

ORIGINAL ARTICLE

Association between etiology of infertility & treatment success: Insights from 100 positive pregnancies in a Rural Hospital

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ABSTRACT

Background: Infertility affects a significant proportion of women worldwide, with etiology influencing treatment outcomes. Polycystic ovary syndrome (PCOS) and other endocrine disorders are common contributors to infertility. Understanding the association between infertility causes and treatment success is essential for optimizing management, particularly in rural hospital settings. **Methods & Materials:** This observational study was conducted at Jahurunessa Hospital, Rugganj, Narayanganj, from June 2024 to May 2025. A total of 100 infertile women who achieved pregnancy following treatment were included. Patients were evaluated using detailed clinical history, physical examination, and relevant laboratory and imaging investigations. Exclusion criteria included incomplete records, severe systemic illness, and uterine anomalies incompatible with pregnancy. Ovulation induction protocols, primarily with letrozole, were used, with adjuvant therapies administered based on clinical need. **Results:** Most participants were aged 19–25 years (63%) and overweight (74%). Primary infertility accounted for 54%, with 62% having infertility for 2–3 years. PCOS was the leading etiology (62%), followed by unexplained infertility (12%) and hyperprolactinemia (9%). Single dominant follicle development occurred in 63% of cycles, with favorable endometrial thickness (9–11 mm) in 77% of patients. Ovulation was achieved within 2–4 cycles in 89% of cases. Pregnancy outcomes included 72% live births, 21% ongoing pregnancies, 5% abortion, and 2% ectopic pregnancies. Complications were uncommon (16%), including ovarian hyperstimulation syndrome (6%) and premature birth (5%). **Conclusion:** Conventional ovulation induction protocols, with individualized adjuvant therapy and careful cycle monitoring, resulted in favorable pregnancy outcomes among infertile women in this rural hospital setting.

Keywords: Infertility, Polycystic Ovary Syndrome, Ovulation Induction, Letrozole, Pregnancy Outcomes, Rural Hospital

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INTRODUCTION

Infertility is a global reproductive health problem affecting approximately 10–15% of couples of reproductive age and poses significant medical, psychological, and social challenges [1]. In low- and middle-income countries, particularly in South Asia, infertility often carries profound social stigma, disproportionately affecting women and influencing marital stability and mental well-being [2]. Despite its high prevalence, access to comprehensive infertility care remains limited in rural and semi-urban settings, where diagnostic facilities and advanced assisted reproductive technologies are often unavailable [3].

Infertility is a multifactorial condition with diverse etiologies, including ovulatory dysfunction, male factor infertility, tubal pathology, endometriosis, endocrine disorders, and unexplained causes [4]. Among these, ovulatory dysfunction—especially polycystic ovary syndrome—is one of the most common and potentially reversible causes of female infertility [5]. Timely diagnosis and appropriate treatment can result in favorable outcomes, even in resource-constrained settings. However, treatment success varies considerably depending on the underlying etiology, duration of infertility, patient characteristics, and treatment modality used [6].

Ovulation induction using oral agents such as letrozole has become a cornerstone of infertility management due to its efficacy, safety profile, and affordability. In rural hospital settings, where access to in vitro fertilization and other advanced reproductive technologies is limited, ovulation induction combined with careful cycle monitoring plays a pivotal role in achieving pregnancy [7]. Transvaginal sonography allows for assessment of follicular development and endometrial receptivity, thereby optimizing treatment timing and improving outcomes. Nevertheless, real-world data on cycle monitoring parameters, pregnancy outcomes, and complications in rural populations remain scarce [8].

Most existing infertility studies originate from tertiary care centers or specialized fertility clinics, which may not reflect the challenges and outcomes encountered in rural healthcare facilities [9]. Differences in patient demographics, delayed presentation, limited diagnostic resources, and reliance on conventional treatment approaches necessitate context-specific evidence to guide clinical practice [10]. Understanding treatment outcomes in such settings is essential for patient counseling, resource allocation, and development of pragmatic infertility care models [11].

This study was conducted at Jahurunessa Hospital, Rupganj, Narayanganj, Bangladesh, to evaluate the socio-demographic and clinical characteristics of infertile women who achieved pregnancy following treatment, assess treatment modalities and cycle monitoring findings, and analyze pregnancy outcomes and associated complications. By focusing on 100 positive pregnancies managed in a rural hospital setting, this study aimed to provide valuable insights into the effectiveness of conventional infertility treatments and highlight areas for optimization in similar resource-limited contexts.

METHODS & MATERIALS

This observational study was conducted at Jahurunessa Hospital, Rupganj, Narayanganj, Bangladesh, over a one-year period from June 2024 to May 2025. A total of 100 infertile women who subsequently achieved pregnancy following treatment were included in the study. Patients attending the infertility outpatient department were evaluated based on clinical history, physical examination, and relevant investigations. Women with incomplete records, known uterine anomalies incompatible with pregnancy, or severe systemic illness were excluded.

