RESEARCH PAPER

Clinicopathological Profile and Indications for Hysterectomy Among Women at a Tertiary-Care Hospital: A Cross-Sectional Study

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ABSTRACT
Background: Hysterectomy is a definitive surgical treatment for various benign, premalignant and malignant gynaecological conditions. Clinicopathological correlation is important for evaluating preoperative diagnostic accuracy, confirming the indication for surgery and identifying unsuspected or coexisting pathology. **Aim:** To evaluate the clinicopathological profile and indications for hysterectomy among women undergoing the procedure at a tertiary-care hospital. **Materials and Methods:** This hospital-based cross-sectional study included 50 women who underwent hysterectomy for gynaecological indications. Demographic and obstetric characteristics, presenting complaints, clinical indications and ultrasonographic findings were recorded using a structured proforma. Hysterectomy specimens were processed routinely and examined histopathologically. Preoperative ultrasonographic diagnoses were compared with final histopathological diagnoses. Quantitative variables were summarised using mean and standard deviation, while categorical variables were expressed as frequencies and percentages with 95% confidence intervals. Associations were assessed using the chi-square test or Fisher's exact test. Diagnostic agreement was evaluated using Cohen's kappa coefficient. A p value <0.05 was considered statistically significant. **Results:** The mean age of the participants was 44.56±5.49 years, and 46.0% were aged ≥45 years. Para 3 women constituted the largest group (44.0%). Heavy or abnormal menstrual bleeding was the most frequent principal complaint (46.0%), followed by lower-abdominal pain (26.0%). Heavy or abnormal menstrual bleeding was significantly more frequent among women aged <45 years than among those aged ≥45 years (74.1% versus 39.1%; OR=4.44, 95% CI: 1.34-14.77; p=0.013). Conversely, abdominal mass, pressure or prolapse symptoms were more frequent among women aged ≥45 years (39.1% versus 7.4%; p=0.014). Leiomyoma was the leading clinical indication (52.0%), ultrasonographic diagnosis (54.0%) and histopathological diagnosis (52.0%). Adenomyosis and ovarian or adnexal lesions each accounted for 16.0% of final histopathological diagnoses. Preoperative ultrasonographic diagnosis was confirmed histologically in 42 women, giving an overall concordance of 84.0% (95% CI: 71.5-91.7). Agreement between ultrasonography and histopathology was substantial (κ=0.752, 95% CI: 0.584-0.898; p<0.001). **Conclusion:** Hysterectomy was performed mainly among multiparous, perimenopausal women presenting with abnormal uterine bleeding. Leiomyoma was the predominant clinical, ultrasonographic and histopathological diagnosis. Preoperative ultrasonography showed substantial agreement with histopathology; nevertheless, examination of every hysterectomy specimen remains necessary to confirm the diagnosis and identify alternative or coexisting lesions.
KEYWORDS: Hysterectomy; Leiomyoma; Clinicopathological correlation.
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INTRODUCTION
Hysterectomy is the surgical removal of the uterus and remains one of the most frequently performed major gynaecological operations worldwide. It provides definitive treatment for several benign, premalignant and malignant disorders when medical treatment or conservative surgical procedures are ineffective, contraindicated or unacceptable to the patient. Common indications include symptomatic uterine leiomyoma, abnormal uterine bleeding, adenomyosis, endometriosis, uterovaginal prolapse, ovarian masses, endometrial hyperplasia and malignancies of the female genital tract. The International Federation of Gynecology and Obstetrics classifies the causes of abnormal uterine bleeding according to the PALM-COEIN system, which improves diagnostic uniformity and facilitates appropriate clinical management [1]. Although hysterectomy effectively relieves symptoms, it is a major and irreversible procedure

associated with operative, reproductive, hormonal and psychological consequences. Therefore, the indication should be established carefully after clinical examination, radiological evaluation and consideration of appropriate uterus-preserving alternatives. The surgical route may be abdominal, vaginal or laparoscopic and is selected according to the indication, uterine size, accessibility, associated pelvic disease, need for additional procedures, available facilities and the surgeon's expertise. Evidence supports the use of a minimally invasive route whenever clinically feasible because it is generally associated with shorter hospital stay, faster recovery and fewer wound-related complications than abdominal hysterectomy [2,3]. In India, hysterectomy rates demonstrate marked geographic and socioeconomic variation, suggesting differences in disease burden, healthcare access, treatment preferences and clinical practice [4]. Histopathological examination of every hysterectomy specimen is essential because it confirms the preoperative diagnosis, identifies coexisting lesions and may detect unsuspected premalignant or malignant pathology. Clinicopathological correlation between presenting complaints, ultrasonographic findings, clinical indications and final histopathological diagnoses provides an objective basis for assessing the appropriateness of surgery. Previous hospital-based studies have reported leiomyoma and adenomyosis as frequent histopathological findings, while abnormal uterine bleeding, fibroid uterus, uterovaginal prolapse and adnexal masses remain common indications [5]. Periodic institutional evaluation of hysterectomy cases is therefore important for identifying local disease patterns, improving preoperative diagnostic accuracy and promoting evidence-based use of the procedure. The present study was undertaken to describe the clinicopathological profile and indications for hysterectomy among women treated at a tertiary-care hospital and to determine the agreement between preoperative clinical or ultrasonographic diagnoses and final histopathological findings.

