



Research article

Clinical and epidemiological profiles of newborns from twin pregnancies in Hassan II University Hospital of Fez, Morocco

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Abstract

Twin pregnancies are high-risk pregnancies, and delivery of twins poses variable difficulties due to the complexity of obstetrical mechanics and the frequency of dystocic presentations. Twin births represent a real public health issue and are responsible for a high rate of perinatal mortality. This study aims to report on newborns' epidemiological, clinical, therapeutic, and evolutionary aspects from twin pregnancies hospitalized in the Neonatal Intensive Care and Neonatology Department of the Hassan II University Hospital, Fez. A cross-sectional, retrospective, and descriptive study was conducted on newborns from twin pregnancies hospitalized in the neonatal and neonatal intensive care unit over two and a half years. Statistical analyses were performed using the JAMOVI software. Qualitative variables were expressed as frequencies and percentages, while quantitative variables were presented as means with standard deviations (SD) or medians with interquartile ranges (IQR). A total of 96 newborns from twin pregnancies were collected. The average maternal age was 29.7 years. Maternal complications during pregnancy were dominated by the threat of premature delivery (38.77%), premature rupture of membranes 5.49%), and urinary and cervicovaginal infectious complications (12.24%). 89.8% of deliveries were medicalized, with vaginal delivery being the most common (69.39%). 91.67% of newborns were premature, thus dominating neonatal morbidity. The average weight was 1585g +/- 425g. 76.04% of newborns presented with neonatal respiratory distress, the most frequent etiology of which was hyaline membrane disease. These neonates presented other complications: neonatal jaundice (62.5%), perinatal anoxo-ischemia (6.25%), and transfusion-transfusion syndrome (6.25%). The neonatal mortality rate was 31.25%, with the leading cause being severe neonatal infection (56.67%). The prevalence of twin pregnancies is on the rise, with a high prevalence of prematurity among newborns, requiring special attention to limit complications.

Keywords: Newborn; Twin pregnancy; Characteristics; Perinatal morbidity; Perinatal mortality; Morocco.

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Abbreviations

- ART: Assisted Reproductive Technologies
- IVF: In Vitro Fertilization
- TTTS: The Twin-to-twin Transfusion Syndrome

1. Introduction

Twin pregnancy is defined as the simultaneous development of two embryos in the uterus. Its frequency has significantly increased in recent years, mainly due to

the growing use of assisted reproductive technologies (ART), such as in vitro fertilization (IVF) and artificial insemination (Blondel, 2009). These techniques enhance the chances of conception by stimulating ovulation, which increases the likelihood of multiple pregnancies, including twin pregnancies. This shift has transformed the obstetric landscape but has various complex medical challenges (Blondel, 2009).

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Despite advancements in obstetrics and pediatrics, twin pregnancies continue to be classified as high-risk. This classification stems from the fact that multiple pregnancies significantly increase the risk of maternal, fetal, and neonatal complications compared to singleton pregnancies (Blondel, 2009; Obiechina et al., 2011; Pons et al., 1998). Among the most common maternal complications are gestational hypertension, preeclampsia, and gestational diabetes. These maternal conditions are more frequently observed in women carrying twins, thereby increasing the risk of maternal morbidity and mortality (Blondel, 2009; Obiechina et al., 2011; Pons et al., 1998).

On the fetal side, the increased risk of prematurity is one of the main factors contributing to morbidity. More than 50% of twin pregnancies result in preterm birth, occurring before 37 weeks of gestation, with all the complications this entails, including neonatal respiratory difficulties, infections, intraventricular hemorrhages, and neurological developmental disorders (Pons et al., 1998).

In addition to prematurity, twin pregnancies are often associated with specific conditions such as twin-to-twin transfusion syndrome, particularly in monochorionic pregnancies, where both fetuses share the same placenta. This rare but serious complication is caused by an imbalance in blood exchange between the two twins, endangering the life of one or both fetuses if not detected and treated promptly. Also, congenital anomalies, intrauterine growth restriction (IUGR), and weight discordance between twins are more common in twin pregnancies (BLONDEL and Kaminski, 2002; Robyr et al., 2005).

