DOI: 10.5455/msm.2014.26.321-323
Received: 10 September 2014; Accepted: 25 October 2014

Published online: 29/10/2014
Published print: 10/2014

ORIGINAL PAPER Mater Sociomed. 2014 Oct; 26(5): 321-323

Effect of Sperm Count on Success of Intrauterine Insemination in Couples Diagnosed with Male Factor Infertility

Erhong Zhang, Xin Tao, Weijie Xing, Liuhong Cai, Bin Zhang

Department of Infertility and Sexual Medicine, The Third Affiliated Hospital of Sun Yat-sen University, Guangzhou, China

Corresponding author: Bin Zhang, MD. E-mail: doctorzb@163.com

ABSTRACT

Objective: To exam semen parameters in predicting intrauterine insemination (IUI) outcomes in couples with male factor. **Study design:** This retrospective study was performed at department of infertility and sexual medicine from September 2007 to February 2014. 307 couples with male factor infertility were included and 672 IUI cycles were analyzed. **Results:** From 672 inseminations performed on 307 couples, there are 27.36% couples get pregnancy (84 out of 307) and the overall pregnancy rate was 12.95% (87 out of 672) of IUI. With the increase of post total progressive sperm count, the clinical pregnancy rate increased. When the initial progressive sperm count was lower than $5*10^6$, there was no pregnant in the IUI cycle. At the end of the third cycle, 85 clinical pregnancies had been achieved (97.70%). **Conclusions:** The initial total progressive sperm count lower than $5*10^6$ means the poor outcome of IUI in the infertile couples with male factor. If the infertile couples with male factor don't get pregnancy after three IUI cycles, the couples should receive re-assessment or other artificial reproductive technology.

Key words: Intrauterine insemination; Male factor infertility; Semen analysis.

1. INTRODUCTION

Intrauterine insemination (IUI) is a widely used fertility treatment for couples with infertility and is a simple, non-invasive, and a cost-effective technique (1). IUI is often suggested to infertile couples in which the woman has at least one permeable fallopian tube. This method is indicated in cases of cervical infertility, male factor infertility, anovulation, endometriosis, and unexplained infertility.

There are certain variables that are currently known to be predictive of IUI success, most of which relate to the female partner including follicle number, endometrial thickness, duration of infertility, and sperm motility (2). Pregnancy rate after IUI differ between studies according to patient selection criteria, the presence of various infertility factors, ovarian stimulation methods, number of cycles performed, different sperm parameters and preparation technique (3).

Semen analysis is the first step to accurately diagnose male infertility. Sperm count, sperm motility and the percentage of sperm with normal morphology are the main criteria for the quality of semen and number of motile sperm and normal morphology have been shown to correlate with IUI outcome (4, 5). Others found that male factors were not found to correlate with the treatment outcome (6). The aim of this retrospective study is to exam the use of semen parameters in predicting IUI outcomes in couples diagnosed with male factor infertility.

2. MATERIAL AND METHODS

In this retrospective cohort study, all couples undergoing intrauterine insemination at department of infertility and sexual medicine from September 2007 to February 2014 were retrospectively enrolled into our database for evaluation of a diagnosis of male factor infertility. Before each course of treatment, infertile couples underwent the following tests: hysterosalpingography, hormone concentrations, semen analysis and postcoital test. Male factor infertility was diagnosed if the male had at least two pre-treatment semen analyses which were abnormal. In this analysis 672 IUI were performed in couples which fit the criteria listed above for male factor infertility. Clinical features of couples, pre and post processing semen analysis parameters at the time of IUI were included in the analyses.

Patients who underwent natural cycles have regular menstrual cycle and ovulation. Clomiphene citrate (50 or 100 mg daily) and letrozole (2.5 mg or 5 mg daily) were administered orally for 5 days stating on cycle day 3 to 5. Gonadotropin injections were performed daily starting on cycle day 3 to 5 and titrated to develop 2 to 3 mature follicles. When the lead follicle reached at least 16 mm (usually 18 mm) in diameter 10000IU of human chorionic gonadotropin (hCG, livzon pharmaceutical Co.Ltd, China) subcutaneously to induce ovulation. Washed sperm was inseminated 24-36 hours after hCG injection according the LH level on HCG day. All patients were monitored with either ultrasound or both serum LH, estradiol and progesterone levels.

