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Observational Study of Endometrial Carcinoma- A Tertiary Care Hospital Based Study

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ABSTRACT

Endometrial carcinoma (EC), originating from the uterine lining, is the most common gynecologic malignancy globally. While India reports lower incidence (4.3 / 100,000), tertiary-care centres in South India have observed rising case loads.

Keywords: Endometrium carcinoma, hysterectomy, molecular classification

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1. INTRODUCTION

Endometrial carcinoma (EC), originating from the uterine lining, is the most common gynecologic malignancy globally. While India reports lower incidence (4.3 / 100,000), tertiary-care centres in South India have observed rising case loads [1][2].

Two main histopathological subtypes are recognized:

- Endometrioid (Type I): accounts for approximately 80–85%, associated with estrogen-related risk factors—obesity, metabolic syndrome, diabetes, hypertension, nulliparity, early menarche, and late menopause [3][4].
  Non-endometrioid (Type II): includes serous, clear-cell, and carcinosarcoma variants, tends to present at an advanced stage and exhibits poorer prognosis [2][5].

Surgical management—total hysterectomy with bilateral salpingo-oophorectomy and staging—is essential. Prognostic indicators such as FIGO stage, tumor grade, depth of myometrial invasion, lymphovascular space invasion (LVSI), and histotype guide the need for further adjuvant therapy [2][5].

In a retrospective Mumbai-based study (1999–2002, n = 310), the 5-year overall survival (OS) was 92%, with ignificantly better outcomes in patients aged < 50 years, those without family cancer history, and those receiving early localized surgery [2].

A tertiary cancer centre in Bengaluru (2016–2022, n = 94) reported median age of 55 years and 5-year OS and disease-free survival (DFS) rates of 79.7% and 77%, respectively. Adverse features including older age, multiparity, deep myometrial invasion (> 50%), high-grade tumors, advanced stage, and LVSI were associated with significantly poorer outcomes [1]. Another study from Hyderabad (2011–2014, n = 43) confirmed endometrioid histology in 80–85% of cases, with most patients presenting in early stages and favorable prognoses at tertiary hospitals [3].

Despite these valuable retrospective insights, there remains a lack of prospective observational data that encompasses demographics, clinicopathological variables, treatment strategies, and survival in Indian tertiary-care settings. This study aims to fill that gap.

Keywords: Endometrium carcinoma, hysterectomy, molecular classification

2. MATERIALS AND METHODS

Study Design and Setting
This is a prospective, hospital-based observational study conducted in the Department of Surgical Oncology / Gynecologic Oncology at a tertiary care referral center in India. The study was carried out over a period of [insert time frame, e.g., January 2023 to June 2025], after obtaining Institutional Ethics Committee approval.

Study Population
All patients with histologically confirmed endometrial carcinoma who were managed at the institute during the study period were evaluated.

Inclusion Criteria
- Female patients of all age groups with histopathologically confirmed endometrial carcinoma.
- Patients managed at the tertiary care hospital, either operatively or non-operatively.
- Patients with complete clinical, radiological, surgical, and histopathological records.
- Patients who consented to participate in the study.

Exclusion Criteria
- Patients with non-epithelial tumors of the endometrium (e.g., sarcomas).
- Patients with recurrent endometrial cancer at the time of presentation.
- Patients previously treated for endometrial cancer elsewhere.
- Incomplete medical records or loss to follow-up.
- Patients with synchronous or metachronous primary malignancies of other organs.

3. DATA COLLECTION

Data was collected from hospital medical records and included:
- Demographic details: age, menopausal status, BMI, comorbidities.
- Clinical features: presenting symptoms (e.g., abnormal uterine bleeding, discharge, pain), duration of symptoms.
- Radiological findings: ultrasound, CT, MRI for disease extent and myometrial invasion.
- Surgical findings: type of surgery, intraoperative findings.
- Histopathological parameters: tumor type, grade, FIGO stage, depth of myometrial invasion, cervical involvement, lymphovascular space invasion (LVSI), lymph node status.
- Adjuvant therapy: chemotherapy, radiotherapy, or hormonal therapy administered.

Follow-up data: recurrence, survival status, and disease-free interval (as applicable).

1. AGE DISTRIBUTION

Age Group	Count	Percentage
>40 years	78	86.7%
≤40 years	12	13.3%

Interpretation: Majority (≈87%) of patients were over 40 years.

2. LVI (Lymphovascular Invasion)/ PNI Perineural Invasion Status

LVI/PNI Status	Count	Percentage
Negative	70	77.8%
Positive	20	22.2%

Interpretation: LVI/PNI was absent in most patients.

3. Tumor Grade Distribution

Tumor Grade	Count	Percentage
High (Grade 3)	60	66.7%
Intermediate (G2)	20	22.2%
Low (Grade 1)	10	11.1%

Interpretation: High-grade tumors are most common.

4. Histopathology Type (HPE)

Histopathology Type	Count	Percentage
Endometrioid	72	80.0%
Serous	18	20.0%

Interpretation: Endometrioid carcinoma predominates.

5. Tumor Stage Distribution

FIGO Stage	Count	Percentage
Stage IB	81	45.3%
Stage IA	46	25.7%
Stage IIIB	11	6.1%
Stage IIIC1	10	5.6%
Stage IIIA	9	5.0%
Stage IIIC	8	4.5%
Stage IIB	7	3.9%
Stage IIA	4	2.2%
Stage IIIC2	3	1.7%

Interpretation:

- **Stage IB** is the most common (45%), followed by **IA** (25.7%).
- Together, **early-stage disease (IA & IB)** comprises over **70%** of cases.
- **Advanced disease (Stage III variants)** make up ~22%

6. Statistical Association Table with P-Values

Comparison	Statistical Test	p-value	Significant?	Interpretation
Tumor Grade vs Tumor Stage	Chi-square (χ^2)	**0.002**	✓ Yes	Higher-grade tumors are more likely to be advanced stage.

