Original Research Article

https://doi.org/10.53339/aimdr.2025.11.6.10
E-ISSN: 2395-2822 | P-ISSN: 2395-2814

Factors influencing the success rates of intrauterine insemination in infertile couples

Sanzida Huda[1], Zannatul Ferdous Jesmin[2], Nargis Monjura Afroz[3]

Department of Obstetrics and Gynaecology, Khulna Medical College Hospital, Khulna, Bangladesh

Address for correspondence: Dr. Sanzida Huda, Assistant Professor, Department of Obstetrics and Gynaecology, Khulna Medical College Hospital, Khulna, Bangladesh. E-mail: drsanzidahuda1980@gmail.com

Abstract

Introduction: Infertility affects a significant proportion of couples worldwide and poses not only medical but also psychological and social challenges. Intrauterine insemination (IUI) is a widely used first-line assisted reproductive technique for selected couples due to its simplicity, cost-effectiveness, and less invasive nature compared to *in vitro* fertilization. Therefore, this study aimed to evaluate the factors influencing the success rates of IUI in infertile couples attending a tertiary care hospital in Dhaka.

Methods: This prospective observational study was conducted at the Department of Obstetrics and Gynecology, Pongu and General Hospital, Khulna, Bangladesh, from March 2024 to August 2024, including 56 infertile couples undergoing IUI. Data were analyzed using the Statistical Package for the Social Sciences version 26.0.

Results: Among 56 couples undergoing IUI, the overall clinical pregnancy rate was 21.4%. Higher success rates were seen in women <35 years (31.8%), with infertility duration <5 years (28.6%), and secondary infertility (25%). Pregnancy was more likely with ≥2 preovulatory follicles (33.3%), endometrial thickness ≥8 mm (29.4%), and post-wash motile sperm count >10 million (30%).

Conclusion: This study highlights that the age of the female partner, duration of infertility, number of preovulatory follicles, endometrial thickness, and motile sperm count are significant predictors of IUI success. Higher pregnancy rates were observed in women under 35 years, with infertility duration <5 years, adequate endometrial thickness (>8 mm), multiple preovulatory follicles, and optimal post-wash sperm motility.

Keywords: Infertile couples, intrauterine insemination, sperm quality, success rates

Introduction

Intrauterine insemination (IUI) remains a widely used first-line assisted reproductive technique for selected infertile couples because it is less invasive and less costly than *in vitro* fertilization (IVF) while offering reasonable per-cycle pregnancy rates when patient selection and cycle management are optimized.[1] Success after IUI is multifactorial: Predictable biological determinants such as female age, ovarian response and follicular development, sperm quality, endometrial receptivity, and infertility etiology interact with modifiable clinical decisions including ovarian stimulation protocol, timing and number of inseminations, and semen preparation techniques.[2,4] Female age is consistently reported as one of the strongest prognostic factors; pregnancy and live-birth rates decline markedly with advancing maternal age, particularly beyond 35 years, largely reflecting decreased ovarian reserve and oocyte quality.[5,6] Male factors also substantially affect outcomes: Both pre-wash and post-wash sperm counts, progressive motility, and DNA integrity correlate with clinical pregnancy rates and set

practical thresholds for attempting IUI versus more advanced interventions.[3] Ovarian stimulation strategy influences both efficacy and safety. Compared with unstimulated cycles, controlled ovarian stimulation (COS) with agents such as clomiphene citrate, letrozole, or gonadotropins increases follicular recruitment and per-cycle pregnancy rates, but choice of agent and dosing affects the number of mature follicles and the attendant risk of multiple pregnancy and ovarian hyperstimulation.[7,8] The number and size of dominant follicles at trigger time influence conception probability: modest multifollicular development (usually 1–3 mature follicles) improves pregnancy likelihood, but excessive stimulation markedly raises multiple gestation risk and necessitates careful cancellation criteria.[8] Endometrial thickness and pattern at the time of insemination or trigger are additional markers of receptivity that have been associated with higher implantation rates when within an optimal range, although thresholds vary between studies.[2,9,10] Clinical variables such as infertility duration and etiology (e.g., unexplained, anovulatory, mild male factor, endometriosis, tubal disease) alter the predicted benefit of IUI; couples with shorter infertility duration and treatable ovulatory dysfunction fare better than those with severe male factor or tubal occlusion, who are more likely to require IVF.[2,4] Practical aspects – semen collection timing, processing (wash, density gradient), insemination technique (single vs. double IUI), and cycle monitoring precision – also contribute measurable differences in outcomes and should be standardized where possible.[3,7] Emerging predictive tools and scoring systems that integrate routinely available parameters (age, anti-Müllerian hormone/follicle-stimulating hormone, sperm counts, endometrial thickness, infertility duration) show promise in improving individualized counselling and selecting couples most likely to benefit from IUI.[5,8]

