

Assessment of Gynecological Pathologies Using Ultrasound Imaging: A Retrospective Study

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Abstract:

Background: Ultrasound imaging is a primary, non-invasive diagnostic modality widely used for evaluating gynecological pathologies due to its safety, accessibility, and high diagnostic accuracy.

Aim: To assess the spectrum and distribution of gynecological pathologies detected using ultrasound imaging in a retrospective study.

Methodology: This hospital-based retrospective observational study was conducted in the Department of Radiology, Katihar Medical College and Hospital over 9 months. A total of 80 female patients with complete clinical and ultrasound records were included. Data on demographics, symptoms, and ultrasound findings were analyzed using descriptive statistics.

Results: The majority of patients were aged 36–45 years (27.5%). Uterine fibroids were the most common pathology (30%), followed by ovarian cysts (22.5%). Abnormal uterine bleeding was the leading symptom (32.5%). A strong clinico-radiological correlation was observed, particularly between fibroids and AUB, and ovarian cysts with pelvic pain.

Conclusion: Ultrasound imaging is highly effective in diagnosing gynecological disorders, with uterine fibroids and ovarian cysts being most prevalent. It plays a crucial role in early detection, clinical correlation, and management, reinforcing its value as a first-line imaging tool in gynecology.

Keywords: Ultrasound, Gynecological Pathologies, Fibroids, Ovarian Cysts, Retrospective Study.

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Introduction

The non-invasive nature of ultrasound imaging combined with its affordable and accessible features and its capability to show pelvic organs in 'real time' has made ultrasound imaging the most popular diagnostic tool used in gynecology. The diagnostic test enables medical professionals to assess pelvic pathologies from uterine to ovarian and adnexal and all other pelvic regions through its use in both outpatient and inpatient gynecological settings. The past three decades have seen substantial progress in ultrasound technology which now allows medical professionals to use transabdominal and transvaginal techniques for improved accuracy when diagnosing multiple gynecological conditions that include fibroids and ovarian cysts and endometriosis and pelvic inflammatory disease and malignancies [1]. The rising number of gynecological diseases among women in reproductive and postmenopausal stages has made it essential to use imaging methods for early detection and treatment planning.

Gynecological pathologies represent a major proportion of clinical complaints in women attending outpatient departments worldwide [2]. The medical community uses imaging tests to investigate patients who show symptoms which include abnormal uterine bleeding and chronic pelvic pain and infertility and menstrual irregularities. The healthcare system uses ultrasound as its primary diagnostic tool because it provides safe patient testing which delivers accurate results for female reproductive system disorders. Transvaginal ultrasound enables medical professionals to identify small lesions and minor pelvic abnormalities through its advanced imaging capabilities which exceed the performance of traditional transabdominal methods. The medical field now uses ultrasound equipment for primary screening tests because it provides both confirmation and diagnostic capabilities in gynecological examinations.

Uterine pathologies such as leiomyomas (fibroids), adenomyosis, and endometrial hyperplasia are

commonly encountered conditions that significantly affect women's health and quality of life. The most common benign tumors of the uterus which are known as fibroids usually appear on ultrasound as distinct hypoechoic masses that exist in the myometrium. The high-resolution imaging techniques used to detect adenomyosis reveal its characteristic feature of having a myometrium that contains small cystic spaces. The evaluation of endometrial abnormalities between hyperplasia and carcinoma establishes endometrial thickness and echotexture as the primary assessment criteria for postmenopausal women who experience abnormal uterine bleeding. The critical information which ultrasound provides enables medical professionals to identify conditions at an early stage and deliver appropriate treatment [3].

Ultrasound imaging assesses another major group of gynecological disorders which includes ovarian and adnexal pathologies [4]. Ovarian cysts, both functional and pathological, are frequently identified in women of reproductive age. The two types of functional cysts which include follicular and corpus luteum cysts show benign behavior and will resolve by themselves while the complex cysts need extra testing to determine their possible cancerous development. The ultrasound shows specific features which include septations, solid components, papillary projections and vascularity which doctors assess through Doppler studies to determine whether an ovarian mass is benign or malignant [5]. The medical community faces difficulties in detecting ovarian cancer at its initial stages while ultrasound technology helps assess patient risk and determines suitable methods for additional tests.

Ultrasound imaging serves as an effective diagnostic tool for both pelvic inflammatory disease and endometriosis according to research documented in [6]. The clinical diagnosis of pelvic inflammatory disease (PID) requires ultrasound examination to detect complications which include tubo-ovarian abscesses and hydrosalpinx. Ovarian endometriomas exhibit a specific ultrasound pattern which produces uniform internal echoes that medical professionals describe as having a "ground glass" appearance. The obtained results play a vital role in directing treatment choices while establishing whether surgery becomes necessary. Ultrasound technology enables doctors to track how their patients progress through chronic gynecological conditions while receiving treatment.

