

Factors Associated with Perinatal Death in Women with Twin Pregnancies at The Kindia Regional Hospital Maternity Ward

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Abstract

Introduction: Twin pregnancies are high-risk pregnancies, especially for the second twin, with very high perinatal mortality. The aim of this study was to identify factors associated with perinatal death in newborns in a level II hospital in Guinea.

Methods: This was a cross-sectional study lasting twelve (12) months, from September 01, 2022 to August 31, 2023, carried out in the maternity ward of Kindia regional hospital. Multivariate regression analysis was performed to investigate factors independently associated with death in the first and second twins. A value of $P < 0.05$ was considered significant.

Results: Perinatal death was higher in the second twin (27.7%) than in the first twin (17.3%). Factors associated with perinatal death in the first twin were prematurity ($ORa=3.18$, 95%- $IC=1.30-7.88$), pre-eclampsia ($ORa=3.30$, 95%- $IC=1.11-9.53$) and hydramnios ($ORa=6.43$, 95%- $IC=1.21-37.5$) and in the second twin, prematurity ($ORa=2.31$, 95%- $IC=1.00-5.25$), ultrasound ($ORa=0.38$, 95%- $IC=0.18-0.81$), monozygotic pregnancy ($ORa=2.58$, 95%- $IC=1.03-6.40$), and threatened preterm delivery ($ORa=4.93$, 95%- $IC=1.49-17.7$).

Conclusion: Factors associated with perinatal death were highly significant in the second twin compared with the first twin, with a strong association with prematurity.

Keywords: Twin Pregnancy, Perinatal Death, Kindia, Guinea

1. Introduction

Worldwide, over 6.3 million perinatal deaths occurred in 2000, most of them in developing countries [1]. Among obstetric conditions known to increase the risk of perinatal mortality, twin pregnancy is a well-known factor [2,3]. Perinatal morbidity and mortality in twin pregnancies is 3 to 7 times higher than in single pregnancies, due to a six-fold higher incidence of prematurity a three-fold higher incidence of intrauterine growth retardation (IUGR) and dystocia deliveries [3-6]. Fetal complications such as bradycardia, placental abruption or cord proclivity may occur after the birth of the first twin, exposing the second to increased morbidity and mortality [6]. A multi-country study in Brazil reported a stillbirth rate of 9.3% and an early neonatal death rate of 8.7% in twins [7]. Delay ≥ 15 minutes between twins, late caesarean section, unqualified birth attendant, monochorionic pregnancy and low birth weight are factors that negatively influence the prognosis of the second twin [8]. In Guinea, perinatal mortality was 39 ‰ births according to the 2018 Demographic Health Survey [9]. The increased risk of obstetric complications in cases of twin hood, the lack of modern equipment for monitoring high-risk pregnancies (fetal monitoring, high-precision ultrasound scans), the absence of a well-equipped neonatal unit, the lack of qualified staff, and delays in obstetric care are factors that may influence the occurrence of perinatal deaths at the Kindia regional hospital maternity ward. African authors have consistently found a higher mortality rate in second twins than in first twins. Balde et al had reported in Guinea a perinatal mortality of 79.1‰ for the first twin and 102.8‰ for the second twin. In Senegal Moreira et al had found a perinatal mortality of 55‰ for the first twin and 102‰ for the second twin. In Congo Brazaville, Buanga-Bamanga et al had reported a neonatal mortality of 214‰ for the second twin [10-12]. Thus, this research was undertaken to better understand the determinants of this very high perinatal mortality in newborns from twin pregnancies. The aim was to identify the factors associated with perinatal death in women with twin pregnancies in a referral care facility in Guinea.

2. Patients and Methods

2.1 Type of Study

This was a cross-sectional study lasting twelve (12) months, from September 01, 2022 to August 31, 2023.

2.2 Study Framework

The Kindia regional hospital maternity unit served as the setting for this study. It is a level II reference maternity hospital in the country's health pyramid, receiving all obstetric emergencies from health centers and private clinics in the Kindia prefecture. With an estimated population of 1,813,979 in 2018 it performs an average of 2,750 deliveries per year with a capacity of 27 beds [13].

2.3 Study Population

The study population consisted of all women with twin pregnancies

of gestational age greater than 28 weeks' amenorrhea (SA) who gave birth at the maternity ward of Kindia regional hospital and their neonates during the study period.