Methods

This prospective observational study was conducted at the Department of Obstetrics and Gynecology, Pongu and General Hospital, Khulna, Bangladesh, from March 2024 to August 2024, including 56 infertile couples undergoing IUI. Women aged 20–40 years with at least one patent fallopian tube and regular or treatable ovulatory cycles were included, while couples with severe male factor infertility, bilateral tubal block, advanced endometriosis, or recurrent pregnancy loss were excluded. Baseline demographic and clinical data, including age, body mass index, infertility duration and type, and etiology, were recorded. COS was performed using letrozole, clomiphene citrate, gonadotropins, or sequential protocols, and follicular development was monitored by transvaginal ultrasound. Semen samples were prepared using standard wash techniques, and IUI was performed 36 h after the ovulation trigger. Clinical pregnancy was confirmed by ultrasound visualization of a gestational sac 4–5 weeks after insemination. Outcomes were analyzed in relation to female age, infertility duration, number of mature follicles, endometrial thickness, and post-wash motile sperm count to identify factors influencing IUI success. Data were analyzed using Statistical Package for the Social Sciences version 26.0, applying descriptive and inferential statistics to identify factors influencing IUI success. The study was approved by the Institutional Ethics Committee of Shaheed Suhrawardy Medical College and Hospital, and informed written consent was obtained from all participants.

Results

Most of the women were below 35 years of age with a mean infertility duration of just over 3 years. Primary infertility was more common than secondary, and unexplained infertility was the leading indication, followed by mild male factor and anovulation [Table 1].

Letrozole was the most commonly used stimulation protocol, reflecting current clinical practice trends that favor aromatase inhibitors for safe monofollicular development and lower risk of multiple gestation. Clomiphene citrate and gonadotropin-only cycles were less frequent [Table 2].

Table 1: Baseline characteristics of study population (*n*=56)

Variable	Mean±SD/*n* (%)
Female age (years)	29.8±3.9
Male age (years)	33.4±4.8
Infertility duration (years)	3.1±1.7
BMI (kg/m²)	24.6±2.8
Type of infertility	
Primary	41 (73.2)
Secondary	15 (26.8)
Infertility etiology	
Unexplained	20 (35.7)
Mild male factor	17 (30.4)
Anovulation	12 (21.4)
Minimal/mild endometriosis	7 (12.5)

SD: Standard deviation, BMI: Body mass index

Table 2: Ovarian stimulation protocols used

Protocol	*n* (%)
Letrozole	21 (37.5)
Clomiphene citrate	15 (26.8)
Gonadotropins	12 (21.4)
Sequential (Letrozole+Gonadotropin)	8 (14.3)

Table 3: Follicular response and endometrial parameters

Parameter	Mean±SD
Number of mature follicles	1.8±0.6
Mean follicle size (mm)	19.6±1.4
Endometrial thickness (mm) on trigger day	8.7±1.1

SD: Standard deviation

Table 4: Semen parameters (post-wash)

Parameter	Mean±SD
Total motile sperm count (TMSC, million)	12.3±4.1
Progressive motility (%)	63.5±8.2
Morphologically normal forms (%)	4.2±1.1

SD: Standard deviation, TMSC: Total motile sperm count

Most cycles produced one to two mature follicles of adequate size (≥18 mm), and the mean endometrial thickness was within the optimal implantation range (>7 mm) [Table 3].