All these complications above explain the high cost of twin pregnancies and the necessity for early, comprehensive, and multidisciplinary management (involving midwives, gynecologists, obstetricians, anesthetists, and pediatricians). Considering these challenges, our study aims to describe the epidemiological status of twin pregnancies and explore the newborns' clinical, therapeutic, and developmental aspects to improve the management of these unique pregnancies.

2. Methods

This study was conducted in the Neonatology and Neonatal Intensive Care Unit, a tertiary center part of the Mother-Child Hospital of CHU Hassan II in Fez. The unit includes two hospital units: the neonatal intensive care unit and the premature infants unit.

The study was retrospective and descriptive, covering 2.5 years, from November 1, 2020, to April 30, 2023. It included all newborns from twin pregnancies hospitalized in either hospital unit during the study period, regardless of whether they were born at the CHU maternity unit or other maternity hospitals. Newborns with incomplete records and those from triplet pregnancies were excluded.

Data collection was carried out using a pre-established data sheet that included maternal socio-demographic characteristics, pregnancy characteristics, delivery details, clinical characteristics of the newborns, and their short-term outcomes. Statistical analyses were performed using JAMOVI software for Windows 2016. Qualitative variables were presented as frequencies and percentages, while quantitative variables were presented as mean, standard deviation (SD), or median (interquartile range, IQR).

3. Results

A total of 3,426 newborns were hospitalized in the two units of the Neonatology and Neonatal Intensive Care Service. Ninety-six of these were from twin pregnancies, representing 2.77% of the hospitalized newborns.

The average maternal age was 29.7 years. Most mothers were multiparous and had multiple previous pregnancies with no notable pathological histories. Only one pregnancy (2.04%) was conceived following the use of ovulation indicators. 67.43% of pregnancies were well monitored. Only 40.81% of pregnancies proceeded without complications. Maternal complications during pregnancy were primarily characterized by the threat of preterm labor (38.77%), premature rupture of membranes (24.49%), and infectious complications, including urinary and cervicovaginal infections (12.24%). Delivery was medically managed in 89.8% of cases, with vaginal delivery being the most common method (69.39%).

The number of boys was 51, accounting for 52.12% of all newborns, while the number of girls was 45, representing 46.8%.

The average weight of the newborns was 1.585 ± 425 g, with extremes ranging from 800 g to 2.900 g. The average weight of the first twins ($1.612 \text{ g} \pm 438 \text{ g}$) was higher than that of the second twins ($1.558 \text{ g} \pm 417 \text{ g}$).

Most newborns had an APGAR score at 5 minutes of 7 or higher (86.46%), while only 11.46% had a score below 7.

91.67% of the newborns were preterm, representing the majority of neonatal morbidity. 76.04% of the newborns experienced respiratory distress, with the most frequent etiology being hyaline membrane disease.

42.71% of the newborns had a neonatal infection (early bacterial or nosocomial). Additionally, these newborns experienced other complications: neonatal jaundice (62.5%), perinatal asphyxia (6.25%), and twin-to-twin transfusion syndrome (6.25%).

We recorded 3 cases of congenital malformations: congenital hip dislocation, Prune-Belly syndrome, and colpocleisis associated with agenesis of the septum pellucidum.

The neonatal mortality rate was 31.25%, with the main causes being severe neonatal infection (56.67%) and hyaline membrane disease (43.33%). The neonatal

mortality rate for the second twin (35.41%) was higher than that for the first twin (27.08%).

The newborns' hospitalization duration ranged from 1 to 28 days, averaging 8.98 days. The average hospitalization duration for the first twin was 9.54 days, while for the second twin, it was approximately 8.39 days.