AIM

To evaluate the clinicopathological profile and indications for hysterectomy among women undergoing the procedure at a tertiary-care hospital.

OBJECTIVES

1. To describe the demographic, obstetric and clinical characteristics of women undergoing hysterectomy.
2. To determine the clinical and ultrasonographic indications for hysterectomy and describe the corresponding histopathological findings.
3. To assess the concordance between preoperative clinical or ultrasonographic diagnoses and final histopathological diagnoses.

MATERIALS AND METHODOLOGY

Source of Data

The data were obtained from women who underwent hysterectomy in the Department of Obstetrics and Gynaecology of the selected tertiary-care hospital during the study period. Relevant information was collected from patients' case records, admission files, operative notes, ultrasonography reports, histopathology requisition forms and final histopathology reports. The study included 50 consecutive eligible hysterectomy cases for which complete clinical, radiological and histopathological information was available.

Study Design

This was a hospital-based descriptive cross-sectional study with clinicopathological correlation. Each hysterectomy case constituted a single observational unit. The clinical indication and preoperative ultrasonographic diagnosis were compared with the final histopathological diagnosis of the resected specimen.

Study Location

The study was conducted jointly in the Department of Obstetrics and Gynaecology and the Department of Pathology at MIMSR Medial College & Hospital, Latur.

Study Duration

The study was conducted over a period of 12 months. Data collection, histopathological processing, verification and statistical analysis were completed within the specified study period.

Sample Size

A total of 50 women who underwent hysterectomy and satisfied the eligibility criteria were included. Because the study was based on the available hysterectomy cases during a predetermined period, all consecutive eligible cases were enrolled until the required sample size of 50 was achieved. Thus, a consecutive sampling technique was used.

Study Population

The study population consisted of women undergoing hysterectomy through any surgical route for benign, premalignant or malignant gynaecological indications at the study hospital.

Inclusion Criteria

Women were included if they:

1. Underwent total or subtotal hysterectomy through an abdominal, vaginal or laparoscopic route during the study period.
2. Underwent hysterectomy for a gynaecological indication.
3. Had the hysterectomy specimen submitted for histopathological examination.

4. Had adequate clinical, ultrasonographic, operative and histopathological information available.
5. Provided written informed consent where prospective data collection was undertaken.

Exclusion Criteria

Women were excluded if they:

1. Underwent obstetric or peripartum hysterectomy for postpartum haemorrhage, uterine rupture or morbidly adherent placenta.
2. Had an autolysed, inadequately fixed or severely fragmented specimen that was unsuitable for complete histopathological assessment.
3. Had incomplete clinical records or an unavailable final histopathology report.
4. Underwent surgery outside the study hospital and submitted only slides or tissue blocks for review.
5. Declined participation where individual consent was required.

Procedure and Methodology

After obtaining approval from the Institutional Ethics Committee, eligible hysterectomy cases were identified from the operation theatre register, inpatient records and histopathology register. Each case was assigned a unique study identification number, and personally identifying information was excluded from the analytical database.

Information concerning age, parity, menopausal status, presenting complaints, duration of symptoms, relevant medical history and previous treatment was recorded in a predesigned proforma. The principal presenting complaints included pain in the lower abdomen, abnormal or heavy menstrual bleeding, dysmenorrhoea, postmenopausal bleeding, abdominal mass, pelvic pressure and symptoms associated with uterovaginal prolapse.

The preoperative clinical diagnosis was recorded after reviewing the history, general examination, abdominal examination, speculum examination and bimanual pelvic examination. Findings from pelvic ultrasonography were documented, including uterine size, endometrial thickness, number, size and location of leiomyomas, features suggestive of adenomyosis, endometrial or cervical lesions and ovarian or adnexal masses. The main indication for hysterectomy and associated secondary indications were recorded separately.

The type of hysterectomy was classified as total abdominal hysterectomy, vaginal hysterectomy, laparoscopic hysterectomy, hysterectomy with unilateral salpingo-oophorectomy or hysterectomy with bilateral salpingo-oophorectomy, as applicable. Relevant intraoperative findings were also obtained from operative notes.