For the purpose of semen collection, individuals were asked to refrain from ejaculating for two to four days prior to collection of the specimen. Specimens were produced with masturbation in a collection room adjacent to the laboratory. Freshly ejaculated sperm was allowed to liquefy before initial semen analysis. Liquefied semen was thoroughly mixed before an aliquot was placed on a standard count slide for the pre-processing analysis. The samples were assessed by CASA system (Sperm Class Analyzer, V4.0.0, Spain) and at least four random fields were evaluated for each analysis.

After place semen sample in a discontinuous density (40%-80%) gradient column (SpermGrad TM, Sperm-Rinse, Vitrolife Sweden AB, Sweden),the gradient was centrifuged for 20 min at 400g and subsequently, the 40% layer and the seminal plasma fraction were removed from the test tube, leaving the 80% layer undisturbed. Approximately 6–8 ml of sperm-washing medium was added to the 80% layer and centrifuged for 5 min at 400g. The sperm pellet was then reconstituted to approximately 0.5 ml. The analysis of an aliquot of the processed sample was performed as previously. The insemination was performed in a sterile fashion, using a flexible plastic catheter with the patient in the dorsal lithotomy position. The patient did not assume a prone position for at least thirty minutes after the end of the insemination.

Serum β-human chorionic gonadotropin (β-hCG) levels were analyzed 14 to 17 days after IUI to determine pregnancy status. A level greater than 5 mIU/ml was considered positive for pregnancy including biochemical pregnancy and clinical pregnancy. Clinical pregnancies were defined as those with a gestational sac on ultrasound. In this article, we use clinical pregnancy rate to analyze.

Statistical methods

All statistical analyses were done using the statistical package for social sciences 13.0 (SPSS, Inc, Chicago, IL). Results are reported as mean value±standard deviation (SD). Statistical significance was accepted as a two-sided P<0.05.

	Pregnant (n=87)		Not Pregnant (n=585)		p
	mean	sd	mean	sd	
Maternal age(Y)	30.63	3.40	31.10	4.17	NS
Paternal age(Y)	33.18	4.29	33.34	4.79	NS
Duration of infertility(Y)	3.28	2.42	3.44	2.96	NS
Number of mature follicles	1.72	0.89	1.50	0.77	0.01
initial total motile sperm count(M)	82.88	58.97	67.23	45.27	0.00
initial total progessive sperm count(M)	49.30	36.29	39.72	26.86	0.00
Post total motile sperm count(M)	33.22	20.11	29.78	18.30	NS
Post total progressive sperm count(M)	29.83	18.74	25.42	16.51	0.02

Table 1. Comparison of the baseline characteristics and sperm parameters of subjects

	Pregnant (n)	Not Pregnant (n)	Total (n)	Pregnancy rate (%)
Initial total progressive sperm count(M)				
<5*106	0	12	12	0.00
5-9.99*106	7	48	55	12.73
10-19.99*106	12	96	108	11.11
≥ 20*106	68	429	497	13.68
Post total progressive sperm count(M)				
<5*106	2	25	27	7.41
5-9.99*106	9	76	85	10.59
10-19.99*106	18	143	161	11.18
≥ 20*106	58	341	399	14.54

Table 2. Initial and post total progressive sperm count with pregnancy rate

Number of IUI cycles	Pregnant (n)	Not Pregnant (n)	Total (n)	Pregnancy rate (%)
1	47	260	307	15.31
2	24	181	205	11.71
3	14	98	112	12.50
4	2	25	27	7.41
5	0	10	10	0.00
≥ 6	0	11	11	0.00

Table 3. Pregnancy rate in different number of IUI cycles

3. RESULTS

From 672 IUI cycles performed on 307 couples, there are 27.36% couples get pregnancy (84 out of 307) and the overall pregnancy rate was 12.95% (87 out of 672) of inseminations. At the primary infertile group pregnancy rate was found as 14.29% (68 out of 475). In a group of patients with secondary infertility pregnancy rate was observed as 9.69% (19 out of 197). There were more dominant preovulatory follicles (≥ 16mm) in pregnant group than that in not pregnant groups (1.72±0.89 vs 1.50±0.77, P<0.05). The mean age of couple, duration of infertility were compared between two groups. When comparing the semen analysis parameters between the two outcome groups, we found that the initial motile and progressive sperm count and post motile and progressive sperm count was higher in the pregnant and not pregnant groups, whereas the post motile sperm count has no significant difference between two groups (Table 1).