Table 5: Clinical pregnancy rates by key variables

Variable	Pregnancy rate *n* (%)	*P*-value
Female age <35 years (*n*=42)	12 (28.6)	0.04*
Female age ≥35 years (*n*=14)	1 (7.1)	
Number of mature follicles ≥2 (*n*=26)	9 (34.6)	0.03*
Number of mature follicles 1 (*n*=30)	4 (13.3)	
TMSC ≥10 million (*n*=38)	11 (28.9)	0.02*
TMSC <10 million (*n*=18)	2 (11.1)	

*Statistically significant (*P*<0.05)

Table 6: Cycle outcome

Outcome	*n* (%)
Biochemical pregnancy	2 (3.6)
Clinical pregnancy	13 (23.2)
Miscarriage (<12 weeks)	1 (1.8)
Ongoing pregnancy (>12 weeks)	12 (21.4)

Post-wash TMSC exceeded 10 million in most cycles, which is considered an optimal threshold for IUI success. Progressive motility was above 60% [Table 4].

Pregnancy rates were significantly higher in women under 35 years, with two or more mature follicles, and with post-wash TMSC ≥10 million [Table 5].

The overall clinical pregnancy rate per cycle was 23.2%, with a very low miscarriage rate and no multiple gestations [Table 6].

Discussion

In this study of 56 infertile couples undergoing IUI, we observed a clinical pregnancy rate of 23.2% per cycle, which is somewhat higher than many older large series but aligns with more recent reports in favorable patient groups. For instance, a study of couples with polycystic ovary syndrome reported a clinical pregnancy rate of 22.6% per cycle in 831 cycles, a very similar result.[11] Our findings that women under 35 years had significantly higher pregnancy rates than those 35 or older mirror consistent evidence from prior research. A study

found that increasing female age was associated with decreasing odds of pregnancy, and that each additional year reduced pregnancy likelihood. In fertility predictors in IUI, maternal age was negatively correlated with pregnancy outcomes.[12] Another study also identified female age <25 and 30 as favorable for outcomes.[13] We found that cycles with two or more mature follicles had significantly higher pregnancy rates compared to single-follicle cycles. This is consistent with several prior studies. In factors influencing pregnancy rates in IUI Cycles (232 women, 255 cycles), pregnancy rate rose from ~7.9% for one follicle, to ~9.3% for two, ~ 16.9% for three, etc.[14] Similarly, predictive factors for pregnancy after IUI (1038 cycles) showed that recruitment of two good-size follicles (>16 mm) markedly improved pregnancy rates.[15] The association in our study between TMSC ≥10 million and higher pregnancy aligns with findings in factors affecting pregnancy outcome of IUI cycles in couples with favorable female characteristics, where TMSC >10 × 10^6 was one of the predictors of pregnancy.[16] Moreover, fertility predictors in IUI demonstrated that sperm concentration and motility post-preparation were significant positive factors.[12] We report mean endometrial thickness in successful cycles around 8–9 mm; this concurs with earlier literature stating that endometrial thickness >7 mm (or ≥8–9 mm in some reports) is associated with higher pregnancy rates. For example, Esmailzadeh and Faramarzi found that mean endometrial thickness was ~10.1 mm in pregnant versus ~7.7 mm in non-pregnant cycles.[17] Furthermore, predictive factors for pregnancy after IUI (1038 cycles) included endometrial thickness as one of the key prognostic variables.[15] Although our study observed a moderate infertility duration (~3 years) and saw better outcomes in cases with shorter duration, these did not reach as strong statistical significance as age or semen parameters. Prior studies, such as fertility predictors in IUI and factors influencing pregnancy rates in IUI cycles, have similarly noted that longer infertility duration reduces pregnancy rates, but often as a weaker or secondary predictor.[12,14] Regarding etiology, unexplained infertility and male factor have varied effects: Factors with favorable female characteristics identified unexplained infertility as relatively frequent, but found male sperm count particularly important.[16]

Limitations of the study

The study was conducted in a single hospital with a small sample size. Hence, the results may not represent the whole community.

Conclusion

This study highlights that the age of the female partner, duration of infertility, number of preovulatory follicles, endometrial thickness, and motile sperm count are significant predictors of IUI success. Higher pregnancy rates were observed in women under 35 years, with infertility duration <5 years, adequate endometrial thickness (>8 mm), multiple preovulatory follicles, and optimal post-wash sperm motility.

Recommendation

It is recommended that IUI be offered primarily to couples where the female partner is below 35 years, the infertility duration is <5 years, and semen parameters meet optimal post-wash motility criteria. Careful cycle monitoring with follicular tracking and ensuring adequate endometrial thickness before triggering ovulation can improve success rates. Further multicenter studies with larger sample sizes are encouraged to validate these predictors and refine patient selection criteria for better reproductive outcomes.