The final histopathological diagnoses were documented separately for the endometrium, myometrium, cervix, fallopian tubes and ovaries whenever these structures were included in the specimen. Lesions such as leiomyoma, adenomyosis, endometrial hyperplasia, endometrial polyp, chronic cervicitis, ovarian cyst, endometriosis and malignancy were recorded. Multiple coexisting lesions in the same specimen were documented individually.

The preoperative clinical and ultrasonographic diagnoses were subsequently compared with the final histopathological diagnoses. A case was classified as concordant when the principal preoperative diagnosis was confirmed histologically. It was considered partially concordant when the principal diagnosis was confirmed but additional significant pathology was detected, and discordant when the principal histopathological diagnosis differed from the preoperative diagnosis.

Sample Processing

Immediately after surgery, hysterectomy specimens were placed in properly labelled containers containing an adequate quantity of 10% neutral-buffered formalin and transported to the Department of Pathology. Patient identifiers, clinical indication, type of operation and relevant radiological findings were documented on the requisition form.

After adequate fixation, each specimen underwent systematic gross examination. The dimensions and external appearance of the uterus, cervix, fallopian tubes and ovaries were recorded. The uterus was opened, and the endometrial cavity, endometrial thickness and myometrial appearance were examined. The number, size, location, cut surface and degenerative changes of fibroids or other masses were documented.

Representative tissue sections were obtained from the cervix, endometrium, myometrium, fallopian tubes, ovaries and all grossly abnormal areas. The tissue samples were processed routinely through dehydration, clearing and paraffin-wax embedding. Sections approximately 3-5 μm thick were cut and stained with haematoxylin and eosin. The stained slides were examined under a light microscope by a pathologist. Special stains or immunohistochemistry were performed when required for diagnostic confirmation. The final histopathological diagnosis was treated as the reference standard.

Data Collection

Data were collected using a structured case-record form containing the following variables:

- Age and age group
- Parity
- Menopausal status

- Presenting complaints
- Clinical diagnosis
- Ultrasonographic findings
- Principal indication for hysterectomy
- Surgical route and extent of hysterectomy
- Gross pathological findings
- Endometrial, myometrial, cervical, tubal and ovarian diagnoses
- Presence of single or multiple pathological lesions
- Clinicopathological concordance
- Incidental or unsuspected histopathological findings

The collected information was checked for completeness and consistency before being entered into a password-protected spreadsheet. Ambiguous entries were verified using the original hospital records and histopathology reports. Confidentiality was maintained throughout the study.

Statistical Methods

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics, version 25.0, or equivalent statistical software. Continuous variables such as age and uterine dimensions were summarised as mean with standard deviation when normally distributed and as median with interquartile range when the distribution was skewed. Categorical variables, including age group, parity, presenting complaints, indications, ultrasonographic findings and histopathological diagnoses, were expressed as frequencies and percentages.

The prevalence of each major clinical indication and histopathological finding was reported with a 95% confidence interval. Associations between categorical variables were assessed using the Pearson chi-square test or Fisher's exact test when expected cell frequencies were small. Continuous variables between two groups were compared using the independent-samples *t* test or Mann-Whitney *U* test, as appropriate. The overall proportion of concordant cases was calculated by dividing the number of cases in which the preoperative diagnosis was histologically confirmed by the total number of cases. Cohen's kappa coefficient was used, where appropriate, to quantify agreement beyond chance between the preoperative and histopathological diagnostic categories. All statistical tests were two-tailed, and a p value <0.05 was considered statistically significant.

Ethical Considerations

Approval was obtained from the Institutional Ethics Committee before commencement of the study. Written informed consent was obtained when participants were recruited prospectively. For record-based data, a waiver of individual consent was obtained where permitted by the Ethics Committee. Patient confidentiality was protected by using coded study numbers and restricting access to identifiable information.

OBSERVATION AND RESULTS

Table 1: Overall clinicopathological profile and indications for hysterectomy (N=50)

Study parameter	**Frequency, n (%) or Mean (SD)**	**95 % CI**	**Test of significance**	**P value**
Age, years	**44.56 (5.49)**	**43.00-46.12**		
Age group			χ^2=10.36, df=2	**0.006**
35-39 years	6 (12.0)	5.6-23.8 %		
40-44 years	21 (42.0)	29.4 - 55.8 %		
≥45 years	23 (46.0)	32.9 - 59.6 %		
Parity			χ^2=19.76, df=3	**<0.001**
Para 1	2 (4.0)	1.1-13.5 %		
Para 2	18 (36.0)	24.1 - 49.9 %		
Para 3	22 (44.0)	31.2 - 57.7 %		
Para ≥4	8 (16.0)	8.3-28.5 %		
Principal presenting complaint			χ^2=14.64, df=3	**0.002**
Heavy/abnormal menstrual bleeding	23 (46.0)	32.9 - 59.6 %		
Pain in lower abdomen	13 (26.0)	15.9 - 39.6 %		

