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ORIGINAL ARTICLE

Frequency of various histopathological types of ovarian tumors reported at a Tertiary Care Hospital, Karachi, Pakistan.

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ABSTRACT… Objective: To determine the frequency, histopathological spectrum, and clinical characteristics of ovarian tumors at a tertiary care hospital of Karachi, Pakistan. **Study Design:** Retrospective, Cross-sectional study. **Setting:** Department of Obstetrics & Gynaecology, Ward-8, Jinnah Postgraduate Medical Centre, Karachi, Pakistan. **Period:** 1st January 2022 to 30th December 2024. **Methods:** Data of 204 female patients diagnosed with ovarian tumors (benign or malignant), and underwent surgical management with complete clinical and histopathological records were analyzed. Data regarding demographics, clinical information, disease biomarkers and histopathology details were noted. Data were analyzed using SPSS version 26. Chi-square test was used to evaluate associations between clinical features and malignancy, taking $p<0.05$ as significant. **Results:** In a total of 204 women, the mean age was 39.38±12.16 years. Among 204 cases, 98 (48.0%) were benign, and 106 (52.0%) malignant. The most frequent benign tumor was serous cystadenoma 30 (14.7%) and the most common malignant tumor was mucinous cystadenocarcinoma (20.6%), followed by high-grade serous carcinoma, in 22 (10.8%) cases. Most malignant tumors presented at FIGO stage III, 46 (22.5%). Elevated CA-125 levels were noted in 117 (57.4%) cases. Significant associations were found between malignancy and menopausal statu ($p<0.001$), comorbidities ($p<0.001$), raised tumor markers ($p<0.001$), and positive family history ($p<0.001$). Upfront surgery was performed in 109 (53.4%) cases, while 46 (22.5%) received neoadjuvant chemotherapy followed by surgery. **Conclusion:** This retrospective cross-sectional study highlights the considerable burden and diverse histopathological spectrum of ovarian tumors at a tertiary care center in Karachi, Pakistan.

Key words: Bmucinous Cystadenocarcinoma, CA-125, Histopathology, Ovarian Tumors, Serous Cystadenoma.

INTRODUCTION

Ovarian tumors pose an increasing global health burden by contributing significantly to morbidity and mortality of women. Approximately 313,959 new cases of ovarian cancer were reported globally during 2020, with an age-standardized incidence of 6.6 per 100,000 women.[1,2] In 2018, ovarian cancers accounted for 295,000 cases with 184000 deaths, and ranked as the leading cause of gynaecological cancer-related mortality worldwide.[2-4]

Adnexal tumors are growths arising from the ovary and fallopian tubes. They may be classified as benign, borderline, or malignant.[5] Ovarian tumors are most frequently diagnosed in women aged 20-45 years and approximately 80% of ovarian tumors are benign. Whereas, malignant tumors comprise about 20% and typically affect women aged 40–65 years. They are often associated with poor prognosis.[3] Serous cystadenoma is the most prevalent form of benign ovarian tumors, followed by dermoid and mucinous cystadenomas.[5] Malignant ovarian tumors are broadly classified into epithelial tumors, germ cell tumors, sex cord-stromal tumors, and metastatic lesions on the basis of histopathology.[6] Epithelial tumors represent the majority approximating up to 88.4% with serous (64.9%) and mucinous (15%) carcinomas being the most common subtypes.[1]

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Owing to non-specific signs and symptoms of ovarian cancer, it is often diagnosed at an advanced stage thus contributing to its status as the gynecological malignancy with the poorest prognosis.[7,8]

Multiple risk factors may lead to the development of ovarian tumors including family history of ovarian or other gynaecological cancers, genetic mutations such as BRCA1, BRCA2, and Lynch syndrome, as well as reproductive factors like nulliparity, early menarche, late menopause, and hormone replacement therapy, all of which increase the number of lifetime ovulatory cycles.[9,10] Lifestyle factors such as smoking is especially linked to mucinous tumors and obesity also contribute. Protective factors include breastfeeding, oral contraceptive use, and tubal ligation.[9,10] Diagnosis depends on a combination of physical examination, imaging modalities, and serum tumor markers such as CA-125, AFP, LDH, CEA, and beta-hCG.[5,11] A study from Lahore, Pakistan in 2022 reported that benign ovarian tumors (82.05%) were significantly more prevalent than malignant ones (14.61%).[12] Surgical intervention remains the mainstay of treatment, with accurate histopathological staging playing a crucial role in disease classification, guiding therapy, and determining prognosis. Given the limited data from this region, the current study aims to determine the frequency and histopathological spectrum of ovarian neoplasms at a Tertiary Care Hospital of Karachi, Pakistan.

