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Original Research Article

A Clinical Study on Factors Influencing Occurrence Infertility in Females

Ch. Mamatha[1], B Sreelatha[2]

[1]Assistant Professor, Department of Obstetrics and Gynecology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar, Telangana State.
[2]Assistant Professor, Department of Obstetrics and Gynecology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar, Telangana State.

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Corresponding Author: Dr. B Sreelatha
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Abstract:

Background: Infertility remains a significant global concern in reproductive health, often associated with social stigma and various socioeconomic and psychological implications. The objective of this study is to examine the incidence of various causes of infertility among female patients attending the gynecology outpatient department (OPD) at our tertiary care Hospital.

Methods: This prospective observational study was conducted at the Department of Obstetrics and Gynecology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar, Telangana State involving 50 women aged 18-40 years presenting with primary and secondary infertility complaints. The study aimed to determine the prevalence of different infertility causes among women attending the Gynecology Outpatient Department over two years.

Results: Primary infertility (N=30) is the number and percentage of cases where infertility was diagnosed before any previous pregnancy. Secondary infertility (N=20): This shows the number and percentage of cases where infertility occurred after a previous pregnancy. Ovarian factors: Most prevalent cause in both primary (46.67%) and secondary (40.0%) infertility, contributing to 44% of total cases. Tubal factors: Second most common cause, affecting 23.33% of primary and 20.0% of secondary cases, making up 22% of total cases.

Conclusion: Polycystic ovary syndrome (PCOS) emerges as a prevalent factor, partly due to lifestyle changes. Ovarian issues, predominantly PCOS, rank highest in both primary and secondary infertility cases, followed by tubal, uterine, peritoneal, and endocrinological factors. Tubal blockage, often linked to conditions like pelvic inflammatory disease (PID), significantly contributes to infertility.

Keywords: Infertility, Primary infertility, Secondary infertility, Polycystic ovary syndrome (PCOS)

Introduction

Infertility presents a significant global challenge within reproductive health, often accompanied by social stigma and profound impacts on individuals' social, economic, and psychological well-being. It affects a substantial proportion of couples of reproductive ages, with an estimated 10 to 15 percent encountering difficulties conceiving. Interestingly, approximately half of women will conceive within the second year of attempting, even without medical intervention. [1] While the prevalence of infertility has shown relative stability over the past four decades, there has been a noticeable surge in demand for infertility evaluation and treatment.

Recent studies conducted by the World Health Organization (WHO) suggest that approximately 8-10% of couples worldwide face infertility issues, amounting to an astonishing 50-80 million individuals globally striving to form families. [2] In India, there has been a 7.7% decrease in the prevalence of infertility from the National Family Health Survey (NFHS)-2 to NFHS-3, declining from around 2% to roughly 1.85%. Infertility is defined as the inability to conceive after 12 months of regular, unprotected intercourse for women under 34 years old, according to WHO guidelines for time to pregnancy. [3] For women over 35, this duration is reduced to 6 months. It can be categorized into primary infertility, where there have been no previous pregnancies, and secondary infertility, which occurs after a prior pregnancy, regardless of its outcome. [4]

The WHO defines infertility as the failure to conceive after 12 months of exposure, serving as a practical guide for management, with a residual incidence of infertility persisting in 10-15% of cases. However, the chances of conception notably decrease after the age of 35. [5, 6] Epidemiological data suggests that approximately 80 million people worldwide are affected by infertility, with rates

varying across different regions. For example, in some areas of Central Africa, the infertility rate may peak at 50%, compared to 20% in the Eastern Mediterranean region and 11% in developed countries. In India, the prevalence of primary infertility is estimated to range from 3.9% to 16.8%. [7]

The psychological and social ramifications of infertility on women globally are profound. Tubal factors, ovulatory issues, endometriosis, and unexplained infertility significantly contribute to its prevalence. [8] These factors demonstrate similar distributions across Asia, Latin America, and the Middle East, with tubal factors being predominant in Africa. Risk factors for infertility include various genital, endocrinal, developmental, and general factors. Pelvic inflammatory disease (PID), often resulting from sexually transmitted infections, unsafe abortions, or puerperal infections, emerges as a leading cause of tubal infertility, frequently associated with chlamydial infection. Polycystic ovarian syndrome (PCOS) is a prevalent cause of anovulatory infertility. [9, 10]

The objective of this study is to examine the incidence of various causes of infertility among female patients attending the gynecology outpatient department (OPD) at the Department of Gynecology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar, Telangana State.

