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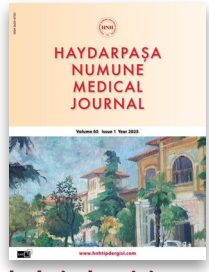

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ORIGINAL ARTICLE

Evaluation of Maternal and Neonatal Outcomes in Triplet Pregnancies: A Single-Center Experience

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Abstract

Introduction: Triplet pregnancies are high-risk gestations associated with increased maternal and neonatal complications. This study evaluates maternal and neonatal outcomes in triplet pregnancies to improve perinatal care strategies.

Methods: This retrospective cohort study analyzed triplet pregnancies delivered at Zeynep Kamil Women and Children's Diseases Training and Research Hospital between August 2013 and February 2025. Data were collected from electronic medical records. Inclusion criteria were triplet pregnancies ≥20 weeks or birth weight >500 g. Maternal complications, chorionicity, and neonatal outcomes were assessed using IBM SPSS Statistics 23.0.

Results: A total of 63 triplet pregnancies were included. The mean maternal age was 28.06±0.68 years. 61.9% of pregnancies were spontaneous, while 28.6% resulted from IVF. Trichorionic pregnancies accounted for 63.5% of cases. PIH (17.5%), GDM (12.7%), and ICP (6.4%) were the most common complications. The mean gestational age was 30.8 weeks, with 63.5% delivering before 34 weeks. NICU admission was required in 74.1% of neonates, and 18% experienced neonatal mortality.

Discussion and Conclusion: Triplet pregnancies carry significant risks due to preterm birth and low birth weight, increasing NICU admissions and perinatal mortality. Optimizing embryo transfer policies and perinatal care strategies is crucial. A multidisciplinary approach is essential to improve outcomes.

Keywords: Assisted reproductive technologies; maternal outcomes; neonatal outcomes; preterm birth; triplet pregnancy.

Multiple pregnancies represent a significant obstetric condition characterized by a markedly increased risk of maternal, fetal, and neonatal complications compared to singleton pregnancies. In recent years, the widespread use of assisted reproductive technologies (ART), increasing maternal age, and advancements in fertility treatments have contributed to a notable rise in the incidence of multiple pregnancies.[1] These pregnancies not only elevate perinatal morbidity and mortality rates but also pose substantial maternal health risks, making them a critical concern in obstetric practice. Notably, perinatal mortality in triplet pregnancies has been reported to be approximately twice as high as in twin pregnancies and eight times higher than in singleton pregnancies.[2] The primary cause of this elevated mortality rate is preterm birth, with prematurity-related complications such as low birth weight, neonatal sepsis, intraventricular hemorrhage, and respiratory distress syndrome playing a crucial role.[3-5]

From a maternal perspective, triplet pregnancies are associated with a significantly increased risk of gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), intrahepatic cholestasis of pregnancy (ICP),

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postpartum hemorrhage, placental abruption, preterm labor, and cesarean delivery. Additionally, the heightened maternal metabolic burden, increased cardiovascular stress, and elevated surgical morbidity further contribute to maternal health risks.[6-8] Moreover, carrying a triplet pregnancy and raising triplet infants pose substantial challenges, not only physically but also in terms of psychosocial and financial burdens on parents.[9,10]

Perinatal outcomes in multiple pregnancies are primarily influenced by chorionicity. In particular, monochorionic pregnancies carry a significantly increased risk of perinatal morbidity due to the presence of interplacental vascular anastomoses. The most common complications in monochorionic pregnancies include twin-twin transfusion syndrome (TTTS), selective intrauterine growth restriction (sIUGR), anemia-polycythemia sequence, and intrauterine fetal demişe.[11-14] Furthermore, the loss of one fetus in monochorionic pregnancies serves as an additional risk factor for neurological sequelae and severe perinatal complications in the surviving fetus.[15] Although existing literature suggests that monochorionic triplet pregnancies may have a worse prognosis compared to monochorionic twin pregnancies, there remains a notable lack of large-scale studies addressing this patient population.[16]

The management of triplet pregnancies presents significant obstetric challenges. Determining the optimal gestational age for delivery, establishing antenatal follow-up protocols, and early identification of maternal-fetal complications are critical for improving perinatal outcomes. Current evidence suggests that the optimal gestational age for elective delivery is between 32+0 and 32+6 weeks in monochorionic and dichorionic triplet pregnancies, whereas in trichorionic triplet pregnancies, it is recommended between 35+0 and 35+6 weeks. Deliveries before these timeframes have been associated with increased neonatal morbidity and mortality.[17,18] However, in cases where maternal or fetal complications are detected early, the timing of delivery should be individualized.