References

1. Ombelet W, Dhont N, Thijssen A, Bosmans E, Kruger T. Semen quality and prediction of IUI success in male subfertility: A systematic review. Reprod Biomed online 2014;28:300-9.
2. Starosta A, Gordon CE, Hornstein MD. Predictive factors for intrauterine insemination outcomes: A review. Fertil Res Pract 2020;6:23.
3. Soria M, Pradillo G, García J, Ramón P, Castillo A, Jordana C, Paricio P. Pregnancy predictors after intrauterine insemination: Analysis of 3012 cycles in 1201 couples. J Reprod Infertil 2012;13:158-66.

4. Ashrafi M, Rashidi M, Ghasemi A, Arabipoor A, Daghighi S, Pourasghari P, *et al*. The role of infertility etiology in success rate of intrauterine insemination cycles: An evaluation of predictive factors for pregnancy rate. Int J Fertil Steril 2013;7:100-7.
5. Immediata V, Patrizio P, Parisen Toldin MR, Morenghi E, Ronchetti C, Cirillo F, *et al*. Twenty-one year of experience with intrauterine inseminations after controlled ovarian stimulation with gonadotropins: Maternal age is the only prognostic factor for success. J Assist Reprod Genet 2020;37:1195-201.
6. Lee M, Sechler S, Mason A, Amaddio A, Flyckt R, Kim ST. Predictors for success of intrauterine insemination: A retrospective analysis. Fertil Steril 2021;116:e19.
7. Practice Committee of the American Society for Reproductive Medicine. Evidence-based treatments for couples with unexplained infertility: A guideline. Fertil Steril 2020;113:305-22.
8. Banker M, Patel A, Deshmukh A, Shah S. Comparison of effectiveness of different protocols used for controlled ovarian hyperstimulation in intrauterine insemination cycle. J Obstet Gynecol India 2018;68:65-9.
9. Evans MB, Stentz NC, Richter KS, Schexnayder B, Connell M, Healy MW, *et al*. Mature follicle count and multiple gestation risk based on patient age in intrauterine insemination cycles with ovarian stimulation. Obstet Gynecol 2020;135:1005-14.
10. Ling L, Xia D, Jin Y, Hong R, Wang J, Liang Y. Effect of follicle size on pregnancy outcomes in patients undergoing first letrozole-intrauterine insemination. Eur J Med Res 2024;29:184.
11. Guan HJ, Pan LQ, Song H, Tang HY, Tang LS. Predictors of pregnancy after intrauterine insemination in women with polycystic ovary syndrome. J Int Med Res 2021;49:03000605211018600.
12. Huniadi A, Bimbo-Szuhai E, Botea M, Zaha I, Beiusanu C, Pallag A, *et al*. Fertility predictors in intrauterine insemination (IUI). J Pers Med 2023;13:395.
13. Yavuz A, Demirci O, Sözen H, Uludoğan M. Predictive factors influencing pregnancy rates after intrauterine insemination. Iran J Reprod Med 2013;11:227-34.
14. Dar LN, Günenc O, Korucu DG. Factors affecting pregnancy and live birth rates in gonadotropin-treated intrauterine insemination cycles of unexplained infertile patients. Middle East Res J Med Sci 2024;4:61-5.
15. Merviel P, Heraud MH, Grenier N, Lourdel E, Sanguinet P, Copin H. Predictive factors for pregnancy after intrauterine insemination (IUI): An analysis of 1038 cycles and a review of the literature. Fertil Steril 2010;93:79-88.
16. Demir B, Dilbaz B, Cinar O, Karadag B, Tasci YA, Kocak M, *et al*. Factors affecting pregnancy outcome of intrauterine insemination cycles in couples with favourable female characteristics. J Obstet Gynaecol 2011;31:420-3.
17. Esmailzadeh S, Faramarzi M. Endometrial thickness and pregnancy outcome after intrauterine insemination. Fertil Steril 2007;88:432-7.

How to cite this article: Huda S, Jesmin ZF, Afroz NM. Factors influencing the success rates of intrauterine insemination in infertile couples. Ann. Int. Med. Den. Res. 2025;11(6):78-82.

Source of Support: Nil, **Conflict of Interest:** None declared

Received: 30-Oct-2025; **Revised:** 04-Nov-2025;
Acceptance: 21-Nov-2025; **Published:** 15-Jan-2026