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Histopathological study of ovarian lesions at a tertiary health-care center

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ABSTRACT

Background: Ovary is the most common site of non-neoplastic and neoplastic lesions, can appear at any age, and is the leading cause of hospitalization and surgery. The ovary is made up of totipotent sex cells and multipotent mesenchymal cells. As a result, when it becomes neoplastic, almost any type of tumor can develop. **Aims and Objectives:** The aim of the study was to find out the histopathological findings of ovarian lesions. **Materials and Methods:** The present study was carried out in the Department of Pathology, Pacific Institute of Medical Sciences, Udaipur, from April 2021 to September 2022 and includes 102 cases of ovarian lesions. Histopathology department received the specimens in formalin filled container and performed routine grossing and H and E staining procedure. **Results:** The incidence of neoplastic ovarian lesion was 40.2%. Majority of non-neoplastic lesion of ovary was follicular cyst (42.6%) followed by simple cyst (36.1%). Surface epithelial tumor was diagnosed in majority of ovarian tumors (73.2%) followed by germ cell tumor (22.0%). The majority histopathological benign tumor type was serous cystadenoma (43.9%) and malignant was high-grade serous carcinoma (14.63%). **Conclusion:** The incidence rate increased with age, with the greatest number of new cases being diagnosed beyond 4th and 5th decade. In our study, the youngest patient was of 2 year and oldest was of more than 60 years. However, histopathological study of ovarian tumors is still considered as a gold standard method, our observations and results proved to be valuable base line information regarding frequency and pattern of ovarian tumors.

Key words: Ovarian lesions; Non-neoplastic; Neoplastic; Histopathological study

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INTRODUCTION

Ovary is the most common site of non-neoplastic and neoplastic lesions, can appear at any age, and is the leading cause of hospitalization and surgery.[1] The ovary is made up of totipotent sex cells and multipotent mesenchymal cells. As a result, when it becomes neoplastic, almost any type of tumor can develop.[2] Ovarian neoplasms are a diverse group of benign and malignant tumors that can be epithelial, stromal, or germ cell in origin. Most ovarian tumors cannot be distinguished from one another based solely on clinical or gross characteristics.[3]

Ovarian neoplasms present a significant challenge to gynecological oncologists. Some non-neoplastic ovarian lesions present as a pelvic mass and can be mistaken for an ovarian neoplasm. As a consequence, early diagnosis and classification is essential for proper therapy.[4] Worldwide, the ovarian cancer is the seventh cause of cancer death in women. In India, it accounts for up to 8.7% of cancers in various parts of the country.[5,6]

Although ovarian cancer has a lower prevalence than breast cancer, it is 3 times more lethal,[6] with a mortality rate of this cancer is expected to rise significantly by 2040. Ovarian cancer has a high mortality rate due to asymptomatic and secret tumor growth, delayed onset of symptoms, and a lack of proper screening, which results in diagnosis in the advanced stages. As a result, this cancer has been dubbed the "silent killer."[7,8]

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Ovarian tumors have a variable histopathological presentation, which leads to their detection at an advanced stage when neither surgery nor chemotherapy are effective.[9] Ovarian tumors in women under 40 years of age have a better prognosis than older patients. The majority of patients with ovarian cysts are asymptomatic, and the cysts are discovered by chance during an ultrasound or routine pelvic examination. Some cysts, on the other hand, can cause a variety of symptoms, some of which can be severe, whereas malignant ovarian cysts typically do not cause symptoms until they reach an advanced stage.

The stage at diagnosis is strongly associated with prognosis, but histologic grade also plays a prognostic role, particularly in predicting recurrence. About 74% of women diagnosed with Stage I disease are under the age of 65. Up to 70% of epithelial ovarian cancer patients present at Stage III or IV. Epithelial ovarian cancer has a histologically determined low malignant potential in 15% of patients, is frequently diagnosed at Stage I, and has a 10-year survival rate of 95–99%. Older women are more likely to be diagnosed with advanced disease at the outset. As a result, they have the worst prognoses.

