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A Study of Correlation of Tumor Markers with Histopathological Types of Ovarian Tumors in a Tertiary Care Hospital, Kangra at Tanda (Himachal)

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Abstract: ***Background**: Ovarian tumors show wide clinical and histopathological variation. Tumor markers are useful adjuncts in preoperative assessment, risk stratification, and planning of treatment, but final diagnosis depends on histopathological examination. **Aim**: To study the correlation of tumor markers with different histopathological types of ovarian tumors in women attending a tertiary care hospital. **Materials and Methods**: This prospective observational study included 82 women with clinically, radiologically, and histopathologically proven benign and malignant ovarian tumors. Detailed history, clinical examination, imaging, operative findings, histopathology, and serum tumor markers including CA-125, beta-hCG, CA 19-9, CEA, alpha-fetoprotein, LDH, and inhibin were recorded. **Results**: The mean age was 43.32 ± 15.73 years. Serous cystadenoma was the most common tumor type (23.75%), followed by mucinous cystadenoma (20.00%) and mature cystic teratoma (16.25%). Mean CA-125 was 74.45 ± 32.25. CA-125 was markedly raised in serous cystadenocarcinoma compared with serous cystadenoma, and malignant epithelial tumors had significantly higher CA-125 levels than benign epithelial tumors (123.5 ± 60.7 vs 39.8 ± 8.1; p<0.0001). Teratoma showed higher alpha-fetoprotein and LDH values. **Conclusion**: Tumor markers provide useful supportive information and show meaningful association with histopathological tumor type, especially CA-125 in epithelial malignancy. However, histopathology remains the gold standard for diagnosis and classification.*

Keywords: Ovarian tumor; Tumor markers; CA-125; Histopathology; Tertiary care hospital

1. Introduction

Ovarian tumors are an important group of gynecological lesions because they include a broad spectrum of benign, borderline, and malignant conditions. The ovary contains epithelial, germ cell, and sex cord-stromal elements, and each of these components can give rise to different tumor types. Therefore, ovarian tumors vary widely in clinical presentation, age distribution, biological behavior, and histopathological pattern [1,2]. Many patients present with vague symptoms such as abdominal pain, abdominal distension, menstrual irregularity, or an abdominopelvic mass. Because early symptoms are often nonspecific, malignant ovarian tumors may remain undetected until an advanced stage [3].

Tumor markers are biochemical substances produced by tumor cells or by the body in response to tumor growth. In ovarian tumors, commonly used markers include CA-125, beta-hCG, alpha-fetoprotein, LDH, CA 19-9, CEA, and inhibin. These markers are not used alone for final diagnosis, but they are helpful in clinical assessment, differentiation of tumor types, preoperative planning, monitoring treatment response, and follow-up. CA-125 is most commonly associated with epithelial ovarian tumors, especially serous tumors, while alpha-fetoprotein, beta-hCG, and LDH are useful in germ cell tumors. Inhibin may be helpful in sex cord-stromal tumors [4,5].

Histopathological examination remains the final and most reliable method for diagnosis. Correlating tumor marker levels with histopathological diagnosis can improve clinical understanding and help in selecting appropriate investigations and management. The present study was therefore planned to evaluate the correlation of tumor markers with histopathological types of ovarian tumors in women attending a tertiary care hospital.

2. Aim and Objectives

Aim: To study the correlation of tumor markers with histopathological types of ovarian tumors in women attending a tertiary care hospital.

Objectives: (1) To study the distribution of ovarian tumors according to histopathological type. (2) To assess serum tumor marker levels in patients with ovarian tumors. (3) To compare tumor marker levels among benign and malignant ovarian tumors. (4) To evaluate the usefulness of tumor markers as supportive diagnostic tools along with histopathology.

3. Materials and Methods

This prospective observational study was conducted in the Department of Obstetrics and Gynecology at Dr. RPGMC, Kangra at Tanda, after approval from the institutional ethical and protocol review committee. A total of 82 patients with

clinically, radiologically, and histopathologically proven benign or malignant ovarian tumors were included after written informed consent. Patients with suspected benign non-ovarian cysts such as para-ovarian cysts and fimbrial cysts, and patients with other abdominopelvic masses not arising from the ovary, were excluded.

All selected patients were evaluated by detailed history, including age, parity, menstrual history, menopausal status, contraceptive history, past medical history, family history of ovarian or breast malignancy, and relevant risk factors. General physical examination, systemic examination, abdominal examination, and gynecological examination were performed. Ultrasonography was used to confirm ovarian mass and to rule out other abdominopelvic lesions. Additional imaging such as CECT, MRI, or PET scan was performed when extra-ovarian spread was suspected.

