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Histopathological spectrum of ovarian neoplasms in Central India

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Abstract:
Ovarian neoplasms are common tumors of the female genital tract and accurate histopathological classification is essential for appropriate diagnosis and management. This retrospective cross-sectional study evaluated 126 ovarian specimens received from March 2020 to March 2025 at a tertiary care center in Central India using routine histopathological examination and the WHO 5th edition classification. Benign tumors predominated (85.6%), followed by borderline (10.4%) and malignant tumors (4.0%), with surface epithelial tumors being the most common subtype. The highest proportion of ovarian neoplasms occurred in the 21–30-year age group. Thus, data shows a broad histopathological spectrum and emphasize the importance of accurate diagnosis for appropriate clinical management.

Keywords: Ovarian neoplasm (ON), histopathological spectrum, benign tumours, borderline tumours, malignant neoplasm

Background:
Ovarian neoplasms account for approximately 3% of all cancers **[1].** They constitute nearly 25% of malignancies arising from the female genital tract **[2]**. Ovarian cancer is among the leading causes of cancer-related morbidity and mortality in women and represents one of the major gynecological malignancies **[3].** The incidence of ovarian cancer varies across populations, with differences reported according to ethnicity and geographic distribution **[4]**. The ovaries are paired reproductive organs that undergo continuous hormonal and physiological changes throughout life, predisposing them to a broad spectrum of benign and malignant neoplasms **[5]**. Most ovarian neoplasms are benign and are frequently diagnosed during the reproductive years, whereas malignant tumors are more commonly identified in older women **[6]**. Although ovarian tumors can occur at any age, a substantial proportion develops during the reproductive period, with factors such as nulliparity, socioeconomic status and genetic and environmental influences contributing to disease risk **[7]**. The diagnosis of ovarian neoplasms involves clinical assessment, radiological imaging, gross examination and microscopic evaluation of the lesion **[8]**. Histopathological examination remains essential for definitive tumor classification and is critical for determining appropriate treatment and management strategies **[9]**. Despite advances in imaging, molecular diagnostics and genetic investigations, histopathology remains a cornerstone of ovarian tumor diagnosis and classification **[10]**. Many malignant ovarian tumors may remain clinically silent during their early stages and can present after local or distant spread, contributing to delayed diagnosis and poorer outcomes **[11].** Therefore, it is interest to evaluate the histopathological spectrum of ovarian neoplasms at a single center in Central India to analyze the diverse histomorphological patterns of ovarian tumors and to determine their value in accurate diagnosis and timely patient management.

Materials and Methods:
This retrospective cross sectional study on the histopathological spectrum of ovarian tumours conducted in Department of Pathology, Government Medical College, Datia, Madhya Pradesh, India, after obtaining approval from institutional ethical committee (letter no: 124/PATHO/GMC/IECBMHR/2025) over a period of five year from March 2020 to March 2025. This study included 126 ovarian specimens and the various histopathological patterns are studied according to the World Health Organisation (WHO) classification of ovarian Tumours 5th edition, 2020.

Inclusion criteria:
All ovarian neoplasms and all age groups were included.

Exclusion criteria:
Non-neoplastic ovarian lesions and poorly fixed and autolyzed specimen were excluded. These patterns and age distribution were expressed in various percentages. We received the histopathological samples in histopathology section of our department after surgical resection. After this specimen fixed in 10% Neutral Buffer Formalin (NBF). After proper fixation in 12-24 hours proper sections from representative areas had taken and routine processing was done. Hematoxylin and eosin staining was done and after slides review by pathologist final diagnosis have been made. Based on these histolpathological patterns, neaoplastic lesions were classified into Benign, Borderline and Malignant ovarian neoplasm according to the WHO classification of Ovarian tumours, 2020 **[5].**

Results:
A total of 126 cases were studied over five years **(Table 1)**. The highest proportion of ovarian neoplasms (36.15%) was observed in the 21–30-year age group. Regarding clinical presentation **(Table 2)**, abdominal pain was the most common symptom (46%), followed by abdominal mass (10%), pelvic pain (8%), and back pain (2%). Approximately 34% of patients were asymptomatic, and their findings were incidental. Of the 126 cases **(Table 3)**, 107 (85.6%) were benign, 13 (10.4%) were borderline, and 6 (4.0%) were malignant. Surface epithelial tumours (SETs) were the most common category, accounting for 80 cases (63.5%), followed by germ cell tumours (GCTs) (34 cases, 27%) and sex cord-stromal tumours (SCSTs) (10 cases, 8%). Among surface epithelial tumours, serous cystadenoma was the most common, followed by mucinous cystadenoma. Squamous cell carcinoma differentiation was observed in two cases of mature teratoma (1.5%).