Clinically, distinguishing a non-neoplastic lesion from a neoplastic lesion is difficult. Early detection can aid in preventing tumor spread and determining prognosis, as diagnosis of ovarian neoplasm at a local stage has a 93% 5 year survival rate.[10] Because ovarian neoplasms are generally not detectable until they reach a larger size, the majority of them are asymptomatic and manifest over time due to the lack of any screening program. Thus, diagnosing the histological pattern of ovarian tumors is critical for proper treatment response because prognosis is primarily determined by degree of differentiation.[10]

Aims and objectives

The aim of the present study was as follows:

1. To study the histopathological findings of ovarian lesions according to age and various histological type and
2. To study the frequency of ovarian lesions in terms of non-neoplastic or neoplastic, benign or borderline or malignant and cystic or solid.

MATERIALS AND METHODS

The present study was cross-sectional study, conducted in the Department of Pathology of Pacific Institute of Medical Science, Udaipur Rajasthan from April 2021 to September 2022. The sample size of 90 was calculated using the formula $4pq/l^2$.[10] The study was conducted after obtaining the ethical clearance from the Institutional Ethical Committee of PIMS, Udaipur dated October 10, 2021, with reference no. STU/IEC/2021/22. All the hysterectomy specimens with unilateral or bilateral adnexa and the cases with solitary salpingo-oophorectomy specimens, unilateral or bilateral and all ovarian cystectomy specimens were included in the study. Those cases with metastatic lesions from other sites were excluded from the study.

The histopathology department will receive the specimen from oncosurgery obstetrics and gynecology in formalin filled container. The specimen was fixed in 10% formalin for 24 h. After that, tissue will be taken for grossing and it will be done according to standard procedure being followed in the department which includes section from the tumor and all margins of the tumor. Paraffin blocks will be made and with the help of the microtome, sections will be cutoff 4–5 mm thickness and stained by hematoxylin and eosin and was studied by light microscopic examination.

Statistical analysis

The data were analyzed by Microsoft version 2007 excel sheet. Mean and standard deviation were calculated for continuous data's. Qualitative/categorical data's were expressed in the form of percentage and t-test was applied to assess the level of significance for quantitative data's. $P<0.05$ was considered as significant.

RESULTS

The mean age of study participants was 41.54±10.50 years. Age ranged from 2 to 71 years. In our study, majority of cases were seen in 40–59 years age group 57 (55.88%) followed by in age group 20–39 years 39 (38.24%), 4 (3.92%) of cases were more than 60 years, and 2 (1.96%) cases were <20 years of age. The incidence of neoplastic ovarian lesions was 41 (40.2%) and non-neoplastic was 61 (59.8%). Out of 61 non-neoplastic ovarian lesions, follicular cyst was found in 26 (42.6%), followed by simple cyst 22 (36.1%), hemorrhagic cyst 5 (8.2%), luteal cyst 5 (8.2%), and endometriotic cyst 3 (4.9%). In our study, majority of non-neoplastic lesion of ovary was follicular cyst (42.6%) followed by simple cyst (36.1%).

Among 41 cases of malignant ovarian tumor, surface epithelial tumor was diagnosed in majority of ovarian tumors 30 (73.2%), followed by germ cell tumor 9 (22.0%), mesenchymal tumor 1(2.4%), and sex cord stromal tumor 1 (2.4%).

In our study the majority of histopathological benign tumor was Serous cyst adenoma (43.9%) (Figure 2) followed by Mature cystic teratoma(19.51%)(Figure 5), Mucinous cystadenoma (7.32%), Serous cystadenofibroma (2.44%), Myxoma (2.44%) (Figure 7) and Fibroma (2.44%). One case

of Borderline Seromucinous tumor was also found (2.44%) (Figure 3). In malignant lesions, High grade Serous carcinoma was most common entity (14.63%) (Figure 4), followed by Mucinous carcinoma (2.44%) and Dysgerminoma (2.44%) (Figure 6) (Table 1). It is observed that neoplastic ovarian lesions group had slightly higher statistically not significant (p value >0.05) mean age than non-neoplastic group. Majority of cases were seen in age group 40–59 years in both groups. Neoplastic group had more elderly (age >60 years) cases than non-neoplastic group (Figure 1).

The majority of cases (38 out of 61) were seen in 40–59 years age group. Follicular cyst (16 out of 26) and simple cyst (16 out of 22) were seen in 40–59 years age group. One patient aged 2 year had simple cyst (Table 2).