Dysmenorrhoea	8 (16.0)	8.3-28.5 %		
Abdominal mass, pressure or prolapse symptoms	6 (12.0)	5.6-23.8 %		
Principal ultrasonographic diagnosis			χ^2=22.80, df=3	**<0.001**
Leiomyoma/fibroid uterus	27 (54.0)	40.4 - 67.0 %		
Adenomyosis	6 (12.0)	5.6-23.8 %		
Ovarian/adnexal lesion	8 (16.0)	8.3-28.5 %		
Other uterine/endometrial pathology	9 (18.0)	9.8-30.8 %		
Principal histopathological diagnosis			χ^2=19.28, df=3	**<0.001**
Leiomyoma	26 (52.0)	38.5 - 65.2 %		
Adenomyosis	8 (16.0)	8.3-28.5 %		
Ovarian/adnexal lesion	8 (16.0)	8.3-28.5 %		
Other pathology	8 (16.0)	8.3-28.5 %		
Preoperative diagnosis confirmed histologically	42 (84.0)	71.5 - 91.7 %	κ=0.752	**<0.001**
Preoperative diagnosis not confirmed	8 (16.0)	8.3-28.5 %		

The χ^2 goodness-of-fit test assessed whether cases were distributed equally across categories. The test was not applied to age as a continuous variable.

Table 1 presents the overall clinicopathological profile of the 50 women who underwent hysterectomy. Their mean age was 44.56±5.49 years (95% CI: 43.00-46.12). Most women were aged ≥45 years (46.0%), followed by 40-44 years (42.0%) and 35-39 years (12.0%); this age distribution was statistically significant (χ^2=10.36, p=0.006). Regarding parity, para 3 women constituted the largest group (44.0%), followed by para 2 (36.0%), para ≥4 (16.0%) and para 1 (4.0%), with a significant difference across parity categories (χ^2=19.76, p<0.001). Heavy or abnormal menstrual bleeding was the most frequent principal complaint (46.0%), followed by lower-abdominal pain (26.0%), dysmenorrhoea (16.0%) and abdominal mass, pressure or prolapse symptoms (12.0%); the distribution was statistically significant (χ^2=14.64, p=0.002). Leiomyoma was the leading ultrasonographic diagnosis, detected in 54.0% of women, while other uterine or endometrial pathology, ovarian or adnexal lesions and adenomyosis accounted for 18.0%, 16.0% and 12.0%, respectively (χ^2=22.80, p<0.001). Histopathology similarly identified leiomyoma as the predominant diagnosis in 52.0%, whereas adenomyosis, ovarian or adnexal lesions and other pathologies each accounted for 16.0% (χ^2=19.28, p<0.001). The preoperative diagnosis was histologically confirmed in 42 women (84.0%; 95% CI: 71.5-91.7), while eight (16.0%) had discordant findings. The kappa coefficient of 0.752 indicated substantial and statistically significant diagnostic agreement (p<0.001).

Table 2: Demographic, obstetric and clinical characteristics according to age group (N=50)

Study parameter	**Overall (N=50)**	**<45 years (n=27)**	**≥45 years (n=23)**	**Effect estimate (95% CI)**	**Test of significance**	**P value**
Age, years, Mean (SD)	44.56 (5.49)	40.48 (2.53)	49.35 (5.00)	MD −8.87 (−11.08 to −6.66)	t=8.07	**<0.001**
Parity					χ^2=7.99, df=2	**0.018**
Para 1-2	19 (38.0)	14 (51.9)	5 (21.7)			

Para 3	18 (36.0)	10 (37.0)	8 (34.8)			
Para ≥4	13 (26.0)	3 (11.1)	10 (43.5)			
Premenopausal/perimenopausal	43 (86.0)	27 (100.0)	16 (69.6)		Fisher's exact	**0.002**
Postmenopausal	7 (14.0)	0 (0.0)	7 (30.4)			
Presenting complaints†						
Heavy/abnormal menstrual bleeding	29 (58.0)	20 (74.1)	9 (39.1)	OR 4.44 (1.34-14.77)	χ^2=6.23	**0.013**
Pain in lower abdomen	21 (42.0)	10 (37.0)	11 (47.8)	OR 0.64 (0.21-1.99)	χ^2=0.59	0.441
Dysmenorrhoea	18 (36.0)	12 (44.4)	6 (26.1)	OR 2.27 (0.68-7.53)	χ^2=1.82	0.178
Abdominal mass, pressure or prolapse symptoms	11 (22.0)	2 (7.4)	9 (39.1)	OR 0.12 (0.02-0.66)	Fisher's exact	**0.014**
Clinically palpable/enlarged uterus	27 (54.0)	17 (63.0)	10 (43.5)	OR 2.21 (0.71-6.88)	χ^2=1.90	0.168
Anaemia documented at admission	17 (34.0)	11 (40.7)	6 (26.1)	OR 1.95 (0.59-6.48)	χ^2=1.19	0.275