Material and Methods

This cross-sectional study was carried out in the Department of Obstetrics and Gynecology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar. Institutional Ethical approval was obtained for the study after explaining the nature of the study in the vernacular language. Written consent was obtained from all the participants of the study.

Inclusion Criteria

1. Couples failed to conceive following marriage for > 2 years
2. Not using any contraception
3. Failure to conceive following previous pregnancy in the absence of contraception, breast-feeding, or postpartum amenorrhoea for two years.
4. Aged 20 – 40 years
5. No male infertility factor or medical disorders were detected.
6. Willing to participate in the study voluntarily

Exclusion Criteria

1. Women on treatment with IVF
2. Not as per inclusion criteria
3. No other medical disorders detected

A detailed history was obtained from enrolled women about their menstrual, obstetrics, and medical history. Careful general and systemic examinations were done, particularly pelvic examination for clinical diagnosis. All clinical features and physical examination findings were documented. All relevant investigations like CBC, blood glucose, thyroid profile, and viral serology were performed. Ultrasonography (USG) was done for the evaluation of pelvic organs (uterine cavity, endometrial thickness, and any adnexal pathology). Hystero-salphingography (HSG) was done for tubal patency and structural abnormality in the uterine cavity. Hormonal studies (FSH, LH, thyroid profile, and prolactin) were done. Hysterolaparoscopy was done in patients who needed further evaluation and results were documented.

Statistical Analysis: The available data underwent thorough processing and was entered into an MS Excel spreadsheet, then transferred to a computerized database utilizing SPSS version 21.0. Continuous variables were represented by mean and standard deviation, while categorical variables were presented as percentages, and their significance was assessed using p-values, with a threshold set at <0.05.

Results

A total of 50 cases of infertility were reported and included in the study. Table 1 shows that the majority of participants (38%) fall within the 26-30 age group. The 21-25 and 31-35 age groups also represent significant portions with 32% and 24% respectively. The youngest age group (36-40) has the smallest representation with only 6%. 30(60%) of cases were due to primary infertility and 20(40%) were due to secondary infertility.

Table 1: Showing the age-wise distribution of 50 cases of infertility included in the study

Age group	Frequency	Percentage
21 – 25	16	32.00
26 – 30	19	38.00
31 – 35	12	24.00
36 – 40	3	6.00
Total	50	100

Table 2 details the causes of infertility in 50 cases included in a study, categorized by primary and secondary infertility. Causes of infertility: Lists the specific factors potentially contributing to infertility.

Primary (N=30): Shows the number and percentage of cases where infertility was diagnosed before any previous pregnancy. Secondary (N=20): Shows the number and percentage of cases where infertility occurred after a previous pregnancy. Ovarian factors: Most prevalent cause in both primary (46.67%) and secondary (40.0%) infertility, contributing to 44% of total cases. Tubal factors: Second most common cause, affecting 23.33% of primary and 20.0% of secondary cases, making up 22% of total cases. Uterine factors: Less frequent compared to the above, present in 20.00% of primary and 15.0% of secondary cases, totaling 18% of all cases. Peritoneal factors: Relatively uncommon, seen in 6.67% of primary and 10.0% of secondary cases, constituting 8% of total cases. Unknown: A small proportion of cases (3.33% primary and 15.0% secondary) have an undetermined cause, accounting for 8% of the total.

