A Study of Clinico Pathological Analysis of Epithelial Ovarian Carcinoma.

Posha Bashir[1] , Dr. Vikas Patel[2] ,Dr.Aamir Bashir[3], k.s. rana[4], Dr. Pankaj kaul[5] , Seerath hamid[6] , Suhail Anjum Rather[7], Zainab Ali[8], Bisma Nazir[9]

[1]*Post-Graduate student, Department of Histopathology, University School of Allied Health Sciences, Rayat Bahra University, Mohali, Punjab, India.*

[2]*Pathologist Skims Soura, Srinagar, Jammu and Kashmir, India*

[3]*Junior Resident, Government Medical College Srinagar, Jammu and Kashmir, India.*

[4]*Associate Professor, Department of Histopathology, University School of Allied Health Sciences, Rayat Bahra University, Mohali, Punjab, India.*

[5]*Dean, University School of Allied Sciences, Rayat Bahra University, Mohali, Punjab, India*

[6]*Post-Graduate student, Department of Histopathology, University School of Allied Health Sciences, Rayat Bahra University, Mohali, Punjab, India.*

[7]*Assistant Professor, Department of Paramedical Sciences, Lyallpur Khalsa College Technical Campus, Jalandhar, Punjab and Post-Graduate , Department of Operation Theatre and Anaesthesia Technology, University School of Allied Health Sciences, Rayat Bahra University, Mohali, Punjab, India.*

[8]*Post-Graduate student, Department of Histopathology, University School of Allied Health Sciences, Rayat Bahra University, Mohali, Punjab, India.*

[9]*Post-Graduate student, Department of Histopathology, University School of Allied Health Sciences, Rayat Bahra University, Mohali, Punjab, India.*

ABSTRACT: Introduction: Epithelial ovarian carcinoma arises in the cells that line the outer surface of the ovaries and can also develop in the fallopian tube lining. This cancer ranks as the second most prevalent gynecological cancer and is the leading cause of cancer-related deaths among women. Epithelial ovarian carcinomas make up the majority of ovarian cancer cases and are generally linked to a higher risk of spreading to other parts of the body.

This type of cancer constitutes around 95% of all ovarian malignancies, with the remaining 5% comprising nonepithelial types such as germ cell tumors and sex-cord stromal tumors. Epithelial ovarian carcinoma significantly contributes to the morbidity and mortality rates associated with gynecological cancers. While it most commonly affects postmenopausal women, it can occur at any age. Histopathologically, four major subtypes are identified: high-grade serous carcinoma (HGSC), endometrioid carcinoma (EC), clear cell carcinoma (CCC), mucinous carcinoma (MC).

Materials & Methods: This research was conducted between January and October 2024, analysed 98 cases of ovarian carcinoma. We evaluated clinical presentations, as well as gross and microscopic characteristics of the ovarian specimens.

Results: In our study, all participants were female, consistent with the gender-specific nature of epithelial ovarian carcinoma. Of the total cases, 31.63% were diagnosed with epithelial ovarian carcinoma, while 68.37% were negative, indicating a significant number of cases without confirmation of the disease. Among the confirmed cases, serous carcinoma was the most common type (15.31%), followed by endometrioid (7.14%), clear cell (5.10%), and mucinous carcinoma (3.06%). A substantial portion of cases was categorized as negative or not applicable (68.37%). The grades of positive cases ranged from well-differentiated (Grade 1) to poorly differentiated (Grade 4), with Grade 3 being the most frequently observed (12.24%). Additionally, 69.39% of cases were negative for grade classification.

Conclusion: This study demonstrates that epithelial ovarian carcinoma primarily impacts women in their 30s to 50s, with a notable number of cases identified through clinical symptoms and diagnostic methods. This underscores the importance of age and symptom profiles for early detection and diagnosis. While family history may contribute to risk, it is not the only factor, and the diversity of tumor types and grades emphasizes the need for tailored treatment approaches.

I. INTRODUCTION

Ovarian cancer is the leading cause of mortality among gynecological cancers, accounting for

approximately 5% of all cancer cases. Due to the vague and nonspecific nature of its symptoms, this type of cancer is often diagnosed at more advanced stages, contributing to its poor prognosis, with a 5-year survival rate frequently falling below 40%. (kumar, et al; 2019).

