

International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Maternal Morbidity and Obstetric Outcomes in Pregnancies Conceived Through IVF and ICSI: A Prospective Observational Study at a Tertiary Care Centre in Western Rajasthan

Dr Himanshi[1], Dr Ranjana Desai[2], Dr Mamta Damor[3], Dr Aanchal Goyal[1]

[1]Postgraduate Student, Department of Obstetrics and Gynaecology, Dr.S.N. Medical College, Jodhpur
[2]Senior Professor, Department of Obstetrics and Gynaecology, Dr.S.N. Medical College, Jodhpur
[3]Senior Resident, Department of Obstetrics and Gynaecology, Dr.S.N. Medical College, Jodhpur

OPEN ACCESS

Corresponding Author:

Dr Himanshi
Postgraduate Student, Department of Obstetrics and Gynaecology, Dr.S.N. Medical College, Jodhpur, Rajasthan, India.
Email: himanshich737@gmail.com

Received: 04-05-2026
Accepted: 28-05-2026
Available online: 30-06-2026

Copyright © *International Journal of Medical and Pharmaceutical Research*

ABSTRACT

Background: Pregnancies conceived through assisted reproductive technology (ART) frequently coexist with advanced maternal age, obesity, prolonged infertility and multifetal gestation. Region-specific prospective data on maternal morbidity after in vitro fertilisation (IVF) and intracytoplasmic sperm injection (ICSI) remain limited.

Methods: Thirty consecutive women with pregnancies conceived by higher ART were followed prospectively through delivery at a tertiary referral hospital in Jodhpur. Although IVF, ICSI, GIFT and ZIFT were eligible under the approved protocol, only IVF (n=17) and ICSI (n=13) cases occurred. Antenatal morbidity, gestational age, delivery mode, postpartum complications, critical-care admission, near miss and mortality were described.

Results: Twenty-two women (73.3%) had at least one antenatal complication. Among these 22, hypertensive disorders alone occurred in 9 (40.9%), gestational diabetes alone in 3 (13.6%), and both in 4 (18.2%). Twenty-one pregnancies (70.0%) ended preterm. Caesarean delivery occurred in 27 (90.0%), including 17 emergency and 10 elective procedures. Eight women (26.7%) were classified as maternal near miss; 2 (6.7%) required ICU admission and 6 (20.0%) received HDU care. Three women (10.0%) had postpartum haemorrhage. No maternal death occurred.

Conclusion: This small tertiary-centre cohort demonstrated a high burden of antenatal morbidity, preterm birth, caesarean delivery and critical-care use after IVF/ICSI conception. The results support early high-risk registration and coordinated obstetric care, but should not be interpreted as risks attributable to ART because there was no unassisted-conception comparator.

Keywords: assisted reproductive technology; in vitro fertilisation; intracytoplasmic sperm injection; maternal morbidity; pregnancy outcome.

INTRODUCTION

Infertility affects approximately one in six adults worldwide and has major reproductive, psychological and financial consequences.[1] Assisted reproductive technology (ART), defined by handling of oocytes or embryos outside the body, has enabled conception for many couples with otherwise limited options.[2] IVF and ICSI now account for most higher-technology procedures; GIFT and ZIFT are rarely encountered in contemporary practice.

Pregnancy after ART is often approached as high risk. The observed excess of hypertensive disorders, gestational diabetes, placenta-related complications, preterm birth and operative delivery reflects a complex mixture of treatment-related factors and the characteristics that led to infertility, including older age, obesity, endocrine disease and multifetal gestation.[3-14] Systematic reviews have reported higher obstetric risk even among ART singletons, but residual confounding remains

important.[15,16] ART is also associated with hypertensive disorders, particularly in some frozen-transfer or donor-oocyte settings,[17] while a meta-analysis reported increased gestational diabetes risk after ART.[18]

Indian tertiary centres care for an especially heterogeneous group: some women receive planned antenatal follow-up, whereas others conceive at external fertility centres and present late or after a complication. This referral pattern can intensify apparent morbidity and makes local prospective documentation useful for service planning. We therefore described antenatal complications, timing and mode of delivery, postpartum morbidity, critical-care utilisation, maternal near miss and mortality among IVF- and ICSI-conceived pregnancies managed at a tertiary centre in western Rajasthan.