2.4 Data Collection

Data were collected during semi-structured interviews, using a pre-established survey form based on women's socio-demographic characteristics (age, occupation, level of education, marital status and residence), obstetrical characteristics (number of prenatal consultations, ultrasound, gestational age, complications during pregnancy, chorionicity, delivery) and newborn characteristics (prematurity, Apgar score, birth weight), which are collected during care and recorded in delivery registers and operative reports. Our variable of interest was perinatal death. It was constructed from information derived from newborns who died between 28^o amenorrhea week and the seventh day of birth. All other newborns were considered alive.

2.5 Statistical Analysis

Descriptive analysis was performed by calculating proportions for qualitative variables and means with standard deviations for quantitative variables. Pearson's chi-square and Fisher's exact tests were used to compare proportions for qualitative variables, and the Wilcoxon test was used to compare medians for quantitative variables. All variables with a $p \leq 0.20$ were included in a multivariate logistic regression model to search for factors associated with perinatal death. Odds ratios with 95% confidence intervals were calculated, and a p -value < 0.05 was considered statistically significant. Statistical analyses were performed using R Studio software version 4.4.1.

2.6 Ethical Considerations

From an ethical point of view, the agreement of university and hospital authorities was obtained for data collection after validation of the research protocol. Free and informed consent was obtained from patients. Anonymity and confidentiality were respected during interviews.

3. Results

3.1 Sociodemographic and Obstetrical Characteristics

A total of 191 women and 382 newborns were included in the study. The median age was 26 years, with extremes of 15 and 40 years. The majority of women were married (72.3%), uneducated (54.5%), housewives (43.5%) and living in urban areas (59.2%). The number of prenatal consultations (<4) represented 80.1%. Twin pregnancies were diagnosed by ultrasound in 70.2% of cases, 34.6% of women had a pregnancy that was not at term (<37 SA) and 37.7% had complications. There were 16.2% monozygotic pregnancies, 55.5% vaginal deliveries and 44.5% caesarean sections (Table 1).

Variables	Effectives (n=191)	Percentages (%)
Sociodemographic characteristics		
Age (year)		
≤19	24	12.6
20-29	98	51.3
≥30	69	36.1
Median : 26 years	Extremes :15 and 40 years	
Marital status		
Single	22	11.5
Divorcee	14	7.3
Maried	138	72.3
Widow	17	8.9
Education level		
No schooling	104	54.5
Schooling	87	45.5
Profession		
Housewife	83	43.5
Civil servant	14	7.3
Liberale	72	37.7
Pupil/Student	22	11.5
Residence		
Rural zone	78	40.8
Urban area	113	59.2
Obstetrical characteristics		
Number of prenatal visits		
< 4	153	80.1
≥ 4	38	19.9
Ultrasound		
Yes	134	70.2
No	57	29.8
Gestational age		
< 37 Weeks of amenorrhea	66	34.6
≥ 37 Weeks of amenorrhea	125	65.4
Complication during pregnancy		
Yes	72	37.7
Anemia	16	8.4
Hypertension	6	3.1
Pre-eclampsia	22	11.5
Threat premature delivery		
Placenta prævia	3	1.6
Hydramnios	7	3.7
No	119	62.3
Chorionicity		
Dizygote	160	83.8
Bichoriale biamniotic	84	44.0
Monochorionic biamniotic	76	39.8
Monozygote : Monochorionic monoamniotic	31	16.2

Delivery		
Vaginal delivery	106	55.5
Caesarean section	85	44.5

Table 1: Sociodemographic and Obstetrical Characteristics

3.2 Characteristics of Newborns.

The majority of twins had cephalic presentation (69.9% and 61.3%). Apgar scores (<7) were 19.4% at one minute and 8.9% at five minutes for the first twin, versus 36.6% and 22.5% for the second twin. Birth weight (< 2500 gr) was observed in 41.9% of cases for the first twin and 57.6% for the second. We recorded an overall perinatal death rate of 22.5% (n= 86/382), including 17.3% (n=33/191) for the first twin and 27.7% (n=53/191) for the second twin. Acute fetal distress accounted for 13.1% of cases for the first twin and 23.0% for the second twin. Prematurity accounted for 33.0% for the first and second twins.

