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Original Research Article

IUI Success Dependent on Maternal Age

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Abstract

***Background*:** Infertility affects approximately one in seven couples worldwide. IUI is a commonly used assisted reproductive technique, with success influenced by maternal age, ovarian response, infertility duration, and sperm quality. As evidence on age-related IUI outcomes in Bangladesh is limited, this study assessed IUI success according to maternal age among patients attending an infertility center in Rangpur. ***Methods*:** A retrospective observational study was conducted at LAB a One Infertility and IUI Center, Rangpur, Bangladesh, from July 2025 to June 2026. A total of 48 women aged 21–40 years undergoing IUI were included. Ovarian stimulation was performed using letrozole, clomifene, or FSH/HMG, followed by hCG triggering. Post-wash sperm count and motility were recorded. Maternal age was categorized as <30 and ≥30 years, and pregnancy following IUI was the primary outcome. Data were analyzed using IBM SPSS Statistics version 27 and presented as frequencies and percentages; $p<0.05$ was considered statistically significant. ***Results*:** Among 48 patients, 62.5% were <30 years, with 25–29 years being the most common age group (47.9%). Letrozole-based stimulation was most frequently used (52.1%), followed by clomifene (27.1%) and FSH/HMG (20.8%); all patients received hCG triggering. The overall pregnancy rate was 20.8%, with a higher rate among women <30 years than those ≥30 years (26.7% vs. 11.1%). Of the 10 pregnancies, 80.0% occurred in women <30 years. Overall, younger women showed more favorable observed IUI pregnancy outcomes. ***Conclusion*:** IUI demonstrated a 20.8% overall pregnancy rate, with more favorable outcomes observed among women younger than 30 years. Maternal age may be an important consideration when counseling couples regarding expected IUI success.

Keywords: Intrauterine Insemination (IUI), Maternal Age, Letrozole-Based Stimulation, Clomifene-Based Stimulation, FSH/HMG-Based Stimulation.

INTRODUCTION

Infertility affects approximately one in seven couples worldwide and is recognized by the World Health Organization as an important public health concern [1]. It can have substantial emotional, social, and financial consequences, highlighting the need for effective and accessible fertility treatments [1, 2].

Intrauterine insemination (IUI) is a commonly used assisted reproductive technique for couples with mild male-factor infertility, ovulatory disorders, endometriosis, and unexplained infertility [3]. It is one of the oldest techniques in reproductive medicine, first performed by the English physician John Hunter in 1790 and later described by Home in 1799 [4]. IUI is generally considered a low- to moderate-complexity treatment option before proceeding to more advanced assisted reproductive technologies (ART), such as in vitro fertilization (IVF) with or without intracytoplasmic sperm injection (ICSI) [5]. Many experts recommend attempting IUI for three to four cycles before considering IVF, as most pregnancies occur during the initial cycles; however, the optimal number of cycles should be individualized according to maternal age, fertility history, and response to treatment [6]. IUI involves processing semen to concentrate motile sperm and introducing them directly into the uterine cavity through a fine catheter, usually in women with at least one patent fallopian tube [7].

The success of IUI varies considerably and is influenced by patient characteristics, ovarian stimulation

protocols, sperm quality, and other treatment-related factors [8]. Several factors have been associated with IUI outcomes, including female age, body mass index (BMI), duration of infertility, and the number of dominant follicles [9,10]. Identifying these prognostic factors is important for appropriate patient selection, counseling, and optimization of treatment outcomes.

Among these factors, female age is considered one of the most important predictors of IUI success. Global studies have consistently reported declining pregnancy rates with increasing maternal age, with younger women generally achieving more favorable outcomes [2]. Long-term evidence from controlled ovarian stimulation cycles has further suggested that maternal age may be the strongest prognostic factor for IUI success [11]. Therefore, consideration of maternal age is important when counseling couples regarding the likelihood of pregnancy following IUI.

Despite the widespread use of IUI, evidence regarding age-related treatment outcomes remains limited in Bangladesh. Therefore, the present study aimed to assess the success rate of IUI according to maternal age among patients undergoing treatment at an infertility and IUI center in Rangpur, Bangladesh.

