

DIAGNOSTIC EFFICACY OF O-RADS MRI IN DIFFERENTIATING BENIGN AND MALIGNANT ADNEXAL MASSES: A PROSPECTIVE STUDY WITH HISTOPATHOLOGICAL VALIDATION IN SOUTH INDIA

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ABSTRACT

Background: Adnexal lesions are common in clinical practice, with a small but significant proportion being malignant. Ultrasound is the first-line tool; however, indeterminate lesions are not uncommon. The Ovarian-Adnexal Reporting and Data System for MRI (O-RADS MRI), introduced by the American College of Radiology (ACR) and ESUR, provides a standardized risk stratification system incorporating morphological features, diffusion-weighted imaging (DWI), and dynamic contrast enhancement (DCE). Several multicenter studies have validated its high diagnostic accuracy, but limited data are available from South Asia. The aim is to evaluate the diagnostic performance of O-RADS MRI in differentiating benign from malignant adnexal lesions, using histopathology as the reference standard. **Materials and Methods:** This prospective single-centre study was conducted between June 2024 and May 2025. A total of 73 women with adnexal masses underwent pelvic MRI including DWI and DCE sequences. Lesions were classified according to O-RADS MRI (categories 1–5). MRI-based categories were compared with histopathology, with premalignant and malignant lesions grouped together. Sensitivity, specificity, PPV, NPV, and diagnostic accuracy were calculated. **Result:** Of 73 adnexal lesions, 22 (30.1%) were malignant. O-RADS MRI showed a sensitivity of 93.1%, specificity of 87.5%, PPV 77.4%, NPV 96.4%, and overall accuracy of 89.9%. **Conclusion:** O-RADS MRI is a highly effective, standardized, and reproducible system for stratifying adnexal lesions. It demonstrates excellent diagnostic performance in distinguishing benign from malignant lesions and can play a critical role in guiding management, particularly in indeterminate cases after ultrasound.

INTRODUCTION

Ovarian cancer is the fifth leading cause of cancer-related mortality among women worldwide, with late diagnosis contributing significantly to poor outcomes.^[1,2] Accurate preoperative characterization of adnexal lesions is critical to avoid unnecessary surgeries for benign lesions and to ensure timely referral of malignant cases.^[3,4] While ultrasound remains the first-line modality, indeterminate findings are not uncommon.^[5] MRI, with its superior soft tissue contrast and functional sequences, plays an important role in further characterizing these lesions.^[6] The O-RADS MRI scoring system was

developed to standardize reporting, provide objective criteria, and improve risk stratification.^[7] This study aims to evaluate its diagnostic performance in an tertiary care setting in South India.

Review of Literature

Several studies have validated O-RADS MRI's diagnostic performance. Thomassin-Naggara et al. demonstrated high sensitivity and specificity in differentiating benign from malignant adnexal masses.^[8,9] Sadowski et al., in a multicenter study, reported sensitivity of 91.5% and specificity of 85%.^[10] Forstner et al. confirmed reproducibility and clinical utility across European centers.^[11] Vargas et al. emphasized the value of multiparametric MRI incorporating DWI and DCE.^[12] Andreotti et al.

highlighted the role of O-RADS MRI in standardized risk stratification.^[13] Despite robust international data, regional validation in South Asia remains limited.^[14,15]

MATERIALS AND METHODS

Design: Prospective observational study
Period: June 2024 – May 2025
Subjects: 73 women with adnexal lesions detected on ultrasound and referred for MRI
Inclusion Criteria
Age >18 years, adnexal lesion confirmed on MRI, histopathology available.
Exclusion Criteria
Known advanced gynecological malignancy, no histological follow-up.
MRI Protocol: 1.5T scanner; sequences included T1, T2, fat-suppressed T1, DWI (b=0, 800), ADC maps, and DCE perfusion.
Interpretation: Two radiologists independently applied O-RADS MRI scoring (v1.0, 2018). Discordances resolved by consensus.

Histopathology: Gold standard. Premalignant and malignant grouped together.

