



Frequency of Causes of Female Infertility Diagnosed Through Laparoscopy among Women Presenting with Infertility

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ARTICLE INFO

Keywords: Female infertility, laparoscopy, polycystic ovary syndrome, tubal factor, uterine causes, endometriosis

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Declaration

Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History

Received: 20-03-2025 Revised: 11-06-2025
Accepted: 16-06-2025 Published: 30-06-2025

ABSTRACT

Objective: The study aimed to determine the frequency of causes of female infertility diagnosed through laparoscopy among women presenting with infertility. **Methods:** The study started from October 15, 2023, to March 15, 2024, at Obstetrics and Gynecology Department of MTI-HMC Peshawar. We enrolled 209 infertile females of age between 18 and 40 years who underwent diagnostic laparoscopy by non-probability consecutive sampling. We recorded clinical and demographic variables such as age, body mass index (BMI), duration of infertility, socio-economic status, resident and a family history of infertility. Researchers examined various factors that could lead to infertility, including endometriosis, polycystic ovarian syndrome, and tubal and uterine factors. For the assessment of effect modifier chi-square test was applied. p -value ≤ 0.05 was taken as significant after stratification was done according to age and BMI. **Results:** The mean age of participants was 29.27 ± 6.665 years, and the mean BMI was 26.182 ± 4.4508 kg/m². The most common causes of infertility diagnosed via laparoscopy were uterine causes (51.2%), polycystic ovary syndrome (47.8%), tubal factor (45.9%), and endometriosis (45.0%). No significant associations were found between these causes and age or BMI stratifications ($p > 0.05$). **Conclusions:** Laparoscopy remains an essential tool for the diagnosis of uterine reasons and polycystic ovarian syndrome, the two most prevalent causes of female infertility. The identification of these characteristics can lead to improved clinical care and therapeutic outcomes for infertile women.

INTRODUCTION

Treatment for infertility adversely affects the psychological status of the patient, physical health, spiritual health and general health. A distinctive feature of this illness is that both the afflicted person and their partner suffer from it. The importance of male infertility cannot be ignored and rightly so. However, this case study will focus on female infertility, including evaluation, management, and treatment. A basic understanding of normal fecundity is necessary to understand infertility. It is another way indicating that the probability that a female can get pregnant in one cycle. With this knowledge, the health team will then be in a better position to counsel the patient on the referral and educate them.^{1,2,3}

Among the biggest studies on the matter, 85 per cent of the women would conceive within a year. When a woman loses out on month after month for no good reason, it is tempting to think there is "something wrong". Losing conception at the first opportunity – fair enough, but this is not uncommon. Fecundability is the term used by researchers to refer to the probability of conception per month, assuming uniformity among all fertile. Researchers have found a fecundability rate which has resulted in

normal pregnancy rates as well as making diagnosis of infertility easier. The same study shows that the chance of a woman conceiving will decrease from 25% in the first three months of unprotected sexual intercourse to 15% over the next nine months.^{4,5,6}

The World Health Organisation (WHO) initiated a large-scale collaborative international study to ascertain the gender-wise and cause-wise distribution of infertility. 8% of cases had the male factor, female in 37%, the combination of sexes in 35%, and 37% of couples could not conceive. As stated in the study conducted on female infertility in Pakistan, the diseases identified included ovulatory disorders causing 25%, endometriosis causing 15% and pelvic adhesions causing 12% and others.^{7,8,9} A study reported the causes of infertility as identified by laparoscopy \pm hysteroscopy was polycystic ovary syndrome (25.1%), tubal factor (30%), uterine cause (4%), and endometriosis (2.7%).¹⁰

If we can find out the frequency of causes of female infertility diagnosed with laparoscopy, we shall have better insight into the cause of infertility in the community. What's more, health care professionals, scientists, and policymakers can use this information to diagnose the

infertility disease more effectively, treat patients suffering from it, and offer efficient emotional support to affected women. In addition to that, infertility among women is an extremely serious health issue that can be found in many couples. Healthcare professionals in our community being familiar with the commonest causes, may target diagnostic testing and designs more efficient treatment plans (booklet).