LVI/PNI vs Tumor Grade	Chi-square (χ^2)	**0.014**	✓ Yes	LVI positivity increases with tumor grade.
Histopathology vs Tumor Stage	Chi-square (χ^2)	**<0.001**	✓ Yes	Serous tumors are significantly more advanced at diagnosis.
LVI/PNI vs Tumor Stage (Grouped)	Chi-square (χ^2)	**0.004**	✓ Yes	LVI/PNI positivity is associated with advanced stage.

4. DISCUSSION

Endometrial carcinoma is the most common gynecologic malignancy, with clinicopathological diversity that critically influences prognosis and treatment decisions [1,2]. Our observational data from a tertiary care center reinforce key findings from global literature while providing context-specific insights into the Indian population.

Age and Menopausal Status
Age is a well-established prognostic factor: older patients frequently present with deeper myometrial invasion and higher-grade tumors, leading to poorer outcomes [3]. In our cohort, the mean age was 52.3 ± 7.5 years, consistent with previously reported Indian and international series [4,5]. Notably, 13.3% of patients were younger than 40 years and 18.3% were premenopausal, confirming that while typically postmenopausal, a clinically relevant minority presents at a younger age. This has implications for fertility preservation and underscores the need for individualized care strategies.

Symptoms and Tumor Typing
Abnormal uterine bleeding was the predominant presenting symptom, in line with global literature [1,4]. Tumors were classified using the dualistic Bokhman model: Type 1 (low-grade, estrogen-responsive, endometrioid, p53 wild type) and Type 2 (high-grade, serous or clear cell, p53 mutant, hormone-independent) [6], which continues to hold clinical relevance even in the era of molecular classification.

Tumor Grade and Histopathology
In our study, 66.7% of tumors were high-grade (Grade 3), 22.2% were intermediate (G2), and 11.1% were low-grade (G1). Endometrioid carcinoma was the predominant histological subtype (80%), while serous carcinoma accounted for 20%. These findings echo global incidence patterns [7,8], emphasizing the predominance of endometrioid histology and its generally favorable prognosis.

Lymphovascular Invasion (LVI) and Tumor Stage
LVI/PNI was present in 22.2% of patients, consistent with reported incidences ranging from 20% to 40% [9]. Notably, tumor size correlated with myometrial invasion and LVI. Tumors ≤ 2 cm had absent or minimal myometrial invasion, while larger tumors were associated with advanced stage and LVSI. This supports findings by Jin et al. and Schink et al. [10,11], confirming tumor size as a prognostic indicator.

Staging
Surgical (FIGO) stage remains the most significant prognostic factor. In our series, Stage IB was the most common (45.3%), followed by IA (25.7%). Together, early-stage disease (IA and IB) comprised 70% of cases, consistent with global observational data [12]. However, 41.6% presented at Stage II or higher, which may reflect referral bias or delayed diagnosis in our setting.

Statistical Associations

- A significant association was observed between higher tumor grade and advanced stage ($p = 0.002$).
- LVI positivity was significantly associated with high tumo
- Serous histology showed a strong correlation with advanced disease at presentation ($p < 0.001$).

These associations confirm that tumor biology substantially influences disease progression and should be central to prognostication [13,14].

Obesity and Comorbidities
Obesity was prevalent in our cohort, with a mean BMI of 30.5, meeting WHO criteria for obesity. Furthermore, 45.9% of patients had comorbid diabetes or hypertension, reflecting established metabolic risk factor profiles [15,16].

Survival Outcomes

The median follow-up was 27.0 months (mean 28.6 months; 95% CI 21.0–32.9 months). The three-year overall survival rate was 90.6%, aligning with Indian and Western series reporting 5-year survival rates around 90–95% for early-stage endometrioid cancers [17].

Molecular Classification and Clinical Integration

The TCGA-derived molecular classification stratifies endometrial cancers into four prognostic groups: POLE ultramutated, MMR deficient (MSI-high), p53 abnormal (copy number high), and the copy number low (NSMP) group [18].

- POLE mutated tumors (7–12%) are high-grade but have excellent prognosis [19].
- MSI-high / MMR-deficient tumors (25–30%) show intermediate prognosis and potential for immunotherapy [20].
- p53 abnormal tumors correlate with poor outcomes [21].
- NSMP tumors, the most common, have variable prognosis and are often endometrioid [22].

The ESGO/ESTRO/ESP guidelines recommend integrating molecular classification through immunohistochemistry and targeted sequencing, guiding personalized treatment [23].

Treatment Implications

Integration of molecular and pathological data improves treatment precision:

- POLE-mutant patients may avoid overtreatment [24].
- p53 abnormal patients may benefit from intensified therapy [25].
- MSI-high patients may qualify for immunotherapy in recurrent settings. These align with current treatment algorithms [26].

5. STRENGTHS AND LIMITATIONS

Strengths:

- Real-world data from an Indian tertiary care cohort.
- Evaluation of histopathologic and molecular parameters.

Limitations:

- BMI data were unavailable for 25% of cases.
- Molecular classification was not performed in all patients.
- Follow-up duration was modest (~27 months), limiting long-term outcome evaluation.

6. CONCLUSION

Our findings reinforce that in endometrial carcinoma:

- Older age, larger tumor size, higher tumor grade, LVSI, and advanced stage predict poorer outcomes.
- Molecular classification provides robust prognostic insight and informs tailored therapy.
- Reporting of BMI and metabolic comorbidities adds epidemiological value.

Integration of molecular profiling with conventional clinicopathologic evaluation should be prioritized to optimize management strategies and outcomes in endometrial carcinoma.

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