ORIGINAL ARTICLE

Effect of Semen Characteristics on Outcome of Intra Uterine Insemination

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ABSTRACT

Aim: To determine the influence of various sperm parameters inseminated on the outcome of Intra Uterine Insemination (IUI) in patients undergoing ovarian stimulation with clomiphene citrate followed by HCG and to assess the likelihood of IUI success as a function of normal motile sperm inseminated (NMSI) and of the percentage of morphologically normal spermatozoa, assessed after sperm preparation.

Study Design: Quasi experimental study.

Place of Study: The study was conducted at Surgimed Hospital Infertility Centre Lahore from January 2010 to December 2016.

Methods: A total of 600 infertile couples underwent 800 infertility treatment cycles. After ovulation induction and follicle monitoring Human Chorionic Gonadotrophin (HCG) was given and IUI done. The initial sperm count and concentration, sperm motility, pre and post wash processed sperm count and concentration, fast motile sperm percentage, total motile sperm (TMS) count and sperm morphology were analyzed. The impact of preprocessing and post processing sperm parameters on pregnancy outcome after IUI was evaluated.

Results: There was a trend towards an increasing percent of conception with increasing TMS count inseminated. Total sperm count, percent motility and percent of fast motile sperm were independent prognostic factors of fertility. Patients with sperm motility >or =30% had pregnancy rate of 13% whereas pts with low motile counts had significantly less ($p<0.005$) pregnancy rates.

Conclusion: Sperm motility is a major determinant of pregnancy out come following IUI.

Keywords: Total motile sperm (TMS), Human chorionic gonadotrophin (HCG), Hysterosalpingography (HSG)

INTRODUCTION

IUI is one of the treatment options for infertile couples before proceeding to other invasive and expensive techniques. Indications of IUI are male factor infertility, cervical factors, unexplained infertility, and contra indications of IUI are endometriosis**,** pelvic inflammatory disease, blocked tubes.

Several semen parameters correlate directly with outcome of IUI. When the number of sperm or percentages of morphologically normal sperm do not attain a certain threshold value, the couple should be directed for other assisted reproductive techniques. The prognostic value of sperm morphology and total motile count before and after preparation is still the subject of debate[1,2].

MATERIAL AND METHODS

This study was carried out at Surgimed Hospital Infertility Centre Lahore from January 2010 to December 2016, where 600 couples underwent 800 infertility treatment cycles. Inclusion criteria of patients were infertility, oligospermia, documented patent tubes and exclusion criteria were endocrine disorders, medical disorders, pelvic inflammatory disease and blocked tubes. Normal Semen Analysis (WHO 1992) was taken as a standard with concentration $>20x10^6$/ ml, total count $>40x10^6$, progressive motility >50%, typically morphology >30%. Females were investigated for their hormonal profile on day 2 Serum Follicular Stimulating Hormone (FSH), Leutinizing Hormone (LH), Prolactin and day 21 Serum progesterone. Tubal patency was confirmed primarily by HSG. Laparoscopy was done in cases of HSG failure and tubal blockage. Males were investigated by Semen analysis. After ovulation induction with clomiphene citrate and gonadotrophins, follicles were monitored by serial trans-vaginal ultrasounds. Injection HCG was given, pregnancy rates were calculated in relation to motile sperm count and sperm morphology. Semen was prepared by collection after abstinence of three days. Sperm concentration was calculated by Makler Chamber. Sperm motility was assessed in 200 sperms/10 fields. Two step pure sperm gradient method was used for preparation of semen by twice

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washing of sperm pellet by centrifugation. Sperm pellet was suspended in 0.5ml sperm buffer.

RESULTS

The results were statistically analysed by chi square, p=0.05 was considered significant. The parameters were analysed before and after preparation of semen sample by concentration gradient method. Semen analysis, sperm concentration, total motile sperm count, sperm morphology were also studied. Table I shows the results of semen analysis.

Table I: Results of semen analysis

Islolated Asthenospermia	265(48%)
Asthenoteratospermia	88(16%)
Oligoasthenospermia	75(14%)
Oligoasthenoteratospermia	57(10%)
Isolated Teratospermia	28(5%)
Islolated Oligospermia	28(5%)
Oligoteratospermia	12(2%)

Table II: Rate of clinical pregnancies/cycle according to the age of the women at the time of IUI

	Group					
	1	**2**	**3**	**4**	**5**	**6**
Age(yrs)	<25	25<30	30<35	35<38	38 <40	<40
Cycles	17	206	334	140	66	37
Clinical	4	27	45	16	10	2
Preg-nancies	(21.43)	(12.93)	(13.53)	(11.31)	(15.24)	(5.04)

Table II shows the impact of various age groups on outcome of IUI. There were number of clinical pregnancies in age group of 25 to 38 years. In 334 cycles of IUI in 30 to 35 years 45(13.53%), In 206 cycles between 25 to 30 years 27(12.93%), in 140 cycles between 35 to 38 years 160(11.3%) pregnancies were achieved. There was a marked decline in clinical pregnancies above 38 years in 37 IUI cycles with only 2(5.04%) pregnancies.