The majority of cases (19 out of 41) were seen in 40–59 years age group. Eight out of 18 cases of serous cystadenoma were seen in age group 40–59 years, another eight cases in age group 20–39 years. Five out of six cases of high-grade serous carcinoma were seen in age group 40–59 years. Six out of eight cases of mature cystic teratoma were seen in age group 20–39 years. In our study, two lesions were solid and 100 were cystic. The unilocular cyst were 84 (84%) and multilocular cyst were 16 (16%) (Table 3).

DISCUSSION

Among all gynecological cancers, ovarian cancer is the second leading cause of mortality. The non-neoplastic and neoplastic lesions are most common in ovaries. The

Table 1: Histopathological categorization of various ovarian tumors

Site of origin	Grade	Histopathological category	N	%
Surface epithelial tumor	Benign	Serous cystadenoma	18	43.90
		Mucinous cystadenoma	3	7.32
		Serous cyst adenofibroma	1	2.44
	Borderline	Seromucinous tumor	1	2.44
	Malignant	Mucinous carcinoma	1	2.44
		High-grade serous carcinoma	6	14.63
Germ cell tumor	Benign	Mature cystic teratoma	8	19.51
	Malignant	Dysgerminoma	1	2.44
Mesenchymal tumor	Benign	Myxoma	1	2.44
Sex cord stromal tumor	Benign	Fibroma	1	2.44
Total			41	100

Table 2: Age-wise distribution of non-neoplastic ovarian lesions

Type of Lesion	Age									
	0–19 years		20–39 years		40–59 years		≥60 years		Total	
	N	%	N	%	N	%	N	%	N	%
Endometriotic cyst	0	0.0	3	13.6	0	0.0	0	0.0	3	4.9
Follicular cyst	0	0.0	10	45.45	16	42.1	0	0.0	26	42.62
Hemorrhagic cyst	0	0.0	2	9.1	3	7.89	0	0.0	5	8.2
Luteal cyst	0	0.0	2	9.1	3	7.89	0	0.0	5	8.2
Simple cyst	1	100.0	5	22.72	16	42.1	0	0.0	22	36.06
Total	1	100.0	22	100.0	38	100.0	0	0.0	61	100.0

Table 3: Age-wise distribution of neoplastic ovarian lesions

Type of Lesion	Age									
	0–19 years		20–39 years		40–59 years		>60 years		Total	
	N	%	N	%	N	%	N	%	N	%
Serous cystadenoma	0	0.0	8	47.1	8	42.1	2	50.0	18	43.90
Mucinous cystadenoma	0	0.0	1	5.9	2	10.5	0	0.0	3	7.32
Serous cyst adenofibroma	1	100.0	0	0.0	0	0.0	0	0.0	1	2.44
Seromucinous tumor	0	0.0	1	5.9	0	0.0	0	0.0	1	2.44
Mucinous carcinoma	0	0.0	0	0.0	1	5.3	0	0.0	1	2.44
High-grade serous carcinoma	0	0.0	0	0.0	5	26.3	1	25.0	6	14.63
Mature cystic teratoma	0	0.0	6	35.3	2	10.5	0	0.0	8	19.51
Dysgerminoma	0	0.0	1	5.9	0	0.0	0	0.0	1	2.44
Myxoma	0	0.0	0	0.0	1	5.3	0	0.0	1	2.44
Fibroma	0	0.0	0	0.0	0	0.0	1	25.0	1	2.44
Total	1	100.0	17	100.0	19	100.0	4	100.0	41	100.0

Table 4: Comparative incidence of non-neoplastic lesions

Authors	Non- neoplastic lesions				
	Follicular cyst	Corpus luteal cyst	Simple cyst	Endometriotic cyst	Hemorrhagic cyst
Kreuzer et al.,[18]	55%	45%	-	-	-
Martinez-Onsurbe et al.,[19]	55%	45%	-	-	-
Sawant and Mahajan, 2017[1]	70%	12.7%	10%	1.8%	5.5%
Baladaniya et al., (2022) [17]	46.9%	5.1%	43.9%	-	4.1%
Present study	42.6%	8.2%	36.1%	4.9%	8.2%

