

The Outcome of pregnancies obtained after IVF compared to spontaneous pregnancies at the Gynecological Endoscopic Surgery and Human Reproductive Teaching Hospital (GESHRTH)

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Abstract

Background: With the advent of Assisted Reproduction Technology, management of infertility amongst couples has remarkably evolved. Despite this great leap, with an increase in the rate of fertilization, few pregnancies progress until birth. The objective of this study was to compare the evolution of pregnancies obtained after IVF to those obtained naturally.

Methodology: We carried out a descriptive cross-sectional study with retrospective and prospective data collection from August 1st, 2016 to April 30, 2019. Our study had two groups of pregnant women, the spontaneous pregnancy group and the post-IVF pregnancy group. Sampling was consecutive and exhaustive. Socio-demographic, clinical and para-clinical variables were collected. The Chi-square and Fischer's exact tests were used to compare variables. The odds ratio was calculated to determine associations between variables. A p value of < 0.05 was considered significant.

Results: A total of 350 pregnancies were included in the study which comprised of 250 spontaneous pregnancies and 100 pregnancies obtained after IVF. Women pregnant through IVF, had an increase in the probability of being; nulliparous (OR: 26.18; CI [11.20-61.22]; p=0.01), primiparous (OR: 1.8; CI [1.12-2.88]; p<0.01), having multiple pregnancies (OR: 4.95; CI [2.32-10.59]; p<0.01) and first trimester vaginal bleeding (OR: 16.72; CI [9.36-29.86]; p<0.01) as compared to spontaneous pregnancies. We also observed that IVF pregnancies were 3.31 times more likely to end in elective cesarean section at the time of delivery than spontaneous pregnancies (OR: 3.31; CI [1.95-5.70]; p<0.01). Some of the obstetric and neonatal complications we studied had a comparable risk between the two groups without statistical significance.

Conclusion: IVF pregnancies have a higher risk of bleeding and miscarriage in the first trimester with a higher probability in resulting to an elective cesarean section at the time of delivery compared to spontaneous pregnancies.

Introduction

Infertility amongst couples carries a significant psychosocial impact and is nowadays considered a global public health problem. In Central Europe, its prevalence varies from 10 to 15% [1]. In Central Africa, Cameroon alone has a prevalence of 20 to 30% [2,3]. The introduction of Assisted Reproduction Technology (ART) has greatly revolutionized the management of infertility amongst couples. However, despite the fact that there is a high fertilization rate with this procedure, few pregnancies progress until birth. The evolution of pregnancies resulting from ART is a current issue of concern. Many studies show an association between In Vitro Fertilization (IVF) and a significant risk of fetal, obstetric and neonatal complications. These are mainly bleeding and miscarriages in the first trimester, congenital

malformations, hypertensive disorders, and prematurity. The main objective of this study was to compare the evolution of pregnancies obtained after IVF to those obtained naturally.

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Methodology

We carried out a cross sectional, descriptive and analytical study with both retrospective and prospective data collection at the Gynaecological Endoscopic Surgery and Human Reproductive Teaching Hospital (GESHRTH). Our study extended over a period of 32 months. From August 1, 2016 to April 30, 2019. Sampling was consecutive and exhaustive after institutional authorization, and ethical committee approval to carry out the study. We had two groups of participants, the spontaneous pregnancy group and the post-IVF pregnancy group. All women who accepted to participate in the study signed a consent form. We included in our study, all patients who had a spontaneous pregnancy which was being followed up at the GESHRTH as well as all patients who had undergone an IVF procedure at the GESHRTH with a resultant pregnancy followed up at the GESHRTH or elsewhere. We excluded, all patients who had undergone IVF elsewhere as well as those whose information regarding the evolution of her pregnancy unknown.

Data collection

Data collection started by identifying patients who conceived spontaneously and where attending antenatal clinic at the GESHRTH as well as those who conceived after IVF by looking through the IVF and ANC register of the above institution. Collection of data was done with the use of a pre-tested, validated data sheet by consulting the patients' records and interview (one on one or by telephone) if additional information was needed. Information pertaining to the socio demographic characteristics of the patients, clinical and para-clinical data concerning evolution, complications and outcome of the pregnancy as well as the neonate were recorded. The sample size was calculated from a pilot study. The minimum number of patients needed was 100 post IVF pregnancies. One IVF pregnancy was matched to 2.5 spontaneous pregnancies, which gave a final sample size of 350 pregnancies.