3.3 Perinatal Prognosis

Perinatal death was higher in the second twin (17.3%) than in the first (27.7%). Bivariate analysis showed that in the first twin, there was a statistically significant association between presentation (p=0.047), prematurity (p<0.001), pre-eclampsia (p=0.005), hydramnios (p=0.018) and perinatal death. In the second twin, a significant association was observed between chorionicity (p=0.018), the performance of ultrasound (p=0.004), prematurity (p<0.001), pre-eclampsia (p=0.013), hydramnios (p<0.001), threatened preterm delivery (p<0.001) and perinatal death (Table 2).

Characteristics	First twin			Second twin		
	Living N = 158	Deceased N = 33	P value	Living N = 138	Deceased N = 53	P value
Age	26.0 (22.0, 30.0)	26.0 (21.0, 30.0)	0.6	27.0 (23.0, 30.0)	25.0 (21.0, 30.0)	0.3
Number of CPN			0.8			0.5
< 4 CPN	126 (82%)	27 (18%)		109 (71%)	44 (29%)	
≥ 4 CPN	32 (84%)	6 (16%)		29 (76%)	9 (24%)	
Chorionocity			0.9			0.018
Dizygote	132 (83%)	28 (18%)		121 (76%)	39 (24%)	
Monozygous	26 (84%)	5 (16%)		17 (55%)	14 (45%)	
Delivery			0.8			0.9
Caesarean section	71 (84%)	14 (16%)		61 (72%)	24 (28%)	
Vaginal delivery	87 (82%)	19 (18%)		77 (73%)	29 (27%)	
Presentation			0.047			0,5
Cephalic	111 (83%)	22 (17%)		87 (74%)	30 (26%)	
Seat	31 (74%)	11 (26%)		43 (70%)	18 (30%)	
Transverse	16 (100%)	0 (0%)		8 (62%)	5 (38%)	
Ultrasound			0.4			0.004
No	45 (79%)	12 (21%)		33 (58%)	24 (42%)	
Yes	113 (84%)	21 (16%)		105 (78%)	29 (22%)	
Prematurity			<0.001			<0.001
No	116 (91%)	12 (9.4%)		106 (83%)	22 (17%)	
Yes	42 (67%)	21 (33%)		32 (51%)	31 (49%)	
Pre-eclampsia			0.005			0.013
No	145 (86%)	24 (14%)		127 (75%)	42 (25%)	
Yes	13 (59%)	9 (41%)		11 (50%)	11 (50%)	
Hydramnios			0.018			<0.001
No	155 (84%)	29 (16%)		138 (75%)	46 (25%)	
Yes	3 (43%)	4 (57%)		0 (0%)	7 (100%)	
Threat premature delivery			0.2			<0.001
No	145 (84%)	28 (16%)		132 (76%)	41 (24%)	
Yes	13 (72%)	5 (28%)		6 (33%)	12 (67%)	

Table 2: Perinatal Death by Mother and Newborn Characteristics

3.4 Factors Associated with Perinatal Death

Factors associated with perinatal death in the first twin were prematurity (ORa=3.18; 95%-IC= 1.30-7.88), pre-eclampsia (ORa=3.30; 95%-IC=1.11-9.53) and hydramnios (ORa=6.43; 95%-IC=1.21-37.5). In the second twin there was prematurity

(ORa=2.31; 95%-IC=1.00-5.25), ultrasound (ORa=0.38; 95%-IC=0.18-0.81), monozygotic pregnancy (ORa=2.58; 95%-IC=1.03-6.40), and threatened preterm delivery (ORa=4.93; 95%-IC=1.49-17.7), (Table 3).

Characteristics	First twin			Second twin		
	OR _{adjusted}	95% CI	p-value	OR _{adjusted}	95% CI	p-value
Prematurity						
No	—	—		—	—	
Yes	3.18	1.30, 7.88	0.011	2.31	1.00, 5.25	0.046
Placenta praevia						
No	—	—		—	—	
Yes	12.5	1.04, 295	0.052	5.47	0.47, 124	0.2
Pre-eclampsia						
No	—	—		—	—	
Yes	3.30	1.11, 9.53	0.028	2.79	0.95, 8.12	0.058
Hydramnios						
No	—	—				
Yes	6.43	1.21, 37.5	0.028			
Ultrasound						
No				—	—	
Yes				0.38	0.18, 0.81	0.012
Chorionicity						
Dizygote				—	—	
Monozygous				2.58	1.03, 6.40	0.041
Threatened premature delivery						
No				—	—	
Yes				4.93	1.49, 17.7	0.011
Adjusted OR = Odds Ratio CI = Confidence Interval						

