

To Study the Obstetrical and Neonatal Outcomes in Spontaneous Conception versus IVF Conception

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Abstract

Objective: Our study aims to study the overall obstetrical and neonatal outcomes in spontaneous conception versus IVF conception.

Study design: Hospital based prospective study

Methods and Materials: The study was conducted at our hospital over a period of one and a half years from September 2014 to April 2016. It was a hospital based prospective study. A total of 100 (50 spontaneous conception and 50 IVF conception) women who were admitted for safe confinement at Obstetrics and gynecology department of hospital were included in the study. For the purpose of the study, the study group was divided in two groups IVF conception group and spontaneous conception group for comparison of obstetrical and neonatal outcome. A detailed history was taken and thorough examination findings were noted. The antenatal course was noted and also the obstetric and neonatal outcomes were noted.

Results: It was observed that the obstetrical outcomes were poorer in IVF conception group than in the spontaneous conception group. Significant association was found between gestational duration, mode of delivery, NICU stay requirement with mode of conception. Association was also found between antepartum hemorrhage (APH), preeclampsia,

gestational diabetes, postpartum hemorrhage (PPH) with mode of conception.

Conclusion: Maternal age, gestational duration, preterm delivery, LSCS deliveries, low-birth weight babies, low APGAR score, and requirement of NICU stay in IVF conception group was significantly higher than in spontaneous conception group. Association was also found between antepartum hemorrhage, preeclampsia, gestational diabetes mellitus, preterm premature rupture of membranes, postpartum hemorrhage with mode of conception.

Keywords: IVF conception; Spontaneous conception; Obstetrical outcomes, postpartum hemorrhage; Preeclampsia, NICU stay.

Introduction

Infertility is a worldwide problem which is not merely a health problem, but also a matter of social injustice and inequality.^{1,2} The World health organization (WHO) estimates that 60 to 80 million couples worldwide currently suffer from infertility.³ Infertility varies across regions of the world and has been estimated to affect 8 to 12 percent of couples worldwide.^{3,4} In India, different studies observed

different prevalence in infertility. Prevalence of infertility in India is 7.4% in rural India and 8.7% in urban India.⁵

WHO has defined infertility as failure to become pregnant after one year of unprotected intercourse. According to ESHRE classification 2010,⁶ 20–30% of infertility are linked to physiological causes in men, 20–35% to physiological causes in women and 25–40% of cases are attributable to a combined problem. In 10–20% cases no cause is found. It is also associated with lifestyle factors like stress, smoking and body weight.

Assisted reproductive technologies (ART) are defined as supporting methods to achieve pregnancy when the process of intercourse is replaced by artificial insemination or fertilization of oocyte outside the body. ART is a constantly expanding field.⁷ Most effective treatment of most types of infertility is *in vitro* fertilization (IVF). The introduction of intra-cytoplasmic sperm injection (ICSI) has been an essential step in the treatment of infertility.⁷ Some forms of ART are also performed in fertile couples for genetic reasons like preimplantation genetic diagnosis (PGD).

Few studies in literature have shown that complications like multiple pregnancies, preeclampsia, placenta previa and APH, preterm birth, PPH, low-birth weight (LBW) and very low birth weight (VLBW) babies were higher in IVF conception than that of spontaneous conception.^{8–15} Our hospital is a tertiary care centre with an IVF centre of its own.

Hence this study was designed to analyze the overall obstetrical and neonatal outcomes in spontaneous conception versus IVF conception.

Materials and Methods

The study was conducted at our hospital over a period of one and a half years from September 2014

to April 2016. It was a hospital based prospective study. The study was presented to Institutional Ethics Committee (IEC) for ethical clearance, after getting clearance from IEC, the study was started. A total of 100 (50 spontaneous conception and 50 IVF conception) women who were admitted for safe confinement at Obstetrics and Gynecology department of hospital were included in the study. Women with preexisting diabetes mellitus, hypertension, clotting disorders and the women who refused to give consent for the study were excluded from the study.

For the purpose of the study, the study group was divided into two groups, IVF conception group and spontaneous conception group for comparison of obstetrical and neonatal outcomes. A detailed history was taken and thorough examination findings were noted regarding age, parity, gestational age, menstrual history, obstetrical history, past surgical and medical history and mode of conception. The antenatal course was noted and also the obstetric and neonatal outcomes were noted. The data was validated and analyzed by Epi Info 7 software. For continuous variable range, mean and standard deviation (SD) were calculated and for categorical variables, proportion and percentage were obtained. To know the association between dependant and independent variable chi-square and odds ratio were applied accordingly.

