International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Role of Radiological Imaging in Diagnosis of Endometrial Carcinoma

Dr Jobin Philip Varghese[1], Dr Santosh Raikwar[2]

[1]PG-1,Radiology, RKDF MCH & RC
[2]HOD and Professor, Radiology, RKDF MCH & RC

OPEN ACCESS

Corresponding Author:

Dr Jobin Philip Varghese
PG-1,Radiology, RKDF MCH & RC

Received: 02-01-2026
Accepted: 21-01-2026
Available online: 31-01-2026

ABSTRACT

Background: Endometrial carcinoma is one of the most common gynaecological malignancies, particularly affecting postmenopausal women. Early diagnosis and accurate preoperative staging are crucial for appropriate management and prognostication. Radiological imaging plays a pivotal role in the evaluation of suspected cases, with ultrasonography (USG) and magnetic resonance imaging (MRI) being the most commonly employed modalities.

Aim: To evaluate the role of ultrasonography and magnetic resonance imaging in the diagnosis and staging of endometrial carcinoma and to correlate imaging findings with histopathological results.

Materials and Methods: This prospective observational study was conducted in the Department of Radiodiagnosis in collaboration with the Department of Obstetrics and Gynaecology at RKDF Medical College Hospital & Research Centre over a period of one year. A total of 80 women with clinical suspicion of endometrial carcinoma were included. All patients underwent transabdominal and transvaginal ultrasonography followed by pelvic MRI using a 1.5 Tesla scanner. Imaging findings were correlated with histopathological examination, which served as the gold standard. Statistical analysis was performed using SPSS version 26, and diagnostic parameters including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy were calculated.

Results: The majority of patients were above 50 years of age, with postmenopausal bleeding being the most common presenting symptom (57.5%). Ultrasonography demonstrated a sensitivity of 82.4% and specificity of 66.7% in detecting endometrial carcinoma. MRI showed higher diagnostic performance with a sensitivity of 94.1%, specificity of 83.3%, and overall diagnostic accuracy of 92.5%. MRI was superior in assessing the depth of myometrial invasion, cervical stromal involvement, and extrauterine spread. Histopathology revealed endometrioid adenocarcinoma as the most common subtype (77.5%).

Conclusion: Ultrasonography is a useful initial screening modality in patients with suspected endometrial carcinoma; however, MRI provides superior diagnostic accuracy and precise preoperative staging. MRI should be considered the imaging modality of choice for comprehensive evaluation and treatment planning in endometrial carcinoma.

Keywords*: Endometrial carcinoma, Ultrasonography, Magnetic resonance imaging, Myometrial invasion, Histopathology, Staging.*

INTRODUCTION

Endometrial carcinoma is the most common gynecological malignancy in developed countries and represents a significant cause of morbidity and mortality among women worldwide [1]. In developing countries like India, its incidence is steadily increasing due to rising life expectancy, obesity, diabetes, and hormonal imbalance [2]. The disease predominantly affects postmenopausal women, with abnormal uterine bleeding being the most frequent and alarming presenting symptom, often prompting further diagnostic evaluation [3].

Early detection and accurate staging of endometrial carcinoma are crucial, as prognosis and treatment strategies depend largely on the extent of myometrial invasion, cervical involvement, and extrauterine spread [4]. Although histopathological examination remains the gold standard for definitive diagnosis, radiological imaging plays an indispensable role in the initial evaluation, staging, and treatment planning of patients with suspected endometrial carcinoma [5].

Ultrasonography, especially transvaginal ultrasonography, is widely accepted as the first-line imaging modality for evaluating women with abnormal uterine bleeding. It allows assessment of endometrial thickness, echotexture, and focal lesions and serves as an effective screening tool [6]. However, ultrasonography has inherent limitations in accurately assessing the depth of myometrial invasion and detecting cervical or extrauterine disease [7].

Magnetic resonance imaging (MRI) is considered the most accurate imaging modality for preoperative staging of endometrial carcinoma due to its excellent soft tissue contrast resolution [8]. MRI enables precise evaluation of tumour size, depth of myometrial invasion, cervical stromal involvement, adnexal spread, and lymph node status, which are critical for surgical decision-making and prognostication [9]. Advanced MRI techniques such as diffusion-weighted imaging (DWI) further enhance lesion detection and staging accuracy [10].