Table 3: Factors Associated with Perinatal Death

4. Discussion

The aim of this study was to identify factors associated with perinatal death in a reference maternity hospital in Kindia. Perinatal death in neonates from twin births was very high in our sample with higher mortality in the second twin (277.4‰) compared with the first twin (172.7‰). In a study carried out in Guinea, the authors had reported an early neonatal prognosis that was very poor, with higher perinatal mortality in the second twin (102.8‰) compared with the first twin (79.1‰) [10]. In Madagascar, authors had recorded a neonatal mortality of 59‰ for the first twin and 78‰ for the second twin [14]. Our result would be explained by the presence of complications such as hypoxia, placental separation and fetal retention due to uterine retraction to which they are often exposed after delivery of the first twin. The obstetrical staff must therefore be active in the delivery of the second twin, in order to reduce the delay or birth interval between the two twins and improve their prognosis.

The multivariate analysis of twin pregnancies carried out by Santana et al showed that maternal complications always appear as factors independently associated with an unfavorable perinatal outcome, with the fetus suffering the consequences either directly (growth retardation and stillbirth) or indirectly through the need to terminate the pregnancy prematurely, with all the consequences of a premature pregnancy [7]. Twin pregnancies were a risk factor for prematurity. In Mali, authors had reported that prematurity was an aggravating factor in morbidity and mortality of the 2nd twin, and that among children with a birth weight of less than 2,500 grams, 317 were premature, 25 were stillborn and 41 had morbidity [8,15]. In Israel, authors found that prematurity was the most important factor contributing to the increase in perinatal morbidity and mortality in multiple pregnancies [16]. The same finding was made at CHU Sud-Réunion, in the case of newborns from twin pregnancies [17]. A study in France found that monochorionic twins had higher rates of hypotrophy in full-term pregnancies ($p < 0.05$) and perinatal mortality ($p < 0.05$) than bichorionic twins [18]. In China, authors revealed that monochorionicity, preeclampsia

and age under 25 were risk factors for preterm delivery before 37 and 34 SA [19]. In Morocco, Boubkraoui reported that full-term twins in monochorionic pregnancies were at greater risk of perinatal mortality than twins in bichorionic pregnancies [20]. As for Balde in Guinea, the factors associated with neonatal death in twins were prematurity, low birth weight and vaginal delivery for the second twin [10].

Our result can be explained by the low socio-economic level of pregnant women, who do their prenatal follow-up in level I health structures where consultations are less expensive. The absence of neonatologists and the lack of a technical platform for the rearing of premature babies in the department had a strong impact on the newborns, with a very high perinatal death rate that constitutes a public health problem. This calls on the health authorities to train staff to care for newborns, make a neonatal unit available, and improve the quality of emergency obstetric and neonatal care. For healthcare staff, to carry out obstetrical ultrasound scans on pregnant women before 14 weeks' gestation to diagnose gemellity, systematic corticosteroid therapy in cases of threatened premature delivery before the 34th week of gestation.

The limitations of this study lie in the fact that it was carried out in a single hospital, making it unrepresentative. However, it is one of the few studies in the country to model risk factors for perinatal death in twin pregnancies.

5. Conclusion

Perinatal death was more frequent in the second twin than in the first. The factors associated with perinatal death were presentation, pre-eclampsia, hydramnios and prematurity for the first twin, and chorionicity, ultrasound, pre-eclampsia, hydramnios, threat of preterm delivery and prematurity for the second twin. Improving the survival of twins, particularly the second twin, will require high-quality prenatal consultations, better management of delivery in an obstetric-surgical environment with a multidisciplinary team, and corticosteroid therapy before 34 weeks' amenorrhea in cases of threatened preterm delivery.

Authors' Contributions

Diallo Fatoumata Bamba and Balde Ibrahim Sory are responsible for the design and execution of the study. Kadio kadio Jean-Jacque Olivier did the statistical analysis, proofreading and correction of the manuscript. Grovogui Fassou Mathias, Bah Oumou Hawa and Sow Alhassane II proofread the introduction and methodology. Diallo Fatoumata Binta Sigon collected the data. Toure Abdoulaye, Balde Ibrahim Sory and Sy Telly proofread the manuscript and made corrections. All authors read and approved the final version of the manuscript.

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