

Factors Influencing the Success Rate of Intrauterine Insemination: A Retrospective Study in Sultan Qaboos University Hospital

Bushra Ahmed*, Gowri Vaidyanathan, Silja Arumughan Pillai, Jokha AISabti, Maha Al-Khaduri and Anil Pathare

Department of Obstetrics and Gynecology, Sultan Qaboos University, Oman

*Corresponding author: Ahmed B, Specialist, Department of Obstetrics and Gynecology, Sultan Qaboos University, Al Khoudh, Muscat 123, Oman, Tel: 0096897474154; E-mail: bushramam@yahoo.com

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Abstract

Background: Intrauterine insemination (IUI) is the therapeutic process of placing washed spermatozoa transcervically into the uterine cavity for the treatment of infertility. The aim of this study is to know the percentage of successful IUI in Sultan Qabos Hospital.

Methods: Total number of IUI of 227, success rate of 49, Factors are used including age of the couple, duration of infertility, endometrial thickness, size of the follicles, sperm count and sperm motility.

Result: The success rate in our study is 21.58%. The mean age of the participants was 33 years (range: 22 to 44 years), the number of pregnant women for age brackets below 30 years, 30 to 35 years, 36 to 40 years and above 40 years were 26, 19, 4 and zero respectively.

Conclusion: While age and duration of infertility were significant predictors of all pregnancy outcomes, many other baseline characteristics like number of follicles and endometrial thickness were also important.

Keywords: Intrauterine insemination; Infertility; Motility; Diagnosis; Contraception

Introduction

Infertility affects between 60 million to 68 million people worldwide; generally one in ten couples experience primary or secondary infertility. According to WHO a couple may be considered infertile if after one year of regular sexual intercourse, without contraception, the woman has failed to conceive and there is no other reason, (such as breastfeeding or postpartum amenorrhea) [1]. The diagnosis of unexplained infertility encompasses an important subset of couples seeking treatment for infertility. After evaluation of ovulatory function, tubal patency, and semen analysis, no etiology is identified in 10-30% of couples seeking treatment for infertility [2]. IUI is considered a first-line procedure among assisted reproductive techniques due to its simplicity, ease of management, relatively low incidence of complications and low cost. However, when IUI is used, should ovarian stimulation be used at the same time? Some investigators have advocated using the natural cycle whereas others have claimed that ovarian stimulation may lead to better results [3].

The aim of IUI is to place a small volume preparation of motile sperm high in the uterine cavity, on the day of ovulation. In many units IUI is often combined with Controlled ovarian hyperstimulation (COH) or ovulation induction. In this way the best sperm are introduced at the right time in the cycle, physically close to the fallopian tubes and by passing cervical mucus, while the number of available oocytes at ovulation is increased [4]. Traditionally, intrauterine insemination (IUI) is the first line of treatment for couples suffering from various causes of infertility, including cervical infertility, ovulation dysfunction, and mild to moderate male factors. IUI is also

used in cases of unexplained subfertility [5]. The overall success rates of IUI remains controversial and depends on several factors, with published pregnancy rates varying from as low as 5% to as high as 70% per patient, however a 10-20% clinical pregnancies per cycle is an acceptable range for all etiologies' [6]. IUI is less invasive, cost effective and an intermediate step before the application of sophisticated assisted reproductive technologies (ART) such as *in vitro* fertilization (IVF) with or without Intracytoplasmic Sperm Injection (ICSI) [7].

IUI is frequently offered to couples with problems conceiving, provided the woman has at least one patent ovarian tube and her partner has only mildly altered semen quality. An important factor to assess as a predictor of pregnancy in response to IUI is the duration of infertility. A number of studies have reported higher pregnancy rates corresponding to shorter periods of infertility [8]. Couples with mild male factor fertility problems, unexplained fertility problems or minimal to mild endometriosis should be offered up to six cycles of intrauterine insemination because this increases the chance of pregnancy. Where intrauterine insemination is used to manage male factor fertility problems, ovarian stimulation should not be offered because it is no more clinically effective than unstimulated intrauterine insemination and it carries a risk of multiple pregnancies [9]. Long-term unexplained or male factor infertility is associated with a low spontaneous pregnancy rate of 2% per cycle. Both IUI and IVF with superovulation increase the chance of pregnancy but have associated risks of OHSS and multiple pregnancies, while IVF in particular is expensive [4].

