

STUDY ON DETERMINANTS OF SUCCESSFUL OUTCOME IN ICSI PREGNANCIES IN A TERTIARY CARE CENTRE

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ABSTRACT

Objectives: A descriptive study was done at the government medical college in Thiruvananthapuram to find out the determinants of the successful outcome of intracytoplasmic sperm injection (ICSI) pregnancies.

Methods: The study was done on 60 ART-conceived patients who underwent ICSI and became positive for pregnancy during 1 year. Their pregnancy was followed up, and data was collected in a structured proforma about determinants of successful outcomes.

Results: Out of 60 *in vitro* fertilization (IVF)-conceived subjects (n=60), the maximum age group (40%) that underwent IVF treatment was between 31 and 35 years old, and they belonged to an upper-lower socio-economic status. 45% of patients had a normal body mass index, 46.7% were overweight, and 8.3% were obese. 73.3% were nulliparas. 78.3% had primary infertility, and 21.1% had secondary infertility. The prevalence of male infertility was 6.7%, and female infertility was 81.7%. 81.1% had regular menstrual cycles. 8.3% of patients had medical disorders, and 48% of patients had previous surgeries like polypectomy, polycystic ovarian drilling, and laparoscopy for endometriosis. 71.7% were given the GnRH antagonist stimulation protocol for 8–12 days, and 11–15 eggs were obtained in 66.7% of the patients. 91.7% of frozen embryos were transferred.

Conclusion: The success of an ICSI pregnancy is determined by the younger age of the female partner, female factor infertility, antagonist stimulation protocol, and the transfer of a frozen embryo.

Keywords: Age, Body mass index, Female factor infertility, Fresh embryo transfer, Intra cytoplasmic sperm injection.

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INTRODUCTION

Infertility can be defined as the incapacity to achieve pregnancy after a reasonable period of sexual intercourse for 1 year without contraception [1]. Available data indicate that at least 50 million couples worldwide experience infertility. According to the World Health Organization, the overall prevalence of infertility in India is 3.9–16.8% [2]. According to Indian society of assisted reproduction, infertility currently affects about 10–14% of the Indian population, with higher rates in urban areas where one out of six couples is affected. The causes of infertility can be mainly divided into male factors, female factors and unexplained factors [3]. Assisted reproductive technology includes all techniques involving the direct manipulation of oocytes and embryos outside the body. ART includes *in vitro* fertilization (IVF), intracytoplasmic sperm injection (ICSI), gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT), cryopreserved embryo transfer, and the use of donor oocytes. IVF and ICSI have a higher success rate than GIFT and ZIFT. IVF involves a sequence of highly coordinated steps, beginning with controlled ovarian hyperstimulation with exogenous gonadotropins, followed by oocyte retrieval under TVS guidance, fertilization in the laboratory, and transcervical transfer of embryos into the uterus. The ART process consists of prevention of premature LH surge, follicular tracking and trigger, oocyte retrieval, fertilization, luteal phase support, endometrial preparation for embryo transfer, fresh or frozen embryo transfer, and first trimester monitoring [4].

METHODS

This was a descriptive study done in patients who underwent IVF and became urine pregnancy test positive in Government Medical College Thiruvananthapuram over a period of 1 year after obtaining institutional

ethical committee clearance (HEC No. 01/16/2018/MCT). Those patients who were taking ART treatment but conceived spontaneously were excluded. A structured proforma to enter the details of the patient and their pregnancy outcome was given. The variables studied were age, body mass index (BMI), type of infertility, gravidity, medical disorders and previous surgeries, stimulation protocol, number of days of stimulation given, and fresh or frozen embryos. The sample size was 60. Outcome variables were expressed as proportions and compared with similar studies.

RESULTS

As shown in Table 1, out of 60 IVF-conceived subjects (n=60), the maximum age group (40%) that underwent IVF treatment was between 31 and 35 years old, and they belonged to an upper-lower socio-economic status. 45% of patients had a normal BMI, 46.7% were overweight, and 8.3% were obese. 73.3% were nulliparas. 78.3% had primary infertility, and 21.1% had secondary infertility. The prevalence of male infertility was 6.7%, and female infertility was 81.7%. 81.1% had regular menstrual cycles. 8.3% of patients had medical disorders, and 48% of patients had previous surgeries like polypectomy, PCO drilling, and laparoscopy for endometriosis. 71.7% were given the GnRH antagonist stimulation protocol for 8–12 days, and 11–15 eggs were obtained in 66.7% of the patients. 91.7% of frozen embryos were transferred.

DISCUSSION

Around 1.7% of patients conceived by IVF were between 22 and 25 years of age, 31.7% were between 26 and 30, the major group was between 31 and 35, that is, 40%, 23.3% between 36 and 40 years, and 3.3% between 41 and 45 years. The mean age of people who

Table 1: Determinants of successful outcome in ICSI pregnancies

Variables					
Age	20-25	26-30	31-35	36-40	41-45
	1 (1.7)	19 (31.7)	24 (40)	14 (23.3)	2 (3.3)
Socioeconomic status	Upper middle	Upper lower	Lower		
	6 (10)	30 (50)	24 (40)		
Body mass index	Normal	Over weight	Obese		
	27 (45)	28 (46.7)	59 (8.3)		
Gravidity	Nullipara	Gravida 2	Gravida 3	Gravida 4	
	47	8	4	1	
Type of infertility	Primary	Secondary			
	47 (78.3)	13 (21.7)			
	Female	Male	Combined		
	37 (61.7)	10 (16.7)	13 (21.7)		
	Tubal factor	Poor ovarian reserve	PCOS	Endometriosis	Unexplained
	9 (23)	17 (46)	7 (20)	3 (9)	1 (2)
Stimulation protocol	GNRH antagonist	GNRH agonist			
	43 (71.7)	17 (28.3)			
No of embryos transferred	One	Two	Three		
	44 (73)	13 (15)	3 (3)		
Fresh/frozen embryo	Frozen	Fresh			
	55 (91.7)	5 (8.3)			