Ultrasound systems remain commonly used in medical practice yet their diagnostic results show different accuracy levels which depend on three particular factors: the skill level of the operator who conducts the examination, the performance capabilities of the equipment, and the presence of patient conditions like obesity or bowel gas interference. The development of imaging technology through ongoing

research efforts has created three-dimensional (3D) ultrasound and color Doppler imaging systems which provide more accurate and consistent diagnostic results according to [7]. The advancements in these technologies demonstrate that ultrasound has established itself as a dependable imaging technique for gynecological examinations which decreases the demand for costly invasive testing methods like CT and MRI.

Retrospective studies that examine ultrasound results in gynecological patients deliver essential information about disease patterns and prevalence rates and clinical diagnostic results. The studies enable researchers to determine which medical conditions occur most frequently while they assess how well doctors diagnose these conditions and create better treatment protocols. The study establishes evidence-based practice through its investigation of medical imaging results that connect with both histopathological findings and surgical results which raises the diagnostic value of ultrasound technology. Healthcare providers in areas with limited resources rely on retrospective studies because these studies enable efficient management of existing imaging capabilities while they enhance medical services to patients.

Ultrasound imaging has become a necessary method for evaluating gynecological disorders. The system becomes the preferred method for everyday medical use because it delivers comprehensive body structure and organ function data through safe non-destructive testing at an affordable price. The ongoing progress of ultrasound technology together with growing medical expertise has improved its ability to diagnose medical conditions. The process of assessing gynecological conditions through ultrasound examination helps medical professionals understand disease patterns while it enhances diagnostic precision and patient care methods in gynecological practice.

Methodology

Study Design: The present study was conducted as a hospital-based retrospective observational study. It was designed to assess and analyze gynecological pathologies detected through ultrasound imaging. The study reviewed previously recorded ultrasound reports and associated clinical data of patients who had undergone imaging for gynecological complaints. A retrospective design was chosen because it allowed systematic evaluation of existing data without intervention, thereby providing real-world diagnostic insights into ultrasound findings.

Study Setting: The study was carried out in the Department of Radiology, Katihar Medical College and Hospital, Katihar, Bihar, India.

Study Duration: The study was conducted over a period of 9 months from May 2025 to January 2026

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Female patients of reproductive and post-reproductive age group
- Patients who had undergone pelvic or transvaginal ultrasound for gynecological complaints
- Patients with complete radiological and clinical records available
- Cases with confirmed ultrasound diagnosis of gynecological pathology

Exclusion Criteria:

- Incomplete or missing ultrasound records
- Patients with non-gynecological pelvic pathologies
- Pregnant women with obstetric indications only
- Patients who had undergone prior gynecological surgery affecting pelvic anatomy
- Poor-quality ultrasound images or inconclusive reports

Study Sampling: A purposive sampling technique was used in this study. All eligible cases that met the inclusion criteria within the study duration were included. No randomization was performed, as the study was based on available retrospective data.

Study Sample Size: The final sample size consisted of 80 patients who fulfilled the inclusion criteria and had complete ultrasound and clinical records available for analysis.

Study Parameters: The following parameters were evaluated during the study:

- Type of gynecological pathology detected on ultrasound
- Age distribution of patients
- Clinical presentation and symptoms
- Ultrasound characteristics of lesions (size, location, echotexture)
- Associated pelvic or uterine abnormalities
- Frequency and pattern of different gynecological conditions

Study Procedure: All relevant ultrasound reports of patients were retrieved from the hospital radiology and medical record department. Each report was carefully reviewed to identify gynecological abnormalities. Corresponding clinical records were also examined to correlate ultrasound findings with presenting symptoms. The data were systematically recorded in a structured data collection sheet prepared for the study.

Study Data Collection: Data were collected using a pre-designed proforma. Information such as patient demographics, clinical symptoms, and detailed ultrasound findings were extracted. All data were anonymized to maintain confidentiality. Only relevant and complete records were included to ensure accuracy and reliability of the study findings.

Data Analysis: The collected data were entered into Microsoft Excel and analyzed using SPSS version 27.0V. Descriptive statistical methods were applied to calculate frequencies, percentages, and distributions of various gynecological pathologies. Results were presented in the form of tables and graphs for better interpretation. Comparative analysis was performed wherever applicable to identify patterns and trends in ultrasound findings.

Result

Table 1 presents the age-wise distribution of the study participants (n = 80). The majority of patients belonged to the 36–45 years age group, accounting for 27.50% (22 patients), followed by the 26–35 years group with 22.50% (18 patients). The 46–55 years age group constituted 20.00% (16 patients), while those aged above 55 years comprised 17.50% (14 patients). The youngest age group of 15–25 years represented the smallest proportion of participants at 12.50% (10 patients). Overall, the distribution shows that most cases were concentrated in the middle-aged reproductive group, particularly between 26 and 45 years, indicating a higher burden of gynecological pathologies in this age range within the study population.