Statistical analysis

The variables were compared using the Chi Square and Fischer's exact tests. The error threshold was set at 5% as statistically significant for each variable studied. The association between the variables was

made using the Odds Ratio expressed with its confidence interval at 95%. A p value of < 0.05 was considered statistically significant.

Results

A total of 350 pregnancies (250 spontaneous pregnancies and 100 IVF pregnancies) were included in the study. The average age of IVF pregnant women group was 37 ± 8 years, while that of women with spontaneous pregnancies was 31 ± 5 years. The majority of pregnant women in our study population were married with 57.1% (81% IVF pregnant women vs. 47.6% spontaneous pregnancy women) and worked in the public sector with 47.1% (55% of IVF pregnant women vs. 44% spontaneous pregnancy women).

Women pregnant through IVF had an increase in probability of being nulliparous (OR: 26.18; CI [11.20-61.22]; $p=0.01$) and primiparous (OR: 1.8; CI [1.12-2.88]; $p<0.01$) and Multiple pregnancies were more likely to occur after IVF than spontaneous pregnancies (OR: 4.95; CI [2.32-10.59]; $p<0.01$) as highlighted in Table 1.

The most common obstetric complication was vaginal bleeding in the first trimester that was 16.72 times more likely of occurring in IVF pregnant women than in spontaneous pregnant women (OR: 16.72; CI [9.36-29.86]; $p<0.01$). The IVF pregnancy had 18.42 odds of bleeding in the first Trimester as illustrated in Table 2. This vaginal bleeding was the most likely cause of early miscarriages observed in our study with risk of early miscarriage multiplied by 5.34 in the IVF pregnancy group as compared to the spontaneous pregnancy group (OR: 5.34; IC [2.68-11.06]; $p<0.01$) as well as the main reason for long prenatal hospitalizations as shown in Table 3.

The Outcome

We observed that IVF pregnancies were more likely to end in an elective cesarean section at the time of delivery as compared to spontaneous pregnancies (OR: 3.31; CI [1.95-5.70]; $p<0.01$). Some of the obstetric and neonatal complications we studied had a comparable risk between the two groups without statistical significance. These were mainly hypertensive disorders, gestational diabetes, placental insertion abnormalities, postpartum bleeding, prematurity, neonatal asphyxia, macrosomia and congenital malformations visible in these newborns.

Table 1. Obstetrical profile of participants and pregnancy characteristics

Variables		Total (%)	IVF N (%)	Spontaneous n (%)	OR [CI 95%]	P value
Gravity	1	91(26)	41(41)	50(20)	2.78[1.68-4.61]	<0.01
	≥ 2	259(74)	59(59)	200(80)	0.36[0.22-0.59]	<0.01
Parity	Nullipara	50(14.3)	43(43)	7(2.8)	26.18[11.20-61.22]	<0.01
	Primipara	136(38.9)	49(49)	87(34.8)	1.8[1.12-2.88]	0.014
	Multipara	164(46.9)	8(8)	156(62.4)	0.052[0.02-0.11]	<0.01
History of Pelvic surgery	Total	121(34.6)	59(59)	62(24.8)	4.36[2.67-7.12]	<0.01
	Myomectomy	39(11.1)	27(27)	12(4.8)	7.34[3.54-15.20]	<0.01
	Cœlioscopy	36(10.3)	27(27)	9(3.7)	9.90[4.46-22.11]	<0.01
	Salpingectomy	20(5.7)	14(14)	6(2.4)	6.62[2.47-17.78]	<0.01
	Polypectomy	6(1.7)	5(5)	1(0.4)	13.11[1.51-16.32]	0.003
	Appendicitis	8(2.3)	3(3)	5(2)	1.52[0.6-6.46]	0.572
Type of pregnancy	Single	319(91.1)	80(80)	239(95.6)	0.18[0.08-0.40]	<0.01
	Multiple	31(9.9)	20(20)	11(4.4)	4.95[2.32-10.59]	0.003
Localization of pregnancy	Intra uterine	347(99.1)	98(98)	249(99.6)	0.13[0.13-1.26]	0.390
	Extra-uterine	3(0.9)	2(2)	1(0.4)	5.08[1.04-5.96]	0.141
	Heterotopic	1(0.3)	1(1)	-	-	0.113

