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Study of Histopathological spectrum of Ovarian Neoplasms – A study at a rural medical college.

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ABSTRACT

Introduction: Ovary is the second most common site of gynaecological malignancies in India. Ovarian neoplasms represent a heterogeneous group of tumours with diverse histomorphological patterns, biological behaviour, molecular alterations, and clinical outcomes.
Materials and methods: This study was conducted in the Department of Pathology, Sri Madhusudan Sai Institute of Medical Sciences and research, Muddenahalli, Chikkaballapur from January 2024 to December 2024
Results: Among the 63 Ovarian tumors studied, majority were benign tumor(95.2%) with most of the tumors affecting during the reproductive age group. Surface epithelial tumors (82.54%) constituted majority of cases.
Conclusion: Ovarian cancers exhibited diverse histomorphological patterns and mostly affected women of reproductive age. The results of the present study align with the majority of Indian and worldwide research.

Key words: Ovary, neoplasm, carcinoma

INTRODUCTION

Ovarian neoplasms represent a heterogeneous group of tumours with diverse histomorphological patterns, biological behaviour, molecular alterations, and clinical outcomes. They account for a significant proportion of gynaecological malignancies and pose diagnostic as well as therapeutic challenges due to their varied presentation and late-stage detection. [1]

Globally, ovarian cancer ranks among the leading causes of cancer-related mortality in women. According to GLOBOCAN 2022 estimates, ovarian cancer accounts for more than 324,000 new cases annually, with an age-standardized incidence rate of 6.7 per 100,000 women. [2] In India, ovarian cancer is the third most common malignancy among women after carcinoma breast and carcinoma cervix, contributing substantially to cancer burden and mortality. [3] the incidence has shown a rising trend, particularly in urban and semi-urban populations. [4]

Histogenetically, ovarian tumours arise from three major components: surface epithelial-stromal cells, germ cells, and sex cord-stromal elements. Surface epithelial tumours constitute

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the majority and are further classified into serous, mucinous, endometrioid, clear cell, and Brenner tumours, each categorized as benign, borderline, or malignant according to architectural complexity and cytological atypia.[5] Serous carcinoma, especially high-grade serous carcinoma (HGSC), represents the most frequent and aggressive subtype. Emerging evidence suggests that many HGSCs originate from the distal fallopian tube epithelium, particularly from serous tubal intraepithelial carcinoma (STIC). [6]

Serum CA-125 remains the most widely used biomarker in ovarian neoplasms. Although not specific, elevated CA-125 levels are frequently associated with epithelial ovarian malignancies, particularly serous carcinomas, and correlate with tumour burden and stage. [7]

Regional epidemiological data are essential for understanding demographic patterns and histopathological distribution, which may vary due to genetic, environmental, and healthcare-related factors. While several studies have described the histopathological spectrum of ovarian tumors in different parts of India, limited data are available from Bangalore Rural and surrounding districts of Karnataka. Hence, the present study was undertaken to evaluate the histopathological spectrum of ovarian tumors in a rural medical college tertiary care centre serving Bangalore Rural.

METHODOLOGY

Study Design and Setting

This is a retrospective observations study conducted in the Department of Pathology at Sri Madhusudan Sai Institute of Medical Sciences and Research, a tertiary care teaching hospital catering to the Bangalore Rural population, Karnataka, India.

Study Period

The study was conducted over a period of 12 months (January 2024 to December 2024).

Sample Size

A total of 2068 gynaecological samples were received during the study period, out of which 63 ovarian tumour specimens were included in the study.

Inclusion Criteria

- All surgically resected ovarian specimens diagnosed as neoplastic lesions (benign, borderline, or malignant).
- Specimens received as oophorectomy, salpingo-oophorectomy, or total abdominal hysterectomy with bilateral salpingo-oophorectomy.

Exclusion Criteria

- Non-neoplastic ovarian lesions (e.g., functional cysts, simple cysts, corpus luteum cysts).
- Inflammatory lesions without neoplastic pathology.

Data Collection

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Relevant clinical and demographic data were obtained from patient records and requisition forms.

The received specimen was grossed and sections taken, stained with Haematoxylin and Eosin (H&E). Tumours were classified according to the WHO Classification of Female Genital Tumours (5th edition-2020). [9]

RESULTS

A total of 2068 samples were received from the department of obstetrics and gynaecology during the study period. Out of which 63 ovarian tumour specimens were analysed in the present study.

The age of patients ranged from 12 to 78 years. The majority of cases occurred in the 21–30 years age group (28.6%), followed by 31–40 years (19%).

