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Prevalence of Endometriosis in Women Presenting with Infertility: Hospital-based Cross-sectional Study

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ABSTRACT

Endometriosis is a gynaecologic disorder that can impair fertility, yet it's prevalence among women presenting with infertility remains variably reported across clinical settings. **Objectives:** To determine prevalence of endometriosis in women presenting with infertility. **Methods:** This descriptive cross-sectional study was performed at the Department of Obstetrics and Gynecology, Combined Military Hospital Multan. Ninety-five married women aged 20-40 years presenting with infertility were enrolled through non-probability consecutive sampling. Baseline sociodemographic, menstrual, and clinical characteristics were recorded. Hormonal evaluation included thyroid-stimulating hormone, luteinizing hormone, follicle-stimulating hormone, and prolactin. All participants underwent diagnostic laparoscopy under general anesthesia by experienced consultants. Endometriosis was diagnosed based on characteristic peritoneal lesions visualized on laparoscopy. Data were analyzed utilizing SPSS version 27. Comparative analyses were performed utilizing an independent sample t-test and chi-square test. **Results:** Mean age was 29.9 ± 4.8 years. Primary infertility was present in 69 (72.6%) and obesity in 47 (49.5%). In 30 (31.6%) of cases women were illiterate, and 58 (61.1%) were from the lower middle socioeconomic class. Endometriosis was identified in 16 (16.8%) of the participants. Demographic, menstrual, and hormonal parameters were comparable between women with and without endometriosis, except obesity – endometriosis being more common in non-obese compared to obese women (27.1% vs. 6.4%, p-value=0.012). **Conclusions:** Endometriosis was detected in nearly one-sixth of infertile women undergoing diagnostic laparoscopy, supporting its clinically relevant prevalence.

INTRODUCTION

Infertility is the failure to conceive after one year of unprotected sexual intercourse. Both partners experience stress and emotional disruptions as a result of infertility [1]. Infertility is caused by a variety of reasons, including systemic and non-systemic disorders, social, environmental, physiological, and genetic factors [2]. The World Health Organization states that infections in the reproductive system or the presence of sexually transmitted illnesses can also lead to infertility [3]. Approximately 48 million women worldwide suffer from infertility [4]. Male infertility accounts for around 20–30% of all cases of infertility, while female infertility accounts for 20–35% [5]. The most prevalent issue in female infertility is ovulatory, which is typically manifested by the absence of periods or irregular menstruation [6]. A distressing condition with a high rate of recurrence is endometriosis. Abdominal discomfort is a typical symptom of endometriosis [7]. Endometriosis is detected in 20–50% of female infertile patients [8]. The condition that primarily affects people of reproductive age is endometriosis. About 6–10% of females in the reproductive age range have endometriosis [9]. Postmenopausal women are less likely to have it, but teenage girls may potentially get endometriosis even before they reach menarche [10]. Maggiore et al. studied 150 women with infertility and found that 52.6% of females had secondary infertility and 47.33% had primary infertility. Endometriosis was diagnosed in 14% of females [11].

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Although endometriosis is a well-recognized cause of infertility worldwide, local data from Pakistan particularly South Punjab remain scarce, with most available studies originating from major urban centers. Additionally, variability in diagnostic approaches and underdiagnosis in resource-limited settings create uncertainty about the true burden of endometriosis in infertile women. Establishing its prevalence in infertility population will aid in the development of appropriate diagnostic algorithms, potentially reducing delays in diagnosis and treatment initiation. This study will provide region-specific prevalence data, helping clinicians improve diagnostic suspicion, guide timely referrals, and optimize management strategies for infertile women in South Punjab. Literature has shown that the incidence of endometriosis varies in infertile females. Through this study, we will get local evidence which would help clinicians prioritize diagnostic testing. Multan and surrounding regions have limited access to advanced diagnostic facilities and delayed health-seeking behavior, which may lead to under-recognition of endometriosis as a cause of infertility. This study aimed to find the prevalence of endometriosis in females presenting with infertility.