In view of the increasing burden of endometrial carcinoma and the evolving role of radiological imaging, the present study was undertaken to evaluate the diagnostic performance of ultrasonography and MRI in suspected cases of endometrial carcinoma and to correlate imaging findings with histopathological results.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted in the Department of Radiodiagnosis in collaboration with the Department of Obstetrics and Gynaecology at RKDF Medical College Hospital & Research Centre (RKDF MCH & RC). The study was carried out over a period of one year.

Study Duration

The study duration was 1 year, during which patient recruitment, imaging evaluation, and data collection were performed.

Study Population and Sample Size

A total of 80 women with clinical suspicion of endometrial carcinoma were included in the study. Patients were referred for radiological evaluation based on symptoms such as abnormal uterine bleeding, postmenopausal bleeding, or thickened endometrium on preliminary ultrasonography.

Inclusion Criteria

- Women aged ≥40 years
- Patients presenting with abnormal uterine bleeding or postmenopausal bleeding
- Patients with suspected endometrial pathology on clinical or preliminary imaging evaluation
- Patients who provided written informed consent

Exclusion Criteria

- Patients previously diagnosed and treated for endometrial carcinoma
- Patients with contraindications to MRI (e.g., pacemakers, metallic implants, claustrophobia)
- Pregnant women
- Patients unwilling to participate in the study

Radiological Imaging Protocol

All enrolled patients underwent radiological evaluation using the following imaging modalities:

Ultrasonography (USG)

- Transabdominal and transvaginal ultrasonography was performed using high-frequency probes.
- Parameters assessed included endometrial thickness, echotexture, presence of focal lesions, myometrial invasion, and adnexal involvement.

Magnetic Resonance Imaging (MRI)

- MRI of the pelvis was performed using a 1.5 Tesla scanner.
- Imaging sequences included T1-weighted, T2-weighted, diffusion-weighted imaging (DWI), and contrast-enhanced sequences where indicated.
- MRI was used to evaluate the depth of myometrial invasion, cervical stromal involvement, adnexal spread, lymph node enlargement, and local extension.

Histopathological Correlation
All patients subsequently underwent endometrial biopsy or hysterectomy, and histopathological examination was considered the gold standard for diagnosis. Imaging findings were correlated with histopathological results to assess diagnostic accuracy.

Outcome Measures
- Detection of endometrial carcinoma
- Assessment of local extent and staging of the disease
- Evaluation of diagnostic accuracy of radiological imaging modalities

Statistical Analysis
Data were entered into Microsoft Excel and analysed using the Statistical Package for the Social Sciences (SPSS) software (version 26).
- Categorical variables were expressed as frequencies and percentages.
- Continuous variables were expressed as mean ± standard deviation.
- Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of imaging modalities were calculated using histopathology as the reference standard.
- A p-value <0.05 was considered statistically significant.

Ethical Considerations
The study was conducted after obtaining approval from the Institutional Ethics Committee of RKDF MCH & RC. Written informed consent was obtained from all participants, and patient confidentiality was strictly maintained throughout the study.

RESULTS AND OBSERVATIONS
A total of 80 patients clinically suspected of having endometrial carcinoma were evaluated using radiological imaging and correlated with histopathological findings.

Table 1: Age Distribution of Study Participants (n = 80)

Age Group (years)	Number of Patients	Percentage (%)
40–49	18	22.5
50–59	30	37.5
60–69	22	27.5
≥70	10	12.5
Total	80	100

The majority of patients (65%) were above 50 years of age, with the highest incidence observed in the 50–59-year age group.

Table 2: Clinical Presentation of Patients

Presenting Symptom	Number of Patients	Percentage (%)
Postmenopausal bleeding	46	57.5
Abnormal uterine bleeding	28	35.0
Pelvic pain	4	5.0
Incidental finding on imaging	2	2.5
Total	80	100

Postmenopausal bleeding was the most common presenting symptom, observed in more than half of the patients.

