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Original Research Article

Histopathological features of ovarian mass among patients attending a tertiary care hospital in South India

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ABSTRACT

Background: First of all, globally, ovarian tumors are becoming a more common source of morbidity and death. The goal of the current investigation was to ascertain the incidence of different ovarian tumor histological and morphological variants in a tertiary healthcare center in southern India.
Methods: The study, which took place in a tertiary healthcare facility in Chennai, involved 89 ovary specimens that were obtained over the course of 18 months (from August 2021 to December 2022) from patients in the obstetrics and gynecology department. The specimens underwent both histological and critical gross examination. Standard H&E-stained paraffin slices were observed. After being organized on proforma, the histology results were examined.
Results: A total of 89 patients, ranging in age from 16 to 90, were enrolled in the study. The majority of patients (30.3%) were in the age range of 31 to 40 years. The majority of ovarian tumors were benign, accounting for 58 (65.2%) of the total, while malignant tumors accounted for 25 (28.1%). The most prevalent type of tumors, according to the World Health Organization (WHO) classification, were surface epithelial tumors (76.12%), followed by germ cell tumors (18.46%). In the current investigation, one case of metastatic tumors to the ovaries was also identified. Serous cystadenoma 29 (32.6%) was found to be the most prevalent subtype among the many known subtypes of ovarian tumors, followed by papillary serous carcinoma 14 (15.7%).
Conclusions: Compared to malignant or borderline tumors, benign ovarian tumors are more common. Surface epithelial tumors are the most prevalent histological subtype of ovarian cancers, followed by germ cell tumors. It's critical to distinguish between benign and malignant tumors in order to ensure appropriate treatment and healing. Future research of this kind with a larger sample size is advised.

Keywords: Ovarian mass, Histopathology, Cancer

INTRODUCTION

The ovary is a primary organ of the female reproductive system. It is composed of epithelial cells, germ cells, and stromal cells, from which tumors can arise, or from nearby communicating structures such as the fallopian tubes or peritoneum. Ovarian tumors can be seen in women of all age groups. It ranks third in incidence after cervical and uterine cancer and has a high mortality rate. The high mortality is due to the delayed onset of symptoms, lack of awareness about the nature of the disease among patients, and the lack of screening procedures that delay the usual probable point of diagnosis.[1]

Epithelial ovarian cancers are the most common ovarian malignancy, with over two-thirds of patients having advanced disease at initial diagnosis. 80% of epithelial cancers are of serous histologic type. Serous epithelial ovarian cancers belong to two distinct groups - type I and type II serous tumors as they differ considerably in the cell of origin, molecular pathogenesis, and their biological behaviour.[2] An adnexal mass, which can be found in women of all age groups, is one of the common gynecological problems. The evaluation and assessment of the adnexal masses are crucial to differentiate between benign and malignant variations of the mass. The maleficent nature of the ovarian tumor can be mitigated by early diagnosis and comprehensive understanding the natural history of the disease. Therefore, it is critical that the risk factors contributing to the development of ovarian tumors are evaluated for early diagnosis. One of the most common risk factors for the development of ovarian carcinoma is a strong familial history among the first-degree relatives.[3]

The difference in incidence of ovarian tumor among different ethnicities is well known but the reasons for this onset seem to be very clear. Worldwide, Europe and North America have higher incidence of ovarian cancer when compared to Asia and Africa.[4] European women of Jewish descent are especially at risk of developing ovarian cancer.[5] Although Asians seem to have lesser incidence of ovarian cancer, certain ethnic groups like Asian Indian/Pakistanis showed higher incidence rate of ovarian cancer and they also had lesser incidence of clear cell tumor which is basically known to be more common in Asia.[6-8]

There are other factors which also differs in race such as parity playing a protective role against ovarian cancer in Asian women and higher risk of postmenopausal hormonal therapy related ovarian cancer in white women since the prevalence of prescribing hormonal therapy is higher among whites.[9] Despite the availability of new advanced modality techniques, the diagnosis of ovarian mass pathology is widely dependent on histopathological examination. The histopathological examination remains the gold standard for understanding the pathogenesis behind ovarian tumor and for classifying the ovarian mass into benign and malignant conditions.[10]

An accurate pre-operative assessment of ovarian mass is important to differentiate between benign and malignant variants. Clinical and pelvic examination can help in identifying the symptoms of the benign and malignant varieties. Unilaterality, cystic consistency, and mobile mass with well-defined borders are considered as benign lesions. On contrary, the ovarian mass which has ill-defined borders, movement restrictions, and ascites, bilateral, firm to hard in consistency is considered a malignant ovarian mass. However, these clinical features are not conclusive to differentiate benign and malignant ovarian mass.[11] A gynaecological oncologist faces a lot of difficulties when treating ovarian masses, both malignant and non-malignant lesions. Correct diagnosis and classification are crucial for the selection of the most appropriate therapy because some non-malignant lesions frequently emerge from the ovary while mimicking ovarian malignancy.