MATERIALS AND METHODS

Study Design and Setting

A retrospective observational study was conducted at LAB a One Infertility and IUI Center, Dhap, Rangpur, Bangladesh**,** over a 12-month period from July 2025 to June 2026. The study was undertaken to assess the relationship between maternal age and pregnancy outcome following intrauterine insemination (IUI).

Study Population and Sample Size

The study included 48 women who underwent IUI during the study period. Patients were identified retrospectively from the center's IUI records and relevant clinical documents. Maternal age at the time of IUI ranged from 21 to 40 years**.**

IUI Procedure and Ovarian Stimulation

Patients underwent preliminary clinical and infertility evaluation before IUI. IUI was performed only after assessment confirmed the absence of an indication of significant tubal damage**,** with adequate ovulation and suitable conditions for insemination.

Controlled ovarian stimulation was performed using letrozole, clomifene citrate, or low-dose FSH/HMG**,** according to the clinical assessment and treatment protocol. Ovulation was subsequently triggered using human chorionic gonadotropin (hCG)**.** IUI was performed following confirmation of appropriate follicular development and timing of ovulation.

Semen Preparation

Semen samples from the male partners were processed by standard sperm washing and preparation techniques before insemination. For inclusion in the IUI program, a minimum sperm concentration of 10 million/mL and sperm motility of at least 35% were required. Post-wash sperm count and motility were recorded from the treatment records.

Eligibility Criteria

Women aged 21–40 years who underwent IUI during the study period were eligible for inclusion. Patients were included if they had undergone ovarian stimulation with letrozole, clomifene, and/or FSH/HMG followed by hCG triggering and met the predefined semen-quality criteria. Patients with documented significant tubal damage or incomplete treatment or pregnancy records were excluded from the analysis.

Study Variables and Outcome

The primary exposure variable was maternal age**,** categorized into <30 years and ≥30 years for analysis. Other variables included type of ovarian stimulation, post-wash sperm count, post-wash sperm motility, and pregnancy outcome.

The primary outcome was pregnancy following IUI, determined from the clinical record based on a positive pregnancy test following the insemination cycle. The overall pregnancy rate was calculated as the number of patients who conceived divided by the total number of IUI patients, expressed as a percentage.

Statistical Analysis

Data were extracted from the patient records, checked for completeness, and analyzed using IBM SPSS Statistics version 27**.** Continuous variables were summarized using mean and standard deviation, while categorical variables were presented as frequencies and percentages. Pregnancy rates were compared between women aged <30 years and ≥30 years**.** The results were presented using tables, and a p-value <0.05 was considered statistically significant where inferential testing was applicable. Given the relatively small sample size, the age-related findings were interpreted primarily using descriptive statistics.

RESULTS

Table 1 shows total of 48 patients undergoing IUI at LAB a One Infertility and IUI Center, Dhap, Rangpur, from July 2025 to June 2026 were included in the study. The maternal age ranged from 21 to 40 years**,** with the largest proportion of patients belonging to the 25–29-year age group (47.9%)**,** followed by 30–34 years (25.0%). Overall, 30 (62.5%) patients were younger than 30 years**,** while 18 (37.5%) were aged ≥30 years (Table 1).

Table 1: Age distribution of patients undergoing IUI (n=48)

Maternal age group	Frequency (n)	Percentage (%)
21–24 years	7	14.6
25–29 years	23	47.9
30–34 years	12	25.0
35–40 years	6	12.5
Total	**48**	**100.0**

Table 2 presents regarding clinical characteristics, letrozole-based ovarian stimulation was the most commonly used regimen (52.1%), followed by clomifene (27.1%) and FSH/HMG-based stimulation (20.8%). All 48 patients received hCG as an ovulation trigger. Post-wash sperm counts were 10–19 million/mL in 35.4%, 20–29 million/mL in 39.6%, and ≥30 million/mL in 25.0% of patients. Similarly, post-wash sperm motility was 35–44% in 31.3%, 45–54% in 43.8%, and ≥55% in 25.0% of patients.