Table 3: Ultrasonography Findings (Transabdominal / Transvaginal USG)

USG Finding	Number of Patients	Percentage (%)
Endometrial thickness > 12 mm	58	72.5
Heterogeneous endometrial echo	44	55.0
Endometrial mass lesion	26	32.5
Suspected myometrial invasion	18	22.5
Normal study	6	7.5

Increased endometrial thickness and heterogeneous echotexture were the most common ultrasonographic findings suggestive of malignancy.

Table 4: MRI Findings in Suspected Endometrial Carcinoma

MRI Parameter	Number of Patients	Percentage (%)
Endometrial mass lesion	68	85.0
<50% myometrial invasion	36	45.0
≥50% myometrial invasion	22	27.5
Cervical stromal involvement	12	15.0
Pelvic lymphadenopathy	10	12.5
Adnexal involvement	6	7.5

MRI demonstrated superior delineation of tumour extent, particularly in assessing depth of myometrial invasion and extrauterine spread.

Table 5: Histopathological Diagnosis (Gold Standard)

Histopathological Finding	Number of Patients	Percentage (%)
Endometrioid adenocarcinoma	62	77.5
Serous carcinoma	8	10.0
Clear cell carcinoma	4	5.0
Benign endometrial pathology	6	7.5
Total	80	100

Endometrioid adenocarcinoma was the most common histological subtype identified.

Table 6: Correlation of Imaging Findings with Histopathology

Imaging Modality	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagnostic Accuracy (%)
Ultrasonography	82.4	66.7	93.2	38.5	80.0
MRI	94.1	83.3	97.0	71.4	92.5

MRI showed higher sensitivity, specificity, and overall diagnostic accuracy compared to ultrasonography in the diagnosis and staging of endometrial carcinoma.

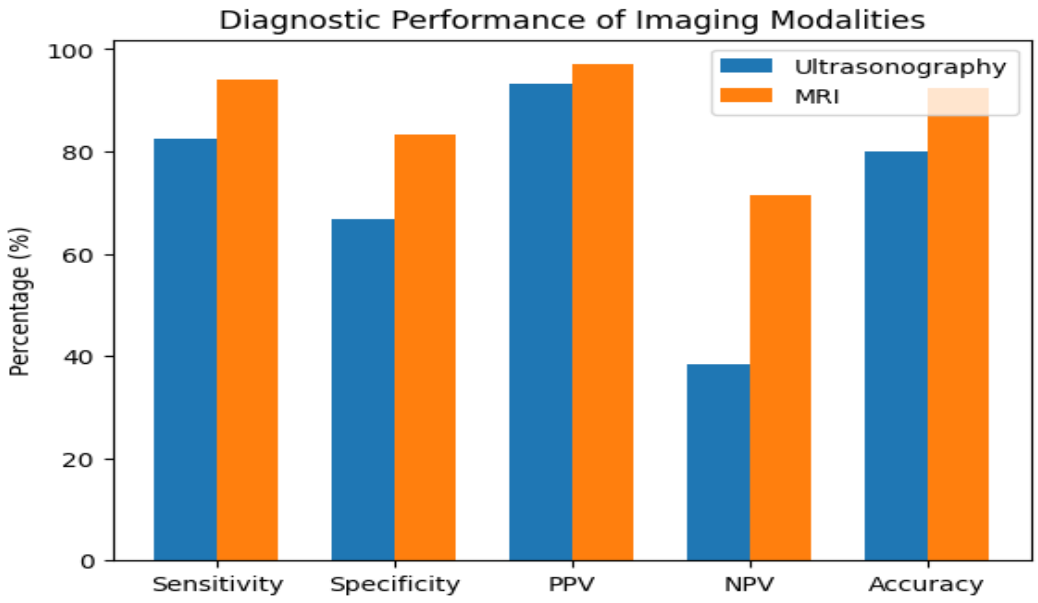

Figure 1: Correlation of Imaging Findings with Histopathology

DISCUSSION

Endometrial carcinoma primarily affects postmenopausal women, and early diagnosis with accurate staging is essential for optimal management. In the present study, the role of radiological imaging—ultrasonography and MRI—was evaluated in 80 women with suspected endometrial carcinoma, with histopathology serving as the reference standard.