Among gynecological oncologies, ovarian neoplasm is the second most common cause of death. Due to contradictory diagnosis of ovarian malignancy preoperatively, prophylactic oophorectomy is being practiced in some centers. Ovarian cancer can originate from a number of different etiological causes, and the most important factors are strong familial history, age, high socio-economic status, increased age of reproduction, and nulliparity. The most common ovarian tumor presentation is the surface epithelial tumor, which is particularly associated with cigarette usage, estrogen replacement therapy, family history of breast and ovarian cancer, and mutations in the BRCA1 and BRCA2 genes.[4]

Although several factors can increase the risk of developing ovarian cancer, there are also some aspects that can help to prevent it which are the use of oral contraceptive pills, and multiparity. Women aged 40-59 years, who took oral contraceptives for longer periods of time and who underwent tubal sterilization have a decreased risk of developing carcinoma ovary vis-a-vis to other women. This study was carried out to determine the histopathological characteristics of ovarian masses in patients attending a tertiary care hospital in South India.

METHODS

This study was conducted as a cross-sectional descriptive study to evaluate the histopathological features of ovarian masses in patients. The study was carried out in the department of obstetrics and gynaecology at Sree Balaji Medical College and Hospital, Bharath University, Chennai, India affiliated with Bharath University, located in Chennai, India. This hospital serves a diverse population, providing a comprehensive platform for the study of ovarian masses. The study was conducted over a period of 18 months, from August 2021 to December 2022. This period allowed for the collection of a sufficient number of cases to ensure the study's validity and reliability. A total of 89 women who were diagnosed with ovarian masses during the total study duration and meeting the inclusion criteria were included in the study.

The inclusion criteria included all women diagnosed with ovarian tumors confirmed through clinical, radiological, or other diagnostic modalities, Women who underwent surgical procedures such as cystectomy, oophorectomy, or hysterectomy with bilateral/unilateral salpingo-oophorectomy or wedge resection and women with histopathological confirmation of the ovarian mass ensuring a definitive diagnosis of the tumor type. The exclusion criteria were pregnant women with ovarian tumors to avoid confounding factors related to pregnancy and its associated physiological changes. Written informed

consent was obtained from all patients participating in the study. The consent process included explaining the study's purpose, procedures, potential risks, and benefits to the participants, ensuring they were fully informed and voluntarily agreed to participate. The study was approved by the institutional ethics committee (002/SBMC/IHEC/2021/1628).

Data collection

A comprehensive proforma was meticulously designed to collect detailed information from each patient participating in the study. The collected data covered several aspects crucial for understanding the patient profiles and their medical history. The demographic details included essential information such as age, marital status, occupation, and residence, providing a baseline for patient analysis. The menstrual history section gathered data on menarche, menstrual cycle regularity, and any menstrual abnormalities, which are critical for assessing gynecological health and identifying patterns that might relate to ovarian mass development. Marital history was documented to understand the patient's reproductive history, including marital status and any issues related to fertility or pregnancy.

Additionally, obstetric history was detailed, focusing on previous pregnancies, deliveries, and any complications encountered, offering insights into reproductive health and potential risks associated with ovarian masses. The medical history section was thorough, collecting information on any past medical conditions, surgeries, and family history of ovarian or other cancers, which are significant risk factors for ovarian masses. This comprehensive data collection approach ensured a holistic view of the patient's health background, facilitating a thorough analysis of potential contributing factors to ovarian masses.

Specimen collection and processing

For patients undergoing surgical procedures, all surgical specimens were meticulously collected. These specimens were fixed in 10% formalin to preserve their cellular integrity, which is essential for accurate histopathological analysis. The tissue samples from ovarian specimens were processed and embedded in paraffin wax, creating stable blocks suitable for thin sectioning. This embedding process allows for precise slicing of the tissue, ensuring that the cellular structure is maintained and can be thoroughly examined under a microscope.