METHODS

This descriptive cross-sectional study was executed at Obstetrics and Gynaecology department, Combined Military Hospital Multan. The study was approved by institutional ethic committee (ERC# 32/2025; dated 16th January 2025). The study was conducted from 1st February to 31st July 2025. Participants were recruited through non-probability consecutive sampling after obtaining written informed consent. Sample size of 95 patients was measured through the WHO sample size calculator using formula for one proportion formula, $n = Z^2\ p\ (1\text{-}p)\ /\ e^2$, assuming 14% prevalence of endometriosis, based on the prevalence reported by Maggiore *et al.* [11], 7% desired precision, and a confidence level of 95%. Inclusion criteria were married women of age 20–40 years having infertility. The women were excluded if females did not want a laparoscopy, had other operable causes of endometriosis, fibroids, intrauterine, cervical, or ovarian malignancy (on history and medical record), or previous history of laparoscopy. Data were collected from participants through face-to-face interview. Baseline data included age, duration of marriage, obesity, type of infertility, area of residence, educational and socioeconomic status, age at menarche, regularity and length of menstrual cycle. Infertility was labelled if couple could not conceive after one year (or longer) of unprotected sex. Primary infertility was labelled if the pregnancy was never achieved. All the patients underwent venous blood sampling aseptically and hormonal profile was obtained from single laboratory. The laparoscopist was not blinded to the patients' clinical history or indication for diagnostic laparoscopy during the procedure. The hormonal panel included Thyroid stimulating hormone - TSH (0.4–4.0 mIU/L), follicle-stimulating hormone – FSH (4.7–21.5 IU/L), luteinizing hormone – LH (2 – 8 mIU/L), and Prolactin (normal <25 ng/mL). All the patients underwent diagnostic laparoscopy under general anaesthesia by the consultant obstetrician with ≥ 5-years post fellowship experience. Endometriosis was diagnosed if typical black or dark blue or dark red peritoneal lesions visualized under magnification during laparoscopy. Routine histopathological confirmation was not performed.

The data analysis was accomplished through SPSS version 27.0. Normality of quantitative data was evaluated through the Shapiro-Wilk test. Quantitative data were presented as mean ± SD and qualitative data as numbers and proportions. Independent sample t-test and chi-square test were utilized to compare quantitative and qualitative data, respectively, between infertile women with or without endometriosis. A p-value less than 0.05 was taken as significant.

RESULTS

The mean age of the participants was 29.9 ± 4.8 and 49 (51.6%) were below 30-years. Obesity was identified in 47 (49.5%) and 50 (52.6%) came from rural area. In 30 (31.6%) of cases, women were illiterate, and 58 (61.1%) were from lower middle socioeconomic class. The mean duration of marriage was 3.7 ± 1.6, and 72 (75.8%) were married for less than 5 years. Primary infertility was most common in 69 (72.6%). Endometriosis was identified in 16 (16.8%) of the cases (Table 1).

Table 1: Characteristics of Women in Women Presenting with Infertility (n=95)

Variables	Mean ± SD / n (%)
Age	
Years	29.9 ± 4.8
< 30-Years	49 (51.6%)
≥ 30-Years	46 (48.4%)
Obesity	
Yes	47 (49.5%)
Area of Residence	
Rural	50 (52.6%)
Urban	45 (47.4%)
Educational Status	
Illiterate	30 (31.6%)
Literate	65 (68.4%)
Socioeconomic Status	
Low	17 (17.9%)
Lower Middle	58 (61.1%)
Upper Middle and High	20 (21.0%)

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Duration of Marriage	
Years	3.7 ± 1.6
< 5-Years	72 (75.8%)
≥ 5-Years	23 (24.2%)
Type of Infertility	
Primary	69 (72.6%)
Secondary	26 (27.4%)
Endometriosis	
Yes	16 (16.8%)

The mean age at menarche was 12.4 ± 0.87 years and 36 (37.9%) had irregular menstrual cycles. The average length of menstrual cycles was 28.7 ± 6.8 days. Mean serum TSH, FSH, LH, and prolactin levels were 2.7 ± 1.0 (mIU/ml), 5.3 ± 1.5 (mIU/ml), 5.4 ± 1.6 (mIU/ml), and 14.9 ± 6.9 ng/dl, respectively (Table 2).

Table 2: Menstrual and Hormonal Profile of Women Presenting with Infertility (n=95)

Variables	Mean ± SD / n (%)
Age at Menarche (Years)	12.4 ± 0.87
Menstrual cycle – Regular	59 (62.1%)
Irregular	36 (37.9%)
Length of Menstrual Cycle (days)	28.7 ± 6.8
Serum TSH Levels (mIU/ml)	2.7 ± 1.0
Serum FSH Levels (mIU/ml)	5.3 ± 1.5
Serum LH Levels (mIU/ml)	5.4 ± 1.6
Serum Prolactin Levels (ng/ml)	14.9 ± 6.9

All the demographic, menstrual, and hormonal characteristics were comparable between infertile women with or without endometriosis, except for obesity – endometriosis being more common in non-obese compared to obese women (27.1% vs. 6.4%) (Table 3).