Table 1: Age-wise distribution of ovarian tumours (n = 63)

Age group (years)	Epithelial tumours	Germ cell tumours	Sex cord stromal tumours	Total
11–20	7	1	0	8
21–30	15	3	0	18
31–40	9	2	1	12
41–50	7	2	1	10
51–60	6	0	1	7
61–70	6	0	0	6
>70	2	0	0	2
Total	52	8	3	63

Table 2: Distribution of ovarian tumors according to histological category

Category	Number (n)	Percentage
Epithelial tumors	52	82.54%
Germ cell tumors	8	12.7%
Sex cord stromal tumors	3	4.76%
Total	63	100%

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Table 3: Distribution according to biological behaviour

Nature of tumor	Number (n)	Percentage
Benign	60	95.2%
Borderline	1	1.6%
Malignant	2	3.2%
Total	63	100%

Table 4: Histological spectrum of ovarian tumours

Histological type	Number (n)	Percentage
Serous cystadenoma and variants	37	58.7%
Mucinous cystadenoma	13	20.6%
Mature cystic teratoma	8	12.7%
Fibroma	2	3.2%
Brenner tumour	1	1.6%
Adult granulosa cell tumor	1	1.6%
Borderline mucinous tumor	1	1.6%
Clear cell carcinoma	1	1.6%
High-grade serous carcinoma	1	1.6%
Total	63	100%

Table 5: Distribution of malignant tumors

Histological type	Number
Clear cell carcinoma	1
High-grade serous carcinoma	1
Total malignant tumors	2

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A total of 63 ovarian tumor specimens received in the Department of Pathology during the study period were included in the present study. The tumors were analysed with respect to age distribution, histological category, biological behaviour, and histopathological spectrum.

Age Distribution: The age of the patients ranged from 12 to 78 years. The majority of cases were observed in the 21–30 years age group (n = 18; 28.6%), followed by the 31–40 years age group (n = 12; 19.0%) and 41–50 years (n = 10; 15.9%). The least number of cases were seen in patients aged more than 70 years (n = 2; 3.2%). This distribution indicates that ovarian tumors were more frequently encountered in women of the reproductive age group. (table 1)

Association Between Age Group and Tumor Category: Cross-tabulation analysis was performed to evaluate the relationship between age group and histological tumor category. Epithelial tumors were most commonly observed in the 21–30 years age group (n = 13) and 31–40 years age group (n = 9). Germ cell tumors were mainly seen in the younger age groups, particularly in the second and third decades of life

Distribution According to Histological Category: Among the 63 ovarian tumors, the majority were epithelial tumors (n = 52; 82.54%). Germ cell tumors and sex cord stromal tumors each accounted for 3 cases (4.76%).

Distribution According to Biological Behaviour: Based on histopathological evaluation, the majority of tumors were benign (n = 60; 95.2%), while borderline tumors accounted for 1 case (1.6%) and malignant tumors were identified in 2 cases (3.2%). The findings indicate that benign ovarian tumors formed the overwhelming majority of ovarian neoplasms in the present study.

Histopathological Spectrum of Ovarian Tumors: The most common tumor identified was serous cystadenoma, accounting for 37 cases (58.7%) of all ovarian tumors. This was followed by mucinous cystadenoma (n = 13; 20.6%) and mature cystic teratoma (n = 8; 12.7%). Less frequently encountered tumors included fibroma (n = 2; 3.2%), Brenner tumor (n = 1; 1.6%), adult granulosa cell tumor (n = 1; 1.6%), and borderline mucinous tumor (n = 1; 1.6%).

Among the malignant tumors, clear cell carcinoma and high-grade serous carcinoma were observed, each accounting for one case (1.6%).

Overall, serous cystadenoma emerged as the most common ovarian tumor, while mature cystic teratoma was the most frequent germ cell tumor identified in the present study.

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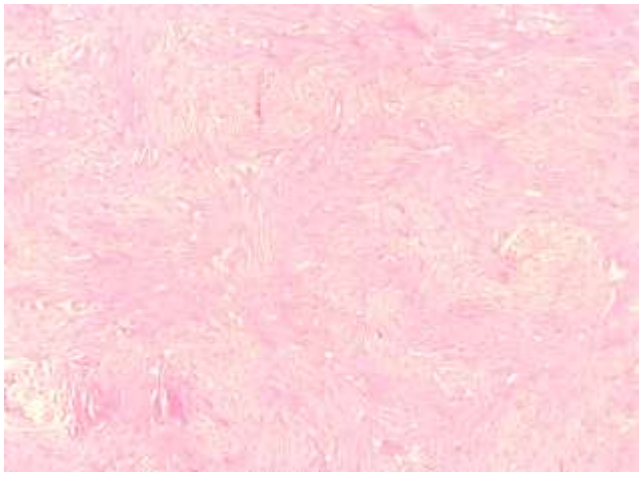