Materials and Methods

This retrospective analytical study was done at Sultan Qaboos Hospital. A total number of women who had intrauterine insemination

from January 2014 to May 2016 were 227. And the number of those women who had successful IUI was 49. Natural cycle or Ovarian stimulation with clomifene citrate or Letrizole +/- gonadotrophins was initiated and a single IUI was performed within 36 hours after triggering ovulation if at least one follicle measuring >16 mm and an endometrial thickness with triple-line development were obtained. Several prognostic factors with regards to IUI treatment outcome have been identified, and include factors such as age of the patient, duration of infertility, type of infertility, cause of infertility (male, female, combined or unexplained), stimulation protocol, follicular response, endometrial thickness.

Complete history regarding their duration and type of infertility, menstrual pattern especially the presence of any irregularity, coital difficulties, complete obstetric history in case of secondary infertility, any history of drug intake and their duration, chronic illness, semen analysis, D2-5 hormonal assessment in form of serum FSH, LH, prolactin, thyroid function test & testosterone were obtained if patient was affording. Female partner were checked out for tubal patency and other gross pathologies. Basic semen analysis of husband was done to know different characteristics and quality of sperms. Husband semen was used after prior consent. The husband was explained about the procedure and asked to collect the semen by masturbation after abstinence of 2-3 days. Processing of semen was done by single layer density gradient method. Prior to insemination, verbal consent of both husband and wife was taken. IUI was done within 36 hours after hCG administration. A total of 0.5-1 ml was inseminated. All Women

remained in supine position for 20-30 minutes. Single insemination was considered for each patient. Patient was given luteal phase support in form of tablet Dydrogestrone (Duphaston) 10 mg twice daily orally for 10 days.

Results

The success rate in our study is 21.58%. The mean age of the participants was 33 years (range: 22 to 44 years), the number of pregnant women for age brackets below 30 years, 30 to 35 years, 36 to 40 years and above 40 years were 26, 19, 4 and zero respectively. Women who were conceived with duration of infertility of less than 3, 3-5 and more than 5 years are 36.8%, 42.8% and 20.4% respectively. Infertility was primary in 58.149% and secondary in 41.851% of the cases. About 18.93% of women with primary infertility conceived with IUI while 25.26% of women with secondary infertility conceived with IUI.

Causes of infertility involved are unexplained (41.4%), Female (30.39% PCOS, 4.4% severe endometriosis, 3.5% hypogonadotropic hypogonadism, 1.3% poor ovarian reserve, 0.88% fibroid uterus), male factor 14% and combined factor in 3.96%. Only four cases are natural cycles. The percentages of cases that conceived after the first, second, third, fourth and sixth cycles are 51%, 25%, 12.5% and 2%. The numbers of mature follicles (one, two or three) in the study with successful IUI are 39.5, 52 and 8.5 (Tables 1-3).

Variables	Success Rate	Yes	No
Mean Age ± SD, years: 30.79 ± 4.6			
Range, years: 22-44			
Total (%): 0.811 [§]			
Age Stratification	48	178	226(21.24)
<30 years	27	73	100(27)
30-35 years	17	68	85(20)
36-40 years	4	31	35(11.5)
>40 years	0	6	9(0)
Total (%)	0.874 [@]		
Duration of Infertility	47	179	226(20.8)
<3 years	15	49	64(23.4)
03-05 years	16	83	99(16.2)
>40 years	16	47	63(25.4)
Total (%)	0.874 [@]		
Type of Infertility	48	179	227(21.2)
Primary	25	107	132(18.9)
Secondary	23	72	95(24.2)
Total (%)	0.410 [@]		
Cause of Infertility	48	179	227(21.2)

Unexplained	15	83	98(15.3)
Male Cause	4	35	39(10.3)
Ovarian Cause	25	52	77(32.5)
Others	4	9	13(30.8)
Total (%)	0.009@*		
Cycles of IUI	0	6	6(0)
Induced	0	6	6(0)
Natural	0	0	0(0)
Total (%)	NA		
Medication used	48	173	221(21.7)
FSH/HMG Inj	3	10	13(23)
Both	39	124	163(23.9)
Total (%)	0.311@ Clomid/Litrozole		
No. of IUI Cycles	48	179	227(21.2)
One	26	60	86(30.2)
Two	11	57	68(16.2)
Three	6	40	46(13)
More than Three	5	22	27(18.5)
Total (%)	0.079@		
No. of Follicles	48	179	227(21.2)
One	28	112	140(20)
Two	18	58	76(23.7)
Three	2	8	10(20)
More than Three	0	1	1(0)
Total (%)	0.010@*		
Size of Follicles	48	179	227(21.2)
One	28	127	155(18.1)
Two	20	52	72(27.7)
Total (%)	0.069@		
Endometrial Thickness	48	179	227(21.2)
<8	12	77	89(13.5)
08-10	27	93	120(22.5)
>10	9	9	18(50)
Total (%)	0.011@*		

Table 1: Patient demographics, risk stratification, complications in the IUI patient cohort from Oman (@Fisher's Exact test; §Chi Square test; †P<0.05 Significant).