Table III shows non linear increase in pregnancy rate per cycle with increased number of motile sperm in IUI sample. With NMSI >5, 14.75% and with NMSI >10, 13.5% pregnancy rate were observed whereas with NMSI <1, 3.13% for NMSI of 1-2, 8.67 and for NMSI <5, 11.89% pregnancy rate were achieved.

Table III: Clinical pregnancy rates/cycle according to the percentage of normal sperm after preparation and the NMSI

NMSI ($x10^6$)	**Clinical Pregnancy/ Cycle**	
	Typical Sperm <30%	**Typical Sperm >30%**
N <5	5/92 (5.43%)	19/161 (11.8%)
N >5	14/76 (18.42%)	66/471 (14.0%)
Total	19/168 (11.31%)	85/632 (13.44%)

Table IV Shows that bad quality sperm specimen with <30% morphologically normal sperm can be compensated by improving the NMSI count. When the patients were divided into groups according to sperm morphologically and NMSI and pregnancy results analyzed, it was observed that there was no significant difference between pregnancy rates 11.4% and 14% with >30% Typical sperm as compared to patients with <30% typical sperm with a pregnancy rate of (5.43%) with NMSI <5 and 18% with NMSI >5. There was a dramatic difference showing the importance of NMSI compensating for poor quality.

Table IV: Rate of clinical pregnancies/ cycle depending on the NMSI

	Group					Total
	1	**2**	**3**	**4**	**5**	
NMSI (x106)	*n* <1	*n* <2	*n* <5	*n* <10	10	
Cycles	30	54	147	349	220	800
Pregnancies	1	5	18	51	29	104
%pregnancies/ cycle	3.13%	8.67%	11.89%	14.75%	13.05%	12.91%

DISCUSSION

IUI is a procedure in which semen preparation modifies sperm characteristics considerably, and there is increase in number of motile spermatozoa inseminated. In this study after semen preparation with washings with different media, nearly three quarters semen samples had improved morphology. In samples with less than 30% normal sperm before preparation, post was the rate of normal features exceeded the 30% threshold level. The clinical pregnancy rates were 5% when less than 30% sperm morphology was normal, whereas it was 13% when more than 70% sperm morphology was normal.

In present study 104 clinical pregnancies where achieved after 800 IUI cycles for a total clinical pregnancy rate/ cycles of 13%. This range correlates with other publications with a pregnancy rate 13%[2].

The pregnancy rate depends on number of motile sperm inseminated. Some authors have observed the likelihood of pregnancy with IUI fell when the post preparation percentage of normal sperm count was low. Kruger et al and several IVF studies have proved low fertilization rates with low sperm count.[3] It is comparable with present study as when NMSI was less than one million only 3.13% pregnancies, whereas with NMSI more than 5 million,

13% pregnancy rate/ cycle was achieved. Several studies agreed on minimum threshold of $5x10^6$ NMSI and recommended IVF when this value was lower. The usefulness of these criteria is, however, limited by variability of quality of ejaculate as well as the variable results of sperm preparation.

All forms of ART yield many mediocre results for women of more than 40 years of age. Our results also show that women with more than 40 years of age had only 2 (5.04%) pregnancies. Many studies suggested that in patients >35 years 10 (15.24%) pregnancies were achieved.[4] This suggests that we should not rule out IUI in this age group, but we could offer at least 3 IUI before resorting to IVF.

Sperm morphology is another sensitive factor beside NMSI and patient's age, affecting results of IUI. Present study shows that sperm morphology alone, before and after preparation, did not predict IUI results, which is similar to other research. Ombelet and others [5,6] suggest that the NMSI could compensate for inadequate sperm morphology. They observed cases of IUI failure when NMSI was less than one million and morphological scores were significantly lower less than 4% of normal forms. Some authors observed less pregnancy rates when pre preparation percentage of normal sperm was low[7].

These divergent results show several criteria of observation of normal spermatozoa which includes morphologic index, abnormal acrosomal characteristic[8,9]. Semen preparation modifies sperm preparation considerably and number of motile spermatozoa and morphological criteria should be logically assessed. In this study less than 30% normal sperm three quarter of sample had improved morphology after preparation. The clinical pregnancy rates in more than 30% normal sperm sample were nearly equal but there was significant difference in cases where less than 30% normal sperm. When these less than normal sperm group were analyzed with NMSI, the NMSI compensated for poor morphologically normal sperm account for less than 30% of the sample the NMSI strongly influences the likelihood of successful IUI[10,11].

CONCLUSION

Strict analysis of motile sperm count and morphology after gradient sperm wash technique is a useful prognostic factor for predicting pregnancy rate for IUI. Our results show that for couples normal sperm morphology < 30% and >5x 10^6 NSMI, IUI should be done. If NMSI threshold cannot be reached IVF should be recommended.

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