This study aims to evaluate the maternal and neonatal outcomes of triplet pregnancies managed in a tertiary care center and to identify associated risk factors. Given the limited number of multicenter studies on triplet pregnancies in Türkiye, this research aims to contribute to perinatal care processes through the data obtained.

Materials and Methods

This study was designed as a single-center, retrospective cohort study aimed at evaluating the maternal and perinatal outcomes of triplet pregnancies managed in our clinic. The study includes triplet pregnancies that resulted in delivery at Zeynep Kamil Women and Children's Diseases Training and Research Hospital between August 2013 and February 2025. Ethical approval for the study was obtained from the Ethics Committee of Zeynep Kamil Women and Children's Diseases Training and Research Hospital on February 19, 2025, under protocol number 25. The study was approved by the institutional ethics committee and conducted in accordance with the ethical standards of the Declaration of Helsinki.

Data were retrospectively retrieved from the hospital's electronic medical records system. The inclusion criteria encompassed triplet pregnancies in women aged 18 years and older who had reached at least 20 weeks of gestation or had a birth weight exceeding 500 grams. Cases involving quadruplet or higher-order multiple pregnancies, conjoined triplets, and triplet pregnancies that underwent feticide or experienced fetal loss before 20 weeks of gestation were excluded from the study (Fig. 1).

In this study, each participant was systematically evaluated based on maternal age, gravidity, parity, pregnancies conceived via ART, PIH, ICP, GDM, placenta accreta spectrum (PAS), uterine atony, blood transfusion requirements, neonatal sex, birth weights, gestational age at delivery, neonatal intensive care unit (NICU) admission, and fetal loss. Chorionicity was determined based on first-trimester ultrasonographic measurements performed by the perinatology unit of our clinic. The diagnosis of PIH was established according to the clinical guidelines published by the American College of Obstetricians and Gynecologists (ACOG) in 2019–2020.[19] GDM was diagnosed following the ACOG 2018 guidelines.[20] Pregnancy follow-ups were conducted through a multidisciplinary approach involving the obstetrics and perinatology departments of our

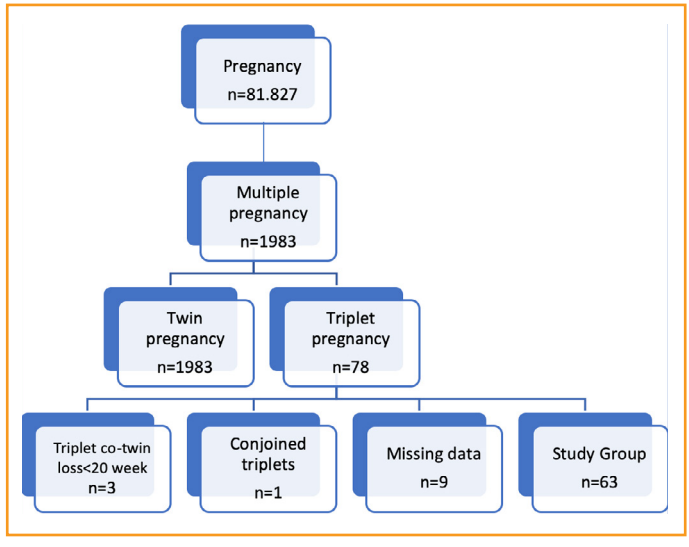

Figure 1. Selection Process of the Study Population.

hospital. Neonatal data were retrospectively retrieved from birth records, neonatal medical charts, and NICU records.

Following the application of exclusion criteria, a total of 63 triplet pregnancies that reached 20 weeks of gestation and delivered at Zeynep Kamil Women and Children's Diseases Training and Research Hospital were included in the study.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as frequencies (n) and percentages (%), while continuous variables were summarized as mean±standard deviation and range (minimum–maximum).

Results

This study evaluated the maternal and neonatal outcomes of triplet pregnancies, providing significant insights into this high-risk pregnancy group. The mean maternal age of the 63 included pregnancies was 28.06±0.68 years, with a gravidity of 2.03±0.16 and a parity of 0.68±0.13 (Table 1).