RESULTS

The commonest age group was 40–50 years (34.2%), followed by 50–60 years.

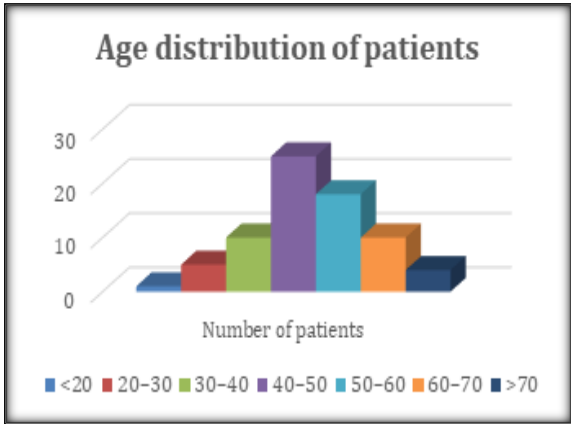
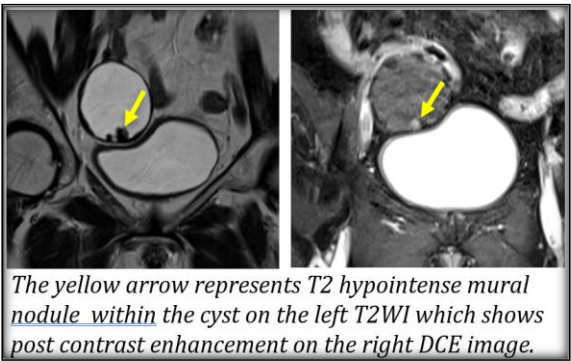


Table 1: O-RADS MRI category vs Histopathology outcome

O-RADS MRI Category	Benign (n)	Malignant (n)
2	37	1
3	11	2
4	4	7
5	1	12

Table 2: Diagnostic performance of O-RADS MRI

Metric	Value
Sensitivity	93.1%
Specificity	87.5%
Positive Predictive Value	77.4%
Negative Predictive Value	96.4%
Accuracy	89.9%



DISCUSSION

Our study demonstrates that O-RADS MRI has excellent diagnostic performance in differentiating benign from malignant adnexal lesions, with sensitivity (93.1%), specificity (87.5%), and accuracy (89.9%) closely matching international data. Thomassin-Naggara et al. first validated the O-RADS MRI scoring system with sensitivity of 93% and specificity of 91%,^[8] while Sadowski et al. reported similar values in a large multicenter trial.^[10]

These results support the robustness and reproducibility of the system across different clinical settings.

Compared with ultrasound-based O-RADS, MRI offers superior tissue characterization, especially with diffusion-weighted imaging and dynamic contrast enhancement.^[9,12] In our series, only one O-RADS 2 lesion was malignant, highlighting the system’s high negative predictive value (96.4%), a key factor in ruling out malignancy and avoiding unnecessary surgery.

Our findings also align with Forstner et al,^[11] who emphasized the utility of MRI in sonographically indeterminate adnexal masses, and Vargas et al,^[12] who showed the added value of multiparametric imaging in refining risk stratification. Importantly, the standardized lexicon of O-RADS MRI enhances interobserver agreement and provides a reproducible framework for clinical decision-making.^[7,13]

The main limitations of our study include its single-center design and modest sample size, similar to other regional studies.^[14,15] Larger multicenter Indian data are needed to confirm external validity. Nevertheless, this prospective study provides important evidence

supporting O-RADS MRI in South Asian populations, where data remain scarce.

CONCLUSION

O-RADS MRI is a robust and standardized system for adnexal lesion risk stratification, offering high diagnostic accuracy and reproducibility. By minimizing unnecessary surgeries for benign lesions and enabling early identification of malignant cases, it ensures timely and effective patient care. Wider implementation in India through clinician training, multidisciplinary awareness, and integration into national guidelines has the potential to significantly enhance early detection, streamline management pathways, and ultimately better survival outcomes.

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