Sociodemographic data including age and body mass index were recorded at enrollment. Body mass index was calculated as weight in kilograms divided by height in meters squared and categorized according to standard WHO criteria. Infertility was classified as primary or secondary, and duration of infertility was documented in years. Etiological assessment included evaluation for ovulatory dysfunction, male factor infertility, endometriosis, luteal phase defect, and unexplained infertility using clinical findings, hormonal assays, pelvic ultrasonography, and semen analysis of partners where applicable.

Ovulation induction was initiated using letrozole as the primary agent, with or without adjuvant therapies such as gonadotropins, dexamethasone, cabergoline, or thyroxine based on individual clinical indications. Cycle monitoring was performed using transvaginal sonography to assess follicular development and endometrial thickness. The number of follicles and endometrial thickness at the time of ovulation trigger were documented. Human chorionic gonadotropin was administered for ovulation triggering when indicated.

Pregnancy was confirmed by positive serum beta-hCG followed by ultrasonographic confirmation. Pregnancy outcomes were categorized as abortion, ectopic pregnancy, ongoing pregnancy, or live birth. Complications including ovarian hyperstimulation syndrome, multiple pregnancy, premature birth, and gestational diabetes mellitus were recorded, with patients classified according to the primary complication observed. Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0.

RESULTS

Table I presents the socio-demographic and clinical characteristics of the study population. The majority of participants were aged 19–25 years (63%), followed by 26–30 years (16%), while 10% were ≤18 years and 11% were ≥30 years. Most women were overweight (74%), with 23% having normal BMI and 3% being obese. Primary infertility was slightly more common than secondary infertility (54% vs. 46%). Regarding duration, infertility of 2–3 years was most frequent (62%). Polycystic ovary syndrome was the leading etiology (62%), followed by unexplained infertility (12%) and hyperprolactinemia (9%), while male factor infertility accounted for 6% of cases.

Table – I: Socio-Demographic and Clinical Characteristics of the Study Population (n = 100)

Variable	Sub-category / Range	Number of Participants (n)	Percentage (%)
Age Range (Years)	≤18	10	10
	19–25	63	63
	26–30	16	16
	≥30	11	11
	Total	100	100
BMI Category (kg/m ²)	Normal weight (18.5–24.9)	23	23
	Overweight (25.0–29.9)	74	74
	Obese (≥30.0)	3	3
Types of infertility	Primary	54	54
	Secondary	46	46
Duration of Infertility (Years)	≤1	20	20
	2–3	62	62
	4–5	12	12
	>5	6	6
Etiology of Infertility	PCOS	62	62
	Hypothyroidism	6	6
	Hyperprolactinemia	9	9

Male factor	6	6
Endometriosis	4	4
LPD	1	1
Unexplained infertility	12	12

Table II shows the distribution of treatment modalities used among the 100 study participants. Letrozole alone was the most commonly prescribed regimen, used in 43% of patients, followed by letrozole plus oradexon in 24%. Combination therapies such as letrozole with cabergoline (7%),

levothyroxine (4%), dehydroepiandrosterone (4%), and injectable gonadotrophins (8%) were also utilized, while monotherapy with cabergoline and levothyroxine was used in only 2% of cases each.

Table – II: Treatment Modalities Used (n = 100)

Treatment Given	Number of Patients (n)	Percentage (%)
Letrozole alone	43	43
Letrozole plus Oradexon	24	24
Cabergoline alone	2	2
Levothyroxine alone	2	2
Letrozole plus Cabergoline	7	7
Letrozole plus Levothyroxine	4	4
Letrozole plus Dehydroepiandrosterone (DHEA)	4	4
Letrozole plus adjuvant for male (Astaxanthin + Co-enzyme Q)	6	6
Letrozole plus Inj. Gonadotrophin	8	8
Total	100	100

Table III describes the type of ovulation induction methods used in the study population. Letrozole was the primary induction agent and was used in the majority of patients (96%),

while a smaller proportion required combination therapy with letrozole plus injectable gonadotropin (rFSH), which was used in 8% of cases.

Table – III: Type of ovulation induction used (n = 100)

Induction used	Number of Patients (n)	Percentage (%)
Letrozole	96	96
Letrozole plus Inj Gonadotropin (rFSH)	8	8

Table IV summarizes the cycle monitoring findings on transvaginal sonography. Most patients developed a single dominant follicle (63%), while 30% and 7% had two and three follicles, respectively. Regarding endometrial thickness, the

majority achieved a thickness of 9–11 mm (77%), followed by ≥ 12 mm in 22%, whereas only 1% had an endometrial thickness of ≤ 8 mm, indicating generally favorable endometrial development at the time of monitoring.

Table – IV: Cycle Monitoring Findings on Transvaginal Sonography (TVS)

Parameter	Category / Range	Number of Patients (n)	Percentage (%)
Number of Follicles	1	63	63
	2	30	30
	3	7	7
Endometrial Thickness (mm)	≤ 8	1	1
	9–11	77	77
	≥ 12	22	22

Table V depicts the pregnancy outcomes of the study participants. Ovulation was achieved predominantly within 2–4 cycles in 89% of patients, while 3% conceived within one cycle and 8% required five or more cycles. Pregnancy was achieved in all cases (100%). Regarding outcomes, 72% resulted in live births, 21% were ongoing pregnancies, 5%

ended in abortion, and 2% were ectopic pregnancies. Ovulation triggering was administered in 33% of cases. Most patients experienced no complications (84%), while ovarian hyperstimulation syndrome occurred in 6%, premature birth in 5%, multiple pregnancy in 4%, and gestational diabetes mellitus in 1%.