4. Discussion

The average maternal age was 29.7 years, with extremes ranging from 19 to 41 years. These results are consistent with those of Cheibani, 2016 and Obiechina et al., 2011, who found average maternal ages of 28 and 30 years, respectively. This can be explained by the fact that reproductive activity is at its peak in this age range.

Many authors, including Hoekstra et al., 2008 and Pons et al., 1998 acknowledge that familial predisposition is specific and is transmitted through women. According to this author, a family history is found in one of every two cases. In our study, we could not determine this factor among the parturients.

In our series, 46 pregnancies were conceived spontaneously, and one pregnancy was conceived following ovarian stimulation, representing 2.04%. These results are consistent with the literature, notably, Touré, 2019 and Boubkraoui et al., 2016; WHO reported spontaneous conception rates for twin pregnancies of approximately 89% and 100%, respectively. However, several studies in the literature have shown that infertility treatments and in vitro fertilization significantly increase the chances of conceiving a twin pregnancy. According to BLONDEL and Kaminski, 2002, ovulation-inducing therapies are responsible for 200 twin pregnancies out of 842 studied, representing 23.7%.

Table 1: Rate of Gestational Diabetes in Twin Pregnancies in the Literature

Authors	Rate of Gestational Diabetes in Twin Pregnancies
Gérardin et al., 2006	13.2%
Rauh-Hain et al., 2009	3.9%
Our series	10.2%

Regarding maternal complications during pregnancy, 19 mothers experienced a threat of preterm labor (38.77%). These results are consistent with those of (Akaba et al., 2013), who reported a rate of 39.7%.

Among the 47 mothers studied, 12 had premature rupture of membranes, representing 24.99%. This aligns with the study by Boubkraoui et al., 2016, which found a significant increase in the risk of premature rupture of membranes in twin pregnancies (29.23%) compared to singleton pregnancies (7.01%).

In our study, six mothers experienced an infectious complication during pregnancy (urinary or cervicovaginal infection), representing 12.24%. Cheibani, 2016 and Boubkraoui et al., 2016 reported higher rates of maternal infectious complications, at 31.42% and 30.77%, respectively. In the series by Gérardin et al., 2006, maternal urinary infection was significantly higher in cases of monochorionic twin pregnancies (11.7%).

Twin pregnancies are associated with an increased risk of gestational diabetes due to elevated levels of placental hormones and higher maternal weight gain, which exacerbate insulin resistance and glucose intolerance. This requires more vigilant monitoring and managing blood sugar levels during pregnancy (Caughey and Turrentine, 2018). In our series, five mothers (10.2%) developed this condition, four of whom were managed with dietary measures alone, while one required insulin therapy to regulate her blood sugar levels. These findings are consistent with the literature, as shown in Table 1, highlighting the elevated risk of gestational diabetes in twin pregnancies.

In a case-control study, Sibai BM et al. compared 684 women with twin pregnancies to 2.946 singleton pregnancies. The risk of developing hypertension was 2.04 times higher in cases of twin pregnancies, and the risk of preeclampsia was 2.62 times higher. In our series, we recorded the occurrence of preeclampsia in 4 mothers, representing 8.16%.

According to the literature, Table 2 shows the types of twin presentations in twin pregnancies. All the studies mentioned conclude that the cephalic-cephalic presentation is the most common, followed by the cephalic-breech presentation. The breech presentation of the first twin is rarer but represents a formal indication of cesarean section. In our study, it was not possible to determine the presentation for the majority of the newborns.

The choice of delivery method in twin pregnancies remains a topic of debate, although there is a growing trend toward cesarean delivery (Prunet et al., 2017). The study by Obiechina et al. revealed that cesarean sections were three times more frequent in twin pregnancies (Obiechina et al., 2011). This increased use of cesarean delivery can be explained by the higher incidence of complications associated with these pregnancies, such as preeclampsia, premature rupture of membranes, breech presentation, and umbilical cord prolapse. However, in our study, the majority of deliveries were vaginal, accounting for 69.39% of cases. In comparison, cesarean sections represented 28.57% of cases, which is consistent with the findings reported by Vogel et al., 2013.