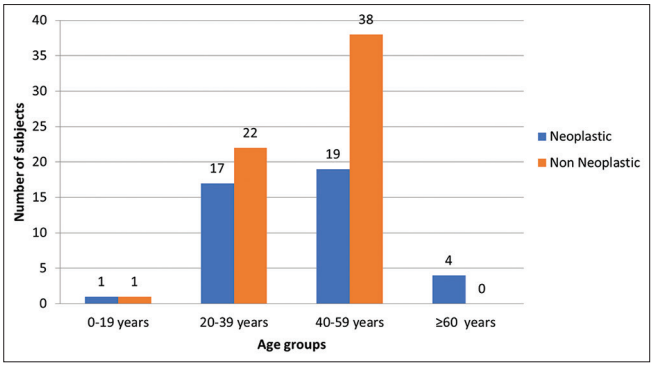

Figure 1: Age group and types of ovarian lesions

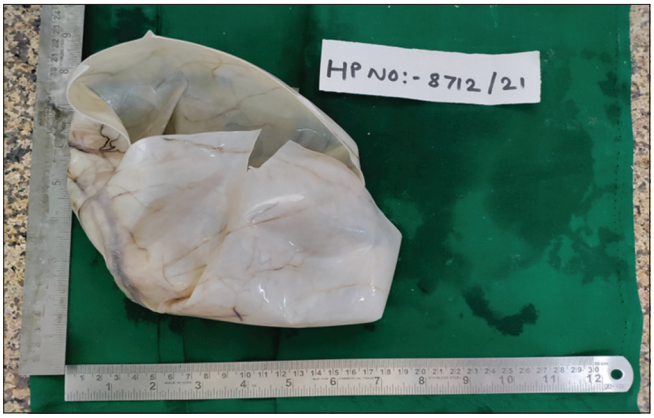

Figure 2: Serous cystadenoma (gross specimen)

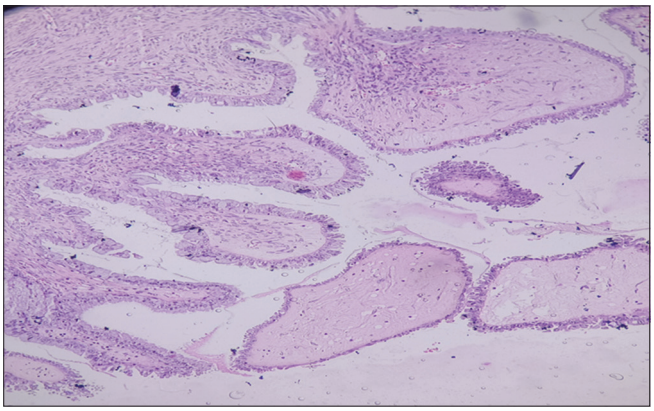

Figure 3: Borderline sero mucionous tumor (H &and E ×100X). Tumour shows papillary architecture with hierarchical branching pattern

constant cyclical changes from puberty to menopause bring about to different cell types, each of which leads to varieties of tumours.[11]

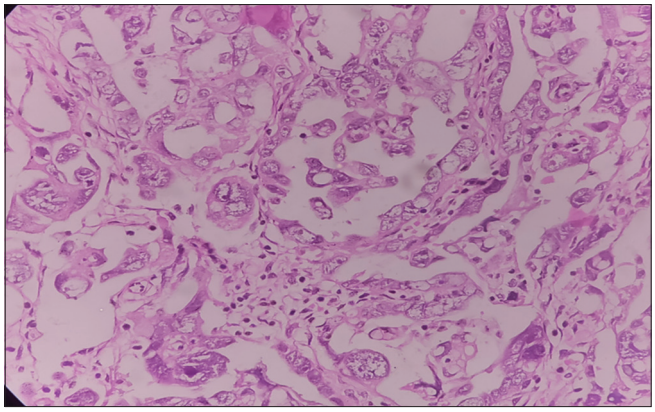

Figure 4: High-grade serous carcinoma (H and E ×400). Tumor shows tubulopapillary architecture. The tubules are lined by cells having vesicular nuclei and prominent nucleoli