Thirty-nine pregnancies resulted from spontaneous conception (61.9%), 6 from intrauterine insemination (IUI) (9.5%), and 18 from in vitro fertilization (IVF) (28.6%) (Fig. 2). The distribution of chorionicity was as follows: 40 pregnancies were trichorionic-triamniotic (63.5%), 14 were dichorionic-triamniotic (22.2%), 6 were monochorionic-triamniotic (9.5%), 2 were dichorionic-diamniotic (3.2%), and 1 was monochorionic-monoamniotic (1.6%).

Among maternal complications, the most frequently observed condition was PIH, occurring in 17.5% of cases. Additionally, GDM was detected in 12.7%, ICP in 6.4%, atonic hemorrhage in 4.8%, and blood transfusion was required in 6.4% of cases (Table 2).

The mean gestational age at delivery was 30.8 weeks. A total of 20 pregnancies reached ≥34 weeks, 13 deliveries occurred between 32 weeks and 33 weeks 6 days, 18

Table 1. Demographic and Obstetric Characteristics of Triplet Pregnancies

	Triplet Pregnancy	
	Mean±SD	**Min-Max**
Age	28.06±0.68	18-39
Gravida	2.03±0.16	1-7
Parity	0.68±0.13	0-5
Previous vaginal delivery	0.4±0.01	0-5
Previous cesarean delivery	0.22±0.07	0-2
Abortus	0.32±0.08	0-3

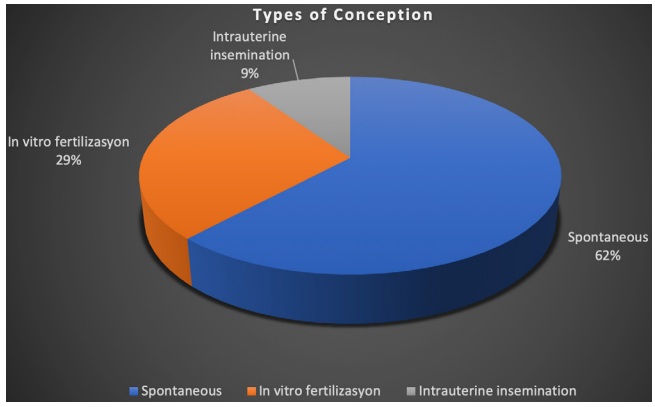

Figure 2. Types of Conception.

Table 2. Obstetric Complications in Triplet Pregnancies

	Triplet Pregnancy	
	n	**%**
Gestational Diabetes	8	12.7
Pregnancy Induced Hypertension	11	17.5
Intrahepatic Cholestasis of Pregnancy	4	6.4
Atony	3	4.8
Blood Transfusion	4	6.4

Table 3. Perinatal Outcomes of Triplet Pregnancies

	Triplet Pregnancy	
	n	**%**
Gender		
Female	88	46.6
Male	101	53.4
Birth Weight		
≥2500 g	6	3.2
LBW	110	58.2
VLBW	31	16.4
ELBW	42	22.2
Birth Week		
≥34 w	60	31.75
≥32w-33w6d	39	20.63
≥28w-31w6d	54	28.57
<28 w	36	19.05
Baby Prognosis		
Maternal Care	15	7.9
NICU	140	74.1
Neonatal death	34	18

*w=week; d=day.

deliveries occurred between ≥28 weeks and 31 weeks 6 days, and 12 deliveries occurred before 28 weeks.

Regarding neonatal outcomes, 53.4% of neonates were male, and 46.6% were female. The mean birth weight was 1541 grams. Birth weight classification revealed that 58.2% of neonates were low birth weight (LBW), 16.4% were very low birth weight (VLBW), and 22.2% were extremely low birth weight (ELBW). The proportion of neonates born at ≥2500 grams was only 3.2% (Table 3).

Evaluation of postnatal clinical outcomes showed that 74.1% of neonates required admission to the neonatal intensive care unit (NICU), 18% experienced neonatal mortality, and only 7.9% received direct maternal care (Table 3).

Discussion

This study evaluates the maternal and neonatal outcomes of triplet pregnancies, providing significant insights into this high-risk pregnancy group. PIH is a complication affecting approximately 4.6% (95% CI: 2.7–8.2) of pregnancies worldwide, with an incidence of approximately 5% in the United States. However, in triplet pregnancies, this rate has been reported to increase to up to 10%.[21,22] In our study, PIH was observed in 17.5% of cases, which is notably higher than the rates reported in the general population.

Regarding GDM, the incidence was 7.8% in the United States in 2020, while other studies have reported a range between 2% and 38%.[23,24] In our study, the incidence of GDM was 12.7%. This increased prevalence is not surprising, considering the heightened insulin resistance and metabolic changes associated with triplet pregnancies.