The risk factors for developing ovarian cancer are less clearly defined than those for other gynecological tumors, but factors such as never having given birth (nulliparity), a family history of the disease, and certain genetic mutations play a role in its onset. Tumor markers such as serum HCG, CA125, alpha-fetoprotein, placental alkaline phosphatase, and lactate dehydrogenase are useful in diagnosis. (Brewster, et al; 2018).

The progression of epithelial ovarian cancer is significantly influenced by the disruption of normal growth regulation and signaling pathways, particularly those involving tyrosine kinase receptors. Epithelial ovarian carcinoma originates in the cells that line the outer surface of the ovaries and can also develop in the lining of the fallopian tubes. This form of cancer is the second most common among gynecological cancers and is a major cause of cancer-related deaths. (Shih, I. M., & Kurman, R. J. et al; 2004).

Epithelial ovarian carcinoma is the predominant type of ovarian cancer, comprising around 95% of all cases, while the remaining 5% includes nonepithelial types, such as germ cell tumors and sex-cord stromal tumors. This cancer greatly contributes to the morbidity and mortality associated with gynecological conditions. While it primarily affects postmenopausal women, it can also occur at any age. (Kurtz, R. C., & Ellenson, L. H. et al; 2015).

This study analyzes samples received in the pathology department between January 2024 and September 2024. Data were collected using a standardized format and were subjected to analysis. Most patients were from Srinagar and surrounding areas, with a few coming from other regions of Jammu and Kashmir. This research aims to provide insights into the clinical and pathological characteristics of epithelial ovarian carcinoma based on our institutional experience.
The aim of study was clinico-pathological analysis of epithelial ovarian carcinoma. To analyses various factors associated with epithelial ovarian carcinoma.

Objective of the study:

To investigate the tissue samples to confirm the presence of epithelial ovarian carcinoma through microscopic examination of tissue sections, identifying characteristic features indicative of malignancy.

To provide a detailed analysis of the histopathological features of epithelial ovarian carcinoma, including different subtypes such as serous, mucinous, endometrioid, and clear cell carcinomas.

To investigate the grading and staging systems used in epithelial ovarian carcinoma and their prognostic implications.

II. METHODOLOGY

This descriptive study was conducted in Department of Pathology, Sher-I-Kashmir Institute of Medical Sciences, Soura, Srinagar, Jammu & Kashmir 190011 from March 2024 to September 2024

STUDY POPULATION: A total 98 female patients with symptoms of epithelial ovarian tumors were included in the study. A detailed clinical history with name, age, menstrual history, Obstetric history, family history was taken. All patients whose specimens were received in the pathology department, SKIMS, were selected and the consent for study was taken.

EXCLUSION CRITERIA:

1. Ovarian cancers other than epithelial cancer were not included.
2. Metastatic tumors to the ovary were ruled out.

GROSS EXAMINATION:

1. Tumor size was measured and fixed in I0% buffered formalin.
2. Capsule was noted for any thickening/ adhesions / haemorrhage/ necrosis/ rupture.
3. Tissue section: size of the tumour, external appearance as in smooth or papillary, solid, cystic or solid-cystic was noted. Any areas of haemorrhage, necrosis or calcification were also noted.
4. In case capsule was breached then a separate section from there was taken and that site was marked with ink.

HISTOPATHOLOGY:
Tissues were processed routinely and embedded in paraffin blocks. The sections were stained with Haematoxylin and Eosin
• Paraffin blocks were prepared.

• 5µm sections were mounted on albumenised slides for haematoxylin and eosin.

STAINING METHODS

Reagents used for Haematoxylin Eosin staining were:

- Harris Haematoxylin (aqueous)
- Ammonia water
- Working Eosin solution
- Acid alcohol
- Graded alcohol
- Xylene
- DPX

STAINING PROCEDURE

1. The sections were put on hot plate for 20 minutes
2. Sections were deparaffinized and hydrated to water by 4 changes in xylene and 3 changes in graded alcohol for 1 minute in each change.
3. Sections were covered with Harris hematoxylin for 15 min.
4. The sections were differentiated in acid alcohol by 3-10 quick dips and then washed in running tap water for 10-15 minutes and dipped in ammonia water till blue.
5. Sections were stained with Eosin Y for one minute.
6. Sections were dehydrated in 95% alcohol with two changes.
7. Subsequently, the sections were cleared in two changes of xylene with two minutes each.
8. They were mounted with DPX.