Routine investigations and tumor markers were recorded. Tumor markers included CA-125, beta-hCG, CA 19-9, CEA, alpha-fetoprotein, LDH, and inhibin as clinically indicated. Operable patients underwent exploratory laparotomy or minimally invasive surgery according to clinical condition and suspected tumor type. Surgical staging, peritoneal washings, omentectomy, or debulking were performed when malignancy was suspected. The excised specimen was sent for histopathological examination, which was considered the final diagnostic standard. Data were entered in Microsoft Excel and analyzed using SPSS version 23. Continuous variables were expressed as mean ± SD, while categorical variables were expressed as frequency and percentage. Student t-test, Chi-square test, and Fisher exact test were used where applicable, and $p<0.05$ was considered statistically significant.

4. Results

The present study included 82 patients with ovarian tumors. The mean age was 43.32 ± 15.73 years, with an age range of 14 to 80 years. The maximum number of patients were in the 31-50 years age group (46.34%), followed by 51-70 years (29.27%). Abdominal pain was the most common presenting symptom, seen in 77 patients (93.90%), followed by abdominal distension in 29 patients (35.37%) and menstrual irregularities in 17 patients (20.73%).

Serous cystadenoma was the most common histopathological diagnosis, seen in 19 cases (23.75%), followed by mucinous cystadenoma in 16 cases (20.00%) and mature cystic teratoma in 13 cases (16.25%). Among malignant tumors, serous cystadenocarcinoma was the commonest, seen in 11 cases (13.75%), followed by serous carcinoma in 5 cases (6.25%). The mean CA-125 level was 74.45 ± 32.25, beta-hCG was 5.89 ± 3.46, CA 19-9 was 21.40 ± 14.50, CEA was 2.35 ± 2.33, alpha-fetoprotein was 123.43 ± 103.20, LDH was 256.71 ± 127.22, and inhibin was 71.00 ± 41.01.

Raised CA-125 level was observed in only 2 of 19 serous cystadenoma cases (10.5%), while it was raised in 10 of 11 serous cystadenocarcinoma cases (90.9%). In epithelial tumors, mean CA-125 was significantly higher in malignant tumors than benign tumors (123.5 ± 60.7 vs 39.8 ± 8.1; $p<0.0001$). In tumor marker comparison by histopathological type, serous cystadenocarcinoma showed the highest CA-125 level (144.1 ± 65.7), while teratoma showed higher beta-hCG, alpha-fetoprotein, and LDH levels. Exploratory laparotomy was the most common surgical procedure, performed in 72 patients (87.8%).

Table 1: Age Distribution of Patients

Age Group (years)	Frequency	Percentage (%)
11-30	18	21.95
31-50	38	46.34
51-70	24	29.27
71-90	2	2.44
Mean ± SD	43.32 ± 15.73	Range: 14-80

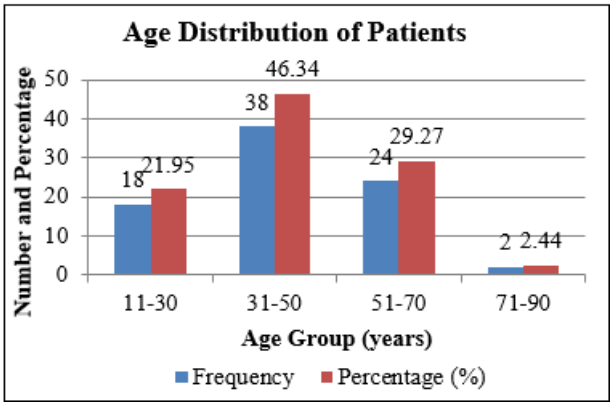


Table 2: Major Histopathological Types of Ovarian Tumors

Histopathological Type	Frequency	Percentage (%)
Serous cystadenoma	19	23.75
Mucinous cystadenoma	16	20.00
Mature cystic teratoma	13	16.25
Serous cystadenocarcinoma	11	13.75
Serous carcinoma	5	6.25
Other tumors	16	20.00