Table – V: Pregnancy Outcome

Parameter	Category	Number of Patients (n)	Percentage (%)
Ovulation Achieved	Cycles Needed ≤ 1	3	3
	Cycles Needed 2–4	89	89
	Cycles Needed ≥ 5	8	8
Pregnancy Achieved	—	100	100
Pregnancy Outcome	Abortion	5	5
	Ectopic	2	2
	Ongoing pregnancy	21	21
	Live birth	72	72
Trigger Given	Yes	33	33

	No	67	67
Complications Observed	OHSS	6	6
	Multiple pregnancy	4	4
	Premature birth	5	5
	GDM	1	1
	None	84	84

DISCUSSION

This study provides insight into the association between infertility etiology and treatment success in a rural hospital setting, highlighting favorable pregnancy outcomes achieved through conventional ovulation induction and careful cycle monitoring. The majority of women in this cohort were young, with 63% aged 19–25 years, which is a known favorable prognostic factor for fertility outcomes. Similar observations have been reported by Huniadi et al., who emphasized younger age as a key predictor of successful conception following ovulation induction and intrauterine insemination^[12]. The predominance of overweight participants (74%) in the present study reflects the growing burden of metabolic disturbances in reproductive-age women, particularly in those with ovulatory disorders.

Polycystic ovary syndrome (PCOS) was the leading etiology of infertility in this cohort, accounting for 62% of cases. This finding aligns with global data identifying PCOS as the most common cause of anovulatory infertility. The high pregnancy achievement in women with PCOS following letrozole-based ovulation induction in this study supports existing evidence favoring letrozole as a first-line agent. Prior studies, including predictive model analyses by Mehrjerd et al., have shown that ovulatory etiology and responsiveness to oral induction agents significantly increase treatment success rates^[13]. Letrozole-based ovulation induction was used in nearly all patients, with only a small proportion requiring adjunctive injectable gonadotropins, highlighting the feasibility of effective infertility management in low-resource settings.

Endocrine disorders such as hyperprolactinemia (9%) and hypothyroidism (6%) were also notable contributors to infertility in this cohort. Targeted medical management using cabergoline and thyroxine likely contributed to the favorable outcomes observed. The importance of correcting prolactin and thyroid abnormalities prior to or during fertility treatment has been well documented by Iancu et al. and Mazzilli et al., who reported improved ovulatory function and pregnancy outcomes following normalization of hormonal disturbances^[14,15].

Cycle monitoring findings in this study demonstrated that 63% of patients developed a single dominant follicle, while 77% achieved an optimal endometrial thickness of 9–11 mm, parameters strongly associated with successful implantation. These findings are consistent with fertility predictors described by Huniadi et al., who reported higher pregnancy rates with monofollicular development and favorable endometrial receptivity^[12]. The limited incidence of multifollicular development may also explain the relatively low rate of multiple pregnancy (4%) observed in this cohort.

Ovulation was achieved within 2–4 cycles in 89% of patients, indicating good responsiveness to treatment. Pregnancy outcomes were encouraging, with 72% live births and 21% ongoing pregnancies, and comparatively low rates of abortion (5%) and ectopic pregnancy (2%). These outcomes are comparable to reports from non-ART fertility treatment settings and support the effectiveness of individualized

ovulation induction protocols. The low complication rate, with 84% experiencing no complications, further underscores the safety of this approach. Similar observations regarding favorable outcomes with careful monitoring have been discussed by Luo et al., who emphasized individualized and multifaceted fertility management strategies^[16].

Male factor infertility accounted for 6% of cases, and adjuvant antioxidant and semen-related therapies were used selectively. Recent reviews by Guo et al. have highlighted the impact of male reproductive health, including infections and oxidative stress, on fertility outcomes, supporting the rationale for addressing male factors even in predominantly female-focused treatment protocols^[17].

Psychosocial aspects and patient adherence may also influence outcomes, particularly in rural settings. Erčulj et al. reported that supportive treatment environments positively affect treatment continuation and success, which may partly explain the high pregnancy achievement observed in this cohort^[18].

LIMITATIONS

This study has several limitations that should be considered while interpreting the findings. The single-center design and relatively small sample size of 100 patients may limit the generalizability of the results to other settings. The absence of a comparison group (e.g., treatment failures or different induction protocols) restricts causal inference regarding treatment effectiveness. Future multicenter studies with larger samples and comparative designs are recommended to validate these findings.

CONCLUSION

Overall, the findings of this study demonstrate that favorable pregnancy outcomes can be achieved across different infertility etiologies using conventional ovulation induction and meticulous cycle monitoring in a rural hospital. However, as the study included only women who achieved pregnancy, comparative success rates between etiological groups could not be determined, which should be considered when interpreting the results.

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Conflicts of interest

There are no conflicts of interest.

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