Results

The demographic analysis of two groups revealed that in spontaneous conception group. Table 1 show that mean age was 30.84 years (22–38 years) with SD of 3.37; while in IVF conception, mean age was 32.4 years (22–44 years) with SD of 4.37. It was found to be statistically significant. (p -value <0.05). There was no statistically significant difference found between the groups with respect to their gravidity. (p -value >0.05) (Table 1).

Table 1: Comparison of Obstetric History of Women Between Spontaneous Conception Group and IVF Conception Group

Age of women at the time of conception	Spontaneous conception (N = 50)	IVF conception (N = 50)	p -value
Age			
<25 years	2	2	
25–30 years	23	15	
>30 years	25	33	
Mean \pm SD	30.84 \pm 3.37	32.4 \pm 4.37	0.04
Range	22–38	22–44	

SD = Standard deviation, IVF = In-vitro fertilization

Table 2 shows that out of 50 women who conceived spontaneously, 28 (56%) were primiparous while 22 (44%) were multiparous. Among IVF conception group, 35 (70%) were primiparous while 15 (30%) were multiparous. However, there was no statistically significant difference found between

the groups with respect to their gravidity. Same table also shows that out of total 50 women who conceived spontaneously, 7 delivered prematurely while in IVF conception group, out of 50 women, 20 delivered prematurely. This difference was found to be statistically significant.

Table 2: Comparison of Obstetric History and Gestational Duration of Women Between Spontaneous Conception Group and IVF Conception Group

Obstetric parameter		Spontaneous conception	IVF conception	<i>p</i> -value
Parity	Primipara	28	35	0.14
	Multipara	22	15	
Gestational duration	<37 weeks	7	20	0.00
	>/ = 37 weeks	43	30	

Table 3 shows that there was no statistical significance found in the incidence of obstetric complications like antepartum hemorrhage (APH), preeclampsia, gestational diabetes mellitus, preterm premature rupture of membrane (PPROM), intrapartum and postpartum hemorrhage and

requirement of blood transfusion. Mode of delivery was also compared between two groups and it was found that, the rate of lower segment cesarean section (LSCS) was significantly higher (64%) in IVF conception group than in spontaneous conception group (22%) as shown in Table 3 (*p*-value <0.01).

Table 3: Comparison of Obstetric Complications of Women Between Spontaneous Conception Group and IVF Conception Group

Variable	IVF conception group	Spontaneous conception group	Odds Ratio	95% CI	<i>p</i> -value
Antepartum hemorrhage	7 (14.0%)	3 (06.0%)	2.5	0.6-10.4	0.18
Preeclampsia	7 (14.0%)	6 (12.0%)	1.1	0.3-3.8	0.76
Gestational diabetes	12 (24.0%)	6 (12.0%)	2.3	0.7-6.7	0.11
PPROM	7 (14.0%)	4 (08.0%)	1.8	0.5-6.8	0.33
Postpartum hemorrhage	4 (08.0%)	5 (10.0%)	0.7	0.2-3.1	0.72
C-section delivery	32 (64.0%)	11 (22.0%)	6.3	2.6-15.2	0.00

The analysis of the birth weights of the newborn in two groups revealed that in spontaneous conception group, mean birth weight was 3030 gm (2260-3810 gm) with SD of 406 gm; while in IVF conception group, mean birth weight was <2623 gm (1076-3410 gm) with SD of 475 gm as shown in Table 4. This difference was found to be

statistically significant. (*p*-value <0.01) Same table also shows that the mean APGAR score at birth and at 5 minutes were also compared but there was no statistically significant difference found. NICU stay was also compared across both the groups which showed that it was significantly higher in the IVF conception group.

Table 4: Comparison of Neonatal Complications in Spontaneous Conception Group and IVF Conception Group

Variable	IVF conception group	Spontaneous conception group	Odds Ratio	95% CI	<i>p</i> -value
Birth weight less than 2500 g	17 (34.0%)	4 (08.0%)	5.9	1.8-119.2	0.00

Variable	IVF conception group	Spontaneous conception group	Odds Ratio	95% CI	p-value
Low APGAR score at birth	1 (02.0%)	0 (0.0%)	3.0	0.1-76.9	0.07
Low APGAR at 5 minutes	1 (02.0%)	0 (0.0%)	3.0	0.1-76.9	0.36
NICU stay required	16 (32.0%)	6 (12.0%)	3.4	1.2-9.7	0.01