OBJECTIVE

To describe maternal morbidity and obstetric outcomes among pregnancies conceived through IVF or ICSI and managed through delivery at a tertiary-care centre in western Rajasthan.

MATERIALS AND METHODS

This prospective observational cohort study was conducted in the Department of Obstetrics and Gynaecology, Umaid Hospital, Dr.S.N. Medical College, Jodhpur, a tertiary referral centre in western Rajasthan. Recruitment began after institutional ethics approval and continued until the prespecified sample of 30 women was attained. Reporting was planned in accordance with the STROBE statement.[19]

Women with primary or secondary infertility who conceived through a higher assisted reproductive technique, were booked after the first trimester or presented late in pregnancy, and could be followed through delivery were eligible. Conceptions following oral ovulation induction alone or intrauterine insemination, refusal of consent and loss to follow-up were excluded. The research committee-approved protocol named IVF, ICSI, gamete intrafallopian transfer (GIFT) and zygote intrafallopian transfer (ZIFT); however, no GIFT or ZIFT pregnancy presented during sampling. The observed cohort therefore comprised 17 IVF and 13 ICSI pregnancies.

Consecutive eligible participants were enrolled after written informed consent. Information was recorded prospectively using a structured proforma covering sociodemographic characteristics, infertility history, ART modality, obstetric history, antenatal complications, gestational age and mode of delivery, maternal disposition and complications, and neonatal outcomes. Hypertensive disorders and gestational diabetes were diagnosed from clinical records using institutional criteria. Preterm birth was delivery before 37 completed weeks. Maternal near miss denoted a life-threatening complication requiring advanced intervention or critical care.

Categorical variables were summarised as counts and percentages and continuous variables as mean with standard deviation or median with interquartile range, as appropriate. Denominators are stated for neonatal outcomes. The small cohort and lack of a spontaneous-conception comparison group made the present analysis descriptive; no causal or equivalence inference was attempted. Data were coded in Microsoft Excel and analysed using IBM SPSS Statistics version 29.0, with verification in Python 3.x.

The Institutional Ethics Committee of Dr.S.N. Medical College, Jodhpur approved the study. Written informed consent was obtained, identifiers were replaced by subject codes, and the study followed the Declaration of Helsinki.[20]

RESULTS

Thirty women were enrolled; 17 (56.7%) conceived by IVF and 13 (43.3%) by ICSI. No GIFT or ZIFT pregnancy occurred. Mean maternal age was 33.10 ± 6.40 years (range 24–49); 9 women (30.0%) were older than 35 years. Twenty (66.7%) were primigravidae. Pre-delivery BMI was normal in 9 (30.0%), overweight in 12 (40.0%) and obese in 9 (30.0%). Eighteen women (60.0%) were booked at the study institution after the first trimester, while 12 (40.0%) were unbooked or arrived at term.

Table 1: Baseline maternal and treatment characteristics

Characteristic	n (%)
Maternal age >35 years	9 (30.0)
Primigravida	20 (66.7)
Overweight BMI 25–29.9 kg/m²	12 (40.0)
Obese BMI ≥30 kg/m²	9 (30.0)
Booked at study institution	18 (60.0)
IVF conception	17 (56.7)
ICSI conception	13 (43.3)

Twin pregnancy	12 (40.0)

Twenty-two women (73.3%) developed at least one antenatal complication. Within this affected subgroup, hypertensive disorders without recorded GDM were most frequent (9/22, 40.9%), followed by combined hypertensive disorder and GDM (4/22, 18.2%) and isolated GDM (3/22, 13.6%). Anaemia occurred in 1/22 (4.5%); the remaining five women (22.7%) had other conditions, including thyroid dysfunction, intrahepatic cholestasis or depression. Percentages in this distribution use 22 affected women as denominator and must not be interpreted as percentages of all 30 participants.

