Original Article

Clinicopathological Profile of Carcinoma Endometrium in a Single Institution of Kerala, India

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ABSTRACT

Introduction: The incidence of endometrial cancer is on the rise in India, particularly in Kerala. A comprehensive understanding of the clinicopathological profile of endometrial cancer can help identify the underlying factors driving this trend and facilitate the development of targeted preventive strategies and effective management policies. **Materials and Methods:** This register-based retrospective study analyzed clinicopathological patterns in endometrial cancer patients at a tertiary care hospital in Kerala from 2013 to 2019, with Institutional Review Board and Scientific Committee clearance. **Results:** A total of 476 patients were identified with endometrial cancer diagnosed and/or treated at our institution. The mean age was 57.9 years (standard deviation [SD] ± 9.5 years) with 73.3% (n = 349) postmenopausal, 14.1% (n = 67) perimenopausal/unknown status, and 12.6% (n = 60) premenopausal. Histopathological analysis showed 80.0% (n = 381) endometrioid, 8% (n = 38) carcinosarcoma, 6.3% (n = 30) serous, 3.6% (n = 17) clear cell, 1.9% (n = 9) un/dedifferentiated, and 0.2% (n = 1) a rare squamous cell carcinoma. Out of 406 patients with available tumor grading, 50% (n = 203) were classified as Grade 1, 15.8% (n = 64) as Grade 2, and 34.2% (n = 139) as Grade 3. There was a significant relationship between age and tumor grade; the mean age of occurrence of high grade was 61 years (SD ± 9.8), and low grade was 56.5 (SD ± 8.6) (P = <0.001). Age also correlated with the incidence of endometrioid or nonendometrioid tumors (mean age 56.7 ± 9.1 years vs. 62.2 ± 9.4 years, P = <0.001). Nonendometrioid tumors were diagnosed in advanced stages compared to endometrioid type (38.1% vs. 20.8% in Stage III/IV, P = 0.004). The tumor size was directly correlated with advanced stage, tumor grade, and myometrial invasion. Specifically, the likelihood of diagnosis at an advanced stage increased with tumor size: 0% for tumors smaller than 2 cm, 11% for tumors measuring 2–4 cm, and 21% for tumors larger than 4 cm (P = 0.001). The deep myometrial invasion occurred in 33.0% of tumors <4 cm versus 68.0% of tumors ≥4 cm (P = <0.001). **Conclusion:** The most common type of endometrial cancer is the endometrioid type. Older age is associated with nonendometrioid as well as high-grade disease. Tumor size plays an important role in predicting myometrial invasion, grading, and stage of the disease.

Keywords: *Carcinoma endometrium, carcinosarcoma, endometrioid adenocarcinoma, myometrial invasion, serous carcinoma, tumor size*

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Introduction

Endometrial cancer, though considered a disease primarily affecting the developed world, has shown an increase in other countries as well, especially in those with rapid socioeconomic transition.[1,2] Early menarche,

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nulliparity, late menopause, estrogen-only hormonal therapy, polycystic ovary syndrome, obesity, diabetes, feminizing ovarian tumors, tamoxifen therapy, previous pelvic irradiation, and Lynch and Cowden syndromes are considered significant risk factors.[3,4] Early stages have good survival with up to 96% at 5 years for localized disease which falls to 67% for node-positive disease.[5] Increasing risk factor prevalence and improved availability of diagnostic modalities have increased uterine cancer incidence in India.[2]

In India, the projected cumulative risk as per the national cancer registry is 1 in 190.[6] Thiruvananthapuram cancer registry of Kerala state has recorded the highest uterine cancer incidence rate in India, though much less than the western incidence.[7] There is an epidemiological transition in cancer incidence to the more western pattern in the state of Kerala. Considering endometrial cancer to be a growing public health problem, we report the clinical and pathological pattern of endometrial cancer at our teaching hospital and aim to analyze these parameters statistically.

Materials and Methods

The study aimed to enumerate the clinicopathological patterns of carcinoma endometrium patients who presented to a single institution over 7 years from 2013 to 2019. This retrospective, register-based, descriptive cross-sectional study received Institutional Review Board and Scientific Committee clearance prior to data collection. Information on all patients with a pathologic confirmation of endometrial cancer, either diagnosed or managed at our institution, was compiled from pathology, oncology, and gynecology registers, with appropriate permissions obtained.