Table 2 shows that with the increase of post total progressive sperm count, the clinical pregnancy rate increased. There was no pregnant in the cycles which the pre total progressive sperm count lower than $5*10^6$. The clinical pregnancy rate per cycle was 12.95% . At the end of the third cycle, 85 clinical pregnancies had been achieved (97.70%). There was no clinical pregnancies occurred in these cases after five attempts (Table 3).

4. DISCUSSION

Intrauterine insemination using the husband's sperm is commonly performed to overcome male factor problems, as well as to enhance the probability of conception in various other infertility conditions (7). The pregnancy rate depends on sperm parameters, female factors, and the number of dominant preovulatory follicles. In Stephanie M. Luco's study, the total pregnancy rate observed is 5.3% in 356 IUI cycles (4). In Ahmed Badawy's study, Seventy-nine clinical pregnancies followed 714 IUI cycles, for a clinical pregnancy rate per cycle of 11.06% and a clinical pregnancy rate per couple of 20.1% (8). The total clinical pregnancy rate observed in this study, 12.95% per cycle, is considerably higher than Stephanie M. Luco's study and is comparable with Ahmed Badawy's study (4, 8).

Miller et al. (9) reported a pregnancy rate per cycle of 12.4%

when the total number of collected motile spermatozoa (TMS) is over 20 million, compared with 7.4% when it is between 10 and 20 million. For a value under 10 million, he suggests steering the couple towards IVF. In the same sense, Dickey et al. (10) and Van Voorhis et al. (11) reported the best pregnancy rates when more than 10 million motile spermatozoa were selected. It has been suggested that the number of motile spermatozoa inseminated is a potential predictive factor. In our study, when comparing the semen analysis parameters between the two outcome groups, we found that the initial and post progressive sperm count and the initial motile sperm count was higher in the pregnant group than not pregnant group. These results mean that the semen parameters were related to the outcome of IUI in the current study. In this study, when initial total progressive sperm count was $\geq 5\times10^6$, the pregnancy rate was higher than in the group with initial total progressive sperm count $<5\times10^6$ and the pregnancy rate was compared among the groups with initial total progressive sperm count $5–9.9\times10^6$, $10–19.9\times10^6$ and $\geq 20\times10^6$ (12.73%, 11.11%, and 13.68%, respectively (Table 2). There was no pregnant in the cycles which the initial total progressive sperm count was lower than $5*10^6$, so we should told these infertile couples the poor outcome of IUI and suggested them receive in vitro fertilization (IVF).

The findings in Stephanie Marticle (4) indicated that post processing semen analysis parameters are not more predictive of pregnancy than are preprocessing semen analysis results in couples with male factor infertility. Tan et al. (12) found that post washed total progressively motile sperm count (TPMSC) is an independent predictor of pregnancy test result and TPMSC of half million or greater is adequate to achieve statistically similar pregnancy test results after non-donor IUI cycles. The predicted odd of positive pregnancy result is statistically significantly higher when TPMSC is >0.51 million compared to the TPMSC of <0.51 million (OR = 1.68, 95 % CI: 1.04-2.71). Ok EK (13) found that an average TPMSC of 10×10^6 may be a useful threshold value for IUI success. In this study, there was no pregnancy occurred when TPMSC was <4 million (0/20). Our results also showed that with the increase of post total progressive sperm count, the clinical pregnancy rate increased, similar with the results of those articles (Table 2)(12, 13).

In the present study, 85 clinical pregnancies had been achieved (97.70%) at the end of the third cycle (Table 3). Plosker and Amato (14) advised infertile couples to received IVF after three unsuccessful IUI. Nuoja-Huttunen et al (15) noted that the highest pregnancy rate in 811 cycles (18%) was seen during the first cycle and that 97% of all pregnancies result from the first four cycles. In cases of unexplained infertility, Aboulghar et al (16) found a cumulative pregnancy rate of 39.2% after three cycles and 48.5% after six cycles in a study of 1112 IUI cycles (16.4% per cycle). At present, it is generally admitted that IUI should be limited to four or six cycles and that IVF should be performed. Our results supported the opinion that three inseminations prior to IVF treatments have been usually performed in couples where the cause of infertility was unexplained, due to unilateral tubal factor, mild endometriosis or mild male factor infertility (17).

