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Reproductive and Clinical Factors Associated with Female Infertility in Eastern North India: A Cross-Sectional Study

Keywords
Female infertility; Primary infertility; Secondary infertility; Reproductive factors; Eastern North India.

Authors
[1]Dr Kirti Kaithwas
assistant professor, obstetrics and gynaecology, obgyn, Institute of Medical Sciences ,BHU, Email ID: kaithwaskirti37@gmail.com, Orcid ID(if you have):0009-0002-2771-5455.

[2]Prof Lavina Chaubey
Professor, obgyn, Obstetrics and Gynaecology, Institute of Medical Sciences,BHU VARANASI 221005, Email ID : lavinachaubey@gmail.com, Orchid Id :0009-0008-6836-2004

[3]Dr Lalit pratap singh
assistant professor, Specialisation orthopaedic, heritage institute of medical college ,Varanasi, Email ID singh.lalitpratap45 @gmail.com

[4]Dr. TB singh
Professor, Department of community medicine, Biostatistics, Institute of Medical Sciences, BHU 221005, VARANASI, Email ID: tbsinghbiostat@gmail.com

Abstract
Female infertility is a multifactorial reproductive-health condition influenced by menstrual, clinical, gynaecological, and obstetric factors. Region-specific evidence regarding these characteristics remains limited in eastern North India. To assess reproductive and clinical factors associated with female infertility and compare these characteristics between women with primary and secondary infertility attending a tertiary-care hospital in Eastern North India. A questionnaire-based, cross-sectional analytical study was conducted at Sir Sunderlal Hospital, Banaras Hindu University, Varanasi, from October 2017 to March 2019. The study included 1,520 women, comprising 761 infertility cases and 759 controls. Among infertile women, 472 had primary and 289 had secondary infertility. Reproductive, menstrual, medical, obstetric, surgical, and treatment-related characteristics were assessed. Categorical associations were evaluated using Pearson's chi-square test at a 5% significance level. Menstrual disturbances, particularly scanty menstrual flow, oligomenorrhoea, and amenorrhea, were prominent among infertile women. Tuberculosis, endometriosis, and PCOS were more prominently represented among cases. Previous D&C showed a significant association with infertility and was particularly prominent among women with secondary infertility. Obstetric characteristics also differed between secondary infertility and controls. PV discharge and surgical intervention did not significantly distinguish primary from secondary infertility. Ovulation induction with IUI was the most frequently reported infertility treatment. Female infertility was associated with multiple reproductive and clinical characteristics. Comprehensive assessment of menstrual patterns, associated diseases, uterine procedures, and obstetric history may facilitate focused infertility evaluation and individualized clinical management.

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1. INTRODUCTION

A conventional definition of infertility is inability to get a clinical pregnancy for 12 months or longer of regular unprotected sexual activity. It is a significant reproductive-health issue as its impact goes beyond the inability to conceive to social, emotional, family and healthcare issues. However, in India, the distribution of infertility is not uniform and demographic and socioeconomic factors may have an effect on primary infertility among population groups (Purkayastha & Sharma, 2021). The patterns of use of fertility-related healthcare are also significant: women who have delayed conception may be very different in their use of professional fertility care (Pathak et al., 2025). Infertility may be broadly classified into primary and secondary. Primary is when pregnancy has never occurred and secondary is when it has occurred but failed to conceive again. Females can be infertile due to multiple factors and this may be a result of a combination of menstrual, endocrine, reproductive, infectious, medical, obstetric, and treatment related characteristics. In women with reproductive tract abnormalities or menstrual disorders, for instance, genital infections have been associated with infertility (Patnaik et al., 2023). The prevalence of primary infertility at the population level can also show geographical variations and clusters of risk factors (Pradhan et al., 2021). The implications are not just biological; there is also significant psychological morbidity linked to infertility amongst women in North India (Kamboj et al., 2023).