Characteristics	Odds Ratio	p-value	95% Confidence Interval
Age stratification	0.5817234	0.020*	0.3690572-0.9169369
Duration of infertility	1.059461	0.792	0.6900870-1.626545
Type of infertility	1.367222	0.338	0.7207401-2.593579
Cause of infertility	1.562455	0.007*	1.1308930-2.158705
Medication used	1.397414	0.142	0.8936862-2.185069
No. of IUI cycles	0.703968	0.043	0.5014737-0.9882292
No. of follicles	1.772551	0.023*	1.081515-2.905126
Size of follicles	1.744505	0.098	0.9031629-3.369602
Endometrial thickness	2.352277	0.002*	1.371343-4.034881

Table 2: Logistic regression-univariate analysis (*P<0.05 Significant).

Characteristics	Odds Ratio	p-value	95% Confidence Interval
Age stratification	0.5262247	0.016*	0.3127751-0.8853403
Duration of infertility	1.25212	0.367	0.768592-2.03984
Type of infertility	1.74379	0.133	0.8448996-3.599013
Cause of infertility	1.456219	0.045*	1.008092-2.103553
Medication used	1.255094	0.375	0.7597962-2.073267
No. of IUI cycles	0.6105217	0.014*	0.4121579-0.9043542
No. of follicles	1.408992	0.225	0.8095908-2.452177
Size of follicles	1.272502	0.536	0.5930792-2.730263
Endometrial thickness	2.513439	0.002*	1.397602-4.520152

Table 3: Logistic regression-multivariate analysis (*P<0.05 Significant).

Discussion

IUI is frequently offered to couples with problems conceiving, provided the woman has at least one patent fallopian tube and her partner has mildly altered semen quality [8]. IUI is most simple, easy and popular assisted reproductive technique practiced today [1]. Age as a significant predictor of outcomes is not surprising, as chronological age has previously been identified as a significant predictor of clinical pregnancy after OS-IUI treatments using both gonadotropins and clomiphene citrate [10]. The advancing maternal age decreases female fecundity and this is due to reduced uterine receptivity and/ or decreased oocyte quality [7].

Secondary infertility of women appears to be a positive predictive factor of successful pregnancy. Women who have already become pregnant (with normal or pathological pregnancies, for the present couple or otherwise) had a greater chance of achieving a pregnancy after IUI than those with primary infertility. Duration of infertility is an important predictor factor as around eighty percent of the cases in our study conceived with duration of less than 5 years. Cause of infertility is important predictor of success of IUI for e.g. Anovulation, Anovulatory and unexplained infertility have been reported in the

literature to have more favorable outcomes after IUI when compared with other etiologies of infertility [11].

Ovarian stimulation with clomiphene, letrozole tablets alone or combined with FSH or HMG injections in our study founded that it increase the success of IUI. It remains controversial whether ovarian stimulation improved the outcome of IUI treatment in ovulatory women. Some investigators have suggested a beneficial effect whereas others observed no benefit. Number of mature follicles is associated with increased pregnancy rates. The authors suggest that to achieve one additional pregnancy, sixteen cycles of multi-follicular growth instead of mono-follicular growth are necessary at the cost of two additional multiple pregnancies. They concluded that three or four follicles instead of two follicles do not add any advantage in achieving further pregnancies [12]. Our study showed that IUI in general, even in a young age group, had an overall pregnancy rate of 21.58%. The results are equal to those achieved with IVF. However, the treatment is simpler and less expensive than IVF.

Conclusions

While age and duration of infertility were significant predictors of all pregnancy outcomes, many other baseline characteristics like number of follicles and endometrial thickness were also important. In ovulatory women undergoing ovarian stimulation and IUI, there are no significant differences in pregnancy rates among the various stimulation protocols. Female etiology was a powerful predictor of success in achieving pregnancy. Couples treated for anovulation associated with PCOS had the highest pregnancy rate per cycle.

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