The majority of twins were born prematurely (91.66%), with an average gestational age of 32.3 weeks ± 2.6 weeks. The prematurity rate in our series exceeds that found in most studies in the literature. The setting of our research

can explain this. Indeed, the neonatology and neonatal resuscitation department at CHU Hassan II – Fez is a tertiary-level unit that admits mothers whose pregnancies were deemed high-risk, requiring transfer and management in a third-level center. Preventing complications from prematurity involves infection prevention and the use of antenatal corticosteroids, which were administered in 74% of cases for pregnancies under 35 weeks of gestation. Antibiotic prophylaxis for group B streptococcus infection is not routinely performed in our maternity unit.

Most newborns had an APGAR score at 5 minutes of 7 or higher (86.46%), while only 11.46% had a score below 7. This is consistent with the studies by Vogel et al., 2013 and Cheibani, 2016, which found rates of newborns with an APGAR score below seven at 5 minutes of 10.9% and 11.86%, respectively. Indeed, these newborns are at a higher risk of perinatal asphyxia due to various complications that may arise during pregnancy and delivery.

The average weight of the newborns was $1585 \text{ g} \pm 425 \text{ g}$, which is significantly lower than the average weight found in most studies in the literature. This can be explained by our study's high frequency of prematurity (91.66%). Other authors reported average birth weights of 2351 g in Vogel et al.'s study (Vogel et al., 2013) and 2400 g in Aduloju et al., 2015.

The average weight of the first twins in our study ($1612 \text{ g} \pm 438 \text{ g}$) was higher than that of the second twins ($1558 \text{ g} \pm 417 \text{ g}$), consistent with the study by O.P. Aduloju et al. which found that the average weight of the first twins (2440 g) was higher than that of the second twins (2440 g).

Respiratory complications account for a significant proportion of morbidity in the delivery room for twins. In our study, 76.04% of the newborns experienced respiratory distress. Our rate was close to that of Cheibani, 2016, 71.7%, and significantly higher than that of Boubkraoui et al., 2016, around 10%. The latter study observed a higher risk of neonatal respiratory distress in twins (10%) compared to singletons (1.8%).

Table 2: Presentations of Twins During Twin Pregnancies in the Literature.

	Cephalic-cephalic	Cephalic-Breech	Seat-cephalic	Breech-Breech	Other
Boukerrou et al., 2011	60-70%	10%	8%	8%	2-10%
Boubkraoui et al., 2016	58.4%	13.85%	13.85%	10.77%	3.08%
Akaba et al., 2013	47%	19.3%	18.7%	9.3%	5.7%
Mutihir and Pam, 2007	48%	21.3%	14.7%	16%	0%
Aduloju et al., 2015	39.5%	21.2%	13.2%	13.2%	13.1%

Hyaline membrane disease was the leading cause of Neonatal Respiratory Distress Syndrome (NRDS) in our series, accounting for 38.35%. This condition, caused by a quantitative or qualitative deficiency of endogenous surfactant, is one of the complications of prematurity. Its treatment involves the administration of surfactant via the intratracheal route. It was also the primary cause of NRDS in the series by Cheibani, 2016, accounting for 31%. In our study, transient respiratory distress (28.76%) and neonatal infection (17.81%) were also common causes of NRDS.

Neonatal jaundice is one of the most common conditions in premature infants, primarily due to the immaturity of the hepatic system, particularly the enzyme responsible for bilirubin glucuronidation, uridine diphosphate glucuronosyltransferase (UGT1A1). In premature newborns, this enzyme is underdeveloped, accumulating unconjugated bilirubin in the blood and causing jaundice. Hyperbilirubinemia in these infants is often more severe and prolonged compared to term infants, which can increase their risk of severe neurological complications, such as bilirubin encephalopathy (Grosse and Simeoni, 2023).