Thus, reproductive history should be considered, and signs suggestive of reproductive dysfunction should be noted when making a clinical assessment. The knowledge of women regarding fertility is still important for prompt identification and action on reproductive issues (Mahey et al., 2018). Menstrual irregularity, such as variation of menstrual flow, irregularity of periods, oligomenorrhoea and amenorrhea can be associated with infertility, and reproductive and clinical histories of previous uterine instrumentation, infection, medical disorders, obstetric events and surgical interventions may also help to describe women with menstrual abnormalities. Community evidence from Haryana has also shown the need to look at reproductive risk factors in the context of female infertility (Kataria et al., 2023). Additionally, past pregnancy-related and surgical history still play a significant role in the clinical history of women in tertiary care settings from Northern India (Verma et al., 2022).

Infertility and its determinants have been studied extensively in India in the recent past but there are still some key evidence gaps. Community-based research from central India shows that there are a number of factors that are related to primary infertility, which shows the importance of population-specific evaluation (Katole & Saoji, 2019). Similarly, research in rural north-western India shows that the nature of the infertility associated traits can differ depending on the local demographic, reproductive, and contextual factors (Banerjee et al., 2023). But there is not such detailed evidence available for all the geographical areas of the country, especially in the eastern part of India.

Moreover, most studies of infertility focus on one dimension only, and do not simultaneously consider the characteristics of menses, medical disorders, history of the reproductive tract, history of previous uterine instrumentation, obstetric events, surgical intervention, and treatment history. In addition, studies conducted in hospitals have shown that infertility has important quality-of-life and psychological aspects, which further underscores the need for comprehensive clinical characterization of women affected by infertility (Dar et al., 2022). International studies also reveal that there is no homogeneity in the types and etiological factors of female infertility in clinical population (Tesfai et al., 2025). The variation in the magnitude of infertility problems and influencing factors on different healthcare settings underlines the importance of evidence generation that is locally driven and not assuming findings from one population are applicable to another (Akalewold et al., 2022). Specifically, the data on these reproductive and clinical characteristics of women in comparison to women with primary and secondary infertility are still scarce among women attending the tertiary hospitals of east India.

In order to make a comprehensive evaluation of reproductive and clinical characteristics, it is important to recognize that female infertility often is not a single isolated factor. Overall, evidence synthesized across the populations suggests that there are multiple demographic, reproductive, medical and behavioural factors that could account for the burden of female infertility (Addisu et al., 2025). Additionally, the fertility levels alone do not necessarily reflect the true status of women's reproductive health, highlighting the need to consider specific reproductive indicators and histories (Sikdar & Bansod, 2025).

The description of the female patient seeking infertility treatment can also give clinically relevant data on the reproductive history, underlying conditions, and previous treatment experiences (Abdo et al., 2023). This is especially important when trying to differentiate between primary and secondary infertility because the epidemiology and trajectory of the two types of infertility may change over time and between populations (Borumandnia et al., 2022). Thus, study of menstrual characteristics, diseases, past history of D&C, vaginal discharge, obstetric history, caesarean delivery, surgical history and history of seeking infertility treatment in one study may give a more comprehensive understanding of female infertility. This is particularly relevant when considering the clinical assessment of women in the case of Sir Sunderlal Hospital in Banaras Hindu University, a tertiary referral hospital for women from eastern UP and its neighbouring areas, and can inform more systematic clinical evaluations and other reproductive health interventions in the region.

Research Objective

- To assess the reproductive and clinical factors associated with female infertility among women attending a tertiary-care hospital in Eastern North India.
- To compare reproductive and clinical characteristics between women with primary and secondary infertility.

2. Materials and Methods

2.1 Study Design and Setting

This was a cross-sectional, analytical study conducted in the department of obstetrics and gynaecology of Sir Sunderlal Hospital, Banaras Hindu University (BHU) in Varanasi, India from October 2017 to March 2019 using a questionnaire. Sir Sunderlal Hospital is a tertiary-care centre which primarily serves the population of eastern Uttar Pradesh (Varanasi, Mau, Jaunpur, Chandauli, Gorakhpur, Azamgarh and Sonbhadra) and adjoining areas of western Bihar, Jharkhand, Madhya Pradesh and Chhattisgarh with some patients from Nepal. Couples were selected from gynaecology OPD during the period of the study.