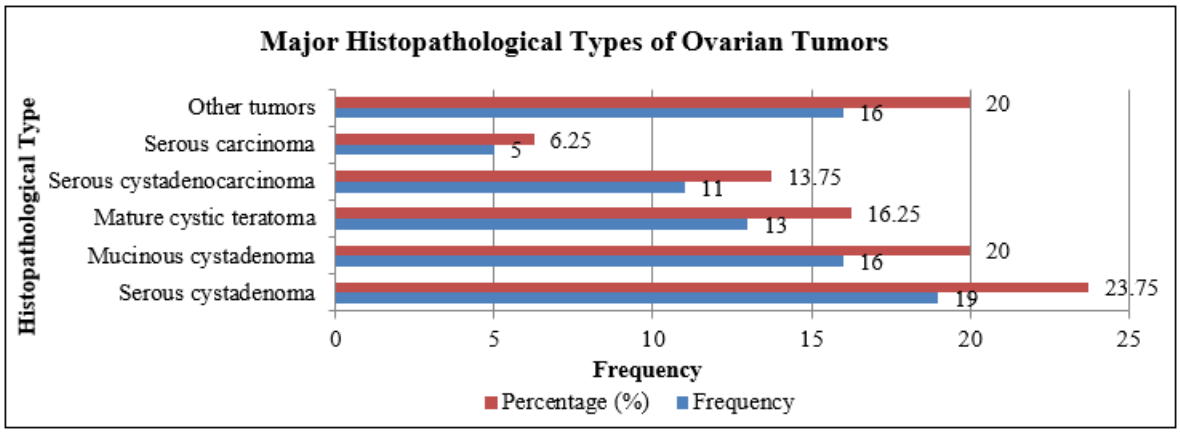


Table 3: Overall Tumor Marker Levels

Tumor Marker	Mean ± SD
CA-125	74.45 ± 32.25
Beta-hCG	5.89 ± 3.46
CA 19-9	21.40 ± 14.50
CEA	2.35 ± 2.33
Alpha-fetoprotein	123.43 ± 103.20
LDH	256.71 ± 127.22
Inhibin	71.00 ± 41.01

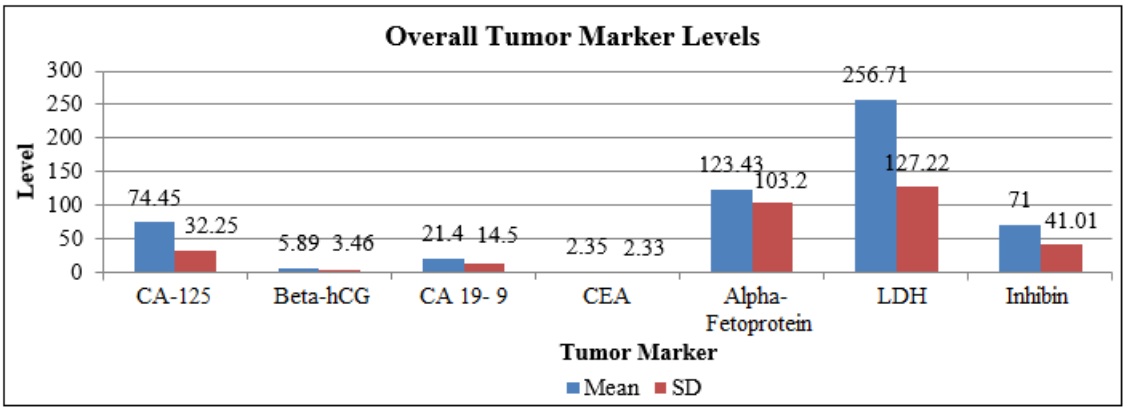


Table 4: CA-125 Status in Serous Cystadenoma and Serous Cystadenocarcinoma

Histopathological Group	Raised CA-125 n (%)	Normal CA-125 n (%)	Total
Serous cystadenoma	2 (10.5)	17 (89.5)	19
Serous cystadenocarcinoma	10 (90.9)	1 (9.1)	11