Table 2: Antenatal morbidity among women with at least one complication n equals 22

Recorded morbidity pattern	n	%
Hypertensive disorder of pregnancy alone	9	40.9
Gestational diabetes mellitus alone	3	13.6
Hypertensive disorder plus gestational diabetes	4	18.2
Anaemia	1	4.5
Other recorded conditions	5	22.7

The categories are mutually exclusive summary categories among the 22 affected women.

Twenty-one pregnancies (70.0%) delivered before 37 weeks and 9 (30.0%) at term. Nineteen women delivered in the late-preterm period, one very preterm and one before 28 weeks. Caesarean section was performed in 27 women (90.0%): 17 emergency (56.7% of the entire cohort; 63.0% of caesareans) and 10 elective (33.3% of the cohort; 37.0% of caesareans). Three women (10.0%) delivered vaginally.

Table 3: Delivery and maternal outcomes n equals 30

Outcome	n	%
Preterm delivery <37 weeks	21	70.0
Term delivery	9	30.0
Caesarean delivery overall	27	90.0
Emergency caesarean	17	56.7
Elective caesarean	10	33.3
Vaginal delivery	3	10.0
Maternal near miss	8	26.7
ICU admission	2	6.7
HDU admission	6	20.0
Postpartum haemorrhage	3	10.0
Blood product transfusion	1	3.3
Ventilatory support	2	6.7
Maternal death	0	0.0

Emergency and elective caesarean percentages use all 30 women as denominator; together they constitute the 27 caesareans.

Eight women (26.7%) were classified as maternal near miss in the study records. Of these, 2 women (6.7% of the cohort) required ICU admission and 6 (20.0%) received HDU care. The ICU cases included a woman with previous caesarean delivery and adherent placenta who developed severe atonic postpartum haemorrhage requiring Bakri balloon tamponade, transfusion and vasopressor support, and another woman with severe pre-eclampsia complicated by intrahepatic cholestasis of pregnancy. Postpartum haemorrhage occurred in three women. There were no maternal deaths.

DISCUSSION

The principal finding was the concentration of maternal morbidity in this small IVF/ICSI cohort: nearly three quarters had an antenatal complication, seven in ten delivered preterm, nine in ten underwent caesarean delivery and more than one quarter required ICU or HDU care. These figures describe the caseload of a tertiary referral hospital and should not be read as population-level incidence or as proof that ART caused each outcome.

Hypertensive disorders dominated the antenatal morbidity profile. This is consistent with meta-analytic evidence linking ART with hypertensive disorders, although risk differs by treatment characteristics and patient factors.[17] In the present cohort, 70% of women were overweight or obese, 30% were older than 35 years and 40% carried twins. Each characteristic can independently increase vascular and metabolic risk. The observed coexistence of hypertension and GDM in four

affected women reinforces the need for early blood-pressure and glycaemic surveillance rather than attributing morbidity solely to the fertilisation technique. Evidence also supports an increased GDM risk in ART pregnancies, particularly in selected IVF and fresh-transfer groups.[18]

The 70% preterm-delivery rate is striking but biologically and clinically plausible in a referral cohort with 40% twin gestation and substantial hypertensive disease. Previous systematic reviews have shown excess preterm birth among IVF/ICSI singletons,[15,16] while multiple gestation further increases risk.[21] However, without a comparator and without cross-tabulation of preterm birth by plurality, our study cannot separate the contribution of ART, underlying infertility, maternal comorbidity, medically indicated delivery and twins.

The caesarean rate of 90% reflects both clinical complexity and decision-making around pregnancies perceived as precious after prolonged infertility. Prior cohort evidence has reported higher operative delivery after ART.[22] In this study, emergency procedures exceeded elective procedures, indicating that the high rate was not explained only by pre-planned maternal request. Clear counselling is important: ART conception alone is not an indication for caesarean birth, yet malpresentation in twins, fetal compromise, prior uterine surgery and severe maternal disease may appropriately lower the threshold for intervention.

