was limited by the number of cases. Therefore, the results may not be generalized.

CONCLUSIONS

The present study shows the histopathological spectrum of the ovarian tumours. Benign tumours are more prevalent than malignant or borderline tumours. The peak age distributions of benign tumours in the reproductive age group and malignant tumours in the menopausal age group agree with theories of cumulative accumulation of oxidative damage over the years and hormonal influences. Surface epithelial tumours are the commonest, followed by germ cell and sex cord stromal tumours. Serous tumours were more common than mucinous tumours. Histopathology is the gold standard for diagnosing ovarian tumours. It is also of great importance in distinguishing benign from malignant tumours. Accurate diagnosis of ovarian tumours is essential for proper treatment, thereby effectively reducing the morbidity and mortality. There is also a need for devising a screening programme for the target groups to enable early initiation of treatment and to reduce the burden of ovarian tumours.

CONTRIBUTION OF AUTHORS

Research concept- Sukeshni Pradeep Daiwile, Balwant Kowe
Research design- Sukeshni Pradeep Daiwile
Supervision- Sukeshni Pradeep Daiwile, Amrapali Gaikwad
Materials- Amrapali Gaikwad, Balwant Kowe
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Literature search- Sukeshni Pradeep Daiwile, Balwant Kowe
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Article editing- Sukeshni Pradeep Daiwile, Amrapali Gaikwad, Balwant Kowe
Final approval- Sukeshni Pradeep Daiwile, Amrapali Gaikwad, Balwant Kowe

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