2.2 Study Population, Sample Size and Sampling

The study population was the eligible cases and controls attending gynaecology OPD. Sample size was calculated based on the assumption of 1:1 ratio of cases to controls, 95% power (1 - ß = 0.95), a value of α = 0.05, and a 10% anticipated non-response rate, with genital tuberculosis included in the sample-size calculation. The minimum required sample size without adjustment for non-response was 758 participants in each group. The clinically suspected infertile cases that attended OPD during the research period who met with the selection criteria were enrolled with written informed consent and the controls were selected by purposive sampling technique in the same OPD.

2.3 Eligibility Criteria

Couples included those in de facto marriage, in the reproductive age group (15–49 years) and with a history of primary or secondary infertility (WHO definition). Excluded were couples who did not live together for over six months as well as divorced or widowed individuals and couples who did not live in eastern North India. The controls were women 15–49 years of age with two or more children, who had never undergone fertility-enhancing treatment.

2.4 Definition of Infertility

Infertility was defined as no clinical pregnancy after 12 months or more of regular, unprotected sexual intercourse. For the purpose of the study the definition of current infertility was used. Primary infertility was defined as infertility in women who never gave birth to a child, and secondary infertility as infertility after giving birth to a child at least once.

2.5 Data Collection and Study Variables

A self-designed questionnaire was used for the collection of the data, including demographic, reproductive, gynaecological, obstetric, medical, surgical and treatment-related data. Menstrual flow, menstrual-cycle regularity, amenorrhea, history of dilatation and curettage (D&C), per-vaginal (PV) discharge, obstetric history, antenatal care, pregnancy complications, history of hospital delivery, history of LSCS, abortion, previous surgical intervention and history of infertility treatment were the variables relevant to the present study. Treatment information comprised no treatment, surgical treatment, antitubercular treatment (ATT), hormonal treatment, in vitro fertilization (IVF), and antibiotic/antiviral treatment. If more than one infertility treatment was received, the latest one was documented.

2.6 Ethical Considerations

The study was approved by the Institute Ethical Committee, Institute of Medical Sciences, Banaras Hindu University (No. Dean/2018/EC/480; dated 23 February 2018). All participants had written informed consent before enrolment.

2.7 Statistical Analysis

Quantitative variables were expressed as mean ± standard deviation (SD), and differences between means were tested using the Student's t-test. Qualitative variables were presented as numbers and percentages, and associations between qualitative variables were evaluated by the Pearson chi-square test. Two-tailed statistical significance was set at 5%.

3. Results

A total of 1,520 women were included, comprising 761 infertility cases (50.1%) and 759 controls (49.9%). Of the infertile women, 472 (62.0%) and 289 (38.0%) were of primary and secondary infertility, respectively. Reproductive and clinical features of the subjects were determined and described below.

3.1 Menstrual Characteristics

Menstrual parameters were significantly different between women with infertility and controls. Infertility cases were mostly represented by scanty menstrual flow, and controls by normal and heavy menstrual flow. In the infertile group, normal and scanty menstrual flow were more often associated with primary than secondary, whereas heavy menstrual flow had a more equivalent distribution between the two types of infertility. There were also variations in the regularity of the cycles, with the women who had infertility presenting with oligomenorrhoea. Distribution of cycle regularity, however, was not different between primary and secondary infertility. Amenorrhea was more common in cases than in controls and also more common in women with primary infertility. The overall associations of menstrual disturbances with the infertility status were significant (Table 1).

Table 1. Menstrual characteristics among cases and controls and according to type of infertility

Characteristic	Category	Cases No. (%)	Control No. (%)	Total No.	Primary infertility No. (%)	Secondary infertility No. (%)	Total No.
Menstrual flow	Normal	479 (44.9)	589 (55.1)	1068	300 (62.6)	179 (37.4)	479
	Scanty	190 (81.2)	44 (18.8)	234	124 (65.3)	66 (34.7)	190
	Heavy	92 (42.4)	125 (57.6)	217	48 (52.2)	44 (47.8)	92
	Total	761 (50.1)	759 (49.9)	1520	472 (62)	289 (38)	761
Cycle regularity	Oligo	209 (76.6)	64 (23.4)	273	136 (65.1)	73 (34.9)	209
	Poly	54 (39.1)	84 (60.9)	138	29 (53.7)	25 (46.3)	34
	Normal	498 (44.9)	611 (55.1)	1109	307 (61.6)	191 (38.4)	498
	Total	751 (50.1)	759 (49.9)	1520	472 (62)	289 (38)	761
Amenorrhea	Yes	157 (67.7)	75 (32.3)	232	108 (68.8)	49 (31.2)	157
	No	604 (46.9)	684 (53.1)	1288	364 (60.3)	240 (39.7)	604
	Total	761 (50.1)	759 (49.9)	1520	472 (62)	289 (38)	761