Figure 1: Ovarian fibroma showing intersecting bundle and fascicles of spindle shaped cells with intervening areas of hyalinisation. [H&E 200x]

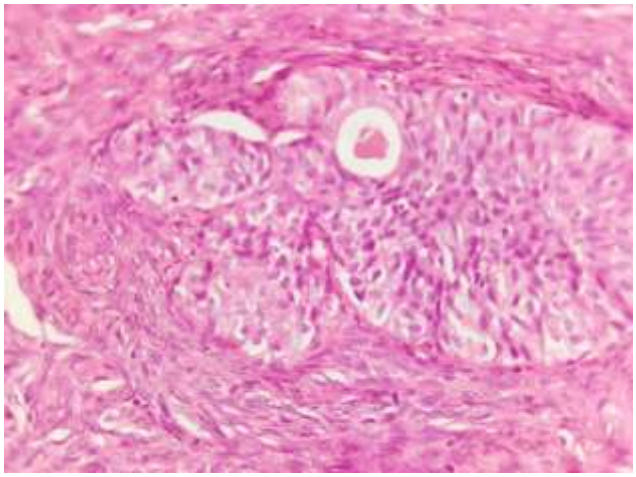

Figure 2: Benign brenner tumor showing transitional / urothelial-like epithelium, typically embedded in fibromatous stroma. [H&E 400x]

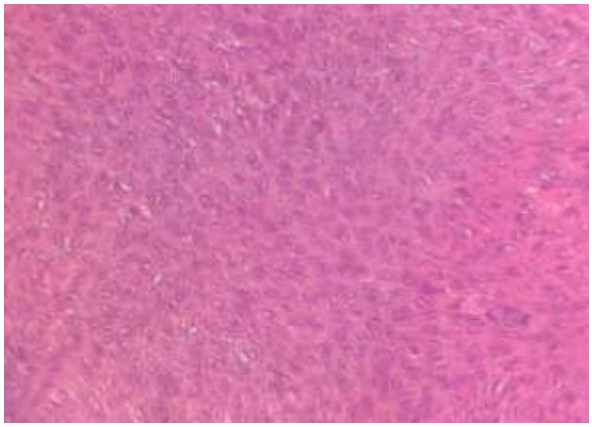

Figure 3: Granulosa cell tumor showing sheets of cells with oval nuclei with nuclear grooves and eosinophilic cytoplasm. [H&E 400x]

To summarize the most common ovarian tumor was serous cystadenoma (58.7%). Epithelial tumors constituted the majority (74.6%) of ovarian neoplasms. Mature cystic teratoma (12.7%)

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was the most common germ cell tumor. Fibroma and granulosa cell tumor represented the sex cord stromal tumors. Only two malignant tumors (3.2%) were observed: clear cell carcinoma and high-grade serous carcinoma.

DISCUSSION

Ovarian tumors represent a heterogeneous group of neoplasms arising from surface epithelial cells, germ cells, and sex cord-stromal elements. Histopathological evaluation remains the gold standard for diagnosis and classification. The present study evaluated the histopathological spectrum of ovarian tumors in 63 cases and compared the findings with previously published Indian and international studies.

Age Distribution: In this study, the predominant occurrence of ovarian tumors was observed in the 21–30 age group, followed by the 31–40 age group. This data indicates an increased prevalence of ovarian cancers among women of reproductive age, Garg et al. observed analogous data, indicating that the predominant occurrence of tumors was in the 31–40 years age range[10] succeeded by the 41–50 years group. Patel et al. and Sudha et al. similarly indicated that ovarian cancers were predominantly detected in individuals throughout their third and fourth decades of life. [11] [12]. A study conducted by Gupta et al. in Eastern Uttar Pradesh revealed a high incidence between the 31–40 years age demographic. [13] International articles have documented analogous tendencies. Other studies by Sharadha et al. and Narang et al. revealed that the majority of ovarian cancers manifest at the reproductive age, indicating hormonal and reproductive factors' impact on ovarian pathology.[14,15] The age distribution identified in this study aligns with both national and international literature.

Distribution According to Histological Category: The current investigation revealed that epithelial tumors comprised the majority at 82.54%, followed by germ cell tumors at 12.7% and sex cord stromal tumors 4.76%. These findings are analogous to other Indian investigations. Gupta et al. documented epithelial tumors in 71.7% of instances, succeeded by germ cell tumors at 22.2% and sex cord stromal tumors at 3.8%.[13] Dutta et al. and Sudha et al. similarly identified epithelial tumors as the major type of ovarian neoplasms.[12,16] Chandanwale et al. indicated that epithelial tumors comprised around 65–70% of ovarian cancers in their research.[17] Global research has demonstrated analogous trends. Research from tertiary institutions indicated that epithelial tumors are the predominant category of ovarian neoplasms, succeeded by germ cell tumors and sex cord stromal tumors.[18,23,24,25] These data corroborate the prevalent assertion that surface epithelial tumors constitute the predominant category of ovarian neoplasms globally. The comparison of the same is done in Table 6.