METHODS

This retrospective cross-sectional study was performed at the department of obstetrics & gynaecology ward-8, Jinnah Postgraduate Medical Centre, Karachi, Pakistan, from 1st January 2022 to 30th December 2024. Approval from Institutional Review Board was obtained vial letter number F.2-81/2025-GENL/320/JPMC. Record of all female patients diagnosed with ovarian tumor (whether benign or malignant), underwent surgical management, with complete records showing demographic, clinical and histopathological data were analyzed. Women with ovarian benign masses <5cm, ectopic pregnancy, para-ovarian cysts, or those having incomplete or missing hospital record were excluded. Being a retrospective study, taking informed written consent was not possible from the participants for the purpose of this research. Non probability, consecutive sampling was used.

A structured data extraction form was used to gather information from medical record in record registers, histopathology reports, and operation theatre records. Demographic and clinical variables such as age, parity, body mass index (BMI), comorbidities, use of oral contraceptive pills, family history of cancer, age of menarche, menopausal status, history of tubal ligation, use of hormone replacement therapy, and history of weight loss, wer documented. Cancer related variables included type of gynaecological malignancy, and histopathological diagnosis of ovarian tumors. Data were entered and analyzed using IBMSPSS, version 26.0. Categorical variables were represented as frequencies and percentages. Continuous variables were shown as mean and standard deviation. Cross tabulations was used to explore association between cancer types and risk factors. For all inferential statistics, $p<0.05$ statistically significant.

RESULTS

A total of 2439 patients were admitted with gynaecological problems during the study period, and out of these, 224 (9.2%) women fulfilled the inclusion criteria. Complete record was not available for 20 women, hence, they were excluded from the study. A total 204 women were analyzed. The mean age was 39.38±12.16 years, ranging between 17-68 years. There were 144 (70.6%) women who were multiparous. There were 46 (22.5%) women who were overweight, and 8 (3.9%) were obese. Evaluation of comorbidities revealed that 57 (27.9 %) women had diabetes, 28 (13.7%) hypertension, while 22 (10.8%) had cardiac issues. Tumor markers were normal in 57 (27.9%) cases. CA-125 was elevated in 117 (57.4%) cases, Lactate Dehydrogenase (LDH) in 10 (4.9%), a-fetoprotein in 5 (2.5%), and CA 19-9 in 15 (7.4%) cases. There were 98 (48.0%) women who had benign ovarian tumors, while 106 (52.0%) were having malignant ovarian tumors. Table-I is showing demographic and clinic

characteristics of women with ovarian tumors.

Study variables		Frequency (%)
Age		39.38±12.16 years
Parity	Nulliparous	60 (29.4%)
	Multiparous	144 (70.6%)
Menopausal status	Pre-menopausal	152 (74.5%)
	Post-menopausal	52 (25.5%)
BMI	Underweight	50 (24.5%)
	Normal BMI	100 (49%)
	Overweight	46 (22.5%)
	Obese	8 (3.9%)
Smoking status	Smoker	4 (2%)
	Non-smoker	183 (89.7%)
	Former smoker	17 (8.3%)
Tubal ligation	Yes	20 (9.8%)
	No	184 (90.2%)
Tumor markers	CA-125	117 (57.4%)
	LDH	10 (4.9%)
	a-fetoprotein	5 (2.5%)
	CA 19-9	15 (7.4%)
	Normal tumor markers	57 (27.9%)
Use of OCP	Yes	25 (12.3%)
	No	179 (87.7%)
Type of lesion	Benign	98 (48%)
	Malignant	106 (52%)
Family history of Cancer Comorbidities	Yes	79 (38.7%)
	No	125 (61.3%)
	Hypertension	28 (13.7%)
	Diabetes	57 (27.9%)
	Thyroid disorders	8 (3.9%)
	Cardiac disorders	22 (10.8%)
	No known comorbidities	89 (43.6%)

Table-I. Demographic and clinical characteristics of women with ovarian tumors (N=204)

The most frequently encountered histopathological type among benign tumors was benign serous cystadenoma 30 (14.7%), followed by benign mucinous cystadenoma 22 (10.8%), benign endometrioma 19 (9.3%), and mature teratoma 16 (7.8%), and the details are shown in Figure-1.