ICP has an incidence of 0.8% in the United States and varies between 0.5% and 1.5% in Europe.[25,26] In our study, ICP was detected in four cases (6.4%), which is significantly higher than the rates reported in the general population. This finding may be attributed to elevated hormone levels and increased hepatobiliary metabolic load in triplet pregnancies.

The increased incidence of PIH, GDM, and ICP in triplet pregnancies naturally predisposes this population to adverse obstetric outcomes. Early detection and appropriate management of these complications play a crucial role in reducing perinatal morbidity and mortality.

The mean gestational age at delivery was 30.8 weeks, with 20 pregnancies (≥34 weeks, 31.7%), 13 pregnancies (32 weeks–33 weeks 6 days, 20.6%), 18 pregnancies (≥28 weeks–31 weeks 6 days, 28.6%), and 12 pregnancies (<28 weeks, 19.0%). According to the literature, 66% of triplet pregnancies result in delivery before 34 weeks, and our study similarly found this rate to be 63.5%, aligning with previous reports. In contrast, the preterm birth rate in singleton pregnancies is only 2.2%.[27] The fact that the risk of early preterm birth is 30 times higher in triplet pregnancies than in singleton pregnancies inevitably contributes to low birth weight and poor perinatal outcomes.

According to the literature, 5% of triplet neonates weigh ≥2500 grams, while 35% weigh <1500 grams at birth. Our study similarly found that 38.6% of triplet neonates were born with a birth weight below 1500 grams, while only 3.2% weighed ≥2500 grams. In contrast, in singleton pregnancies, only 1.1% of neonates weigh <1500 grams, while 9.1% weigh ≥2500 grams.[27] Low birth weight is a major determinant of increased perinatal mortality and NICU admission rates, further exacerbating the financial burden on healthcare and insurance systems.

In our study, 74.1% of neonates required admission to the neonatal intensive care unit (NICU), only 7.9% were cared for by their mothers, and 18% experienced neonatal mortality. According to the 2019 Turkish Ministry of Health data, the general perinatal mortality rate is 10.8 per 1000 live births, whereas in triplet pregnancies, this rate rises to 11.4%.[28]

Beyond these findings, the psychosocial and financial burdens that triplet pregnancies impose on families should not be overlooked. The significant physical, emotional, and economic challenges faced by parents should be considered in the development of long-term healthcare policies.[9,10]

In our study, 38% of pregnancies were conceived through ART. Globally, the increasing prevalence of multiple pregnancies has been strongly associated with ART. Studies have demonstrated that double embryo transfer (DET) results in significantly higher multiple birth rates compared to elective single embryo transfer (eSET). Among women under 35 years of age, the multiple birth rate following DET has been reported as 40%. Although this rate decreases with age, it remains as high as 28% even in women aged 38–40 years.[29] Optimizing the number of embryos transferred during IVF cycles is crucial in preventing multiple pregnancies.

Chorionicity is a key prognostic factor in triplet pregnancies.[13,14] However, in our study, 40 of the 63 pregnancies were trichorionic, 16 were dichorionic, and 7 were monochorionic. One of the limitations of our study is that the sample sizes within chorionicity subgroups were insufficient for a robust comparative analysis, thereby limiting our ability to draw definitive conclusions on the impact of chorionicity on pregnancy outcomes.

Conclusion

Triplet pregnancies are high-risk gestations characterized by a significantly increased incidence of maternal and neonatal complications. The high rates of prematurity and low birth weight directly impact perinatal mortality by increasing the need for neonatal intensive care.

A substantial proportion of triplet pregnancies result from ART. Therefore, optimizing embryo transfer policies is crucial in reducing the incidence of multiple pregnancies. While chorionicity is a critical determinant of neonatal and maternal prognosis, further large-scale studies are needed to better understand its implications.

In conclusion, the management of triplet pregnancies requires a multidisciplinary approach. Improving perinatal and neonatal care strategies, determining optimal delivery timing, and revising ART policies will play a pivotal role in reducing adverse maternal and neonatal outcomes in triplet pregnancies. Additionally, given the significant social and psychological impact on families, the development of psychosocial support programs is essential.

Ethics Committee Approval: The study was approved by Zeynep Kamil Women and Children's Diseases Training and Research Hospital Ethics Committee (No: 25, Date: 19.02.2025).

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Conflict of Interest: The authors declare that there is no conflict of interest.

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