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Table 6: Comparative analysis of histological category of ovarian tumors

SL no	Study	Surface epithelial tumors	Germ cell tumors	Sex cord stromal tumors	Others
01	Present study	82.54%	12.7%	4.76%	-
02	Gupta et al[13]	71.7%	22.2%	3.8%	2.3%
03	Mathew LR et al[23]	69.1	17.6%	9.0%	4.3%
04	Batool et al[24]	63.0%	29.5%	6.9%	0.6%
05	Sampurna K et al [25]	79.5%	13.5%	5.0%	2.0%

Distribution According to Biological Behaviour: The current investigation revealed that benign tumors comprised 95.2% of cases, malignant tumors represented 3.2%, and borderline tumors composed 1.6%. Indian research has repeatedly indicated a prevalence of benign ovarian tumors. Gupta et al. reported benign tumors in 63.7% of patients, malignant tumors in 31.1%, and borderline tumors in 5.2%.[13] Narang et al. similarly observed that benign tumors constitute roughly 70–80% of ovarian neoplasms.[15] Global literature further corroborates this trend. Numerous studies indicate that benign tumors constitute the predominant category of ovarian neoplasms, but malignant tumors, although less prevalent, substantially impact death rates due to delayed detection.[19,14,16] The increased prevalence of benign tumors in this study may be ascribed to timely surgical intervention and enhanced diagnostic imaging, facilitating the identification of tumors prior to malignant change. The comparison of biological behaviour is shown in table.7

Table 7: Comparative analysis depicting the biological behaviour.

SL no	Study	Benign	Borderline	Malignant
01	Present	95.2%	1.6%	3.2%
02	Gupta et al[13]	63.7%	5.2%	31.1%
03	Batool et al[24]	79%	4.5%	15.8%
04	Kanasagara et al[26]	86%	9.5%	4.5%

Histopathological Spectrum of Ovarian Tumors: In the current investigation, serous cystadenoma (58.7%) was identified as the predominant ovarian tumor, succeeded by mucinous cystadenoma (20.6%) and mature cystic teratoma (12.7%). The results align with the data of Gupta et al., indicating that serous cystadenoma is the predominant benign epithelial tumor, whereas mature cystic teratoma is the most prevalent germ cell tumor.[13] Yogambal et al. and Prakash et al. similarly identified serous cystadenoma as the most prevalent ovarian malignancy in their research.[20,21] In contrast, several investigations, such those by Sudha et al., identified mature cystic teratoma as the predominant benign tumor, underscoring geographical disparities in tumor prevalence.[12] Global research has similarly revealed consistent trends. Numerous studies indicate that serous tumors are the predominant epithelial tumors, but mature cystic teratoma is recognized as the most prevalent germ cell tumor globally.[22]

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Malignant Tumors: In the current investigation, only two malignant tumors (3.2%) were identified: clear cell carcinoma and high-grade serous carcinoma. Numerous Indian investigations have shown serous carcinoma as the predominant malignant ovarian neoplasm. Gupta et al. also identified serous carcinoma as the primary malignant epithelial neoplasm.[13] Global research has similarly demonstrated that high-grade serous carcinoma is the predominant malignant ovarian neoplasm, responsible for the majority of ovarian cancer-related fatalities.[22] The comparatively reduced incidence of malignant tumors in this study may be attributed to the limited sample size.

CONCLUSION

This study assessed the histological spectrum of ovarian tumors in a tertiary care facility catering to the rural population of Bangalore. Ovarian cancers exhibited diverse histomorphological patterns and mostly affected women of reproductive age. Epithelial tumors were the predominant category of ovarian neoplasms, with 74.6% of cases, succeeded by germ cell tumors and sex cord stromal tumors. Serous cystadenoma was identified as the predominant histological type among all tumors, but mature cystic teratoma was the most prevalent germ cell tumor. The predominant tumors in this investigation were benign (95.2%), with a minor fraction of malignant lesions detected. These findings align with the majority of Indian and worldwide research, which indicate the prevalence of benign epithelial ovarian tumors. The findings underscore the significance of histological testing as the ultimate standard for diagnosing and classifying ovarian neoplasms, facilitating suitable therapy and prognostic evaluation. The prompt identification and precise pathological categorization of ovarian cancers are crucial for enhancing patient outcomes. Current regional epidemiological data, such as this study, enhance the comprehension of ovarian tumor patterns among the local community.

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