The most frequent histopathological finding for malignant ovarian tumors was malignant mucinous cystadenoma 42 (20.6 %), followed by high-grade serous cystadenocarcinoma 22 (10.8%), and poorly differentiated adenocarcinoma of ovary 12 (5.9%), and the details are given in Figure-2

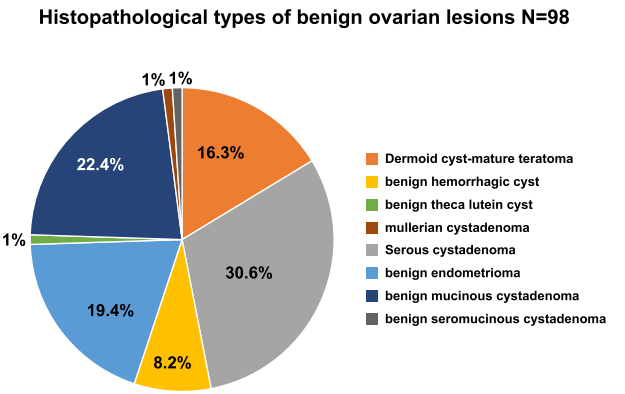

Figure-1. Histopathological spectrum of benign ovarian tumors (n=98)

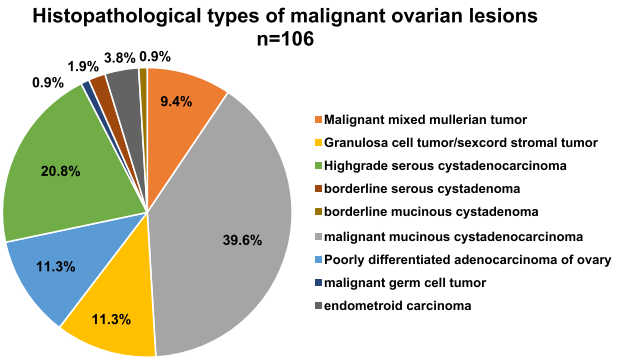

Figure-2. Histopathological spectrum of malignan ovarian tumors (n=98)

The most frequent stage of the disease at the time of diagnosis for ovarian cancer was stage-3, noted in 46 (22.5%) cases, followed by stage-2 41 (20.1% cases), stage 1 9 (4.4%), and stage-4 7 (3.4%) cases. There were 109 (53.4%) patients were treated by upfront surgery, 7 (3.4%) had chemotherapy as first line treatment, 46 (22.5%) cases first received chemotherapy then followed by surgery. There were 42 (20.6%) patients who had surgery followed by chemotherapy. Among surgical treatments for benign pathologies, 80 (39.2%) patients had cystectomy, 10 (4.9%) patients had adnexectomy, 9 (4.4%) had cystectomy plus bilateral salpingoophrectomy. Among treatment modalities for malignant pathologies, 47 (23%) had staging laparotomy, 46 (22.5%) had interval debulking, 5 (2.5%) had staging laparotomy-fertility sparing surgery. In 5 cases who underwent stage in laparotomy-fertility sparing surgery, 2 cases also had frozen section done during surgery. There were 7 (3.4%)

women who received chemotherapy as palliative treatment. Malignant ovarian tumors were found to have significant association with family history of malignancy (p<0.001), raised tumor markers (p<0.001), comorbidities (p<0.001), smoking status (p=0.001), and menopausal status (p<0.001), and the details are given in Table-II.

DISCUSSION

This study gives valuable details regarding frequency, histopathological patterns and clinical characteristics of ovarian tumors in a tertiary care hospital in Karachi. Our findings revealed a higher proportion of malignant tumors (52%) as compared to benign showing contrast to many global studies. This can be due to the fact that Jinnah Postgraduate Medical Centre is a tertiary care setup that receives referrals of complex cases from all over Sindh and some parts of Balochistan. Cases with suspicion of malignancy are referred to the institute from far and wide. Malignancies are often diagnosed late, presents in advanced stage due to low awareness, lack of screening or limited healthcare access. These factors are common in low- and middle-income countries (LMICs) like Pakistan.[13,14] The mean age of patients was 39.38 years, with malignant tumors more frequent among postmenopausal women. These findings are consistent with literature reporting incidence in women aged 50-70 years.[15,16] This study showed a significant association between menopausal status and malignancy, demonstrating its potential as a risk indicator.