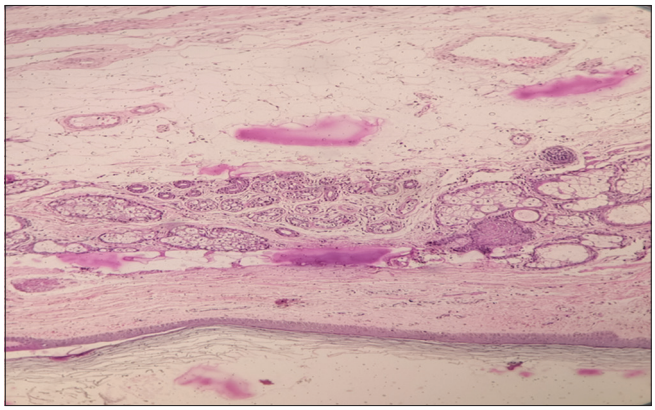

Figure 5: Mature cystic teratoma (H and E ×100). Cyst wall shows stratified squamous epithelium with adnexal structures

The diverse histopathology in ovarian tumors reflects the different cell origins.[6] Recent surveillance, epidemiology, and end result calculations of lifetime risk for ovarian carcinoma are that, 1 in 55 women will develop ovarian cancer over their life time. As the symptoms of the disease are vague and manifest over time, ovarian cancers are difficult to detect until they are in advanced stage.[12]

Identification of various histological patterns of ovarian tumor is important in diagnosis, prognosis, and treatment of ovarian cancers. Immunohistochemistry is now emerging as an important tool in diagnosis of ovarian tumours.[13]

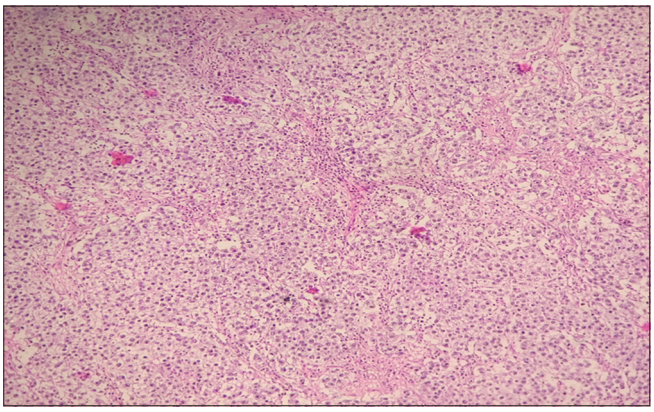

Figure 6: Dysgerminoma (H &and E ×100X). Tumour is composed of lobules of polygonal cells separated by fibrous septa which are infiltrated by lymphocytes.

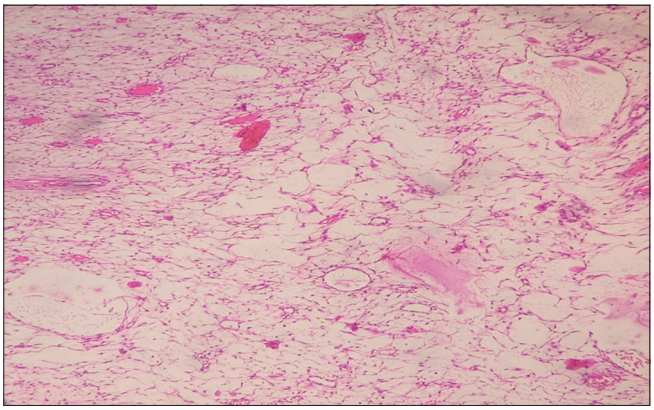

Figure 7: Myxoma (H &and E ×100X). Tumour is composed of bland stellate shaped cells surrounded by loose fibromyxoid stroma.

The majority of patients in the present study were in the age group 40–59 years (55.88%) followed by in age group 20–39 years (38.24%). Similar finding were observed in the study done by Kar et al.,[14] which showed that 46.25% of patients in the age group 40–59 years and 41.7 % in 20–39 years. Other studies done by Ramachandran et al.,[15] (40–59 years-30% of patients; 20–39 years-53.0%), Pilli et al.,[16] (40–59 years-30% of patients; 20–39 years-58.0%), and Baladaniya et al.,[17] (40–59 years-37.3% of patients; 20–39 years-50.3%).