ICSI: Intra cytoplasmic sperm injection

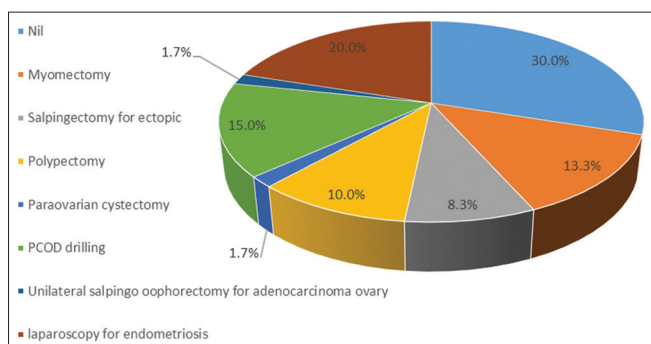


Fig. 1: Surgery

underwent IVF is 32.6, with a standard deviation of 4.5. Major group who got conceived by IVF was between 31 and 35 irrespective of the fact that fertility rate decreases with age is because, majority subjects who reported for IVF treatment was between the age group of 30-40 years. From the present study, it is understood that the chance of getting conceived by IVF decreases as age advances. The decrease was related to a reduction in oocyte production and probably due to reduced implantation. A study by Lawrence *et al.* in 2005 said that the cumulative pregnancy rates can be increased by increasing the number of IVF cycles, irrespective of age [5]. Cumulative clinical pregnancy rates after three cycles were 75.5%, 56.5%, 53.0%, and 32.1% for women aged <30, 30-34, 35-39, and ≥40 years, respectively. 45% of patients had a normal BMI, 46.7% were overweight, and 8.3% were obese. The mean BMI was 19.9, with a standard deviation of 2.32. Rittenberg *et al.* analyzed 33 reports consisting of 47,967 treatment cycles, and they found that women who were overweight or obese had significantly decreased clinical pregnancy and live birth rates and significantly higher miscarriage rates than women with a normal BMI [6]. 78.3% of patients were nulliparous, 13% had second gravida, 6% were third gravida, and 1.7% had fourth gravida. 78.3% of patients had primary infertility, and 21.7% had secondary infertility. 61% had only female factor infertility, 17% had male factor infertility, and 22% had combined infertility, out of which 23% of patients with female infertility had tubal causes, 46% had poor ovarian reserve, 20% had pcos, 9% had endometriosis, and 2% had an unexplained cause. This inference was supported by a study done in Kashmir. The etiology of infertility in 250 consecutive couples revealed a female factor in 57.6%, a male factor in 22.4%, and combined factors in 5.2% [7]. In the present study, there was no significant difference between the ART

group and the comparative group for medical disorders ($p=0.464$). 8.3% of patients had medical disorders, of which the most common was hypothyroidism. The other cause was metabolic syndrome associated with obesity and anovulation. As shown in Fig. 1, 70% of patients had undergone surgery, out of which 20% had laparoscopy for endometriosis, 15% had polycystic ovarian disease (PCOD) drilling, 13.3% underwent myomectomy, 8.3% underwent salpingectomy for ectopic pregnancy, 1.7% underwent paraovarian cystectomy, and 1.7% underwent salpingo oophorectomy for adenocarcinoma ovary. Regarding stimulation protocol, 71.7% were given antagonist protocol and 17% were given agonist protocol. About 98.3% of patients were given stimulation for a range of 8 to 11 days; 1.7% were given stimulation for 12 days. RCT by Femke *et al.* said a fixed dose (150 IU/day) of rFSH was used for ovarian stimulation, and GnRH antagonist cotreatment was initiated on the day when the leading follicle reached 14 mm in diameter, and the stimulation was continued for 7-12 days [8]. In a meta-analysis done by Dunhua *et al.* said, GnRH-ant protocols resulted in a statistically significantly lower duration of stimulation compared with GnRH-a protocols, but there was no significant difference in the number of oocytes retrieved, cycle cancellation rate, or clinical pregnancy rate [9]. One embryo was transferred in 73% of cases, two in 22%, and three in 5% of cases [10]. About 91.7% of frozen embryos were transferred, and 8.3% of fresh embryos were transferred. The current study found that 91.7% of frozen embryos were transferred and 8.3% of fresh embryos were transferred. Frozen embryo transfer is preferred over fresh embryo transfer because the clinical pregnancy rate and perinatal outcome were found to be better [11]. The above observation was consistent with the study by Maheswari *et al.* said, singleton pregnancies after the transfer of frozen-thawed embryos were associated with better perinatal outcomes compared with those after fresh IVF embryos [12].

CONCLUSION

Successful conception following ICSI depends upon age, BMI, cause of infertility, stimulation protocol, and frozen embryo transfer. Success rate was higher when age was <35 years. We could not find any significant difference in outcome between the normal BMI group and the overweight group. Female factor infertility was more than male factor infertility, and unexplained causes of poor ovarian reserve were the most common contributing cause. Frozen embryo transfers had a higher success rate. Delaying the transfer process, as in the frozen cycle, was found to improve endometrial receptivity since the hormonal environment is more similar to a pregnancy conceived without infertility treatment.

CONFLICTS OF INTEREST

Nil.

AUTHORS' CONTRIBUTION

1. Devika Vijayan: Sample collection
2. Prema Nalligounder: Preparation of manuscript
3. Reji Mohan: Designing the study
4. Sheila Balakrishnan: Designing the study

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