Table 2 shows the causes of infertility in 50 cases of infertility included in the study

Causes of infertility	Primary (N=30)	Secondary (N=20)	Total (%)
Ovarian factors	14 (46.67%)	8 (40.0%)	22(44%)
Tubal factors	7 (23.33%)	4 (20.0%)	11(22%)
Uterine factor	6 (20.00%)	3 (15.0%)	09(18%)
Peritoneal factor	2 (6.67%)	2 (10.0%)	04(8%)
Unknown	1 (3.33%)	3 (15.0%)	04(8%)

Table 3 focuses on pathologies identified during laparoscopy in 39 women with infertility, categorized by primary and secondary infertility. Ovarian factor: Present in 48.0% (12/25) of primary infertility cases and 35.71% (5/14) of secondary infertility cases, making up 43.59% (17/39) of all cases. PCOS: The most common specific pathology within the ovarian factor group, affecting 24.0% of primary and 21.42% of secondary infertility cases, totaling 23.08% of all cases. Other ovarian pathologies: Simple cysts: Seen in 4.0% of primary cases only. Chocolate cysts: Present in 8.0% of primary and 7.14% of secondary cases, totaling 7.69% of all cases. Complex cysts: Found in 8.0% of primary and 7.14% of secondary cases, totaling 7.69% of all cases. Steak ovaries: Identified in 4.0% of primary cases only.

Table 3: Laparoscopically identified pathology of infertility (n=39)

Causes of infertility		Primary (N=25)	Secondary (N=14)	Total (n=39) (%)
Ovarian factor	PCOS	6 (24.0%)	3 (21.42%)	9 (23.08%)
	Simple cyst	1 (4.0%)	0 (00.0%)	1 (2.56%)
	Chocolate cyst	2(8.0%)	1 (7.14%)	3 (7.69%)
	Complex cyst	2 (8.0%)	1 (7.14%)	3 (7.69%)
	Steak Ovaries	1 (4.0%)	0 (00.0%)	1 (2.56%)
Total		12 (48.0%)	5 (35.71%)	17 (43.59%)

Ovarian factors, particularly PCOS, play a significant role in both primary and secondary infertility based on this laparoscopic evaluation. Other ovarian pathologies like chocolate cysts and complex cysts also contribute to a notable portion of cases.

Table 4: Laparoscopically identified pathology of infertility

Causes of infertility		Primary (N=25)	Secondary (N=14)	Total (n=39) (%)
Tubal factor	B/L block	4 (16.0%)	1 7.14%)	5 (12.82%)
	U/L Block	1 (4.00%)	2 14.28%)	3 (7.69%)
	Hydrosalpinx	0 (0.00%)	1(7.14%)	1 (2.56%)
	TO mass	1 (4.00%)	1 (7.14%)	2 (5.13 %)
	Peri tubal	1 (4.00%)	0(0.00%)	1 (2.56%)
Total		7 1(7.95%)	5 (12.82%)	4 (30.76%)

Table 4 focuses on tubal factors identified during laparoscopy in 39 women with infertility, again categorized by primary and secondary infertility. Tubal factor: Present in 7/25 (28.0%) of primary infertility cases and 5/14 (35.71%) of secondary infertility cases, constituting 12/39 (30.76%) of all cases. Bilateral tubal block: The most common tubal pathology, affecting 16.0% of primary and 7.14% of secondary cases, totaling 12.82% of all cases. Unilateral tubal block: Less frequent compared to bilateral blocks, seen in 4.00% of primary and 14.28% of secondary cases, making up 7.69% of all cases. Other tubal pathologies: Hydrosalpinx: Found in 1/14 (7.14%) of secondary cases only. Tubal ovarian (TO) mass: Present in 4.00% of primary and 7.14% of secondary cases, totaling 5.13% of all cases. Peritubal adhesions: Identified in 4.00% of primary cases only. Tubal factors, particularly bilateral tubal block, are significant contributors to both primary and secondary infertility based on this laparoscopic evaluation. Unilateral tubal block and other

pathologies like hydrosalpinx and TO masses also play a role in a smaller portion of cases.