Table 2: Clinical characteristics of patients undergoing IUI (n=48)

Characteristics	Frequency (n)	Percentage (%)
Age group		
<30 years	30	62.5
≥30 years	18	37.5
Type of ovarian stimulation		
Letrozole-based stimulation	25	52.1
Clomifene-based stimulation	13	27.1
FSH/HMG-based stimulation	10	20.8
Ovulation trigger		
hCG administered	48	100.0
Post-wash sperm count		
10–19 million/mL	17	35.4
20–29 million/mL	19	39.6
≥30 million/mL	12	25.0
Post-wash sperm motility		
35–44%	15	31.3
45–54%	21	43.8
≥55%	12	25.0

Table 3 shows among the 48 IUI cycles, 10 patients conceived, resulting in an overall pregnancy rate of 20.8%, while 38 (79.2%) did not conceive. The pregnancy rate was higher among women younger than 30 years, with 8 of 30 patients (26.7%) achieving pregnancy, compared with 2 of 18 patients (11.1%) among those aged ≥30 years. Thus, the observed pregnancy proportion was approximately 2.4 times higher in women younger than 30 years.

Table 3: Pregnancy outcome according to maternal age group (n=48)

Maternal age group	Pregnant, n (%)	Not pregnant, n (%)	Total
<30 years	8 (26.7)	22 (73.3)	30
≥30 years	2 (11.1)	16 (88.9)	18
Total	**10 (20.8)**	**38 (79.2)**	**48**

Table 4 shows among the 10 successful pregnancies, 8 (80.0%) occurred in women younger than 30 years, including 3 (30.0%) in the 21–24-year group and 5 (50.0%) in the 25–29-year group. The remaining 2 pregnancies (20.0%) occurred among women aged ≥30 years, with one pregnancy each in the 30–34-year and 35–40-year groups.

Table 4: Distribution of successful IUI pregnancies by maternal age (n=10)

Maternal age	Pregnancies, n	Percentage (%)
21–24 years	3	30.0
25–29 years	5	50.0
30–34 years	1	10.0
35–40 years	1	10.0
Total	**10**	**100.0**

Overall, the findings demonstrated a higher observed pregnancy rate following IUI among women younger than 30 years**,** although the relatively small sample size should be considered when interpreting the age-related difference.

DISCUSSION

In our study, most patients undergoing IUI were younger than 30 years, with the largest proportion aged 25–29 years, followed by 30–34 years. This finding is similar to a study conducted in Bangladesh, where women aged 25–29 years (21.0%) and 30–34 years (17.7%) constituted substantial proportions of primary infertility patients. However, that study reported a higher proportion of women aged 35–39 years (29.4%) than in our study (12.5%) [12]. The predominance of younger women in our study may reflect their greater reproductive potential and suitability for IUI.

In our study, letrozole-based ovarian stimulation was the most commonly used regimen, followed by clomifene and FSH/HMG, with all patients receiving hCG as the ovulation trigger. This finding is similar to previous study, which reported letrozole as the predominant stimulation protocol (54.3%), followed by clomifene (23.9%) and HMG (7.2%). They also reported a mean post-treatment progressive sperm count of 17.4 ± 11.3 million in women with shorter infertility duration, broadly comparable to the favorable post-wash sperm parameters observed in our study [13].

In our study, the overall pregnancy rate was 20.8%, with a higher rate among women <30 years than those aged ≥30 years. This finding is similar to previous study, which reported favorable pregnancy outcomes following IUI, with ongoing pregnancy rates of 86.8% and 88.4% and abortion rates of 9.2% in the respective groups [14]. The higher pregnancy rate among younger women in our study may reflect their better reproductive potential.

Furthermore, 80.0% of successful IUI pregnancies occurred in women younger than 30 years, with the highest proportion in the 25–29-year group (50.0%). This finding is consistent with previous study, which reported who identified younger maternal age as an important predictor of IUI success [3-15]. The lower proportion of pregnancies among women aged ≥30 years may reflect age-related declines in fertility and IUI effectiveness; however, this should be interpreted cautiously given the small number of successful pregnancies in our study.

Overall, IUI outcomes were more favorable among younger women, while letrozole-based stimulation was the most commonly used ovarian stimulation protocol, with an overall pregnancy rate of 20.8%.

CONCLUSION

IUI achieved an overall pregnancy rate of 20.8% in this study, with a higher observed pregnancy rate among women younger than 30 years compared with those aged ≥30 years. Most successful pregnancies occurred in women below 30 years, particularly those aged 25–29 years. These findings suggest that younger maternal age may be associated with more favorable IUI outcomes. However, the small sample size warrants cautious interpretation, and larger prospective studies are needed to confirm the age-related differences in IUI success.

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