The eight maternal near-miss events, including two ICU admissions and six HDU admissions, reveal clinically important morbidity despite zero maternal mortality. Postpartum haemorrhage affected one in ten women, including a severe case with adherent placenta. Large administrative and cohort studies have similarly drawn attention to severe maternal morbidity among women conceiving with infertility treatment, while emphasising the importance of age, BMI, plurality and baseline disease.[23] The absence of maternal mortality in this cohort occurred in the context of prompt multidisciplinary management and timely escalation through intra- and interdepartmental referrals. Planned delivery at a facility with blood-bank, anaesthesia, critical-care and neonatal support is therefore reasonable for women with accumulated risk factors.

Strengths and Limitations

Prospective data collection, complete follow-up through delivery, and reporting of critical-care and maternal near-miss outcomes are strengths. Prompt multidisciplinary action, supported by timely intradepartmental and interdepartmental referrals and coordinated obstetric, anaesthesia, critical-care, transfusion and neonatal services, was an additional strength of clinical care in this cohort. Limitations include the small sample, single-centre referral setting, absence of an unassisted-conception comparison group, 40% late or unbooked presentation, and lack of information on embryo-transfer protocol, fresh versus frozen transfer, donor gametes and infertility-centre practices. The study was not powered for IVF-ICSI comparisons or multivariable adjustment. Some morbidity categories were recorded as composite patterns, so their denominator has been made explicit.

CONCLUSION

Pregnancies conceived through IVF or ICSI and managed at this tertiary centre showed substantial antenatal morbidity, preterm delivery, caesarean birth and critical-care use, although no maternal death occurred. Early registration, systematic screening for hypertensive and metabolic disease, attention to multifetal gestation, and multidisciplinary delivery planning are warranted. Larger comparative cohorts are needed to quantify the independent contribution of ART and specific treatment protocols.

ACKNOWLEDGEMENT

The authors thank the faculty and staff of the Department of Obstetrics and Gynaecology, Umaid Hospital and Dr.S.N. Medical College, Jodhpur, and all women and families who participated in the study. The authors gratefully acknowledge Dr Shailendra Vashistha and the VAssist Research Team (www.thevassist.com) for assistance with scientific manuscript preparation and submission support.

CONFLICT OF INTEREST: None declared.

SOURCE OF FUNDING: Nil.

REFERENCES

1. World Health Organization. Infertility prevalence estimates, 1990–2021. Geneva: World Health Organization; 2023.
2. Zegers-Hochschild F, Adamson GD, Dyer S, Racowsky C, de Mouzon J, Sokol R, et al. The International Glossary on Infertility and Fertility Care, 2017. Fertil Steril. 2017;108(3):393–406. doi:10.1016/j.fertnstert.2017.06.005.
3. Tamanna, Meena K, Meena M. Prevalence of abruptio placentae among women with preeclampsia in a tertiary care institute and its fetomaternal outcomes. Int J Med Pharm Res. 2026 Mar;7(2):1101-5.
4. Meena SK, Meena N, Trivedi S, Agarwal M. Fetomaternal outcome in preeclampsia and eclampsia in third trimester. Int J Med Pharm Res. 2026 Mar;7(2):3491-7.