Thin sections of the paraffin-embedded tissue were cut and stained using hematoxylin and eosin (H&E) stains, which are standard in histopathology for highlighting tissue morphology and cellular details. This staining method provides a clear view of the cellular components and structures, making it possible to identify any abnormalities or pathological features within the ovarian tissue.

In cases where the initial H&E staining did not provide conclusive results, special stains and immunohistochemical techniques were employed. These advanced techniques are invaluable for providing additional diagnostic information by highlighting specific cellular components or markers that are not visible with routine staining. Immunohistochemistry, in particular, involves using antibodies to detect specific proteins within the cells, which can indicate the presence of certain diseases or conditions. This method is particularly useful in identifying specific histological subtypes of ovarian masses, thereby aiding in the accurate classification and diagnosis of the tumor.

Histopathological analysis

The histopathological analysis of each ovarian mass involved a detailed examination of various features to accurately classify the type and nature of the tumor. Key aspects examined included the tumor type, distinguishing between benign, borderline, or malignant classifications. The cellular characteristics were scrutinized, focusing on the type of cells present, their arrangement, and any signs of atypia, which can indicate malignancy or other pathological changes. Tumor architecture was also assessed, noting whether the tumor was cystic, solid, or mixed, as these structural features provide important clues about the tumor's behaviour and potential prognosis. Additionally, the presence of specific markers or patterns suggestive of particular histological subtypes was recorded, aiding in the detailed categorization and understanding of the ovarian masses. This comprehensive analysis provided a robust framework for understanding the pathological landscape of ovarian masses in the study population.

Statistical analysis

All data collected were entered in excel and analysed using Stata16.0. The continuous variables were described as mean with standard deviation or median with interquartile range based on normality of the data. Categorical variables were described as frequency with percentages.

RESULTS

Table 1 shows the age-wise distribution of patients with ovarian mass, highest number of patients with ovarian mass were between the age group of 31-40 years 27 (30.3%), which is followed by 41-50 years 21 (23.6%) and least prevalence is seen among patients with age group <20 years 3 (3.4%), so maximum number of cases are presenting during reproductive age group. Most of the patients with ovarian mass are married it accounts for almost 81 (91%) of cases. The patients with para 2 have the highest number of ovarian masses 30 (33.7%) followed by nulliparous women 21 (23.6%) and a smaller number of cases among multiparous women 1 (1.1%).

Table 1: General characteristics of the study participants (n=89).

Characteristic	Frequency	Percentage
Age group (in years)		
<20	3	3.4
21-30	14	15.7
31-40	27	30.3
41-50	21	23.6
51-60	14	15.7
>60	10	11.2
Marital status		
Married	81	91
Unmarried	8	9
Parity		
Nullipara	21	23.6
Para 1	17	19.1
Para 2	30	33.7
Para 3	14	15.7
Para 4	6	6.7
Para >5	1	1.1

Table 2 shows the frequency distribution of major histopathological type of ovarian mass, almost most of the patients diagnosed with ovarian mass, has surface epithelial tumor it accounts for (85.4%) and followed by germ cell tumor and sex cord stromal tumor both accounts for same percentage (6.7%) and metastatic tumor accounts for (1.1%). Nature of ovarian mass of study participants accounted for benign lesion almost 65.2% and which is followed by malignant lesion 28.1%.

Table 2: Frequency distribution of major histopathological type of ovarian mass (n=89).

Types	Frequency	Percentage
Histopathological types		
Surface epithelial tumor	76	85. 4
Germ cell tumor	6	6. 7
Sex cord tumor	6	6. 7
Metastatic tumor	1	1.2
Laterality		
Unilateral	76	85.4
Bilateral	13	14.6
Consistency		
Cystic	52	58.4
Solid	24	26.9
Complex	13	14.6
Nature of ovarian mass		
Benign	58	65.2
Borderline	6	6.7
Malignant	25	28.1

The major subtypes of the ovarian mass are surface epithelial tumor, germ cell tumor, sex cord tumor, metastatic tumor. Among them, surface epithelial tumor is the most common type of lesion in that benign nature accounts for (69.7%) is high when compared to the malignant nature (26.3%) of the tumor. In germ cell epithelial tumor, the same nature of lesion the benign nature was common compared to the malignant nature (50%) and (16.7%), but in the sex cord stromal tumor, highest percentage is for the malignancy of the tumor when compared to benign nature of the tumor (50%) and (33.3%). The metastatic tumors are always malignant in nature (Figure 1).