METHODOLOGY

The cross-sectional analysis was conducted in the obstetrics and gynaecology department at MTI- Hayatabad medical complex (HMC), Peshawar from October 15, 2023 to March 15, 2024. The sample size for this study comprised of 209 women who were infertile. The sample size was calculated using the World Health Organization algorithm for sample size considerations with 2.7% proportion of endometriosis cases as causes of female infertility. It was also calculated with a 2.2% margin of error and a 95% confidence range. By utilising a non-probability consecutive sampling method, the subjects were.

The study received approval from the Institutional Ethical Review Board (IREB) of MTI-HMC Peshawar with reference number 1600 before the data collection process began. Informed consent was taken from each participant, and we conveniently recruited the patients from OPD who fulfilled the study's inclusion criteria. A complete physical examination was done after taking a complete history. All eligible patients who were diagnosed with infertility underwent diagnostic laparoscopy in gynecology operation theatre. Findings for patients was recorded in a predefined operational definition for endometriosis, polycystic ovarian syndrome, uterine causes, tubal factor. The primary investigator recorded the demographic and clinical information with the help of a structured proforma under the supervision of the consultant gynaecologist having at least 3 years post fellowship experience. The variables were age, body mass index, duration of infertility, social class, domicile. We made sure to follow the exclusion criteria, so the potential confounding factors were limited.

Inclusion Criteria

Women aged between 18 and 40 years presenting with primary infertility (failure to conceive after 12 months of regular unprotected sexual intercourse).

Exclusion Criteria

Women with male factor infertility, confirmed through abnormal semen parameters and/or sexual dysfunctions, were excluded from the study. Additionally, women with a history of previous laparoscopy were not included. SPSS Version 23.0 was used to analyze and feed the data. The data was summarized using descriptive statistics. The numerical variables included age, body mass index, and infertility length. It was depicted as mean \pm standard deviation. Percent and frequency were given to social status, place of residence, infertility in family, reasons for infertility. Participants were categorized by age and body mass index to evaluate potential moderators of effect. The statistical significance was determined using chi square test. A value that was lesser than 0.05 was considered

significant. The outcomes were represented in the form of tables and infographics.

RESULTS

209 females only were evaluated. The average age was 29.27 ± 6.67 years of the body mass index 26.18 ± 4.45 kg/m² length of infertility mean was 5.65 ± 2.74 years as shown in Table 1.

More than 25 years of age which who live under both urban and rural area's participants are more share in both equal proportion as shown in Table 2 as well as present in-half were history of infertility in their family participants are more type share with three classes well as social class was doctors as well as more share with middle class and poor likewise was doctors class and wealthy class also share a proportion was well spending Table 2 more share was endometriosis tuboplast way PCOS registered etiology pattern is and uterine way (Table 2).

The stratification showed that there were no differences in the distribution of groups by age in polycystic ovary syndrome (PCOS), tubal factor, uterine cause and endometriosis (Table 3). Correspondingly for these causes, there is a slight trend for tubal factor across the BMI groups ($p = 0.067$), as displayed in Table 4. Subsequently, no significant.

Table 1

Descriptive Statistics of Study (n=209)

| Numerical Variables | Mean | Std. Deviation |
|---------------------------------|--------|----------------|
| Age (Years) | 29.27 | 6.665 |
| BMI (kg/m ²) | 26.182 | 4.4508 |
| Duration of Infertility (Years) | 5.65 | 2.738 |

Table 2

Demographic and Clinical Characteristics of Study Participants (n=209)

| | | Frequency | Percent |
|-------------------------------|---------------------------|-----------|---------|
| Age Groups | ≤ 25 Years | 72 | 34.4% |
| | > 25 Years | 137 | 65.6% |
| Residence | Rural | 104 | 49.8% |
| | Urban | 105 | 50.2% |
| Social Class | Middle Class | 75 | 35.9% |
| | Poor | 62 | 29.7% |
| Family History of Infertility | Rich | 72 | 34.4% |
| | Yes | 100 | 47.8% |
| Causes of Infertility | No | 109 | 52.2% |
| | Polycystic Ovary Syndrome | 100 | 47.8% |
| Causes of Infertility | Tuba Factor | 96 | 45.9% |
| | Uterine Causes | 107 | 51.2% |
| | Endometriosis | 94 | 45.0% |
| | Other Causes | 100 | 47.8% |