Menstrual flow: cases vs controls, $\chi^2 = 1.08$, df = 3, $p < 0.001$; primary vs secondary infertility, $\chi^2 = 4.711$, df = 2, $p < 0.095$. Cycle regularity: cases vs controls, $\chi^2 = 95.048$, df = 2, $p < 0.001$; primary vs secondary infertility, $\chi^2 = 2.44$, df = 2, $p < 0.295$. Amenorrhea: cases vs controls, $\chi^2 = 33.94$, df = 1, $p < 0.001$; primary vs secondary infertility, $\chi^2 = 3.845$, df = 1, $p < 0.050$.

3.2 Associated Disease Profile

An associated disease distribution was different between the cases and controls of infertility. The most commonly represented disease among women with infertility was tuberculosis with a predominance of women with the disease even higher. In the study population, there were only cases of infertility in which PCOS was observed. Frequencies of the various other disease conditions classified under the "Others" category were also higher in cases than controls. DM/HTN and hypothyroidism were comparatively more represented among controls, however, the difference with regard to hypothyroidism was relatively small. The control group also had a higher proportion of women who did not have any known disease. Combined, the whole disease profile was significantly linked with the infertility status, and there were significant differences in the distribution of underlying clinical conditions between women with infertility and controls (Table 2).

Table 2. Relationship of disease with cases and controls (n=1520)

Disease	Cases No.	Cases %	Control No.	Control %	Total No.
Tuberculosis	113	85.6	19	14.4	132
DM/HTN	56	42.1	77	57.9	133
Hypothyroidism	86	47.8	94	52.2	180
Endometriosis	25	96.2	1	3.8	26
Others	14	82.4	3	17.6	17
No disease known	417	42.5	565	57.5	982
PCOS	49	100	0	0	49
Total	761	50.1	759	49.9	1520

$\chi^2 = 1.722$, df = 7, $p < 0.001$.

The distribution of associated diseases was significantly different among the cases and controls, as seen in Figure 1, with a higher prevalence of tuberculosis, endometriosis and PCOS in the cases.

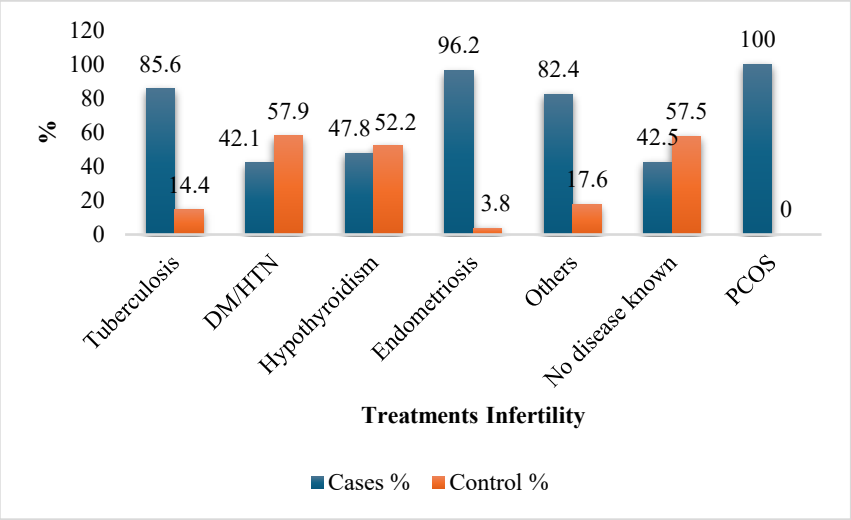

Figure 1. Distribution of associated diseases among cases and controls

As seen in Figure 1, endometriosis and PCOS were more commonly present among the infertility group and also tuberculosis was significantly more common among the cases. By comparison, DM/HTN, hypothyroidism and no known disease were relatively common in controls.