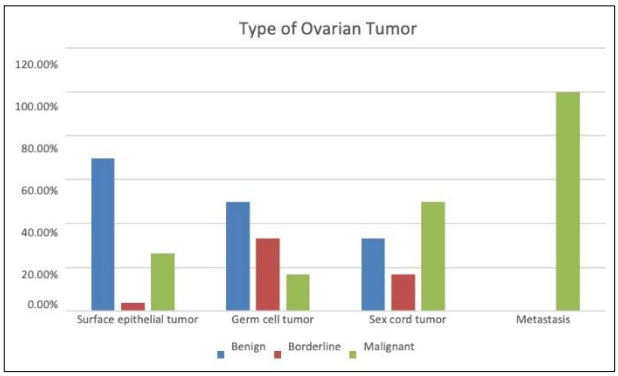

Figure 1: Distribution of histological pattern of tumor with nature of tumor.

Figure 2 shows the age distribution of benign/borderline/malignancy of ovarian mass, among less than 20 years of age group the ovarian mass presentation is less common among those individuals, the benign nature is common than the borderline and malignant. In the age group 31-40 years though the benign nature is common than malignant, among all the age groups compared the malignant nature of ovarian tumor is high among 31-40 years of age group, which is followed by 41-50 years of age group.

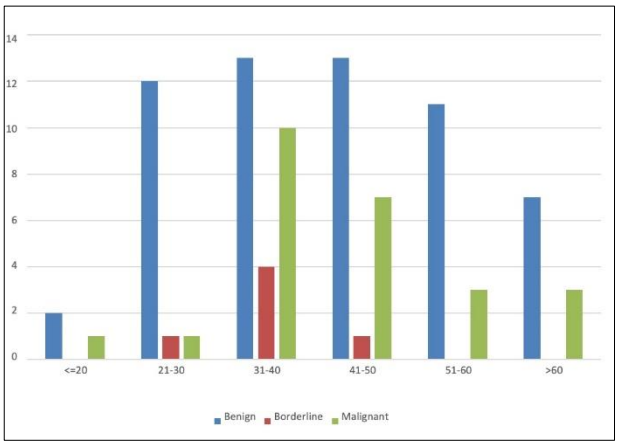

Figure 2: Distribution of age with type of ovarian tumour (n=89).

In this study, the surface epithelial tumors of serous tumors are serous cystadenoma, serous borderline tumor, papillary serous carcinoma, and undifferentiated tumor, among these surfaces' epithelial tumor, serous cystadenoma

accounted for the largest number 29 (32.6%) and followed by papillary serous carcinoma 14 (15.7%) and least was undifferentiated tumor 1 (1.1%).

Among the surface epithelial tumor, the mucinous tumor are mucinous cystadenoma, mucinous borderline tumor and mucinous cystadenocarcinoma, among these mucinous tumor, mucinous cystadenoma accounted for largest number 11 (12.4%) and borderline and malignant nature of mucinous tumor accounted for 5 (5.6%) and 4 (4.5%). Endometrioid tumor is one type of surface epithelial tumor and which accounted for 1 (1.1%). Sex cord stromal tumors are fibroma-thecoma group and granulosa cell tumor, which had equal number of presentations 3 (3.4%). In germ cell tumor, the mature and immature teratoma has 6 (6.7%) of presentation of ovarian mass (Table 3).

Table 3: Distribution of common sub-type of ovarian mass (n=89).

Histopathological type	Frequency (%)
Surface epithelial tumor	
Serous tumors	
Serous cyst adenoma	29 (32.6)
Serous borderline tumor	10 (11.2)
Papillary serous carcinoma	14 (15.7)
Undifferentiated	1 (1.1)
Mucinous tumors	
Mucinous cystadenoma	11 (12.4)
Mucinous borderline tumor	5 (5.6)
Mucinous cyst adenocarcinoma	4 (4.5)
C. endometroid carcinoma	1 (1.1)
Sexcord stromal tumors	
Fibroma - the coma group	3 (3.4)
Granulosa cell tumor	3 (3.4)
Germ cell tumor	
Mature teratoma/immature teratoma	6 (6.7)
Metastatic tumor	
Krukenberg tumor	1 (1.1)

DISCUSSION

Ovarian neoplasm is given importance not only because of varied histopathological features but has now become a public health importance because of the increased mortality rate. Disease progression of ovarian mass is based on the clinical assessment of the patients and histological features, and proper diagnosis and management of patients. There are many investigations available in diagnosing the nature of pathology of an ovarian mass. Due to complex histological features and anatomical location, it poses a major challenge in its management. It is very difficult to arrive at a diagnosis pre-operatively with only clinical presentation and examination, so microscopic examination is very important for further management.