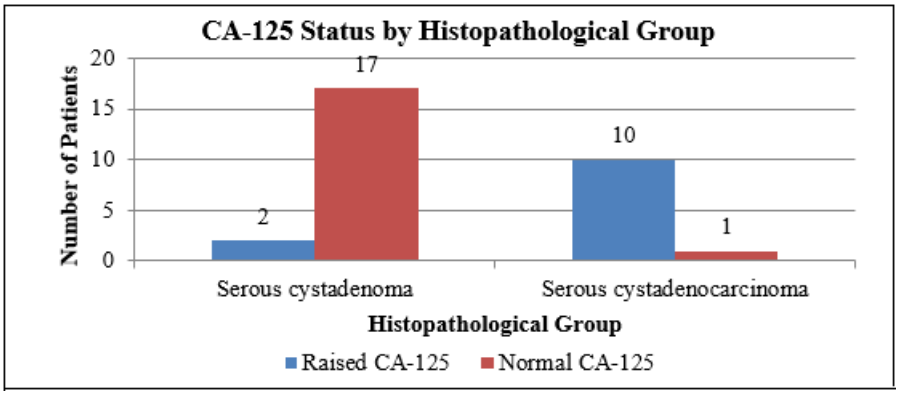
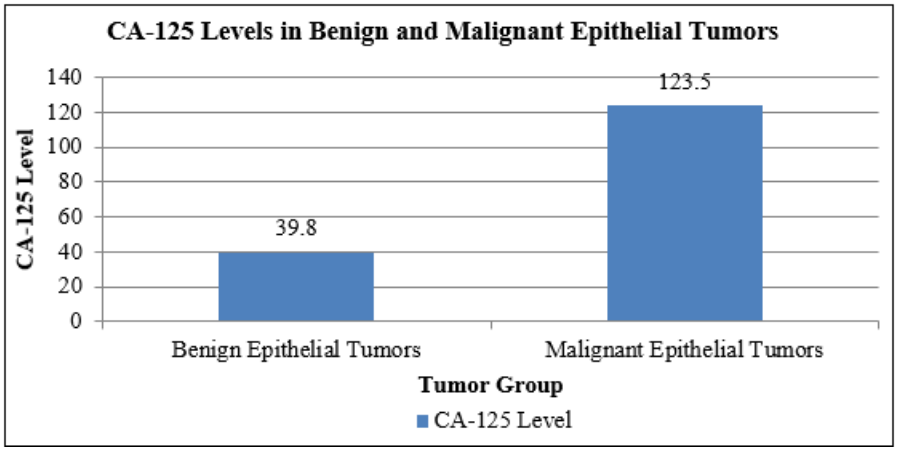


Table 5: CA-125 Levels in Benign and Malignant Epithelial Tumors

Tumor Marker	Benign Epithelial Tumors	Malignant Epithelial Tumors	p-value
CA-125	39.8 ± 8.1	123.5 ± 60.7	<0.0001



5. Discussion

The present study shows that ovarian tumors occur across a wide age range and present with nonspecific symptoms. The mean age was 43.32 ± 15.73 years, and most patients were in the 31-50 years age group. This pattern suggests that ovarian tumors are commonly encountered in middle-aged women, although younger and elderly women may also be affected. Abdominal pain was the most frequent symptom, followed by abdominal distension and menstrual irregularities. These symptoms are common in both benign and malignant ovarian tumors, which makes clinical diagnosis alone difficult.

Histopathology showed that serous cystadenoma, mucinous cystadenoma, and mature cystic teratoma were the common benign tumors, while serous cystadenocarcinoma was the commonest malignant tumor. This is in agreement with several studies where surface epithelial tumors form the largest category of ovarian tumors. Tumor markers provided important supportive diagnostic information. CA-125 showed a strong association with epithelial malignancy. It was raised in 90.9% of serous cystadenocarcinoma cases, compared with only 10.5% of serous cystadenoma cases. The mean CA-125 level was also significantly higher in malignant epithelial tumors than benign epithelial tumors, with $p<0.0001$.

Different marker patterns were seen with different histopathological types. Teratoma showed relatively higher alpha-fetoprotein and LDH values, supporting the role of germ cell tumor markers in selected cases. However, tumor markers may be raised in some benign conditions and may be normal in some malignant lesions. Therefore, tumor markers should not replace histopathological examination. They are best used as supportive tools along with clinical findings, imaging, operative assessment, and final tissue diagnosis.

6. Conclusion

The present study concludes that tumor markers show useful correlation with histopathological types of ovarian tumors. CA-125 was the most useful marker for epithelial ovarian tumors and showed significantly higher levels in malignant epithelial tumors compared with benign epithelial tumors. Raised CA-125 was much more common in serous cystadenocarcinoma than serous cystadenoma. Germ cell-related markers such as alpha-fetoprotein, beta-hCG, and LDH were more helpful in selected non-epithelial tumors such as teratoma and dysgerminoma.

Although tumor markers are valuable in preoperative assessment, risk stratification, planning of surgery, and follow-up, they cannot be used as the sole diagnostic test. Histopathological examination remains the gold standard for final diagnosis and classification. A combined approach using clinical examination, imaging, tumor markers, operative findings, and histopathology provides the best method for proper diagnosis and management of ovarian tumors in tertiary care settings.

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