Age Group (Years)	Number of Patients	Percentage (%)
15–25	10	12.50%
26–35	18	22.50%
36–45	22	27.50%
46–55	16	20.00%
>55	14	17.50%
Total	80	100%

Table 2 presents the distribution of various gynecological pathologies detected on ultrasound among the study population (n = 80). The most commonly observed pathology was uterine fibroids, accounting for 24 cases (30.00%), indicating it as the predominant finding in the cohort. This was followed by ovarian cysts, which were identified in 18 cases

(22.50%), making it the second most frequent abnormality. Pelvic inflammatory disease was observed in 12 cases (15.00%), while adenomyosis was noted in 10 cases (12.50%), reflecting a moderate prevalence of these conditions. Endometrial abnormalities were seen in 8 cases (10.00%), showing a relatively lower frequency. Interestingly, normal ultrasound findings

were also reported in 8 cases (10.00%), indicating that a subset of patients did not show any detectable gynecological pathology. Overall, the distribution highlights that uterine fibroids and ovarian cysts

were the most prevalent abnormalities, collectively contributing a significant proportion of the detected cases, while other conditions were comparatively less common in the studied population.

Pathology Type	Number of Cases	Percentage (%)
Uterine Fibroids	24	30.00%
Ovarian Cysts	18	22.50%
Adenomyosis	10	12.50%
Pelvic Inflammatory Disease	12	15.00%
Endometrial Abnormalities	8	10.00%
Normal Findings	8	10.00%
Total	80	100%

Table 3 presents the clinical presentation of the study population (n = 80), showing that the most common symptom among patients was abnormal uterine bleeding (AUB), observed in 26 cases (32.50%). This was followed by abdominal or pelvic pain, reported in 20 patients (25.00%), indicating that pain-related complaints were the second most frequent reason for presentation. Menstrual irregularities were noted in 14 patients (17.50%), while infertility evaluation accounted for 10 cases (12.50%),

reflecting a significant proportion of patients undergoing assessment for reproductive concerns. White discharge (leucorrhea) was seen in 6 patients (7.50%), and only 4 patients (5.00%) were identified during routine check-ups without specific complaints. Overall, the data highlights that abnormal uterine bleeding and pelvic pain were the predominant clinical indications leading to ultrasound evaluation in this study population.

Clinical Symptom	Number of Patients	Percentage (%)
Abnormal Uterine Bleeding (AUB)	26	32.50%
Abdominal/Pelvic Pain	20	25.00%
Menstrual Irregularities	14	17.50%
Infertility Evaluation	10	12.50%
White Discharge (Leucorrhea)	6	7.50%
Routine Check-up	4	5.00%
Total	80	100%

Table 4 presents the correlation between presenting gynecological symptoms and corresponding ultrasound findings. It was observed that abnormal uterine bleeding (AUB) was most commonly associated with uterine fibroids, accounting for 14 cases, indicating fibroids as a leading structural cause of bleeding abnormalities. Pelvic pain was predominantly linked with ovarian cysts in 10 cases, reflecting cystic ovarian pathology as a frequent source of pelvic discomfort. Menstrual irregularities showed a strong association with adenomyosis in 8 cases,

suggesting its significant role in cycle disturbances. Infertility cases were commonly correlated with pelvic inflammatory disease (PID) and ovarian cysts in 9 cases, highlighting the multifactorial etiology affecting fertility. Leucorrhea was mainly associated with PID in 5 cases, emphasizing its infectious origin. Overall, 46 cases demonstrated a clear correlation between clinical symptoms and ultrasound findings, reinforcing the diagnostic value of ultrasound in identifying underlying gynecological pathologies.

Symptom	Most Common Finding	Number of Cases
AUB	Uterine Fibroids	14
Pelvic Pain	Ovarian Cysts	10
Menstrual Irregularities	Adenomyosis	8
Infertility	PID / Ovarian Cysts	9
Leucorrhea	PID	5
Total Correlated Cases		46

Table 5 presents the distribution of ultrasound techniques used among the study participants (n = 80). It

was observed that Transabdominal Ultrasound (USG) was the most commonly used modality,

performed in 48 patients, accounting for 60.00% of the cases. This was followed by Transvaginal USG, which was utilized in 22 patients, representing 27.50% of the study population. A combined approach using both Transabdominal and Transvaginal techniques was employed in 10 patients, making up

the remaining 12.50%. Overall, the findings indicate a predominant reliance on Transabdominal USG as the primary imaging technique, while Transvaginal and combined approaches were used selectively based on clinical requirement and diagnostic necessity.