Details collected included basic demographics, symptomatology, parity, menopausal status, biopsy results, and type of biopsy procedure. Additionally, final histopathology after surgery was recorded, noting the grade, tumor size, and stage of the disease. For operated cases, the surgical stage was used, while for nonoperated patients, a clinicoradiological stage was assigned. Parity was categorized into three groups: nulliparous, single child, and two or more children.

Results

Over 7 years, carcinoma endometrium was diagnosed and/or treated for 476 patients at our institution. The mean age of the patients was 57.9 years (standard deviation [SD] ± 9.5 years), with the youngest patient aged 29 years and the oldest 92 years. There were 17 patients under 40 years of age and 53 patients aged 70 years and above [Figure 1]. Symptomatology

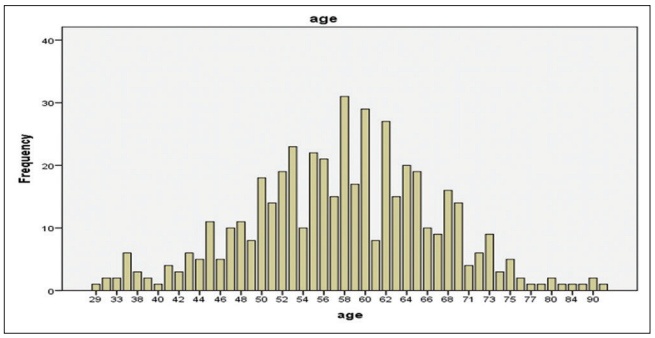

Figure 1: Age distribution of carcinoma endometrium patients – bar chart

was documented in 304 patients. The most common symptom observed was bleeding per vaginum. Other presenting symptoms included discharge per vaginum, abdominal and back pain, abdominal fullness and mass, vaginal mass, urinary retention, recurrent urinary infections, urinary incontinence, hematuria, weight loss, loss of appetite, and postcoital bleeding. Two cases were incidentally diagnosed during imaging for unrelated reasons.

Out of the total cohort, 60 patients were premenopausal, comprising 12.6% of the group, and 73.3% were postmenopausal (n = 349). Additionally, 67 patients were either in the perimenopausal period or had an unknown menopausal status, accounting for 14.1% of the total [Figure 2]. Data on parity were available for 257 patients. Among them, 22 patients were nulliparous, making up 8.6%. The majority, accounting for 80.5% of the patients, had a parity of two or more children. Three hundred and fifty-six patients had stage information available, the most common being Stage 1A [Figure 3].

Eighty percent of our patients had endometrioid adenocarcinoma, with carcinosarcoma being the second most common at 8% followed by serous cancer at 6.3% [Table 1]. A rare case of primary endometrial squamous cell carcinoma (SCC) was also reported, where imaging showed endometrial growth and normal cervix, with pathology showing no disease in the cervix and SCC in the endometrium. Four hundred and six patients had information on histopathological grade available. 65.5% had low-grade disease (Grade 1 + Grade 2), while 34.5% had Grade 3 disease [Table 2]. In endometrioid adenocarcinoma, 14.8% were high grade. The mean tumor size was 4.3 cm (SD ± 2.1 cm), ranging from 0.2 cm to 15.5 cm. The most common medical comorbidity was diabetes mellitus, followed by hypertension and hypothyroidism. Only 68 patients had a lymphadenectomy or sampling done, with a mean of 9.75 lymph nodes sampled per case (range 1–40). Of the 68 patients who underwent lymphadenectomy, 7 patients had positive nodes.

The method of biopsy data is available in 367 patients. The predominant biopsy method in our cohort is endometrial curettage or fractional curettage, utilized in 86.1% (n = 316). In contrast, Pipelle aspiration is rarely used, accounting for just 2.2% of cases (n = 8). Additionally, 17 patients (4.6%) were diagnosed with the disease posthysterectomy, either due to initially negative biopsy results or because the surgery was performed for other reasons, leading to an incidental detection of the disease.