3.3 D&C History

Clear difference between cases of infertility and controls was seen on a history of D&C. There was a higher proportional representation of women with a history of D&C among those with infertility compared to controls. This significant difference was also observed when the women who suffered from infertility were categorised as primary and secondary infertility. In women with a history of D&C, secondary infertility was more prevalent and in women without a history of D&C, primary infertility was more prevalent. Case-control comparison was statistically significant as was comparison by type of infertility. These results highlight the significance of previous D&C in the study population and the strong association with secondary infertility (Table 3).

Table 3. D&C in female partner (n=1520)

D&C	Cases No. (%)	Control No. (%)	Total No.	Primary infertility No. (%)	Secondary infertility No. (%)	Total No.
No	470 (61.8)	599 (75.0)	1039	399 (72.1)	131 (27.9)	470
Yes	291 (38.2)	190 (25.0)	481	133 (45.7)	158 (54.7)	291
Total	761 (50.1)	759 (49.9)	1520	472 (62)	289 (38)	761

Cases vs controls: $\chi^2 = 30.638$, $df = 1$, $p < 0.001$; primary vs secondary infertility: $\chi^2 = 53.273$, $df = 1$, $p < 0.001$.

3.4 PV Discharge

There was a different distribution of PV discharge among those with and without an infertility diagnosis. The absence of PV discharge predominated in both groups, but was more frequently represented among women with infertility. On the other hand, previous PV discharge was seen more frequently in controls than cases, relative to their numbers. The difference between the two groups of cases and controls was statistically significant. However, in the infertile group, the distribution of PV discharge was quite comparable, both in women with primary and secondary infertility. The great majority of women in both the groups of infertility did not report PV discharge and only a small difference was present in these two groups. Thus, no significant relationship was found between PV discharge and type of infertility. Therefore, the case-control design did not result in a significant difference between primary and secondary infertility (Table 4).

Table 4. PV discharge in female partner (n=1520)

PV discharge	Cases No. (%)	Control No. (%)	Total No.	Primary infertility No. (%)	Secondary infertility No. (%)	Total No.
No	691 (90.8)	527 (69.4)	1218	426 (90.2)	265 (91.6)	691
Yes	70 (10.2)	232 (30.6)	302	46 (9.8)	24 (8.4)	70
Total	761 (100)	759 (100)	1520	472 (100)	289 (100)	691

Cases vs controls: $\chi^2 = 1.090$, $df = 1$, $p = 0.001$; primary vs secondary infertility: $\chi^2 = 0.446$, $df = 1$, $p = 0.504$.

PV discharge was less frequently reported among infertility cases than controls and showed a similar pattern between primary and secondary infertility groups, as shown in Figure 2.

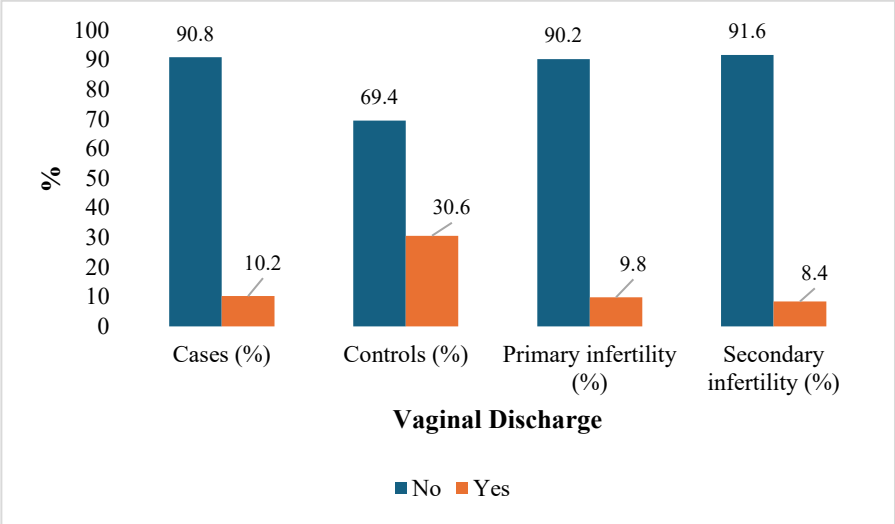

Figure 2. Distribution of PV discharge among study groups

The figure shows that absence of PV discharge predominated across all groups. The presence of PV discharge was comparatively higher among controls, while only a small difference was observed between primary and secondary infertility.