Table 3: Comparison of Demographic, Menstrual, and Hormonal Characteristics Between Infertile Women with or without Endometriosis (n=95)

Characteristics	Endometriosis		p-value*
	Yes (n=16)	No (n=79)	
Age (Years)	29.0 ± 4.7	30.2 ± 4.8	0.373
< 30-Years	10 (20.4%)	39 (79.6%)	0.338
≥ 30-Years	6 (13.0%)	40 (87.0%)	
Obesity – Yes	3 (6.4%)	44 (93.6%)	0.012
No	13 (27.1%)	35 (72.9%)	
Area of Residence: Rural	6 (12.0%)	44 (88.0%)	0.184
Urban	10 (22.2%)	35 (77.8%)	
Educational Status: Illiterate	5 (16.7%)	25 (83.3%)	0.975
Literate	11 (16.9%)	54 (83.1%)	
Socioeconomic Status: Low	4 (23.5%)	13 (76.5%)	0.674
Lower Middle	8 (13.8%)	50 (86.2%)	
Upper Middle and High	4 (20%)	16 (80%)	
Duration of Marriage (Years)	3.9 ± 1.1	3.8 ± 1.7	0.608
< 5-Years	13 (18.1%)	59 (81.9%)	0.753
≥ 5-Years	3 (13.0%)	20 (87.0%)	
Type of Infertility: Primary	11 (15.9%)	58 (84.1%)	0.703
Secondary	5 (19.2%)	21 (80.8%)	
Age at Menarche (Years)	12.3 ± 0.8	12.5 ± 0.9	0.363
Menstrual Cycle: Regular	8 (13.6%)	51 (86.4%)	0.274
Irregular	8 (22.2%)	28 (77.8)	
Length of Menstrual Cycle (days)	27.4 ± 8.3	28.9 ± 6.5	0.411
Serum TSH Levels (mIU/ml)	2.71 ± 0.99	2.70 ± 1.04	0.959
Serum FSH Levels (mIU/ml)	6.4 ± 2.5	5.0 ± 1.1	0.041
Serum LH Levels (mIU/ml)	5.2 ± 2.1	5.5 ± 1.5	0.620
Serum Prolactin Levels (ng/ml)	15.9 ± 11.2	14.6 ± 5.7	0.503

*Independent sample t-test for quantitative data, chi-square test for categorical data (Fischer's exact test where cell count <5)

DISCUSSION

The most important investigative technique for assessing endometriosis is now laparoscopy. One of the main causes of infertility is thought to be endometriosis. The availability of diagnostic facilities is most likely the cause of the high incidence in developed parts of the world. In our study, endometriosis was identified in 16 (16.8%) of the cases. One hundred and fifty female infertile patients who underwent laparoscopies were enrolled by Maggiore *et al.* They discovered that 52.67% of females had secondary infertility and 47.33% had primary infertility. Endometriosis was diagnosed in 14% of females [11]. For a workup of infertility, 84 patients were admitted for diagnostic laparoscopy in a study by Rao *et al.* In individuals with subfertility, the incidence of endometriosis during diagnostic laparoscopy was 20.2%. The prevalence of primary infertility was 29.41%, while that of secondary infertility was 70.58% [12]. These incidences closely match our observations. After undergoing unsuccessful reproductive technologies, 215 individuals with infertility that could not be explained between the ages of 25 and 45 had diagnostic laparoscopies, according to a study by Nezhat *et al.* According to pathology reports, 90.7% patients had endometriosis, and 98.6% patients had tissue abnormalities [13]. This is in contrast with our results. The enrolment of highly selected patients who had not responded to earlier reproductive treatments may be the likely cause. Additionally, pathology later confirmed their findings. Abdulrazzaq *et al.* conducted a review study in which they calculated prevalence rates for various populations and study methodologies. Prevalence rates in clinical studies ranged widely, from 0.05% to 37%, with a pooled incidence of 6.8% (95% CI 4.41%–9.24%). According to surveys, endometriosis was reported by 18.3% of respondents in Turkey and 0.76% of respondents in Scotland as the reason for infertility [14]. The prevalence of endometriosis in our study (16.8%) is comparable to that reported in Turkey (18.3%), suggesting a similar burden in populations with comparable reproductive health profiles. In contrast, the markedly lower prevalence reported in