5. Nandwana D, Khan A, Bhati A, Sushma. serum lactate dehydrogenase level biomarkers for severity and outcome in preeclampsia and eclampsia. Int J Med Pharm Res. 2026 May;7(3):3518-23.
6. Tiwary N, Meena K, Gupta K, Baig SA. Maternal and perinatal outcomes in women with PCOS receiving metformin during pregnancy: A clinical observational study. Biomed Biopharm Res. 2025;22(1):1077–82.
7. Tiwary N, Kansal D. Pregnancy outcomes of metformin use in pregnant women with PCOS: A comparative study. Biomed Biopharm Res. 2025;22(2):878–84.
8. Choudhary N, Kom TT, Khuman V, Singh LBC, Sharma P, Kumar P. Maternal outcomes in pregnant women with subclinical hypothyroidism: An observational cohort study at a tertiary care hospital in Northeast India. Int J Med Pharm Res. 2025;6(6):1619-24.
9. Kumari P, Rawat RP, Meena S. Perinatal outcomes in twin pregnancies: A prospective observational study at a tertiary care centre. Int J Med Pharm Res. 2025 Sep;6(5):2139-41.
10. Kumari P, Rawat RP, Meena S. Gestational age at delivery and perinatal mortality in twin pregnancies: A prospective cohort study. Int J Med Pharm Res. 2025 Sep;6(5):2142-4.
11. Kumari P, Sharma S, Meena K, Rawat RP. Study of maternal outcomes in twin pregnancies: A prospective observational study at a tertiary care centre. Int J Med Pharm Res. 2025;6(6):2255-9.
12. Gurjar D, Kumari P, Devi T, Rawat RP. Perinatal outcome in twin pregnancies: vaginal delivery versus caesarean section – A prospective observational study at a tertiary care centre. Int J Med Pharm Res. 2025 Nov;6(6):2043-7.
13. Kumari P, Maurya M, Sharma S, Rawat RP. Association of chorionicity with perinatal mortality in twin pregnancies: A prospective observational study at a tertiary care centre. Int J Med Pharm Res. 2025;6(6):2260-3.
14. Devi T, Kumari P, Gurjar D, Rawat RP. Effect of birth weight on perinatal mortality in twin pregnancies: A prospective observational study at a tertiary care centre. Int J Med Pharm Res. 2026 Jan;7(1):1-4.
15. Pandey S, Shetty A, Hamilton M, Bhattacharya S, Maheshwari A. Obstetric and perinatal outcomes in singleton pregnancies resulting from IVF/ICSI: a systematic review and meta-analysis. Hum Reprod Update. 2012;18(5):485–503. doi:10.1093/humupd/dms018.
16. Qin J, Liu X, Sheng X, Wang H, Gao S. Assisted reproductive technology and the risk of pregnancy-related complications and adverse pregnancy outcomes in singleton pregnancies: a meta-analysis of cohort studies. Fertil Steril. 2016;105(1):73–85.e1-6. doi:10.1016/j.fertnstert.2015.09.007.
17. Chih HJ, Elias FTS, Gaudet L, Velez MP. Assisted reproductive technology and hypertensive disorders of pregnancy: systematic review and meta-analyses. BMC Pregnancy Childbirth. 2021;21:449. doi:10.1186/s12884-021-03938-8.
18. Bosdou JK, Anagnostis P, Goulis DG, Lainas GT, Tarlatzis BC, Grimbizis GF, et al. Risk of gestational diabetes mellitus in women achieving singleton pregnancy spontaneously or after ART: a systematic review and meta-analysis. Hum Reprod Update. 2020;26(4):514–44. doi:10.1093/humupd/dmaa009.
19. von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology statement. Lancet. 2007;370(9596):1453–7. doi:10.1016/S0140-6736(07)61602-X.
20. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA. 2013;310(20):2191–4. doi:10.1001/jama.2013.281053.
21. Qin J, Wang H, Sheng X, Liang D, Tan H, Xia J. Pregnancy-related complications and adverse pregnancy outcomes in multiple pregnancies resulting from assisted reproductive technology: a meta-analysis of cohort studies. Fertil Steril. 2015;103(6):1492–1508.e1-7. doi:10.1016/j.fertnstert.2015.03.018.
22. Shevell T, Malone FD, Vidaver J, Porter TF, Luthy DA, Comstock CH, et al. Assisted reproductive technology and pregnancy outcome. Obstet Gynecol. 2005;106(5 Pt 1):1039–45. doi:10.1097/01.AOG.0000183593.24583.7c.
23. Dayan N, Fell DB, Guo Y, Wang H, Velez MP, Spitzer KA, et al. Severe maternal morbidity in women with high BMI in IVF and unassisted pregnancies. Hum Reprod. 2018;33(8):1548–56. doi:10.1093/humrep/dey224.