3.5 Obstetrical History in Secondary Infertility and Controls

Obstetrical history showed differences between women with secondary infertility and controls across the characteristics examined. There was a marked difference in the antenatal care history of the two groups. A significant difference was also noted regarding the complications of pregnancy, which suggests that there is a different pattern of previous pregnancy-related complications between women with secondary infertility and control women. There was also a significant group difference in the number of hospital deliveries in the past. Also, when comparing the statistics, LSCS history varied widely. The pattern for abortions was especially pronounced with an abortion history being more strongly represented on the secondary infertility side and a lack of abortions being more strongly represented on the controls side of the spectrum. The overall results show that there were significant differences between women with secondary infertility and the control group in previous obstetrical experiences and pregnancy-related history (Table 5).

Table 5. Obstetrical history with secondary infertility and control

Group	Category	Secondary infertility No.	%	Control No.	%
ANC received	No	29	10	189	24.9
	Yes	130	45	570	75.1
Complication during pregnancy	No	92	31.8	604	79.6
	Yes	67	23.2	155	20.4
Past hospital delivery	No	11.1	6.9	21.1	15.3
	Yes	18.8	48.1	78.9	57.2
LSCS	No	87	30.1	561	73.9
	Yes	72	24.9	198	26.1
Abortion	No	121	41.8	618	81.5
	Yes	168	58.12	141	18.5

ANC received: $\chi^2 = 3.921$, df = 2, $p < 0.001$; complication during pregnancy: $\chi^2 = 4.14$, df = 2, $p < 0.001$; past hospital delivery: $\chi^2 = 3.94$, df = 2, $p < 0.001$; LSCS: $\chi^2 = 4.06$, df = 2, $p < 0.001$; abortion: $\chi^2 = 4.355$, df = 1, $p < 0.001$.

3.6 Surgical Intervention

A statistically significant difference was observed between the infertility cases and controls in previous surgical intervention. Previous surgery was more common among controls while no previous surgery was more common among women with infertility. This pattern lead to a strong association between the surgical-intervention history and the case-control status. In contrast, it was noted that the distribution was rather similar for the infertile group including both primary and secondary infertility. For both women with and women without prior surgical procedures, primary infertility was more common than secondary infertility and the relative distribution was virtually the same regardless of surgical history. As a result, there was no statistically significant relationship between the type of infertility and surgical intervention. Surgical history thus separated cases from controls, but not primary and secondary infertility (Table 6).

Table 6. Surgical intervention in cases and controls (n=1520)

Surgical intervention	Cases No. (%)	Control No. (%)	Total No.	Primary infertility No. (%)	Secondary infertility No. (%)	Total No.
No	607 (55.5)	487 (44.5)	10.94	377 (62.1)	230 (37.9)	607
Yes	154 (36.2)	272 (63.8)	426	95 (61.7)	59 (38.3)	154
Total	761 (50.1)	759 (49.9)	1520	472 (62)	289 (38)	761

Cases vs controls: $\chi^2 = 45.846$, df = 1, $p < 0.001$; primary vs secondary infertility: $\chi^2 = 0.009$, df = 1, $p < 0.924$.

3.7 Treatment of Infertility

The treatment profile was different for women getting different therapeutic approaches for infertility. Ovulation induction with IUI was the most common treatment reported and a significant number of women did not have infertility treatment at the time of evaluation. Other treatments such as ATT and hormonal treatment were also frequently found while other treatments like surgery, IVF and antibiotics / antiviral medication were comparatively small. Primary infertility was more common than secondary infertility in all the treatment groups but the relative percentages differed according to the treatment offered. The statistical comparison of the overall picture did not show a significant difference between primary and secondary infertility in terms of treatment distribution. Women who received the various types of infertility treatment were not significantly different in terms of primary versus secondary infertility (Table 7).