This study showed serous cystadenoma was the most frequent benign tumor (14.7%). This aligns with global trends that represent serous tumors as the most prevalent benign subtype.[17] The predominance of mucinous cystadenocarcinoma (20.6%), and high-grade serous carcinoma (10.8%) seen in this study is consistent with international data indicating that epithelial tumors comprise 85–90% of malignant ovarian neoplasms.[18,19]

This study showed that granulosa cell tumors accounted for 5.9% of malignant cases. This is an interesting finding as these rare sex cord-stromal tumors, while constituting only 2–5% of all ovarian malignancies globally, these are often diagnosed at an earlier stage and carry a relatively

Variables		Type of Lesion		P-Value
		Benign n=98)	Malignant (n=106)	
Body mass index	Underweight	25 (25.5%)	25 (23.6%)	<0.001
	Normal BMI	63 (64.3%)	37 (34.9%)	
	Overweight	9 (9.2%)	37 (34.9%)	
	Obese	1 (1.0)	7 (6.6%)	
Comorbidities	Hypertension	6 (6.1%)	22 (20.8%)	<0.001
	Diabetes	11 (11.2%)	46 (43.4%)	
	Thyroid dysfunction	2 (2.0%)	6 (5.7%)	
	Cardiac Disorder	3 (3.1%)	19 (17.9%)	
	No known comorbidities	76 (77.6%)	13 (12.3%)	
Use of oral contracetives		10 (10.2%)	15 (14.2%)	0.390
Smoking status	Smoker	3 (3.1%)	1 (0.9%)	0.001
	Non-smoker	94 (95.9%)	89 (84.0%)	
	Former smoker	1 (1.0%)	16 (15.1%)	
Family history of cancer		16 (16.3%)	63 (59.4%)	<0.001
Menopausal status	Pre-menopausal	92 (93.9%)	60 (56.6%)	<0.001
	Post-menopausal	6 (6.1%)	46 (43.4%)	
Raised CA-125		40 (40.8%)	77 (72.6%)	<0.001

Table-II. Association of type of ovarian lesion with study variables (N=204)

favorable prognosis.[20,21] This study showed a high proportion of patients presenting with stage-III disease (22.5%) at diagnosis. This finding highlights diagnostic delays and also reflect broader evidence that 70–80% of ovarian cancers are diagnosed at an advanced stage globally due to non-specific symptoms and absence of effective screening.[22,23] In this study, 12.3% of patients reported using oral contraceptive pills. This finding suggests a missed opportunity for preventive strategies and highlights cultural or healthcare access barriers in contraceptive use. There is substantial evidence that their long-term use reduces the risk of ovarian cancer by 30–50%, particularly for epithelial subtypes.[24,25] There was a significant association between family history of malignancy and malignant tumors ($p<0.001$) this finding is consistent with existing literature, particularly involving BRCA1/2 mutations as a strong risk factor.[26,27] The study found that 57.4% of patients had elevated CA-125 levels, showing its role in the evaluation of ovarian cancer. However nearly 1/3rd of malignancies had normal tumor marker profile. This is consistent with the existing evidence showing that tumor markers are indeed helpful bur are neither reliable nor sensitive or specific and should be interpreted alongside imaging and histopathology.[28,29] Surgical intervention remains the cornerstone of treatment, with staging laparotomy and debulking surgeries being the most common modalities for malignant tumors in the present setting. The significant number of interval debulking procedures (22.5%) highlights the growing global acceptance of neoadjuvant chemotherapy for patients with advanced disease where optimal debulking is initially unfeasible.[30,31] Fertility-sparing surgeries performed in 2.5% of malignant cases emphasize the importance of individualized treatment, especially in younger women.

In terms of limitations, retrospective nature and single-center scope, may not fully represent the broader picture at a vast or national national level with respect to ovarian tumors insights. The study lacked long-term follow-up data, survival analysis and recurrence assessment.

CONCLUSION

This retrospective cross-sectional study highlights the considerable burden and diverse histopathological spectrum of ovarian tumors at a tertiary care center in Karachi, Pakistan. Malignant ovarian tumors constituted a slightly higher proportion than benign tumors, with malignant mucinous cystadenoma and high-grade serous cystadenocarcinoma being the most prevalent malignant subtypes. Key risk factors significantly associated with malignancy included postmenopausal status, raised tumor markers, family history of cancer, presence of comorbidities, and higher BMI. Most malignant cases presented at an advanced stage, underscoring the need for increased awareness, timely diagnosis, and multidisciplinary management.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Haleema Yasmin:** Study concept, design, drafting,.
2	**Omema Akhtar:** Literature review, methodology.
3	**Shigraf Iftikhar:** Data collection, data analysis.
4	**Memoona Rehman:** Discussion, literature review.
5	**Samra Rizwan:** Data collection, data analysis.
6	**Fatima Asghar:** Study design, data entry.