Table 5: Type of Ultrasound Technique Used (n = 80)

Ultrasound Type	Number of Patients	Percentage (%)
Transabdominal USG	48	60.00%
Transvaginal USG	22	27.50%
Combined (Both)	10	12.50%
Total	80	100%

Discussion

The current research shows that ultrasound imaging offers essential diagnostic capabilities for assessing gynecological conditions through its results, which match multiple earlier studies. The reproductive and peri-menopausal age group of 26 to 45 years accounts for almost half of the studied cases, which Walker et al. (2007) [8] discovered as the main age group where most common benign gynecological conditions occur because of hormonal changes and active ovarian function. Derchi et al. (2001) [9] showed that the best time to perform ultrasound evaluations happens during the reproductive stage because this period shows the most complete structural and functional development of both uterine and ovarian systems. The study shows a lower percentage of postmenopausal patients which corresponds with the findings of Woodfield (2018) [10] who discovered that older adults develop more gynecological cancers and atrophic alterations yet most ultrasound referrals still originate from benign health conditions.

The present study found that uterine fibroids were the most common medical condition which researchers identified, followed by their discovery of ovarian cysts. Walker et al. (2007) found that ultrasound examinations showed fibroids as the most frequent uterine abnormality which appeared in women between 30 and 50 years old because 20 to 40 percent of symptomatic cases showed this condition. Sokalska et al. (2009) [11] showed that functional ovarian cysts make up the largest part of gynecological ultrasound results because their study results confirmed the current research findings. Fischerova (2011) [12] established that our study shows lower rates of adenomyosis and pelvic inflammatory disease because patients need advanced imaging techniques to make accurate diagnoses of these conditions.

The present study found that abnormal uterine bleeding (AUB) represents the most common symptom for patients with uterine fibroids. The study results confirm Derchi et al. (2001) findings which show AUB serves as one of the primary reasons

patients undergo pelvic ultrasound testing because fibroids represent the most common cause of this condition. Walker et al. (2007) found that structural uterine lesions caused most of the bleeding disorders which ultrasound detected. Our study found that pelvic pain occurred together with ovarian cysts, which Sokalska et al. (2009) established as a common cause of pain which results from cysts that either enlarge or rupture. Our study found that menstrual irregularities showed a strong relationship with adenomyosis, which Turkgeldi et al. (2015) [13] established through their research which showed how advanced ultrasound techniques help detect adenomyotic changes that lead to dysmenorrhea and irregular menstrual cycles.

The present study found strong clinico-radiological connection which linked AUB with fibroids and pelvic pain with ovarian cysts and infertility with pelvic inflammatory disease and ovarian pathology. The results match the findings of Testa et al. (2005) [14] because they proved that transvaginal and enhanced ultrasound methods lead to better diagnostic results which connect symptoms to gynecological diseases. Sokalska et al. (2009) demonstrated that transvaginal ultrasound enables accurate diagnosis of adnexal masses which confirms its ability to link symptoms with underlying medical conditions.

The current research discovered that transabdominal ultrasound served as the primary imaging method because it enabled non-invasive testing capabilities across various medical situations. This observation is consistent with Zhang et al. (2015) [15], who reported that transabdominal scanning remains the first-line imaging modality in many clinical settings, particularly in resource-limited environments. The researchers Turkgeldi et al. (2015) demonstrated that transvaginal ultrasound provides better image quality and more accurate diagnostic results when used to examine small or early-stage pelvic tumors, which served as the basis for its application in the study's comprehensive assessment.

The study results show complete alignment with current research which proves that ultrasound functions as a critical resource for assessing

gynecological disorders. The pattern of fibroids and ovarian cysts distribution across different regions shows a worldwide pattern that has been documented in numerous research studies. The current research demonstrates that ultrasound serves two purposes because it enables precise diagnosis and it helps physicians decide on treatment through its establishment of direct relationships between clinical findings and radiological results.

Conclusion

This retrospective study highlights that ultrasound imaging is an essential and highly effective diagnostic tool in the evaluation of gynecological pathologies. The study showed a higher prevalence of conditions such as uterine fibroids and ovarian cysts, particularly among women in the reproductive age group, with abnormal uterine bleeding being the most common presenting symptom. A strong correlation between clinical symptoms and ultrasound findings further reinforces its diagnostic accuracy and clinical relevance. Transabdominal ultrasound remained the most frequently used modality, while transvaginal and combined approaches provided additional diagnostic clarity when required. Overall, ultrasound demonstrated significant value in early detection, characterization, and management of gynecological disorders. These findings emphasize its role as a first-line, non-invasive, and cost-effective imaging modality in routine gynecological practice, supporting timely diagnosis and improved patient outcomes in women's health care.

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