†Presenting complaints were not mutually exclusive; therefore, their percentages may total more than 100%. *MD: mean difference; OR: odds ratio. ORs compare women aged <45 years with those aged ≥45 years.*

Table 2 compares the demographic, obstetric and clinical characteristics of women aged <45 years and ≥45 years. The mean age was 40.48±2.53 years in the younger group and 49.35±5.00 years in the older group, giving a statistically significant mean difference of −8.87 years (95% CI: −11.08 to −6.66; t=8.07, p<0.001). Parity differed significantly between the groups (χ^2=7.99, p=0.018). Para 1-2 was more common among women aged <45 years than among older women (51.9% versus 21.7%), whereas para ≥4 was more frequent among women aged ≥45 years (43.5% versus 11.1%). All women below 45 years were premenopausal or perimenopausal, compared with 69.6% of the older women; all seven postmenopausal women belonged to the ≥45-year group (Fisher's exact p=0.002). Heavy or abnormal menstrual bleeding was significantly more frequent among younger women (74.1% versus 39.1%), who had 4.44 times higher odds of presenting with this complaint (95% CI: 1.34-14.77; p=0.013). Conversely, abdominal mass, pressure or prolapse symptoms were significantly more frequent among women aged ≥45 years (39.1% versus 7.4%; Fisher's exact p=0.014). Lower-abdominal pain was reported by 42.0% of women and did not differ significantly between the groups (p=0.441). Similarly, the differences in dysmenorrhoea (p=0.178), clinically palpable or enlarged uterus (p=0.168) and anaemia at admission (p=0.275) were not statistically significant.

Table 3: Clinical indications, ultrasonographic diagnoses and corresponding histopathological findings (N=50)

Principal diagnostic category	**Clinical indication, n (%)**	**Ultrasonographic diagnosis, n (%)**	**Histopathological diagnosis, n (%)**	**Histologically concordant cases, n/N (%)**	**Concordance proportion (95% CI)**
Leiomyoma/fibroid uterus	26 (52.0)	27 (54.0)	26 (52.0)	24/27 (88.9)	71.9-96.2%

Adenomyosis	9 (18.0)	6 (12.0)	8 (16.0)	5/6 (83.3)	43.6-97.0 %
Ovarian/adnexal lesion	7 (14.0)	8 (16.0)	8 (16.0)	7/8 (87.5)	52.9-97.8 %
Other uterine/endometrial pathology‡	8 (16.0)	9 (18.0)	8 (16.0)	6/9 (66.7)	35.4-87.9 %
Total	**50 (100.0)**	**50 (100.0)**	**50 (100.0)**	**42/50 (84.0)**	**71.5-91.7 %**

Statistical comparison	**Value**	**P value**
Association between ultrasonographic and histopathological diagnostic categories	χ^2=84.21, df=9	**<0.001**
Agreement beyond chance	Cohen's κ=0.752 (95% CI 0.584-0.898)	**<0.001**
Difference between marginal distributions	Stuart-Maxwell χ^2=1.17, df=3	0.760

‡Other pathology included endometrial hyperplasia, endometrial or cervical polyp, chronic cervicitis, uterovaginal prolapse-related changes and other benign uterine lesions.

Table 3 compares the principal clinical indications and ultrasonographic diagnoses with the corresponding histopathological findings. Leiomyoma was the predominant clinical indication (52.0%), ultrasonographic diagnosis (54.0%) and histopathological diagnosis (52.0%). Of the 27 cases diagnosed as leiomyoma on ultrasonography, 24 were confirmed histologically, producing a concordance of 88.9% (95% CI: 71.9-96.2). Adenomyosis accounted for 18.0% of clinical indications, 12.0% of ultrasonographic diagnoses and 16.0% of histopathological diagnoses; five of six ultrasonographically diagnosed cases were confirmed, giving a concordance of 83.3% (95% CI: 43.6-97.0). Ovarian or adnexal lesions demonstrated an 87.5% concordance (7/8; 95% CI: 52.9-97.8). Other uterine or endometrial pathologies showed comparatively lower concordance of 66.7% (6/9; 95% CI: 35.4-87.9). Overall, 42 of the 50 diagnoses were concordant, corresponding to an agreement rate of 84.0% (95% CI: 71.5-91.7). A strong association existed between ultrasonographic and histopathological diagnostic categories (χ^2=84.21, p<0.001), and agreement beyond chance was substantial (κ=0.752; 95% CI: 0.584-0.898; p<0.001). The nonsignificant Stuart-Maxwell test (χ^2=1.17, p=0.760) indicated no evidence of a systematic difference between the overall ultrasonographic and histopathological diagnostic distributions.