III. RESULTS AND ANALYSIS

Table 1: Shows the Age Distribution

Age Group	No. of cases	Percentage	Minimum Age	**Maximum** Age	Average Age
A 20-30 yr	16	16.33%	24	30	27.71
B 30 - 40 yr	46	46.94%	31	40	36.67
C 40 - 50 yr	19	19.39%	41	50	46.89
D 50 - 60 yr	17	17.35%	52	60	56.59
Total	98	100.00%	24	60	40.52

The average age of the entire study population is 40.52 years, with the youngest patient being 24 years old and the oldest 60 years old.

Table 2: Shows the Diagnosis

Diagnosis	No. of cases	Percentage
Negative	67	68.37%
Positive	31	31.63%
Total	98	100.00%

The table above provide a breakdown of the diagnoses based on clinical findings. It shows that 68.37% of the cases were diagnosed as negative, while the remaining 31.63% were positive for epithelial ovarian carcinoma. This data highlights the proportion of confirmed cancer cases in the total sample.

Table 3: Age Distribution (positive and negative cases)

Age Group	No. of cases	Percentage	Minimum Age	Maximum Age	Average Age
NEGATIVE	67	68.37%	24	60	38.28
A 20-30 yr	15	15.31%	24	30	27.63
B 30 - 40 yr	35	35.71%	31	40	36.51
C 40 - 50 yr	8	8.16%	41	50	47.88
D 50 - 60 yr	9	9.18%	52	60	55.56
POSITIVE	31	31.63%	29	60	45.42
A 20-30 yr	1	1.02%	29	29	29.00
B 30 - 40 yr	11	11.22%	33	40	37.18

Age Group	No. of cases	Percentage	Minimum Age	Maximum Age	Average Age
C 40 - 50 yr	11	11.22%	45	48	46.18
D 50 - 60 yr	8	8.16%	52	60	57.75
Total	98	100.00%	24	60	40.52

The below table provide an age-wise distribution of cases based on the presence of symptoms suggestive of epithelial ovarian carcinoma. It clearly shows that while symptoms are present across various age groups, the positive cases (those diagnosed with the disease) show significant statistical representation, particularly in certain age ranges.

This indicates that while symptoms are present across all age groups, older age groups (30-60 years) exhibit a significantly higher likelihood of a positive diagnosis. The mean age for positive cases is notably higher, at 45.42 years, suggesting that the disease is more prevalent or detectable in these older age brackets.

Statistically, the risk of a positive diagnosis appears to increase with age, with a substantial jump observed after the age of 30. The average age of positive cases in the 50-60 year range is particularly high, at 57.75 years, reinforcing the association between advancing age and the likelihood of developing epithelial ovarian carcinoma.

Table 4: combinations of symptoms experienced by patients.

Combined Symptoms	Positive No. of cases (%)	Negative No. of cases (%)	Total No. of case (%)
Abdominal Pain	9(9.2%)	4(4.1%)	13(13.3%)
Abdominal Pain, Constipation		2(2%)	2(2%)
Abdominal Pain, Loss of appetite		4(4.1%)	4(4.1%)
Abdominal Pain, fullness		1(1%)	1(1%)
Abdominal Pain, fullness, Loss of appetite		3(3.1%)	3(3.1%)
Abdominal Swelling	1(1%)	1(1%)	2(2%)
Abdominal Swelling Loss of appetite		3(3.1%)	3(3.1%)
Back pain	9(9.2%)	1(1%)	10(10.2%)
Back pain, Loss of appetite		1(1%)	1(1%)
Bloating	6(6.1%)		6(6.1%)
Bloating, Weight loss		1(1%)	1(1%)
Constipation	9(9.2%)	1(1%)	10(10.2%)
Constipation, Fatigue		1(1%)	1(1%)
Fatigue	13(13.3%)		13(13.3%)
Fatigue, Frequent Urination, Fullness		5(5.1%)	5(5.1%)
Frequent Urination	5(5.1%)	2(2%)	7(7.1%)
Fullness, Abdominal Swelling	2(2%)		2(2%)
Increased Abdominal Size	3(3.1%)		3(3.1%)
Loss of appetite	9(9.2%)		9(9.2%)
Pelvic Pain	1(1%)		1(1%)
Tiredness		1(1%)	1(1%)
Total	67(68.4%)	31(31.6%)	98(100%)

The table below shows combinations of symptoms experienced by patients, categorized by the number and percentage of positive and negative cases for each combination. It highlights how different symptoms co-occur and their distribution in both negative and positive cases.