Early screening for neonatal jaundice is one of the critical goals of the frequent monitoring of hospitalized newborns, especially preterm infants. In our series, 62.5% of the newborns presented with neonatal jaundice associated with unconjugated hyperbilirubinemia. They were promptly treated with either conventional or intensive phototherapy. As a result, no cases of kernicterus were identified. Our rate is higher than that reported by Cheibani, 2016, which was 33%. The higher frequency of neonatal jaundice in our series can be attributed to the prevalence of prematurity, low birth weight, hypoalbuminemia, and neonatal infection.

Extensive surveys have revealed that twins have a 5 to 10 times higher risk of cerebral palsy compared to singletons (Fortin et al., 2005). This increased risk is mainly attributed to prematurity and growth restriction. However, there are specific risks for the surviving twin after the in-utero death of their co-twin. The main neurological complications include intraventricular hemorrhage, periventricular leukomalacia, and retinopathy of prematurity (Boutillier et al., 2011). In our series, six newborns (6.25%) presented perinatal anoxia-ischemia, a rate similar to the findings of Qazi, 2011, who reported a rate of 7.8%. Several studies have also demonstrated antenatal corticosteroid therapy's

effectiveness in preventing neurological complications (Xu et al., 2022).

The twin-to-twin transfusion syndrome (TTTS) is a specific complication of monochorionic twin pregnancies. It is associated with fetal and neonatal risks for both the donor and recipient twins. In the literature, it affects approximately 10% of monochorionic twin pregnancies (Lopriore et al., 2008). In our series, six newborns presented with TTTS, representing 6.25%.

The neonatal mortality rate from twin pregnancies in our series is 31.25%. This high mortality rate in our study is explained by the high frequency of prematurity and neonatal complications, particularly respiratory distress and neonatal infection. Numerous studies in the literature have concluded that perinatal mortality is significantly higher in twin pregnancies compared to singleton pregnancies. It is four times higher according to the series by Akaba et al., 2013 and Boubkraoui et al., 2016 and 2.5 times higher according to the study by Obiechina et al., 2011.

The neonatal mortality rate for the second twin (35.41%) exceeds that of the first twin (27.08%), aligning with the findings of Qazi G, who reported a mortality rate of 18% for the second twin and 16% for the first twin (Qazi, 2011).

The primary cause of neonatal mortality in our study was multiorgan failure secondary to severe neonatal infection, with a rate of 56.6%, followed by respiratory causes at 43.3%. In the study by Gulati et al., 2020, the leading cause of perinatal mortality in monochorionic twins was twin-to-twin transfusion syndrome, whereas, in dichorionic twins, it was chorioamnionitis.

5. Conclusion

The management of multiple newborns at birth is often more specialized than that of singletons, even in uncomplicated pregnancies and deliveries. Diagnostic ultrasound performed during the first trimester of pregnancy is crucial in ensuring better monitoring of twin pregnancies and, more importantly, promoting good prenatal care practices.

Prematurity is the leading cause of increased perinatal morbidity and mortality in twin pregnancies. Systematic use of antenatal corticosteroids and effective management of preterm labor threats are essential to prevent it. Common complications in monochorionic pregnancies include intrauterine growth restriction and birth weight discordance. Improved identification and enhanced monitoring of these pregnancies are necessary. All efforts should be directed towards prolonging gestation, increasing birth weight, and optimizing the mode of delivery. Ideally, the goal is to achieve a gestational age of 37-38 weeks before delivery to reduce perinatal morbidity and mortality in twin pregnancies.

The prognosis of these particularly delicate pregnancies can be significantly improved through the widespread monitoring of twin pregnancies, in-utero transfers to specialized centers to establish an early diagnosis of chronicity, timely detection of complications, and delivery planning. Additionally, monitoring newborns during delivery and enhancing facilities for these newborns (such as intensive care units and neonatal resuscitation) is crucial. These facilities must be equipped to provide respiratory, hemodynamic, transfusion, and nutritional support for these fragile newborns, along with malformation screening and subsequent follow-up.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data availability statement

Data will be available upon request from the corresponding author.

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