The grade of the tumor has a statistically significant relationship with age, with higher-grade tumors being more common in older individuals. Grade 3 tumors had a mean age of occurrence of 61 years (SD ± 9.8 years), whereas Grade 1 and 2 tumors combined had a mean age of 56.5 years (SD ± 8.6 years). An independent sample t-test revealed a significant P = <0.001, indicating a highly significant difference between the mean ages for the different tumor grades. Nonendometrioid pathologies also show a significant increase with age. The mean age of occurrence for all grades of endometrioid tumors is 56.7 years (SD ± 9.1 years), whereas nonendometrioid pathologies have a mean age of occurrence of 62.6 years (SD ± 9.4 years). An independent sample t-test revealed a statistically significant difference here, with P = <0.001, indicating a strong association.

A Chi-square test was conducted to assess the relationship between the pathological type of endometrial cancer and the stage of the disease. The results indicate that nonendometrioid pathologies present at a significantly higher stage compared to endometrioid adenocarcinoma. Specifically, 20.8% of endometrioid adenocarcinoma cases were diagnosed at Stage III or IV, whereas 38.1% of nonendometrioid cases were diagnosed at these advanced stages. The Chi-square test revealed P = 0.004, indicating high statistical significance in the difference between the two groups, with an odds ratio of 2.3.

In tumors <2 cm, none were diagnosed at Stage III or IV. For tumors sized 2–4 cm, 11% were at Stage III or IV, and this percentage increased to 27% for tumors larger than 4 cm. A Chi-square test revealed a statistically significant relationship between tumor size below and above 4 cm and International Federation of Gynaecology and Obstetrics (FIGO) stage (P = 0.001), with an odds ratio of 3.4. Patients with larger tumors were found to have higher tumor grades. Specifically, 14.8% of tumors <4 cm were Grade 3, whereas 42.1% of tumors larger than 4 cm were Grade 3. A Chi-square test revealed a highly significant relationship between tumor size and grade (P = <0.001), with an odds ratio of 4.18.

Tumors measuring 4 cm or smaller exhibited a 33% incidence of more than half of the myometrial invasion. In contrast, tumors larger than 4 cm demonstrated 68% of cases showing more than half of the myometrial invasion. This difference is statistically significant, as indicated by a Chi-square test (P = <0.001), with an odds ratio of 4.39. When a tumor size of 2 cm or smaller was considered, there were no cases where more than half myometrial invasion was observed.

Table 1: Histopathology types of endometrial cancer

Histopathology	Frequency (%)
Endometrioid adenocarcinoma	381 (80.0)
Carcinosarcoma	38 (8.0)
Clear cell carcinoma	17 (3.6)
Serous carcinoma	30 (6.3)
Undifferentiated/dedifferentiated carcinoma	9 (1.9)
SCC	1 (0.2)
Total	476 (100.0)

SCC: Squamous cell carcinoma

Table 2: Histopathological grading in data available patients

Grade	Number of patients (%)
Grade 1	203 (50)
Grade 2	64 (15.8)
Grade 3	139 (34.2)
Total	406