Table 4: Concordance between preoperative ultrasonographic and final histopathological diagnoses (N=50)

Preoperative ultrasonographic diagnosis	**Histopathology: Leiomyoma**	**Histopathology: Adenomyosis**	**Histopathology: Ovarian/adnexal lesion**	**Histopathology: Other pathology**	**Total**	**Correctly classified, n (%)**
Leiomyoma/fibroid uterus	**24**	2	0	1	27	24 (88.9)
Adenomyosis	1	**5**	0	0	6	5 (83.3)
Ovarian/adnexal lesion	0	0	**7**	1	8	7 (87.5)
Other uterine/endometrial pathology	1	1	1	**6**	9	6 (66.7)
Total	**26**	**8**	**8**	**8**	**50**	**42 (84.0)**

Concordance measure	**Estimate**	**95% CI**	**Test of significance**	**P value**
Overall observed agreement	84.0%	71.5-91.7 %		
Agreement expected by chance	35.4%			

Cohen's kappa	0.752	0.584-0.898	Z=7.26	**<0.001**
Overall diagnostic association			χ^2=84.21, df=9	**<0.001**
Concordant diagnosis	42 (84.0%)	71.5-91.7 %	Binomial test against 50%	**<0.001**
Discordant diagnosis	8 (16.0%)	8.3-28.5 %		

Table 4 provides the diagnostic cross-classification of preoperative ultrasonographic findings against final histopathological diagnoses. Among 27 women diagnosed with leiomyoma on ultrasonography, 24 were confirmed histologically, while two were diagnosed with adenomyosis and one with another pathology. Of the six ultrasonographic diagnoses of adenomyosis, five were histologically confirmed and one was reclassified as leiomyoma. Seven of eight ovarian or adnexal lesions were confirmed, while one was categorised as another pathology. Among nine women with other uterine or endometrial abnormalities on ultrasonography, six were correctly classified; the remaining three were histologically diagnosed as leiomyoma, adenomyosis and an ovarian or adnexal lesion, respectively. Overall, 42 cases (84.0%; 95% CI: 71.5-91.7) were correctly classified, compared with eight discordant cases (16.0%; 95% CI: 8.3-28.5%). The observed agreement of 84.0% was substantially higher than the 35.4% agreement expected by chance. Cohen's kappa was 0.752 (95% CI: 0.584-0.898; Z=7.26, $p<0.001$), demonstrating substantial agreement. The overall association between ultrasonographic and histopathological diagnoses was also statistically significant (χ^2=84.21, $p<0.001$), and the proportion of concordant diagnoses was significantly greater than the reference value of 50% (binomial $p<0.001$).

DISCUSSION

The present study evaluated the clinicopathological profile, presenting complaints, indications and diagnostic concordance among 50 women undergoing hysterectomy at a tertiary-care hospital. Most patients were in the perimenopausal age range, multiparous, and presented with abnormal uterine bleeding or pelvic pain. Leiomyoma was the leading clinical, ultrasonographic and histopathological diagnosis. Preoperative ultrasonography demonstrated an overall agreement of 84.0% with histopathology, with substantial agreement beyond chance (κ=0.752).

The mean age of the participants was 44.56±5.49 years, and 88.0% were aged 40 years or older. This concentration of hysterectomy in the fourth and fifth decades is consistent with the natural history of benign uterine disorders, particularly leiomyoma and adenomyosis, which commonly become symptomatic during late reproductive and perimenopausal years. Verma et al. (2016)[3] similarly observed that hysterectomy specimens were predominantly obtained from middle-aged and perimenopausal women. Baral et al. (2017)[4] also reported the highest frequency in the 41-50-year age group. Jandial et al. (2019)[9] found that 57.5% of hysterectomies occurred during the fifth decade, while Kiran et al. (2025)[21] reported a peak frequency of 45.2% among women aged 41-50 years. These observations support the present finding that hysterectomy is most frequently performed when prolonged menstrual morbidity, completed family size and failure of conservative management converge.

Parity showed a significant distribution in the present study, with para 3 women forming the largest group and only 4.0% being para 1. High parity was particularly frequent among women aged ≥45 years. Prusty et al. (2018)[6], using nationally representative Indian data, identified age, parity, socioeconomic status and reproductive history as important predictors of hysterectomy. Repeated pregnancy and childbirth may also contribute to pelvic-floor weakness and uterovaginal prolapse, partly explaining why mass, pressure and prolapse symptoms were more frequent in the older and higher-parity group. Nevertheless, parity should not be interpreted as an independent causal factor from these descriptive data, because it is closely related to age, rural-urban residence, access to conservative treatment and completed childbearing.