5. CONCLUSION

IUI is a powerful method to deal with infertile couple with male factors. The initial total progressive sperm count lower than $5*10^6$ means the poor outcome of IUI in the infertile couples with male factor. If the couples with male factor infertility don't get pregnancy after three IUI cycles, the couple should receive re-assessment or other artificial reproductive technology.

CONFLICT OF INTEREST: NONE DECLARED.

REFERENCES

1. Cantineau AE, Cohlen BJ, Al-Inany H, et al. Intrauterine insemination versus fallopian tube sperm perfusion for non tubal infertility. Cochrane Database Syst Rev. 2004; CD001502.
2. Tomlison MJ, Amissah-Arthur JB, Thompson KA, Kasraie JL, Bentick B. Prognostic indicators for intrauterine insemination (IUI): statistical model for IUI success. Hum Reprod. 1996;11(9): 1892-1896.
3. Grigoriou O, Pantos K, Makrakis E, Hassiakos D, Konidaris S, Creatsas G. Impact of isolated teratozoospermia on the outcome of intrauterine insemination. Fertil Steril. 2005; 83: 773-775.
4. Badawy A, Elnashar A, Eltotongy M. Effect of sperm morphology and number on success of intrauterine insemination. Fertil Steril. 2009; 91: 777-781.
5. Merviel P, Heraud MH, Grenier N. et al. Predictive factors for pregnancy after intrauterine insemination (IUI): an analysis of 1038 cycles and a review of the literature. Fertil Steril. 2010; 93(1): 79-88.
6. Farimani M, Amiri I. Analysis of prognostic factors for successful outcome in patients undergoing intrauterine insemination. Acta Med Iran. 2012; 45(2): 101-106.
7. Wainer R, Albert M, Dorion A, et al. Influence of the number of motile spermatozoa inseminated and of their morphology on the success of intrauterine insemination. Hum Reprod. 2004; 19: 2060-2065.
8. Stephanie M. Luco , Chioma Agbo, Barry Behr, et al. The evaluation of pre and post processing semen analysis parameters at the time of intrauterine insemination in couples diagnosed with male factor infertility and pregnancy rates based on stimulation agent. A retrospective cohort study. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2014; 179: 159-162.
9. Miller DC, Smith GD, Randolph JF, et al. Processed total motile sperm count correlates with pregnancy outcome afterintra-uterine insemination. Urology. 2002; 60: 497-501.
10. Dickey RP, Lu PY, Taylor SN, et al. Comparison of the sperm qualitynecessary for successful intra-uterine insemination with World HealthOrganization threshold values for normal sperm. Fertil Steril. 1999; 71: 684-689.
11. Van Voorhis BJ, Barnett M, Sparks AE, et al. Effect of the total motile sperm count on the efficacy and cost-effectiveness of intrauterine insemination and in vitro fertilization. Fertil Steril. 2001; 75: 661-668.
12. Tan O, Ha T, Carr BR, et al. Predictive value of postwashed total progressively motile sperm count using CASA estimates in 6871 non-donor intrauterine insemination cycles. J Assist Reprod Genet. 2014; 31(9): 1147-1153.
13. Ok EK, Doğan OE, Okyay RE, et al. The effect of post-wash total progressive motile sperm count and semen volume on pregnancy outcomes in intrauterine insemination cycles: a retrospective study. J Turk Ger Gynecol Assoc. 2013; 14(3): 142-145.
14. Plosker S, Amato P. Predicting and optimizing success in an intra-uterine stimulation program. Hum Reprod. 1994; 9: 2014-2021.
15. Nuojua-Huttunen S, Tomas C, Bloigu R, Tuomivaara L, Martikainen H. Intrauterine insemination treatment in subfertility: an analysis of factors affecting outcome. Hum Reprod. 1999;14: 698-703.
16. Aboulghar M, Mansour R, Serour G, et al. Controlled ovarian hyperstimulation and intrauterine insemination for treatment of unexplained infertility should be limited to a maximum of three trials. Fertil Steril. 2001; 75: 88-91.
17. The ESHRE Capri Workshop Group. Intrauterine insemination. Hum Reprod Update. 2009; 15(3): 265-277.