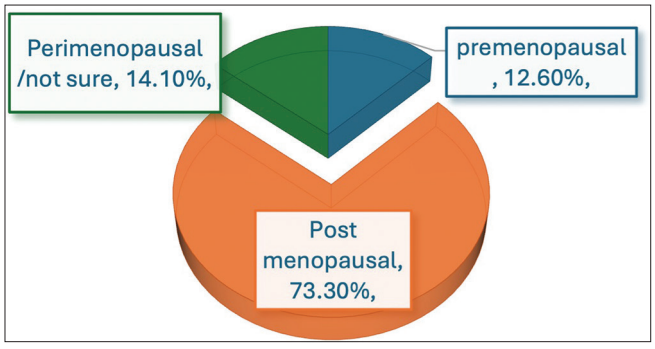

Figure 2: Menopausal status of carcinoma endometrium patients

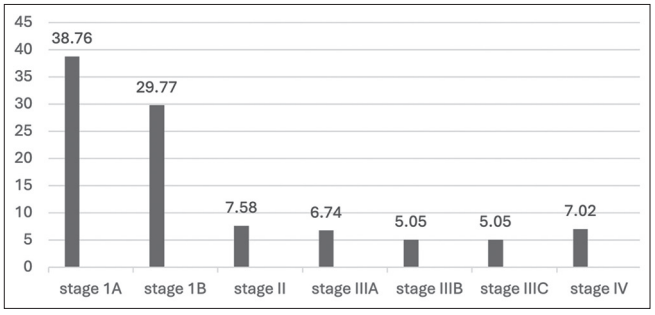

Figure 3: Stage distribution of 356 stage data available patients in percentage

Discussion

Endometrial cancer, a prevalent gynecological malignancy, exhibits diverse clinicopathological features that significantly impact patient prognoses and treatment modalities. Increasing age is considered a prognostic factor for carcinoma endometrium outcomes. With increasing age, muscle invasion and higher-grade pathologies increase with worse outcomes than their younger counterparts.[8,9] This study group's mean age of 57.9 years (SD ± 9.5 years) matched the literature-described age group of carcinoma endometrium.[10-12] Management challenges in younger ladies are unique in that fertility preservation and avoiding hysterectomy with progesterone therapy may be required in well-selected ladies who have not completed a family. In our cohort, 3.57% of patients (n = 17) were <40 years of age. Like all other endometrial cancer series in the literature, abnormal uterine bleeding was the most common presentation here as well.[10-13] This is predominantly a disease of postmenopausal women who get a higher grade and Type II tumors more often when compared to those in the reproductive age group.[14] 12.6% of women in this study were premenopausal.

Silverberg and Gilks consider identifying the role of estrogen in endometrial cancer causation as one of the most important discoveries in the last 50 years in the gynecological oncology field.[15] Bokhman classically described endometrial carcinomas as of two types. The low-grade carcinoma Type 1 is estrogen dependent, and the high-grade Type 2 is nonestrogen dependent.[16] Type 1 endometrial cancer, which is mostly constituted by low-grade endometrioid adenocarcinoma [Figure 4], has a strong positivity for estrogen/progesterone receptors and p53 wild type. Type 2 cancers, mostly serous cancers in literature, are p53 mutated and estrogen receptors negative. Although Bokhman considered mostly serous tumors in the Type 2 group, All other nonendometrioid aggressive biologies are considered along with it [Figure 5], including clear cell and carcinosarcoma. High-grade endometrioid [Figure 6] was not properly categorized initially in this binary division, and it is worth mentioning that this Type 1 and 2 classification was not used for staging or risk stratification.[17,18] Information from the cancer genome atlas paved the way for the genomic classification, dividing this disease into four categories depending on mutations, copy number alternations, and microsatellite instability (MSI). These are POLE ultramutated, MSI hypermutated, copy number low (wild type p53), and copy number high (abnormal p53).[19-21] Mismatch repair immunohistochemistry (IHC) for MSI, IHC for p53, and POLE mutation analysis help to categorize patients into these categories at the lowest cost and resource. This categorization helps in prognostication and clinical decision-making better than the older clinicopathological classifications. POLE mutation currently does not have any less costly surrogates like the IHC for p53 and MSI. Our data are from before 2019, and we do not have information on these parameters for our patients.

The World Health Organization (WHO) 5th edition of female genital cancer pathology should be followed currently in carcinoma endometrium pathological