In our study, out of 102 studied ovarian lesions, 61 lesions were non-neoplastic (59.8%), while 41 lesions were neoplastic (40.2%). The non-neoplastic lesions were higher than the studies done by Kreuzer et al.,[18] they reported 82 (40.39%) non-neoplastic lesions, out of 203 ovarian lesions and Martinez-Onsurbe et al.,[19] they reported 55 (41.67%) non-neoplastic lesions out of 132 ovarian lesions.

Out of 61 non-neoplastic lesions, 26 (42.6%) had follicular cyst, while 22 (36.1%) had simple cyst. The studies done by Sawant et al.[1] and Baladaniya et al.[17] also reported follicular cyst and simple cyst as the commonly encountered conditions in non neoplastic lesions (Table 4).

Broad categorization of these lesions includes surface epithelial tumor (73.2%), germ cell tumor (22%), mesenchymal tumor (2.4%), and sex cord stromal tumor (2.4%). Our results are in concordance with the other studies where surface epithelium is reported to be the most common site of origin of tumour.[20-23]

In the present study, 41 neoplastic lesions were diagnosed that most common was benign (78.04%), followed by malignant (19.51%) and borderline (2.44%) grade. Histopathologically, benign tumors constituted 32/41 (78.04%) neoplastic lesions. This percentage is similar to other authors (Pilli et al., 76% and Pachori et al., 72.3%).[16,20]

Serous cystadenomas were the most common benign neoplasm encountered in our study (56.25%; 18/32 of benign neoplastic lesions), followed by mature cystic teratoma (25%; 8/32 of benign neoplastic lesions). The study done by Maru et al., also shows similar finding like serous cystadenoma (28%), mature cystic teratoma (13%), and mucinous cystadenoma (6%).[23] Another study by Yasmin et al., shows that serous cystadenoma was (24%) and mature teratoma (18%),[24] other study like Baladaniya et al., was found similar finding like serous cyst adenoma most common one (30%) followed by mature teratoma which is (26%) and mucinous cystadenoma (21%).[17]

Limitations of the study

The present study was conducted in with limited number of patients in single tertiary health care center.

CONCLUSION

Ovarian tumors may occur at any age, including infancy and childhood. In our study, we observed that this incidence rate increased with age, with the greatest number of new cases being diagnosed beyond 4th and 5th decade. In our study, the youngest patient was of 2 years and oldest was of more than 60 years. Ovarian cancer is commonly known as a "silent killer" as it remains asymptomatic until the advanced stage. However, histopathological study of ovarian tumors is still considered as a gold standard method, our observations and results proved to be valuable base line information regarding frequency and pattern of ovarian tumors in ours setup and will serve as a reference for future studies.