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Scotland (0.76%) may reflect differences in study design, diagnostic criteria, and population characteristics, including earlier detection and better access to healthcare. According to Van Gestel *et al.* most lesions were categorized as minor or mild (74%), while the prevalence of endometriosis was 44%. Adhesions and tubal factors had respective prevalence rates of 16% and 20% [15]. Differences in healthcare access, geography, and ethnicity also affect the timing of presentations and diagnostic rates. Eight hundred and sixty-six females with a mean age of 33.80 ± 7.7 years who had gynaecological laparoscopic surgery were included in a study conducted in Jordan. The overall prevalence was 10.3%, with 89 of these women receiving a diagnosis of endometriosis [16]. This is lower than the prevalence observed in our study. The lower detection rate may be caused by relying solely on imaging and by including populations with early-stage infertility. Infertility may result from endometriosis due to both structural and biochemical factors. Chronic inflammation and oxidative stress can affect oocyte quality, fertilization, and implantation, whereas pelvic adhesions and distortion of tubo-ovarian anatomy can affect ovum pickup and fertilization [17]. Furthermore, even in women with mild illness, hormonal changes, lower ovarian reserve (particularly with endometriomas), and decreased endometrial receptivity may all play a role in subfertility [18]. All demographic, menstrual, and hormonal characteristics were similar for infertile women with and without endometriosis in the current study. According to a recent study, women with various endometriosis presentations did not significantly differ in their mean age at diagnosis or symptom profile, suggesting that clinical or demographic characteristics may not be a reliable way to differentiate patients [19]. Infertility caused by endometriosis frequently manifests as non-specific demographic tendencies. It is possible for mild disease to be prevalent and clinically silent. Overall demographic factors were similar for women with and without endometriosis, although ovarian-reserve markers were different, according to a recent comparative infertility database study [20]. Subtle ovarian-reserve variations may still exist, although demographic disparities are minimal because infertility cases frequently include women of similar reproductive age. The detection of endometriosis in a substantial proportion of infertile women highlights the need to maintain a high index of suspicion, even when routine clinical, menstrual, and hormonal parameters are unremarkable. These findings support the judicious use of diagnostic laparoscopy in selected patients, particularly non-obese women, to enable timely diagnosis and targeted management, thereby potentially improving fertility outcomes. The strengths of this study were using the gold-standard technique of diagnostic laparoscopy improved the precision of endometriosis detection. Comparisons between groups were made possible by the inclusion of comprehensive sociodemographic and menstrual data as well as hormonal profile. Tertiary care setting reflected actual clinical practice with limited resources.

The limitations of this study should be considered when interpreting the findings. The small sample size, non-probability consecutive sampling, and single-center setting may limit generalizability. Endometriosis was diagnosed based on visual laparoscopic findings without routine histopathological confirmation, and disease severity was not systematically staged, limiting assessment of disease burden. The cross-sectional design prevents causal interpretation and does not establish the temporal relationship between endometriosis and infertility. No multivariable analysis was performed to account for potential confounding; therefore, the observed association between obesity and endometriosis should not be interpreted as an independent association. In addition, the laparoscopist was not blinded to clinical history, which may have introduced detection bias. Treatment outcomes were not assessed; therefore, the study cannot determine whether diagnosis or subsequent management improves fertility outcomes. Future multicentre studies should incorporate histopathological confirmation, standardized staging, multivariable analysis, and prospective assessment of treatment outcomes.

CONCLUSIONS

Endometriosis was identified in 16 (16.8%) infertile women undergoing diagnostic laparoscopy, indicating a clinically relevant prevalence in this population. Most demographic, menstrual, and hormonal characteristics were comparable between women with and without endometriosis, although obesity and serum FSH levels differed significantly between the groups. Importantly, 79 (83.2%) women had no evidence of endometriosis on laparoscopy, highlighting the need to evaluate other potential causes of infertility in the majority of patients. Endometriosis should therefore be considered during infertility evaluation, particularly when clinical suspicion persists despite non-specific routine findings, while the decision to perform diagnostic laparoscopy should be individualized according to clinical indication. Although serum FSH levels differed significantly between the groups, the clinical significance of this finding remains uncertain. Most demographic, menstrual, and hormonal characteristics were comparable between women with and without endometriosis, although serum FSH levels were significantly higher among women with endometriosis (p=0.041). Given the cross-sectional design, these findings do not establish causal relationships

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or determine whether laparoscopic diagnosis or subsequent treatment improves fertility outcomes.

Authors' Contribution

Conceptualization: BG, LN
Methodology: BG, SM[1], SM[2], NN
Formal analysis: SM1, NN
Writing and Drafting: BG, LN, SM[1]
Review and Editing: BG, LN, SM[1], SM[2], NN

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

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