Discussion

Mean maternal age was significantly higher in IVF conception group than in spontaneous conception group. Similar findings were obtained in another study conducted in Sweden.¹¹ Mohammed A.B.F also conducted a study which also showed that mean maternal age in IVF conception group was significantly higher than those of spontaneous conception group.¹⁶

In this study, proportion of primiparous women was more in IVF conception group than in spontaneous conception group (70% v/s 56%). In similar such studies proportion of primiparous women was significantly higher in IVF conception group than in the spontaneously conceived group (91% v/s 49.7% in Mohammed A.B.F, *et al.* and 91.7% v/s 49.6% in Vasario E, *et al.*)^{16,17}

The study reported that significantly higher rates of preterm birth occurred in IVF conception group (40%) than in the spontaneous conception group (14%). The main findings of a similar study in Sweden were that the rates of preterm births were higher in women who conceived through IVF (13.3%), than in the general population (6.0%).¹¹

Incidence of antepartum hemorrhage (APH) was higher in IVF conception group (14%) in our study than in spontaneous conception group (6%). Study by Reubinoff, *et al.*¹⁸ showed no significant difference. There was no significant difference found in the incidence of pre eclampsia which was similar to studies by Mohammed A.B.F, *et al.*¹⁶ and Reubinoff, *et al.*¹⁸ However contradictory results were seen in two studies of Tan, *et al.*¹⁹ and Tanbo, *et al.*²⁰ in which pregnancies in the two groups were not attended by the same obstetrics staff.

In our study we observed that the incidence of gestational diabetes mellitus (GDM) was twice in IVF group (24%) than in the spontaneous conception group (12%) while none of the other studies reported any significant difference in the rates of GDM between the two groups.^{17,18,21} The incidence of PPRM in this study was low in IVF conception group (14%) and spontaneous conception group

(8%). Zadori, *et al.*²¹ reported a higher rate of preterm premature rupture of membranes (PPROM) (36%) in IVF group and (35%) in spontaneous conception group. Mohammed A.B.F, *et al.*¹⁶ reported lower rates similar to our study (8.3% and 7.4%) in the two groups.

We found significantly higher rates of intra-partum hemorrhage and postpartum hemorrhage which was contradictory to the studies conducted by Mohammed A.B.F, *et al.* and Vasario, *et al.*^{16,17} in whom the difference was not significant. The rate of lower segment cesarean section (LSCS) was found significantly higher in IVF conception group which was similar to studies done by Baxi and Kaushal in 2008; Boulet, *et al.* in 2008; Suzuki and Myake in 2010.²²⁻²⁴ Medical complications during pregnancy are more in the IVF conception group owing to the fact that they belong to a higher age group of patients; this increases the need for operative interventions. However an uncomplicated IVF pregnancy is not an indication for cesarean section.

The mean birth weight of neonates in IVF conception group was (2623 gm) was significantly lower than in the spontaneous conception group (3030 gm) in this study. The proportion of low birth weight newborns in IVF conception group was 24%, while that in spontaneous conception group was 8%. However two studies by Mohammed A.B.F, *et al.* and Reubinoff, *et al.*^{16,18} observed no significant difference in the mean weight of newborn between IVF and spontaneous conception group.

Lastly the NICU admission rates and stay in NICU were compared between two groups. It was observed that both are significantly high in IVF conception group in our study. This was in agreement with a study conducted by Joy, *et al.*, Mohammed A.B.F, *et al.* and Vasario E, *et al.*^{16,17}

The differences reported in previous studies and not confirmed by this study or vice versa could be due to pitfalls in the patients' selection or due to differences in the protocol of antenatal care between groups. Large scale, multicentric, prospective epidemiological studies are need to investigate this further and to confirm long-term health consequences in assisted conception children.

Conclusion

In conclusion, the maternal age in IVF conception group was significantly higher than maternal age in spontaneous conception group. Significant association was found between gestational duration, mode of delivery, NICU admission requirement and stay with mode of conception. Association was also found between antepartum hemorrhage, preeclampsia, gestational diabetes mellitus, preterm premature rupture of membranes, postpartum hemorrhage with mode of conception. The odds of LSCS deliveries in IVF conception group were higher than in spontaneous conception group. But uncomplicated IVF pregnancy is not an indication of cesarean section. Similarly, odds of preterm delivery were higher in IVF conception group than in spontaneous conception group. Risk of low birth weight newborns in IVF conception group was higher than in spontaneous conception group, which was statistically significant. The risk low APGA score and requirement of NICU admission stay was higher in IVF conception group than in spontaneous conception group.

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