- Abdominal pain remains a prominent symptom, occurring in 13 cases (9.2% of total), with 9 positive and 4 negative cases.
- Fatigue is another common standalone symptom, appearing in 13 cases (13.3% of total) without any other symptom combinations.
- Some patients experience combinations of symptoms, such as fatigue, frequent urination, and fullness (5.1% of cases), or abdominal pain and loss of appetite (4.1%).
- Several combinations of symptoms, such as abdominal swelling and loss of appetite, occur less frequently (3.1% each).
- A total of 98 cases are recorded, with 68.4% representing positive cases and 31.6% representing negative cases.

These tables offer a comprehensive view of symptom distribution, showing both individual and combined symptom patterns among patients, aiding in the understanding of symptom frequency and potential diagnostic indicators.

Table 5: Shows the Types carcinoma

Types	No. of cases	Percentage
NEGATIVE	67	68.37%
NA	67	68.37%
POSITIVE	31	31.63%
clear cell	5	5.10%
endometriod	7	7.14%
mucinous	3	3.06%
NA	1	1.02%
serious	15	15.31%
Total	98	100.00%

The table above represent types of carcinoma diagnosed.

1. Distribution of Types:
   - Serous Carcinoma: The most common type among the diagnosed cases, representing 15.31% of the total cases. This is consistent with the fact that serous carcinoma is the most prevalent subtype of epithelial ovarian carcinoma.
   - Endometrioid Carcinoma: 7.14% of the cases fall under this subtype.
   - Clear Cell Carcinoma: 5.10% of the cases are classified as clear cell carcinoma.
   - Mucinous Carcinoma: The least common type in this dataset, making up 3.06% of the cases.
   - NA: Indicates cases where the specific type was not recorded, accounting for 1.02%.
2. Negative and NA Categories:
   - The high percentage of cases classified as negative (68.37%) and NA (68.37%) suggests that either a significant number of patients did not have epithelial ovarian carcinoma.
   - Among the 31 diagnosed cases, the types of carcinoma were distributed as indicated above.

This data highlights the diversity in types of epithelial ovarian carcinoma among diagnosed patients and emphasizes the importance of accurate classification for understanding disease prevalence and treatment planning.

Table 6: Distribution of Grades Among Diagnosed Cases:

Grade	No. of cases	Percentage
1	3	3.06%
2	6	6.12%
3	12	12.24%
4	9	9.18%
Negative	68	69.39%
Total	98	100.00%

The table below represent the Grade of diagnosed cases.

1. Distribution of Grades Among Diagnosed Cases:
   - Grade 1: Represents 3.06% of the diagnosed cases. Grade 1 is typically indicative of well-differentiated tumors with a better prognosis.
   - Grade 2: Accounts for 6.12% of the cases. Grade 2 tumors are moderately differentiated.
   - Grade 3: The most common grade among the diagnosed cases, representing 12.24%. Grade 3 tumors are poorly differentiated and often have a worse prognosis.
   - Grade 4: Represents 9.18% of the cases. Grade 4 tumors are usually the least differentiated and may have a more aggressive behavior.
2. Negative Cases:
   - No. of Cases: 68
   - Percentage: 69.39%
   - This high percentage of negative cases indicates that a significant portion of the patients presented with symptoms suggestive of epithelial ovarian carcinoma but were ultimately not diagnosed with the disease.

Table 7: Shows The Represent Surgery Types:

Surgery Type	Positive No. of cases (%)	Negative No. of cases (%)	Total No. of case (%)
Debulking	10 (10.2%)	1 (1.02%)	11 (11.22%)
Oophorectomy	13 (13.27%)	3 (3.06%)	16 (16.33%)
TAH BSO	44 (44.9%)	27 (27.55%)	71 (72.45%)
Total	67 (68.37%)	31 (31.63%)	98 100%)