Table 2. Antenatal complications of participants

Variables	Total n (%)	IVF n (%)	Spontaneous n (%)	OR [CI 95%]	P value
Vaginal bleeding	92(42)	91(91)	56(22,4)	16,72[9,36-29,86]	<0,01
First trimester bleeding	86(93,5)	64(97)	22(85)	18,42[10,12-33,52]	0,01
Early Abortion	34(73,9)	31(91,2)	3(25)	5,34[2,68-11,06]	<0,01
Rupture of membranes	31(8,9)	4(4)			
Threatened preterm delivery	26(7,4)	4(4)	22(8,8)	0,43[0,15-1,28]	0,122
Gestational hypertension	15(4,3)	5(5)	10(4)	1,26[0,42-3,79]	0,676
Chronic Hypertension	9(2,6)	4(4)	5(2)	2,04[0,54-7,76]	0,286
Pre-eclampsia	6(1,7)	3(3)	3(1,2)	2,55[0,51-12,88]	0,241
Gestational Diabete	4(1,1)	2(2)	2(0,8)	2,53[0,35-18,21]	0,340
Placenta abruptio (RPH)	5(1,4)	-	5(2)	-	0,154
Placenta praevia	4(1,1)	1,2(3)	1(1,2)	0,85[0,83-8,09]	0,874
Placenta accreta	2(0,6)	-	2(0,8)	-	0,370
Hyperemesis gravidarum	5(1,4)	2(2)	3(1,2)	1,68[0,28-10,2]	0,569
Malaria	40(11,4)	5(5)	35(14)	0,32[0,12-0,85]	0,017
Vaginal infections	16(4,6)	1(1)	15(6)	0,16[0,21-1,21]	0,043
Urinary tract infection	15(4,3)	2(2)	13(5,2)	0,37[0,82-1,68]	0,182
Hospitalization in the 1 st Trimester	113(32,3)	99(99)	14(5,6)	16,7[16,5-28,63]	<0,01
Hospitalization in the 3 rd Trimester	72(20,6)	40(40)	32(12,8)	4,54[2,63-7,83]	<0,01

Table 3. Multivariate analysis with logistic regression

Outcome of pregnancies	Odds ratio	95% CI
Gravidity	0,44	0,24 – 0,80
Nulliparity	0,04	0,06 – 0,34
Primiparity	0,66	0,40 – 1,71
Past history of pelvic surgery	0,85	0,52 – 1,39
Multiple pregnancy	2,36	1,70 – 7,92
Vaginal bleeding in 1 st Trimester	1,92	1,02 – 4,14
Early abortion	2,22	2,04 – 8,71
Cesarean section delivery	2,41	1,10 – 5,28
Hospitalization	2,02	1,19 – 3,44

Discussion

Some studies found a higher proportion of nullipara women were undergoing IVF in comparison to that found in our study [4]. This discrepancy can be explained by the limited access to specialized structures in assisted reproductive technology (ART) in our context [5]. The obstetric profile of these patients could further explain the different maternal complications (i.e. hypertensive disorders, gestational diabetes etc.) and perinatal complications (membrane rupture, prematurity and congenital malformations) very often found in the literature, which is often associated with ART [6-8].

Concerning the proportion of multiple pregnancies, other authors found a higher incidence of multiple pregnancies with ART compared to that of our study [9]. This could be explained by the reduction in the number of embryos transferred per procedure or better still confirm the fact that with time, the incidence of multiple pregnancies is dropping [10]. The most common complication for women undergoing ART was vaginal bleeding in our study; this finding has been corroborated by many authors throughout literature [4,11,12]. However, this complication is not specific to ART; it is common to pregnant women above 35 years of age regardless of the mode of conception [13]. Regarding the outcome of pregnancies, similar studies agree that most pregnancies gotten through IVF are more likely to end in a caesarian section [9,11,14]. This could be explained by the fact that most women who undergo ART are anxious about the outcome of their pregnancy [15] and as such are more likely to opt for the mode of delivery with less neonatal complications.

In conclusion, our studies show that IVF pregnancies have a higher risk of bleeding and miscarriage in the first trimester. In addition, they are more likely to end in a caesarian section.

Disclosure of interest

The authors report no conflict of interest.

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