Table 5: Laparoscopically identified pathology of infertility

Causes of infertility		Primary (N=25)	Secondary (N=14)	Total (n=39) (%)
Uterine factor	Fibroid	1 (33.33%)	1 (50.00%)	2 (5.12%)
	Mullerian	1 (33.33%)	0(00.00%)	1 (2.56%)
	Hypoplastic	1 (33.33%)	1 (50.00%)	2 (5.12%)
	Total	3 (12.00%)	2 (14.28%)	5 (12.82%)
Peritoneal factor	Endometrosis	1 (20.0%)	2 (66.67%)	3 (7.69%)
	Pelvic adhesions	1 (20.0%)	1 (33.33%)	2 (5.13%)
	Tuberculosis	3(60.0%)	0 (00.00%)	3 (7.69%)
	Total	5 (20.00%)	3 (21.42%)	8 (2.05%)

Table 5 focuses on uterine and peritoneal factors identified during laparoscopy in 39 women with infertility, still categorized by primary and secondary infertility. Uterine factor: Present in 3/25 (12.00%) of primary infertility cases and 2/14 (14.28%) of secondary infertility cases, constituting 5/39 (12.82%) of all cases. Fibroids: The most common uterine pathology, affecting 33.33% of both primary and secondary cases individually, but only 5.12% of all cases overall (due to the small sample size). Mullerian anomaly and hypoplastic uterus: Each seen in 33.33% of primary and 50.00% of secondary cases individually but makes up only 2.56% and 5.12% of all cases respectively. Peritoneal factor: Present in 5/25 (20.00%) of primary infertility cases and 3/14 (21.42%) of secondary infertility cases, totaling 8/39 (20.51%) of all cases. Endometriosis: Most common peritoneal pathology, found in 20.0% of primary and 66.67% of secondary cases, but only 7.69% of all cases overall. Pelvic adhesions: Seen in 20.0% of primary and 33.33% of secondary cases individually but makeup only 5.13% of all cases. Tuberculosis: Identified in 3/25 (60.00%) of primary cases only but constitutes 7.69% of all cases. Uterine and peritoneal factors play a smaller role compared to ovarian and tubal factors in this study population. However, their presence can still contribute to infertility in some cases. Fibroids, while common individually within each category, have a smaller overall impact due to the limited sample size. Endometriosis is the most significant peritoneal factor, particularly in secondary infertility. Pelvic adhesions and Mullerian anomalies also contribute to a small portion of cases.

Table 6: Hysterolaparoscopically identified causative factors of infertility.

	Primary (N=25)	Secondary (N=14)	Total (n=39) (%)
Uterine factor	6 (24.00%)	4 (28.71%)	10 (25.64%)
Tubal factor	6 (24.00%)	4 (28.71%)	10 (25.64%)
Ovarian factor	11 (44.00%)	5 (35.71%)	16 (41.02%)
Peritoneal factor	6 (24.00%)	3 (21.43%)	9 (23.07%)
Unexplained	4 (16.00%)	4 (28.57%)	6 (20.51%)

Table 6 summarizes the findings of hysterolaparoscopy in 39 women with infertility, all five listed factors (uterine, tubal, ovarian, peritoneal, unexplained) were identified in at least some cases. Ovarian factors: Most prevalent cause in both primary (44.00%) and secondary (35.71%) infertility, contributing to 41.02% of all cases. Tubal and uterine factors: Equally common, affecting around 24.00% of primary and 28.71% of secondary cases each, making up roughly 25.64% of all cases for both categories. Peritoneal factors: Less frequent compared to the above, seen in 24.00% of primary and 21.43% of secondary cases, constituting 23.07% of all cases. Unexplained infertility: Found in 16.00% of primary and 28.57% of secondary cases, totaling 20.51% of all cases. Hysterolaparoscopy helps identify specific causes of infertility in a significant portion of cases. Ovarian factors, particularly, play a major role in both primary and secondary infertility. Tubal and uterine factors also contribute substantially, highlighting the importance of assessing both fallopian tubes and the uterine cavity. Peritoneal factors, while present, have a somewhat smaller impact on this data.