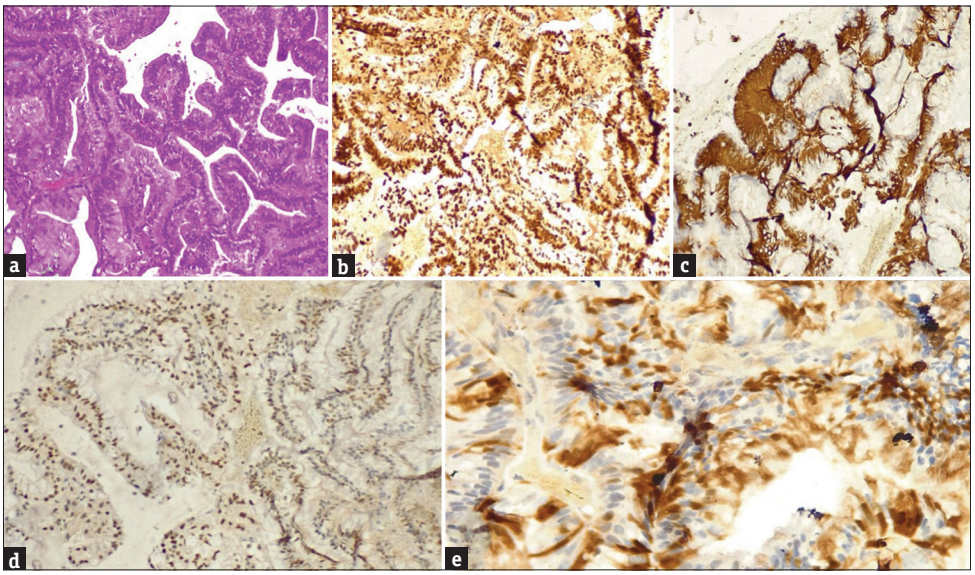

Figure 4: Low-grade endometrioid adenocarcinoma, (a) Neoplastic cells arranged in villoglandular pattern (H and E, ×10), (b) Strong and diffuse nuclear positivity of estrogen receptor (immunohistochemistry [IHC]), (c) Focal and patchy positivity of P16 (IHC), (d) Wild type p53 (IHC), (e) Neoplastic cells showing vimentin positivity (IHC)

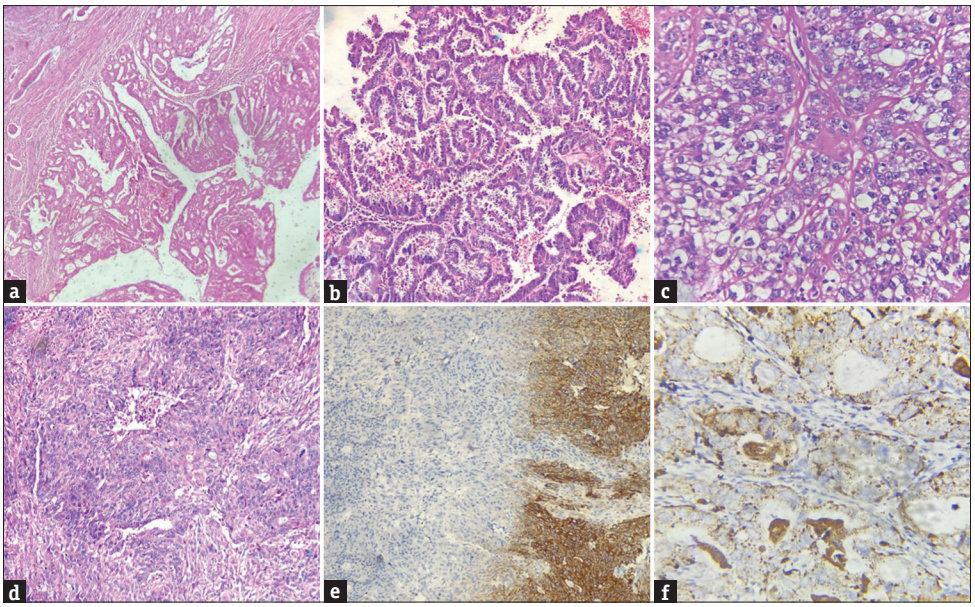

Figure 5: (a) High-grade serous carcinoma (H and E, ×20), (b) Serous carcinoma showing papillary pattern and hobnailing (H and E, ×20), (c) Clear cell carcinoma (H and E, ×40), (d) Carcinosarcoma (H and E, ×40), (e) Carcinosarcoma with carcinomatous area showing CK positive and negative in sarcomatous area (immunohistochemistry [IHC]), (f) Clear cell carcinoma showing napsin A positivity (IHC)