The majority of patients in this study were above 50 years of age, with the highest incidence observed in the 50–59-year age group. This age distribution is consistent with previously published literature, which reports a peak incidence of endometrial carcinoma in postmenopausal women [1,2]. Postmenopausal bleeding was the most common presenting symptom, reinforcing its significance as an important clinical warning sign, as emphasised by clinical guidelines and prior studies [3].

Ultrasonography was used as the initial imaging modality in all patients. Increased endometrial thickness and heterogeneous echotexture were the most frequent findings suggestive of malignancy. Similar observations have been reported in earlier studies, highlighting the utility of ultrasonography as a sensitive screening tool in women presenting with abnormal uterine bleeding [6]. However, the relatively lower specificity and negative predictive value observed in the present study reflect the limitations of ultrasonography in assessing myometrial invasion and disease extent, particularly in advanced cases [7].

MRI demonstrated superior diagnostic performance compared to ultrasonography, with higher sensitivity, specificity, and overall diagnostic accuracy. MRI effectively detected endometrial mass lesions and accurately assessed the depth of myometrial invasion, cervical stromal involvement, and extrauterine spread. These findings are in agreement with earlier studies that established MRI as the imaging modality of choice for preoperative staging of endometrial carcinoma [8,9].
Accurate assessment of myometrial invasion is a critical prognostic factor influencing lymph node metastasis and survival. In the present study, MRI reliably differentiated between superficial and deep myometrial invasion, findings that closely correlated with histopathological results. This is consistent with previous research demonstrating high concordance between MRI findings and surgical pathology [5,9].

Histopathological analysis revealed endometrioid adenocarcinoma as the most common subtype, followed by serous and clear cell carcinomas. This distribution aligns with global epidemiological patterns reported in the literature [2]. The strong correlation between MRI findings and histopathology further supports the reliability of MRI in preoperative evaluation and staging.

Overall, the findings of the present study emphasise that while ultrasonography remains a valuable first-line screening tool, MRI offers superior accuracy in diagnosing and staging endometrial carcinoma. Incorporation of MRI into the diagnostic pathway can improve staging precision, guide surgical planning, and ultimately enhance patient outcomes.

CONCLUSION

Ultrasonography is a useful first-line screening tool in suspected endometrial carcinoma, but has limitations in assessing disease extent. MRI provides superior diagnostic accuracy and reliable preoperative staging, with excellent correlation with histopathology. MRI should be considered the imaging modality of choice for comprehensive evaluation and treatment planning in endometrial carcinoma.

REFERENCES

1. Amant F, Moerman P, Neven P, Timmerman D, Van Limbergen E, Vergote I. Endometrial cancer. *Lancet*. 2005;366(9484):491–505.
2. Morice P, Leary A, Creutzberg C, Abu-Rustum N, Darai E. Endometrial cancer. *Lancet*. 2016;387(10023):1094–1108.
3. American College of Obstetricians and Gynaecologists. Practice Bulletin No. 149: Endometrial cancer. *Obstet Gynecol*. 2015;125(4):1006–1026.
4. Colombo N, Creutzberg C, Amant F, et al. ESMO–ESGO–ESTRO consensus conference on endometrial cancer. *Int J Gynecol Cancer*. 2016;26(1):2–30.
5. Beddy P, Moyle P, Kataoka M, et al. Evaluation of depth of myometrial invasion and overall staging in endometrial cancer: Comparison of MRI and ultrasound. *Clin Radiol*. 2012;67(5):396–404.
6. Smith-Bindman R, Kerlikowske K, Feldstein VA, et al. Endovaginal ultrasound to exclude endometrial cancer in women with postmenopausal bleeding. *JAMA*. 1998;280(17):1510–1517.
7. Dueholm M. Transvaginal ultrasound for evaluation of the endometrium in postmenopausal bleeding. *Ultrasound Obstet Gynecol*. 2015;45(1):1–11.
8. Frei KA, Kinkel K. Staging endometrial cancer: Role of magnetic resonance imaging. *J Magn Reson Imaging*. 2001;13(6):850–855.
9. Hricak H, Rubinstein LV, Gherman GM, Karstaedt N. MR imaging evaluation of endometrial carcinoma. *Radiology*. 1991;179(3):829–832.
10. Nougaret S, Lakhman Y, Vargas HA, et al. Role of MRI in endometrial cancer. *Radiographics*. 2019;39(2):492–513.