In this study, the highest number of cases of ovarian mass is among patients aged 31-40 years (30.3%), followed by those aged 41-50 years. A study done by Patil et al also showed a similar age distribution, with 50% of ovarian masses in his 31-40-year-old group, followed by his 41-50-year-old group.[12] Priya et al found that the mean age of patients diagnosed with an ovarian mass was similar to that of our study in the reproductive age group.[11] The highest number of cases in the third decade of life was reported by Jha and Karki et al in 2008 and Kuldeepa et al in 2011, with 26.7% and 36.7% of cases, respectively. These findings are comparable to our study and show that the frequency of ovarian mass is higher among the reproductive age group.[5,13]

In this present study, the number of cases of ovarian tumors was higher among married individuals (91%) compared to unmarried individuals (9%). However, in a systematic review and meta-analysis, it was shown that the prevalence of ovarian tumors was higher among unmarried women compared to married women, which is opposite to the findings of our study. The justification behind the systematic review and meta-analysis was that unmarried women tend to notice and consult a physician at a later stage compared to married women, who are diagnosed early and treated appropriately.[14]

The majority of cases in the current study (65.2%) were benign, followed by malignant (28.1%) and borderline (6.7%). The majority of previous research have reported on a same pattern of benign, borderline, and malignant tumors. 75% of the tumors in the Bodal et al study was benign, 1.66% were borderline, and 14% were malignant.[15] In a similar vein, Bhagyalaxmi et al's 2014 study found that 78.3% of tumors were benign, 18% were malignant, and 3.7% were borderline.[16]

In the current investigation, there were 85.4% cases of surface epithelial tumors, 6.7% cases of germ cell tumors, and 6.7% cases of sex cord stromal tumors. The surface epithelial tumor results were comparable to those of Willis et al (71.66%), Bodal et al (71.67%), and Neha et al (70.6%).[15,17,18] While other authors' findings were consistent with our study, the results of germ cell tumors in the current study were comparable to those of Neha et al (18.8%).[18]

Similar findings were found for sex-cord stromal tumors in Jha and Karki's 2008 study (3% instances) and Bodal et al's 2014 study (3.33% cases).[5,15] In their investigation, Kayastha et al (2009) did not report a single case of sex-cord stromal tumors.[19] Serous tumors made up the bulk of epithelial tumors, with mucinous tumors coming in second. The outcomes matched those of research conducted in 2016 by Modepalli et al and Ahmad et al.[20,21] According to Ahmad et al's findings (19.81%), serous cystadenocarcinoma was the most frequent malignant surface epithelial tumor, accounting for 13.85% of cases.[20] In contrast to research conducted by Pilli et al, Jha et al,

and Modepalli et al, our study's incidence of malignant tumors was low.[5,21,22]

In the current study, granulosa cell tumors and fibromas were equally common, accounting for 6.7% of sex-cord stromal tumors. The findings corroborated those of Jha et al, Bhagyalaxmi et al, and Wills et al.[5,16,17] Metastatic ovarian tumors were 1.2% in the current study, which was comparable to Jha et al findings (3.67%). 1.7% of cases of metastatic ovarian tumors were reported by Akakpo et al.[5,23]

The limited sample size and brief research time are the study's two main limitations. Based on the data, a tentative estimate of the prevalence of different ovarian tumor subtypes in Chennai can be made. The study may have inherent selection bias, as it only includes cases that were referred for histopathological examination. Future studies should include a larger and more diverse sample size from multiple centers across different geographic locations to improve the generalizability of the findings.

CONCLUSION

In this present study, ovarian tumors are more prevalent among the reproductive age group. Surface epithelial tumors are the most commonly noted on histopathology reports, followed by germ cell tumors and sex cord tumors. Ovarian tumors are more common among multiparous women. A major goal of ovarian cancer research today is to develop the best screening tools for early diagnosis and treatment, and to determine the nature and prognostic factors of ovarian tumors. The study of histopathological features is very important because ovarian carcinoma has varied histopathological presentations, and there is a close association between diagnosis, histopathological features, and the nature of malignancy. Effective management of ovarian tumors still poses a challenge, so early diagnosis is necessary for a favourable prognosis.

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