Table 1: Age wise distribution of ovarian tumours

Age Group (Years)	Number of Cases (n)	Percentage (%)
10–20	14	11%

21–30	45	36%
31–40	43	34%
41–50	11	9%
51–60	8	6%
>60	5	4%
Total	126	100%

Table 2: Distribution of clinical symptoms

Clinical Symptom	Percentage (%)
Abdominal pain	46%
Abdominal mass	10%
Pelvic pain	8%
Back pain	2%
Asymptomatic patients	34%
Total	100%

Table 3: Distribution of different ovarian tumours

Histological Classification	Tumour Type	Number of Cases (n)	Percentage (%)
Tumour Behaviour	Benign	107	85.6
	Borderline	13	10.4
	Malignant	6	4
	Total	126	100
Surface Epithelial Tumours	Serous tumours	52	65.0*
	Benign	50	96.0**
	Borderline	1	2.0**
	Malignant	1	2.0**
	Mucinous tumours	25	31.25*
	Benign	22	88.0**
	Borderline	0	0
	Malignant	3	12.0**
	Endometrioid tumour	1	1.25*
	Brenner tumour	1	1.25*
	Clear cell tumour	1	1.25*
	Total	80	63.5
Germ Cell Tumours	Dysgerminoma	24	70.5*
	Benign cystic teratoma	8	23.5*
	Immature teratoma	2	6.0*
	Struma ovarii	0	0
	Total	34	27
Sex Cord-Stromal Tumours	Granulosa cell tumour	7	70.0*
	Fibroma	3	30.0*
	Sertoli–Leydig cell tumour	0	0
	Total	10	8
Metastatic Tumours	Metastatic tumours	0	0

Discussion:

The ovary is a female reproductive organ with complex anatomy and physiology that is regulated by multiple hormones. Ovarian neoplasms (ONs) are classified based on the morphological and cytological features of tumour cells **[9]**. Because of their asymptomatic nature, delayed onset of symptoms and the absence of effective screening methods, ovarian cancers are often referred to as the "silent killer" **[10].** Ovarian cancer remains one of the leading causes of mortality among women. In ovarian tumours, benign lesions are more common than malignant ones. Risk factors contributing to the development of ovarian neoplasms include nulliparity, a positive family history of cancer and genetic mutations **[6].** The high mortality rate is largely attributed to the advanced stage of disease at the time of diagnosis in most patients. Thus, ovarian tumours represent a heterogeneous group of neoplasms with a wide spectrum of clinicopathological features. Approximately 80% of ovarian neoplasms are benign; however, the ovary is also a common site for primary malignancy and secondary metastatic involvement may occur. According to the WHO classification, ovarian tumours are categorized into surface epithelial tumours (SETs), sex cord stromal tumours (SSTs), germ cell tumours (GCTs) and metastatic tumours. SETs are further subdivided into serous, mucinous, endometrioid, clear cell, seromucinous and Brenner tumours, each classified as benign, borderline, or malignant. GCTs include mature cystic teratoma, immature teratoma, dysgerminoma, yolk sac tumour, embryonal carcinoma, choriocarcinoma, mixed germ cell tumours, monodermal teratomas (struma ovarii and strumal carcinoid) and gonadoblastoma. SSTs comprise fibroma, thecoma, juvenile granulosa cell tumour, adult granulosa cell tumour and Sertoli–Leydig cell tumour. In the present study, 126 cases of ovarian neoplasms were analyzed over a five-year period. SETs were the most common, accounting for 80 cases (63.5%), followed by GCTs in 34 cases (27%), SSTs in 10 cases (8%) and SCC differentiation seen in two cases (1.5%). In Surface Epithelial tumours Serous Cystadenoma was the most common in occurance and mucinous cystadenoma is the second most common entity. The majority of tumours were benign, with 107 cases (85.6%), followed by borderline tumours in 13 cases (10.4%) and malignant tumours in six cases (4%). These findings are consistent with other studies **[11**, **12].** Squamous cell carcinoma differentiation was observed in two cases, comprising 1.5% of all ON cases. Most affected women in the present study belonged to the 21–30 year age group **(Table 1),** which is comparable to findings reported by Batool *et al.* **[13]** in a study conducted at the Department of Pathology, Gandhi Medical College, India, involving 541 cases **[13].** Abdominal pain was the most common clinical presentation, reported in 46% of cases, followed by abdominal mass in 10%, pelvic discomfort in 8% and back pain in 2% of patients. Notably, 34% of patients were asymptomatic or presented with only vague symptoms **(Table 2),** a finding similar to that reported by Zeng *et al.*, where abdominal pain was the most frequent symptom (33 cases, 39.00%) **[14].** Cathcart *et al.* also noted that many malignant ovarian tumours exhibit variable growth periods and often involve adjacent organs before clinical symptoms become apparent **[15].**

Conclusion:

Benign ovarian neoplasms were more common than malignant tumours, with surface epithelial tumours being the predominant category. Serous cystadenoma was the most common benign tumour, while serous carcinoma was the predominant malignant tumour. Histopathological examination combined with clinical staging is essential for accurate diagnosis and appropriate patient management.

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