

# Pregnancy outcomes among women who conceived with assisted reproductive technology (ART)

## Introduction

- Assisted reproductive technology(ART) refers to all procedures that deal with oocytes, sperms, and embryos for the purpose of treating infertility. This includes IVF(In Vitro Fertilization) and ET(Embryo Transfer), ICSI(Intracytoplasmic Sperm Injection), PGT(Preimplantation Genetic Testing), GIFT(Gamete Intrafallopian Transfer), ZIFT(Zygote Intrafallopian Transfer) but does not include IUI(Intrauterine Insemination) and superovulation drug therapy. In 2020, more than 20,000 newborns were born with ART technology in Korea, accounting for approximately 8% of annual births. Despite the success of ART, as the frequency of ART increases, the maternal and infant outcome is emerging as an important issue. A broad understanding of the pregnancy outcome of ART is necessary for accurate counseling and appropriate prenatal management for infertile couples.

## Objective

- The aim of this study was to investigate the prevalence of adverse pregnancy outcomes among women undergoing assisted reproductive technology(ART).

## Materials and methods

- This was a retrospective cohort of 3,829 women who gave live birth at our institution from January 2020 to December 2021 at the Department of Obstetrics and Gynecology, CHA Gangnam Medical Center, CHA univer. ART included fresh embryo transfer, thawing embryo transfer and intrauterine insemination methods.

## Results

Table 1. Natural pregnancy and ART: Characteristics

	Natural pregnancy (2429, 63.4%)	ART (1400, 36.6%)	p-value
Age	34.44	36.43	<0.001
Gestational age	37.86	37.35	0.261
Neonatal weight	3073	2864	<0.001

Table 2. Incidence of Pregnancy outcome

	Natural pregnancy (2429)	ART (1400)	p-value
Advanced maternal age	1137(46.8%)	1003(71.6%)	<0.001
Multiple pregnancy	39(1.6%)	280(20%)	<0.001
Cesarean section	1722(70.9%)	1184(84.6%)	<0.001
Preterm delivery	200(8.2%)	236(16.9%)	<0.001
PROM	567(23.35%)	223(15.9%)	
Placenta previa	39(1.6%)	60(4.3%)	<0.001
Placenta accrete	157(6.5%)	79(5.6%)	0.309
Placenta abruption	5(0.2%)	7(0.5%)	0.117
Postpartum hemorrhage	14(0.6%)	(0.6%)	0.798
Uterine atony	46(1.9%)	40(2.9%)	0.053
GDM	167(6.9%)	123(8.8%)	0.031
HTN disorder	59(2.4%)	76(5.4%)	<0.001

Table 3. Risks of Pregnancy outcome of ART use compared with natural pregnancy

	OR	CI	p-value
Cesarean section	2.25	1.90-2.67	<0.001
Preterm delivery	2.23	1.85-2.76	<0.001
Placenta previa	2.74	1.82-4.13	<0.001
GDM	1.31	1.02-1.66	0.03
HTN disorder	2.31	1.63-3.26	<0.001

Table 4. Risks of Pregnancy outcome of ART use compared with natural pregnancy, adjusting maternal age and multiple pregnancy

	Adjusted OR	CI	p-value
Cesarean section	1.70	1.43-2.04	<0.001
Preterm delivery	1.02	0.80-1.32	0.853
Placenta previa	2.78	1.81-4.28	<0.001
GDM	1.18	0.91-1.54	0.207
HTN disorder	1.59	1.01-2.36	<0.001

- The participants included 2,429 (63.4%) pregnant women conceived naturally and 1,400 (36.6%) pregnant women after ART.

- It was demonstrated that women using ART were more likely to develop adverse pregnancy outcome during pregnancy.
- The ART group had a higher proportion of advanced maternal age (71.6% vs 46.8%,  $p<0.001$ ), multiple pregnancy (20% vs 1.6%,  $p<0.001$ ) and cesarean section (84.6% vs 70.9%,  $p<0.001$ ).
- In the ART group, Placenta abruption (0.2% vs 0.5%,  $p=0.117$ ), Uterine atony (1.9% vs 2.9%,  $p=0.053$ ) and gestational diabetes mellitus (6.9% vs 8.8%,  $p=0.031$ ) were higher proportion than natural pregnancy. However, there was no statistically significant difference in the incidence of outcome between the two groups.

- ART group experienced higher risk of hypertensive disorder (OR = 2.31, CI 1.63-3.26;  $p<0.001$ ), gestational diabetes mellitus (OR 1.31, CI 1.02-1.66,  $p=0.03$ ), preterm delivery (OR=2.26, CI 1.85-2.76;  $p<0.001$ ), and placenta previa (OR 2.74, CI 1.82-4.13;  $p<0.001$ ).

- After adjusting advanced maternal age and multiple pregnancy, ART group was associated with an increased risk of hypertensive disorder (adjusted OR = 1.59, CI 1.01-2.36;  $p<0.001$ ), and placenta previa (adjusted OR 2.78, CI 1.81-4.28;  $p<0.001$ ).

## Conclusions

The risk of hypertensive disorder and placenta previa was significantly higher in pregnant women after ART. Our findings in this study provide useful information to clinicians in prenatal care of women who conceived with ART.