The table below represent Surgery Types: In the analysis of surgical interventions among patients with epithelial ovarian carcinoma, the data shows a distinct distribution between positive and negative diagnoses. For patients with a positive diagnosis, the most common surgery performed was Total Abdominal Hysterectomy with Bilateral Salpingo-Oophorectomy (TAH BSO), accounting for 44 cases (44.9%). This was followed by Oophorectomy with 13 cases (13.27%) and Debulking with 10 cases (10.2%). Conversely, for patients with a negative diagnosis, TAH BSO was also the most frequent procedure, with 27 cases (27.55%). However, the number of patients undergoing Oophorectomy and Debulking was lower, at 3 (3.06%) and 1 (1.02%) respectively. In total, TAH BSO was performed in the majority of cases, comprising 71 surgeries (72.45%), while Oophorectomy and Debulking accounted for 16 (16.33%) and 11 (11.22%) surgeries, respectively. This indicates that TAH BSO is a prevalent surgical approach for both positive and negative diagnoses, with a higher frequency in positive

IV. DISCUSSION

Age and gender distribution:

Age: The study reveals that the largest group of patients (46.94%) falls within the 30-40 age range, with an average age of 40.52 years. Individuals aged 30 to 60 show a highest risk for epithelial ovarian carcinoma, indicating a potential link between advancing age and the likelihood of developing this disease.

Gender: All patients in this study were female, which aligns with the understanding that epithelial ovarian carcinoma exclusively affects women

Diagnosis:

Positive vs. Negative Cases: Out of 98 patients, 31.63% received a positive diagnosis of epithelial ovarian carcinoma, while 68.37% tested negative. This underscores the diagnostic difficulties, as many symptomatic patients did not meet the criteria for carcinoma, highlighting the necessity for improved diagnostic tools to detect early signs.

Symptoms:

Common Symptoms: Abdominal pain, loss of appetite, and fatigue were prevalent symptoms across both positive and negative cases. However, positive cases often exhibited more complex symptom combinations, such as frequent urination alongside fatigue and bloating, which could serve as critical indicators for earlier diagnosis.

Tumor type and Grades:

Types: Serous carcinoma was the most frequently diagnosed type, accounting for 15.31% of cases, followed by endometrioid, clear cell, and mucinous carcinomas. Understanding the prevalence of these subtypes is vital for developing targeted treatment strategies.

Grades: The majority of diagnosed tumors were classified as higher grade (Grades 3 and 4), indicating advanced disease stages at diagnosis. This raises concerns regarding early detection and the aggressive nature of the cancer.

Surgical intervention:

Surgery Types: Total Abdominal Hysterectomy with Bilateral Salpingo-Oophorectomy (TAH BSO) was the most commonly performed surgery (72.45%), even among patients without confirmed carcinoma. The high incidence of surgeries, particularly TAH BSO, suggests that surgical intervention is a primary approach in managing suspected malignancies, possibly due to challenges in accurately ruling out cancer through non-surgical mean.

Discussion points:

Late Diagnosis: The high average age of positive cases and the prevalence of advanced-grade tumors highlight the issue of late diagnosis. Enhancing early detection methods could significantly improve patient outcomes

Symptomatology: The identification of specific symptom combinations that correlate with positive diagnoses points to the need for refined diagnostic protocols to facilitate earlier identification of cases.

Role of Family History: The limited presence of family history in most cases emphasizes the importance of exploring environmental and lifestyle factors in the development of ovarian carcinoma.

Surgical Practices: The high rate of surgical interventions, particularly among non-carcinoma cases, may reflect a conservative management approach for suspected malignancies, highlighting the necessity for more accurate preoperative diagnostic tools

V. CONCLUSION:

Epithelial ovarian carcinoma presents a significant challenge in gynaecological oncology, largely due to its nonspecific symptoms and the tendency for late-stage diagnosis, which contributes to its poor prognosis. The variety of histopathological subtypes—such as serous, mucinous, endometrioid, and clear cell carcinomas illustrates the complexity of the disease and the need for personalized management approaches.

Recognizing risk factors like family history, hormonal treatments, and reproductive history emphasizes the critical role of targeted screening and prevention strategies. Additionally, advancements in molecular characterization and innovative biomarkers provide promising opportunities for early detection and tailored treatment.

Our hypotheses indicate that a thorough examination of histopathological subtypes, combined with molecular insights and treatment options, could significantly improve the identification and management of patients with epithelial ovarian carcinoma. By integrating these multidisciplinary approaches, we may achieve better outcomes, fostering hope for more effective interventions in this challenging condition. Future research should aim to enhance screening methods, clarify the molecular mechanisms associated with each subtype, and create personalized therapeutic strategies to boost survival rates and quality of life for those affected.

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