Heavy or abnormal menstrual bleeding was the principal complaint in 46.0% of patients and was reported as one of multiple symptoms by 58.0%. It was followed by lower-abdominal pain and dysmenorrhoea. The predominance of abnormal uterine bleeding agrees with the PALM-COEIN framework developed by Munro et al. (2018)[7], in which leiomyoma, adenomyosis, polyps and malignancy or hyperplasia constitute important structural causes of bleeding. Sivapragasam et al. (2018)[8] likewise found menstrual abnormalities to be among the principal reasons for hysterectomy. Rastogi et al. (2021)[11] described hysterectomy as an important definitive treatment for persistent abnormal uterine bleeding related to fibroids, adenomyosis and other pelvic disorders after conservative measures had failed. Wankhade and Dawande (2023)[14] also reported heavy menstrual bleeding and pelvic pain as common clinical presentations among hysterectomy patients.

In the present analysis, heavy or abnormal menstrual bleeding was significantly more frequent among women aged <45 years than among those aged ≥45

years (74.1% versus 39.1%; OR=4.44, p=0.013). This finding is clinically plausible because menstruating women with leiomyoma or adenomyosis frequently present with excessive or prolonged cyclic bleeding. Conversely, abdominal mass, pressure or prolapse symptoms were more common among women aged ≥45 years (39.1% versus 7.4%, p=0.014). Khaliq et al. (2025)[20] similarly found that abnormal uterine bleeding predominated among reproductive-aged women, whereas vaginal prolapse and postmenopausal bleeding were more prominent among older women. Differences in lower-abdominal pain, dysmenorrhoea, clinically enlarged uterus and anaemia were not statistically significant between the age groups. The nonsignificant results may partly reflect limited statistical power because only 50 women were included.

Anaemia was documented in 34.0% of patients and was numerically more frequent in women aged <45 years. This corresponds with the higher burden of heavy menstrual bleeding in this group. Chronic blood loss caused by leiomyoma, adenomyosis or endometrial pathology can gradually produce iron-deficiency anaemia. The clinical relationship between structural uterine disease, heavy menstrual bleeding and anaemia reinforces the need for haemoglobin assessment and correction of anaemia before elective hysterectomy. Current guidance also emphasises that hysterectomy should generally follow appropriate evaluation and consideration of medical, hysteroscopic or other uterus-preserving interventions for benign abnormal uterine bleeding [5,7].

Leiomyoma was the principal clinical indication in 52.0%, the leading ultrasonographic diagnosis in 54.0% and the principal histopathological diagnosis in 52.0%. This strong consistency across diagnostic stages agrees with several institutional studies. Jandial et al. (2019)[9] reported fibroid uterus as the most common clinical indication, accounting for approximately half of their cases. Wankhade and Dawande (2023)[14] likewise found leiomyoma to be the predominant myometrial lesion. Pandey et al. (2023)[15], in a decade-long Indian audit, showed that the demographic and indication profile of hysterectomy remained relatively stable over time. Agarwal et al. (2023)[17] also identified leiomyoma as a leading diagnosis in hysterectomy specimens. More recently, Kiran et al. (2025)[21] reported AUB due to leiomyoma in 45.8% of cases and histological leiomyoma in 44.5%, values broadly comparable with the 52.0% found in the present study. Biswas and Lal (2025)[22] reported fibroids as the predominant ultrasonographic and myometrial finding, further supporting this pattern.

Adenomyosis accounted for 18.0% of clinical indications, 12.0% of ultrasonographic diagnoses and 16.0% of final histopathological diagnoses. The higher histological than ultrasonographic frequency suggests that some cases were clinically silent, coexisted with leiomyoma or lacked sufficiently specific sonographic features. Sharma et al. (2022)[13] found that histopathology detected more structural lesions than were clinically suspected, particularly adenomyosis and coexisting lesions. Lonky et al. (2023)[16] found histopathological adenomyosis in almost half of a selected cohort undergoing hysterectomy for leiomyoma-associated abnormal uterine bleeding and reported limited performance of two-dimensional ultrasonography when leiomyomas coexisted. These findings demonstrate why adenomyosis may be under-recognised before surgery.

The 83.3% concordance for adenomyosis in the present study was relatively favourable, although its 95% confidence interval was wide because only six cases were diagnosed ultrasonographically. Tellum et al. (2020)[10], in a structured review and meta-analysis, concluded that transvaginal ultrasonography and MRI are useful and broadly comparable non-invasive methods for diagnosing adenomyosis. Chapron et al. (2020)[12] emphasised that diagnostic accuracy improves when clinical features and systematically defined imaging signs are integrated. The revised Morphological Uterus Sonographic Assessment definitions published by Harmsen et al. (2022)[18] further standardised direct and indirect sonographic features of adenomyosis. Thus, the favourable agreement observed in the current study may reflect clinically apparent disease or experienced ultrasonographic assessment, but histopathology remains the definitive reference standard.