Table 7. Treatment of infertility in female partners (n=761)

Treatment of infertility	Primary infertility No.	%	Secondary infertility No.	%	Total No.	%
No Treatment Received Yet	114	64.8	62	35.2	176	23.1
Surgical Treatment	23	54.8	19	45.2	42	5.5
ATT	68	58.6	48	41.4	115	15.2
Hormonal	75	67	37	33	112	14.7
Ovulation Induction + IUI	139	63.8	79	36.2	218	28.6
IVF	29	58	21	42	50	6.6
Antibiotics/Antiviral medication	24	51.1	23	48.9	47	6.2
Total	472	62	289	38	761	100

$\chi^2 = 6.256$, df = 6, p = 0.395.

The distribution of different infertility treatments received by the infertile women is presented in Figure 3.

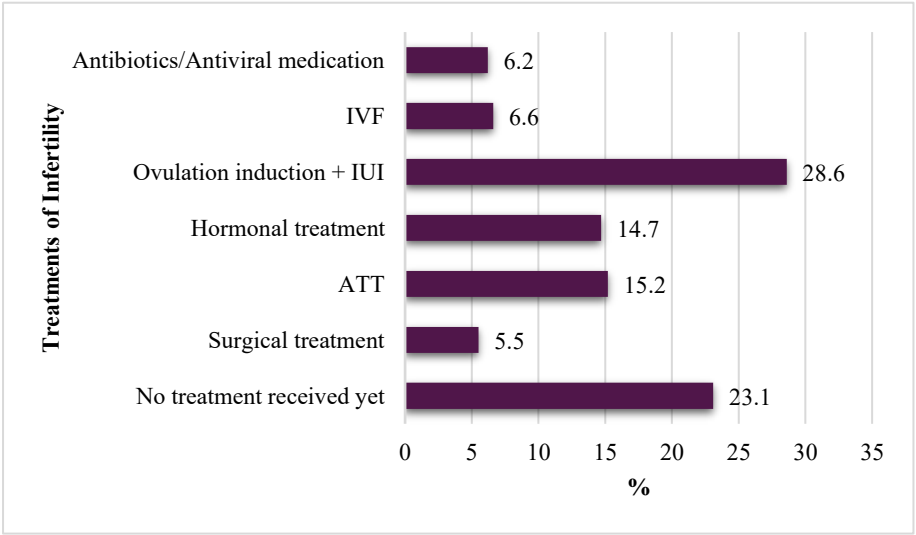

Figure 3. Distribution of infertility treatments among infertile women

As shown in Figure 3, ovulation induction with IUI was the most commonly reported treatment, followed by women who had not yet received treatment. Surgical treatment, IVF, and antibiotics/antiviral medication were comparatively less frequent.

4. Discussion

The current study indicates that female infertility is related to a wide range of reproductive, menstrual, clinical and obstetric characteristics and not only one. Menstrual disturbances became an important feature, including scanty menstrual flow, oligomenorrhoea and amenorrhea which were more dominant among the infertile women. The profile also revealed that TB, endometriosis and PCOS were the dominant diseases in the infertility group,

indicating that infectious, endocrine and gynaecological diseases were major components of the clinical profile of women with infertility. In particular, there was a strong association between D&C and infertility in previous D&C, which was more common among women who had secondary infertility. PV discharge and previous surgery were, in contrast, able to distinguish between cases and controls, but not between primary and secondary infertility. A history of obstetric factors was also found to differentiate women with secondary infertility from controls, especially prior abortions and other pregnancy related experiences. Treatment patterns were varied with the most common being ovulation induction with IUI. All these results point to the multifaceted reproductive and clinical picture of female infertility.