In our investigation, 20% of the infertile women exhibited a normal BMI, while 30% had a high BMI. Among the overweight group, comprising 18 women, 11 were classified with primary infertility and 7 with secondary infertility. Additionally, 12 infertile women were classified as obese, with 8 falling under primary infertility and 4 under secondary infertility. A significant proportion of women experiencing secondary infertility had a history of prior abortions, accounting for 10 cases. Among these, 9 cases were spontaneous abortions, while 1 was induced abortions. Notably, out of the 9 women with prior spontaneous abortions, 6 cases had undergone check curettage procedures. Among

the 50 cases examined, menstrual abnormalities were present in 25 women, while the remaining 25 exhibited a normal menstrual pattern. Furthermore, women were diagnosed with polycystic ovary syndrome (PCOS), with 6 (24.0%) falling under primary infertility and 3(21.42%) under secondary infertility. Hypothyroidism emerged as the predominant endocrinological abnormality, with 12 infertile women affected, including 5 with primary infertility and 7 with secondary infertility. Additionally, 2 infertile women were diagnosed with hyperprolactinemia, of which 1 was classified with primary infertility and 1 with secondary infertility.

Among the 50 cases, 8 exhibited high day 2/3 follicle-stimulating hormone (FSH) levels exceeding 10, with 4 of these women experiencing primary infertility and 4 with secondary infertility. Furthermore, low anti-Müllerian hormone (AMH) levels were detected in 7 infertile women, including 2 with primary infertility and 1 with secondary infertility. Notably, women with low AMH levels showed concomitantly elevated FSH levels. The mean and standard deviation (SD) of FSH levels in patients with normal AMH were 7.24± 5.12, whereas in patients with low AMH, the mean and SD of FSH levels were 14.83 ± 6.69 ($p= 0.0021$, <0.05).

Discussion

The prevalence of primary infertility in our study was 60%, while that of secondary infertility was 40%, consistent with findings from studies by Duignan et al. [11] reporting 77% and 23%, respectively, and Templeton et al. [12] reported 74.9% and 25.1%, respectively for primary and secondary infertility. The mean age of infertile women was 26.59 ± 5.5 years overall, with those experiencing primary infertility having a mean age of 28.12 ± 6.2 years and those with secondary infertility having a mean age of 26.59 ± 5.5 years. In our study, a significant proportion of women with primary infertility (40%) fell within the 21-25 age group, consistent with the observations by Sortey et al. [13] (41.5%), and Pal et al. (42%). Similarly, the majority of women with secondary infertility (44%) belonged to the 26-30 age group, which is comparable to that reported by Sortey et al. [13] (43.5%). Regarding the duration of infertility, the majority of infertile women (66%) in our study reported 1-5 years, which closely aligns with the observations by Sharmila et al. [14], who found that 51.82% were infertile for 5 years. Hypothyroidism was observed in 24% of infertile women in our study, which is similar to the findings of Verma et al. [15] (23.9%). Various causes of infertility were investigated, with ovarian factors (41%) being the most common, followed by tubal (25%), uterine (25%), and peritoneal factors (23%). Polycystic ovary syndrome (PCOS) was the most prevalent ovarian factor, observed in 23.04% of the patients, consistent with the findings of Nandhini et al. [16] (23%). Bilateral tubal blockage (12.86%) emerged as the primary tubal factor, which is similar to the findings of Bhide et al. [17] (12.6%). Uterine factors contributed to infertility in 25.6% of the patients in our study, which is similar to the findings of Hema et al. (20.9%). Müllerian tract anomalies were detected in 2.56% of the cases, constituting the primary uterine pathology identified, consistent with observations by Sholapurkar et al. [18] Sud et al. [19] and Prabhu et al. [20] Endometriosis was identified as the most common pelvic factor causing infertility in our study, differing from the study by Hema et al., where pelvic adhesions were reported as the primary cause.

Conclusion

Comprehensive assessment of female infertility entails a thorough review of medical history, physical examination, and diagnostic tests. Polycystic ovary syndrome (PCOS) is a prevalent condition, partly due to lifestyle changes. Ovarian issues, predominantly PCOS, rank the highest in both primary and secondary infertility cases, followed by tubal, uterine, peritoneal, and endocrinological factors. Tubal blockage, often linked to conditions such as pelvic inflammatory disease (PID), significantly contributes to infertility. Endometriosis poses additional challenges, with limited treatment options and poor prognosis. Unexplained infertility, or idiopathic infertility, constitutes cases in which the cause remains elusive, despite comprehensive investigation.

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