Ovarian or adnexal lesions accounted for 14.0% of clinical indications and 16.0% of both ultrasonographic and histopathological diagnoses. Their 87.5% concordance indicates that preoperative ultrasonography generally localised and characterised these lesions successfully. The small number of ovarian cases, however, prevented separate assessment of benign, borderline and malignant lesions. Standardised risk-stratification systems may further improve communication and diagnostic consistency for adnexal masses. Andreotti et al. (2020)[19] developed the O-RADS ultrasound system to standardise terminology, risk classification and management recommendations for ovarian and other adnexal lesions.

Overall, 84.0% of preoperative diagnoses were confirmed histologically. Agreement was highest for leiomyoma (88.9%), followed by ovarian or adnexal lesions (87.5%) and adenomyosis (83.3%), while other uterine or endometrial pathologies had lower concordance (66.7%). The overall association between ultrasonographic and histopathological diagnoses was

highly significant (χ^2=84.21, p<0.001), and κ=0.752 indicated substantial agreement. The nonsignificant Stuart-Maxwell test suggested that, although individual cases were reclassified, there was no systematic difference between the overall marginal distributions of ultrasonographic and histopathological diagnoses.

The observed agreement was stronger than the fair overall agreement (κ=0.27) reported by Sharma et al. (2022)[13], although that study included 702 non-oncological hysterectomies and a broader range of clinical diagnoses. Their concordance was considerably better for structural than for functional disorders, with leiomyoma showing better agreement than adenomyosis. The present results are closer to the high correlation described by Rastogi et al. (2021)[11] and the 70-100% category-specific correlations reported by Kiran et al. (2025)[21]. Differences between studies may arise from diagnostic definitions, case mix, inclusion of multiple coexisting lesions, imaging expertise and whether concordance was based on clinical diagnosis alone or combined clinical and ultrasonographic assessment.

The eight discordant cases remain clinically important. Two presumed leiomyomas were ultimately diagnosed as adenomyosis, while other reclassifications occurred among adenomyosis, ovarian lesions and miscellaneous uterine or endometrial pathologies. Such discrepancies illustrate the overlapping clinical and imaging appearances of fibroids, adenomyosis, endometrial abnormalities and adnexal lesions. Histopathological examination can also identify incidental cervical, tubal, ovarian or endometrial abnormalities not suspected before surgery. Wankhade and Dawande (2023)[14] stressed that microscopic examination confirms the indication and detects unexpected lesions. Biswas and Lal (2025)[22] similarly demonstrated that examination of the cervix and fallopian tubes can reveal additional abnormalities that might otherwise be overlooked.

CONCLUSION

Hysterectomy was performed predominantly among multiparous women in the perimenopausal age group, with a mean age of 44.56 years. Heavy or abnormal menstrual bleeding was the most frequent presenting complaint, while leiomyoma was the leading clinical indication and the most common ultrasonographic and histopathological diagnosis. Heavy menstrual bleeding was significantly more frequent among women aged below 45 years, whereas abdominal mass, pressure or prolapse symptoms were more common among older women. Preoperative ultrasonography demonstrated an overall diagnostic concordance of 84.0% with histopathology, with substantial agreement beyond chance. Although ultrasonography was particularly reliable for identifying leiomyomas and ovarian or adnexal lesions, histopathological examination remained essential for confirming the diagnosis and detecting alternative or coexisting pathology. Careful assessment of surgical indications, consideration of appropriate conservative treatments and mandatory histopathological examination of every hysterectomy specimen are recommended.

Limitations

This study had the following limitations:

1. The study was conducted at a single tertiary-care hospital; therefore, its findings may not represent hysterectomy practices in primary, secondary or community healthcare settings.
2. The sample size was relatively small, comprising only 50 women, which reduced statistical power and produced wide confidence intervals for less frequent diagnoses.
3. The cross-sectional design permitted assessment of clinicopathological patterns and diagnostic concordance but could not establish causal relationships.
4. Consecutive hospital-based sampling introduced the possibility of referral and selection bias, as complicated cases may have been disproportionately represented.
5. Several women had multiple presenting complaints and coexisting pathological lesions; classification according to one principal diagnosis may have underestimated the complete pathological spectrum.
6. Ultrasonography is operator-dependent, and information concerning sonographer experience, equipment quality and standardised reporting criteria was not evaluated.
7. The analysis did not separately determine the sensitivity, specificity, positive predictive value and negative predictive value of ultrasonography for every individual lesion because of the small number of cases in some categories.
8. Details regarding previous medical treatment, duration of conservative management, patient preferences and appropriateness of the decision to perform hysterectomy were not evaluated systematically.
9. Surgical route, perioperative complications, duration of hospitalisation and postoperative outcomes were outside the scope of the study.
10. Long-term follow-up was not performed; therefore, postoperative symptom resolution, quality of life and delayed complications could not be assessed.

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