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REFERENCES

1. Sawant A and Mahajan S. Histopathological study of ovarian lesions at a tertiary health care institute. MVP J Med Sci. 2017;41(1):26-29.
   https://doi.org/10.18311/mvpjms/2017/v4i1/724
2. Sikdar K, Kumar P and Roychowdhary NN. A study of ovarian malignancy: A review of 149 cases. J Obstet Gynaecol India. 1981;30:478-480.
3. Bonfiglio TA and Yener SE. Gynaecologic Cytology. Philadelphia, PA: Lippincott-Raven; 1997. p. 157-164.
4. Srikanth S and Anandam G. Bilateral dermoid cyst of ovary. Med J DY Patil Univ. 2014;7(4):492-493.
   https://doi.org/10.4103/0975-2870.135281
5. Basu P, De P, Mandal S, Ray K and Biswas J. Study of 'patterns of care' of ovarian cancer patients in a specialized cancer institute in Kolkata, Eastern India. Indian J Cancer. 2009;46(1):28-33.
   https://doi.org/10.4103/0019-509x.48592
6. Mondal SK, Banyopadhyay R, Nag DR, Roychowdhury S, Mondal PK and Sinha SK. Histological pattern, bilaterality and clinical evaluation of 957 ovarian neoplasms: A 10-year study in a tertiary hospital of eastern India. J Cancer Res Ther. 2011;7(4):433-437.
   https://doi.org/10.4103/0973-1482.92011
7. Yoneda A, Lendorf ME, Couchman JR and Multhaupt HA. Breast and ovarian cancers: A survey and possible roles for the cell surface heparan sulfate proteoglycans. J Histochem Cytochem. 2012;60(1):9-21.
   https://doi.org/10.1369/0022155411428469
8. Jacobs IJ and Menon U. Progress and challenges in screening for early detection of ovarian cancer. Mol Cell Proteomics. 2004;3(4):355-366.
   https://doi.org/10.1074/mcp.R400006-MCP200
9. Roychowdhury NN, Sanyal MK, Sanyal S and Bhatterjee KK. Epidemiological study of ovarian malignancy: A review of 117 cases. J Obstet Gynecol India. 1977;26:723-728.
10. Ahmad N, Hassan MJ, Khan S, Jairajpuri ZS and Jetley S. Histopathological spectrum of ovarian lesion in a tertiary care hospital over a period of five years. Saudi J Pathol Microbiol. 2019;4(11):868-874.
    https://doi.org/10.36348/SJPM.2019.v04i11.017
11. Mills SE. Sternberg's Diagnostic Surgical Pathology. 5th ed., Vol. 2. United States: Wolters Kluwer Health; 2009.
12. Hiremath PB, Gane B, Meenal C, Narvekara S and Bobby NM. Clinical profile and pathology of ovarian tumour. Int J Biol Med Biol Med Res. 2012;3(2):1743-1746.
13. Haung J, Hu W, Sood AK. Prognostic Biomarkers in Ovarian Cancer. Cancer Biomark. 2010;8:231-251.
14. Tushar K, Asaranti K and Mohapatra PC. Intra-operative cytology of ovarian tumours. J Obstet Gynecol India. 2005;55(4):345-349.
15. Ramachandran G, Harilal KR, Chinnamma K and Thangavelu H. Ovarian neoplasms-a study of 903 cases. J Obstet Gynecol India. 1972;22:309-315.
16. Pilli GS, Suneeta KP, Dhaded AV and Yenn VV. Ovarian tumours: A study of 282 cases. J Indian Med Assoc. 2002;100(7):420, 423-424, 447.
17. Bhavana B, Nanavati M and Goswami H. Histopathological spectrum of ovarian lesions in tertiary care hospital. Int J Sci Res. 2022;11(6):1228-1233.
18. Kreuzer GF, Parodowski T, Wurche KD and Flenker H. Neoplastic or non-neoplastic ovarian cyst? The role of cytology. Acta Cytol. 1995;39(5):882-886.
19. Martinez-Onsurbe P, Villaespesa AR, Anquela JM and Ruiz PL. Aspiration cytology of 147 adnexal cysts with histologic correlation. Acta Cytol. 2001;45(6):941-947.
    https://doi.org/10.1159/000328368
20. Pachori G, Meena US, Sunaria RK, Pachori P, Jethani N and Bayla T. Histopathological study of ovarian tumours in Ajmer region. Int J Med Sci Public Health. 2016;5(7):1400-1403.
    https://doi.org/10.5455/ijmsph.2016.19092015213
21. Bhuvanesh U and Logambal A. Study of ovarian tumours. J Obstet Gynaecol India. 1978;28:271-277.
22. Gupta N, Bisht D, Agarwal AK and Sharma VK. Retrospective and prospective study of ovarian tumours and tumour-like lesions. Indian J Pathol Microbiol. 2007;50(3):525-527.
23. Maru AM and Menapara CB. Histopathological study of non-neoplastic and neoplastic ovarian lesions in a tertiary care hospital in Gujarat, India. Trop J Path Micro. 2019;5(2):63-68.
    https://doi.org/10.17511/jopm.2019.i02.03
24. Yasmin S, Yasmin A and Asif M. Clinicohistological pattern of ovarian tumours in Peshawar region. J Ayub Med Coll Abbottabad. 2008;20(4):11-13.

Authors' Contributions:
PS and **MS-** Concept and design of study or acquisition of data, coordination of project activities or analysis and interpretation of data. **VB** and **PN-** Interpretation of data, Manuscript preparation and revising it critically for important intellectual content. **CM and KV-** Manuscript preparation and revising of manuscript.

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