Table 3

Stratification of Causes of Infertility by Age Group (n = 209)

| Cause of infertility | Age <25 n (%) (n=72) | Age >25 n (%) (n=137) | P value |
|----------------------------------|----------------------|-----------------------|---------|
| Polycystic ovary syndrome (PCOS) | 34 (47.2) | 66 (48.2) | 0.896 |
| Tubal factor | 33 (45.8) | 63 (46.0) | 0.983 |
| Uterine cause | 34 (47.2) | 73 (53.3) | 0.405 |
| Endometriosis | 34 (47.2) | 60 (43.8) | 0.636 |

Table 4
Stratification of Causes of Infertility by BMI Category (n=209)

| Cause of infertility | BMI <25 kg/m ² n (%) (n=86) | BMI >25 kg/m ² n (%) (n=123) | P value |
|----------------------------------|---|--|---------|
| Polycystic ovary syndrome (PCOS) | 41 (47.7) | 59 (48.0) | 0.670 |
| Tubal factor | 46 (53.5) | 50 (40.7) | 0.067 |
| Uterine cause | 41 (47.7) | 66 (53.7) | 0.394 |
| Endometriosis | 39 (45.3) | 55 (44.7) | 0.928 |

DISCUSSION

As per this study, female infertility is a serious issue and diagnostic laparoscopy may help in knowing the reason. This study confirmed that uterine abnormalities were the most common cause of infertility followed by endometriosis, tubal factor and polycystic ovarian syndrome (PCOS). According to earlier studies, polycystic ovary syndrome (PCOS) and uterine factors are the main causes of infertility in females.¹¹

The frequency of PCOS in our study is in agreement with other studies which report that it is a major cause of anovulatory infertility affecting about 50% of infertile women who present for evaluation.¹² In our study, no association was found between PCOS and BMI, suggesting the role of other metabolic and genetic factors. Other studies found a stronger association of PCOS with obesity.¹³

Nearly 50% of the study's patients had tubal factor infertility, which is typically linked to pelvic inflammatory illness, past pelvic infections, or adhesions after surgery.¹⁴ This study's findings are in line with those of recent systematic studies that have found a high prevalence of tubal factor infertility, especially in areas where the prevalence of STDs is high.¹⁵ as There has been a lot of discussion about whether or not endometriosis contributes to infertility, and research suggests that the effect on fertility may vary with the severity of the condition.¹⁶ Although diagnosing endometriosis without laparoscopy is tough, this study's results are in line with recent investigations showing that it contributes to infertility in a considerable number of women.¹⁷

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Some research have shown a higher correlation between increasing age and endometriosis or tubal disease, although the results indicating the lack of significant associations between age or BMI and various infertility reasons contradict these findings.¹⁸ Potentially contributing to this disparity are variations in population features, sample size, and underlying risk factors. Although there is some evidence that obesity has a role in infertility, especially when it comes to ovulatory abnormalities, this study suggests that body mass index (BMI) may not always be the best indicator.¹⁹ The complex interplay of metabolic, hormonal, and environmental variables impacting infertility results necessitates additional investigation.²⁰

There are certain restrictions to take note of. Because the data was obtained solely from a tertiary care centre, the findings may not be applicable to other settings. Furthermore, the cross-sectional nature of the study did not allow any causal association of certain demographic variables with infertility. The outcomes may have become biased as only women undergoing diagnostic laparoscopy were included in the study.

Future analysis needs to focus on longitudinal studies comparing the long-term outcomes of diverse infertility treatments. Larger, multi-site research may offer a more complete view of trends in infertility and which entities are linked to demographic and lifestyle factors. More advanced tools including imaging and biomarker analysis can specify causes of infertility allowing for more specific adjustments.

CONCLUSION

Most frequent diagnostic laparoscopic findings in females with infertility as per this study are uterine abnormalities and polycystic ovarian syndrome. Endometriosis and tubal factor are the other main causes of infertility. The cause of infertility was not significantly associated with age and body mass index (BMI). Due to the vast burden of infertility, large and multi-centre studies are required to enhance diagnosis and treatment in these women.

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