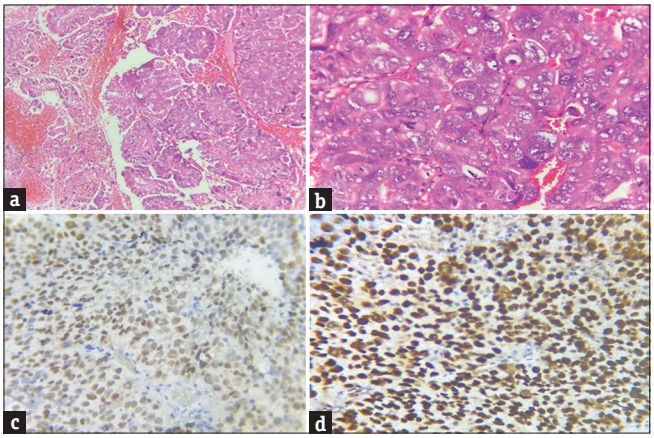

Figure 6: High-grade endometrioid adenocarcinoma, (a) Solid growth with necrotic area (H and E, ×10), (b) Tumor cells showing marked nuclear atypia (H and E, ×40), (c) Estrogen receptor showing nuclear positivity (immunohistochemistry), (d) Mutant p53 immunoexpression

typing.[22] The pathological type and grade of cancer significantly impact the outcome.[12] The FIGO classification now incorporates pathological types into the staging system, meaning that even an aggressive variant with less than half myometrial invasion is classified as stage II.[23] In this study, nonendometrioid carcinomas were found to have a significantly higher stage of presentation compared to the endometrioid variant, supporting this viewpoint. This significance is more so because here all grades of endometrioid are considered together, which includes 14.8% high-grade disease. Molecular classification also found a way in the newer classification, and molecular prognostication is considered more relevant than the older clinical-pathological one. A POLE mutated endometrial carcinoma is downstaged to Stage 1AmPOLEmut even if higher-grade aggressive biology cervical stroma involved Stage II.[23]

Carcinosarcoma surprisingly is the second most common type of endometrial cancer found in our study. Carcinosarcoma incidence is on the rise in developed countries.[24,25] An incidence of 5.8% is reported from Christian Medical College, Vellore, South India.[26] Current WHO categorization places carcinosarcoma in its epithelial tumor category, moving it from the mixed epithelial and mesenchymal tumor category.[22] In data from a Delhi tertiary center, carcinosarcoma comes second after uterine papillary serous carcinoma in nonendometrioid pathologies (nine out of 115 patients).[27] Our tertiary care center serves approximately 4–5 districts in the state, primarily managing referred cases. This referral pattern may contribute to the higher incidence of carcinosarcoma observed in our data. Additionally, while IHC for the pathological typing of endometrial cancer was available, its routine use only began midway through our study period.

When a binary grading system is used, Grades 1 and 2 are considered low grades, and Grade 3 is considered high.[28] Low grades in this study had a lower mean age than higher grades. As life expectancy increases, the number of higher-grade tumors will increase, which is a public health problem as higher-grade tumors utilize more resources. Our study also proves that nonendometrioid variants significantly increase with increasing age.

Jin *et al*., in their meta-analysis, confirm that tumor size is an important prognostic factor. A tumor size of more than 2 cm is an independent predictor of recurrence, muscle invasion, and nodal involvement.[29] In our study, all patients below 2 cm had no or less than half myometrial invasion only. Tumor size should be included in factors that help decision-making in endometrial cancer. Shink *et al*.,[30] in their data on 142 women, suggest tumor size to be a precise and inexpensive prognostic factor. In our data, when we used a 4 cm cutoff both grade and stage were significantly higher for larger tumors.

Limitations of the study

Although there were 476 pathologically confirmed cases of endometrial cancer, many cases had missing data on symptomatology and other variables. As a result, the denominator varies for each variable, as only cases with available data are included in the analysis. Additionally, since the data only extend up to 2019, genomic classification is not feasible. In our resource-limited setting, lymphadenectomy was not routinely performed, and sentinel node biopsy was unavailable at that time.

Conclusion

In our hospital, the mean age of patients diagnosed with endometrial carcinoma is 57.9 years, with an SD of ± 9.5 years. Eighty percent of these cases are endometrioid adenocarcinoma pathology. Higher-grade tumors and nonendometrioid pathologies are more commonly found in older individuals. Nonendometrioid endometrial cancers tend to present at more advanced stages compared to the endometrioid variant. Tumors larger than 4 cm are associated with statistically significantly higher stage and higher-grade disease compared to tumors smaller than 4 cm. Notably, none of the tumors measuring 2 cm or smaller showed more than half myometrial invasion.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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