The current results confirm the results of previous studies showing that female infertility is a complex issue and is associated with a wide range of reproductive and medical factors, which may overlap. Menstrual, gynaecological, infectious and other clinical characteristics should not be looked at as individual factors and multiple factors as mentioned by Deshpande & Gupta 2019 were observed to be responsible for infertility in the present study and should be looked at in the same manner. The high prevalence of PCOS among the women included in the current study is also of clinical importance as recent data on prevalence of PCOS and associated sociodemographic variables among young adults of Delhi NCR has been reported (Sharma et al., 2025). High fertility levels in north-eastern Democratic Republic of Congo, a high fertility setting, also show evidence of the importance of examining the reproductive history and factors of each person as a reproductive-health issue (Alongo et al., 2025).

These findings are also set in some larger context in reproductive-health evidence. Reproductive outcomes are determined not just by female clinical characteristics, but also by reproductive behaviour, use of healthcare resources and couple-level factors. Research on reproductive-age women has shown the significance of reproductive-health needs and access to relevant services (Gebre et al., 2016) and research conducted in North India has revealed the variation in reproductive-health knowledge and practices among women after pregnancy (Pal et al., 2022). Furthermore, infertility is a couple level phenomenon and male reproductive traits might play a role in addition to female factors. Age related differences in semen parameters among males from infertile couples have been proved in a tertiary care center in central India (Kumar et al., 2017). These observations underscore the need to apply the female factor revealed in the current study in a larger context of couplehood for reproductive health.

The results are relevant to the evaluation of infertility in tertiary-care centers. A detailed menstrual history, previous uterine instrumentation, associated medical and gynaecological conditions and previous obstetric events should be part of the clinical evaluation. Menstrual abnormalities should be given special consideration because it may be the first clue to the presence of reproductive dysfunction and a history of D&C or previous adverse obstetric events may be particularly helpful in assessing secondary infertility. The results also suggest a holistic assessment instead of risk factor focused evaluations. This might lead to earlier detection of relevant reproductive history and to appropriate diagnostic investigation and management based on the clinical profile of the individual woman.

There are several caveats to the results. A cross-sectional study does not allow conclusions to be drawn on associations regarding temporal or causal relationships between factors investigated and infertility. Recruitment was done in a tertiary-care hospital and this may affect generalizability to the general population. Selection bias may also be introduced as described above when controls are purposefully selected. Further, data was gathered through a self-designed questionnaire, and the data gathered on other multiple reproductive and clinical variables were based on participant history, and therefore, recall/reporting bias might occur. The study's primary examination of associations was based on categorical comparisons and as such was not able to fully consider the possibility of confounding or interactions between multiple reproductive factors.

Prospective, multicentre and community-based studies with diverse population of eastern North India are required in the future. Future studies with a larger sample size that include multivariable analysis will be useful to identify which reproductive and clinical factors are independently associated with infertility after controlling for other factors. An in-depth female and male reproductive evaluation as well as Laboratory and imaging findings and longitudinal follow-up should also be incorporated in future investigations to further elucidate the temporal relationships. These studies will help to better understand potentially modifiable factors and inform the development of region-specific strategies for prevention and early detection of infertility and clinical management.

5. Conclusion

The present study emphasizes the multifactorial nature of female infertility; important reproductive, menstrual, clinical and obstetric characteristics have been found to differentiate the infertile women from controls. Menstrual irregularities especially scanty menstrual flow, oligomenorrhoea and amenorrhea were conspicuous in women with infertility, which suggests the importance of menstrual history in assessing infertility. The disease profile associated with this also revealed a higher number of TB, Endometriosis and PCOS among infertile females indicating the need to assess underlying infectious, endocrine and gynaecological disease conditions. Previous uterine instrumentation, as part of the reproductive-history evaluation, was important as a history of D&C was associated with infertility and was more prominent among women with secondary infertility. Differences were also observed between obstetric characteristics of women with secondary infertility and controls, such as previous abortion, complications related to the pregnancy, hospital delivery and cesarean section. However, PV discharge and previous surgery did not have significant difference between primary and secondary infertility, and their distribution was relatively similar between all types of infertility. There was a wide variation in the treatment history, with the most commonly reported

being ovulation induction and IUI. In summary, these results highlight that a thorough reproductive and clinical history is crucial in the assessment of female infertility. Systematic investigation of menstrual pattern, diseases, previous uterine surgery and obstetric history could be useful in helping to focus investigations and provide more individualised care for women who present with infertility.

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