

Complications of Twin Delivery and Associated Factors: A Hospital-Based Cross-Sectional Analytical Study in Yaoundé

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Abstract

Background: Twin birth is considered a high-risk obstetrical situation. Despite the progress in obstetrical and pediatric care that has occurred in recent years, twin delivery is still associated with high maternal morbidity and perinatal mortality. Few recent studies have focused on the complications and risk factors associated with complications of twin birth in our environment. The objective of our study was to identify the complications of twin birth and the factors associated with them. **Methodology:** We carried out a cross-sectional analytical study. Data collection was prospective, over a period of 4 months (January 1, 2022 to April 30, 2022), at the maternity units of the Gyneco-Obstetric and Pediatric Hospital of Yaoundé and the Central Hospital of Yaoundé. The study population included all pregnant women who gave birth to twins during our study period at these hospitals. Data analysis was done using the SPSS software (Statistical Package for the Social Sciences) version 23.0. The Chi-square test was used to compare proportions and the student's t test to compare means. A p-value of less than 0.05 was considered statistically significant. **Results:** In total, we recorded 37 complicated twin deliveries out of a total of 66 twin deliveries. This corresponded to a complication rate of 56%. Maternal complications occurred in 11.38% of cases, the majority being soft tissue lesions (4.54%), and postpartum hemorrhage (4.54%). Perinatal complications at the time of delivery were dominated by early neonatal infections (12.12%), non-reassuring fetal condition (10.6%) and intrauterine fetal death (6.06%). Factors associated with complications of twin births after

univariate analysis were: maternal age ≤ 30 years (OR = 8.15; CI = 9.78 - 71.06; P = 0.03), being a student, (OR = 5.09; CI = 3.65 - 7.10; P = 0.00), primary level of education (OR = 1.48; CI = 3.30 - 6.63; P = 0.00), having less than four prenatal contacts (OR = 5.76; CI = 12.2 - 27, 24; P = 0.02), lack of ultrasound assessments (OR = 2.65; CI = 1.08 - 4.65, P = 0.04), diagnosis of twinning at labor (P = 0.03), admission for preeclampsia and eclampsia (OR = 2.01; CI = 1.24 - 5.9; P = 0.04), qualification of birth attendant as midwife (OR = 2.33; CI = 6, 38 - 8.50; P = 0.00), delivery time greater than 15 minutes for the second twin (OR = 2.45; CI = 1.14 - 5.26; P = 0.019). **Conclusion:** twin birth remains associated with high maternal and neonatal morbidity in our environment. The rate of maternal-fetal complications is 56% in our series. Post-partum hemorrhage, soft tissue injury and early neonatal infections are the main complications. These are closely linked to a number of factors whose control would improve the prognosis of twin birth.

Keywords

Post-Partum Hemorrhage, Prenatal Visit, Ultrasound, Twin Birth

1. Introduction

Twin pregnancy is defined as the simultaneous development of two embryos in the uterus [1]. Depending on the embryological origin, the fetuses resulting from these pregnancies may have the same or different hereditary heritages. Twin pregnancy is by far the most common form of multiple pregnancy. The average frequency of occurrence of spontaneous twin pregnancies in the human species is approximately 1%. However, there are racial and ethnic variations with a prevalence of 0.65% in Asia, 1.14% in Europe, and 2.2% in Africa – with up to 4% in some regions, particularly in Nigeria [1]. The incidence of twin pregnancy has increased considerably in recent years due to the use of ovulation inducers and the increase in maternal age. Indeed, 1/3 of twin pregnancies in the USA can be attributed to an iatrogenic intervention [2]. In 2016, the frequency was estimated at 2.54% in Mali [3] and 2.02% in Morocco [4]. A study conducted in Cameroon by Kouam *et al.* revealed an incidence of 1.8% at the University Hospital Center of Yaoundé [5].

Despite progress in obstetrical and pediatric care in recent years, twin pregnancy remains a high-risk situation during pregnancy and at the time of child-birth [6]. Maternal morbidity is markedly increased by a higher frequency of complications, namely pre-eclampsia and its complications, intrauterine fetal death, premature rupture of membranes and gestational diabetes [4] [7]. In a study conducted in 2011 by the World Health Organization (WHO) in 29 countries, maternal deaths were 4 times higher in twin pregnancies [8]. As a high-risk obstetrical situation, twin birth is frequently associated with postpartum hemorrhage due to uterine over distension. There is increased risk of mal-pre-

sentation and cord prolapse, and often cessation of labor during the expulsion of the 2nd twin, thus increasing the risk of acute fetal distress and need for instrumental extraction, obstetrical maneuvers and recourse to cesarean delivery [7]. Perinatal mortality is 3 to 7 times higher in twins compared to singletons due in particular to a higher occurrence of prematurity, hypotrophy and difficult delivery [9]. Monochorionic twins carry an additional risk owing to the twin-twin transfusion syndrome which occurs in 10% of cases [10].

Despite the low frequency of twin pregnancies, twins play a significant role in total perinatal mortality: 12.5% of perinatal deaths are due to twins in the United States. In England and Wales, in 1984, perinatal mortality in twin pregnancies was 42.8 per 1000 compared to 9.4 in singleton pregnancies [9]. Perinatal mortality, which is higher in African settings, is due to the fact that most of these women come from a weak socioeconomic background and they often start prenatal consultation at an advanced gestational age [10]. Indeed, 186/1000 perinatal deaths are due to twinning in Nigeria [11]. In Cameroon in 1993, perinatal mortality during twin pregnancies was 6.9% [5].

The study of twin pregnancy in the African environment is of interest not only because of its higher occurrence in the black community, but also because of the difficulties encountered in its diagnosis and follow-up, and in the management of delivery and its complications. While it is obvious that the prognosis of twin birth is poorer than that of singleton pregnancy, very few studies in our community have focused on factors related to complications of twin delivery.

From these elements, we expect a higher maternal and fetal morbidity associated with twin delivery. To prevent or manage these complications we need to know their predisposing factors in our setting to enable anticipation. This is why we decided to carry out this study To study the factors associated with complications of twin delivery in hospitals in Yaoundé. The specific objectives were to determine the prevalence and distribution of complications from twin births and to identify socio-demographic, clinical and reproductive factors associated to complications from twin births.

2. Methodology

2.1. Study Design

The study was an analytic cross-sectional. It was carried out in the obstetrics and gynecology units of the gyneco-obstetric and pediatric hospital of Yaoundé and the central hospital of Yaoundé. These are two reference hospitals with highly qualified staff: the former, a semi-autonomous facility, tends to receive more clients of the higher socio-economic stratum while the latter is seen as a government social facility that receives clients of all strata. The study lasted six months, from 1st December 2021 to 30th June 2022.

Study Population

The study population was made up of all women who gave birth in these two facilities during the study period. All women who were delivered of twins vaginal-

ly or by cesarean section at the two facilities and who consented to participate were included. Women with higher order deliveries and those who gave birth to twins outside these facilities but were brought there for management of complications were excluded. Sampling was consecutive and exhaustive. The required minimum sample size estimated using this formula:

$$N = \frac{t^2 \times p (1 - p)}{m^2}$$

N = minimal sample size

m = level of precision (=5%)

p = prevalence of the event (=1.8; the prevalence of twin pregnancy) [5]

t = standardized level of significance = 1.96

$n = (1.96)^2 \times 0.018 (1 - 0.018) / (0.05)^2 = 25$

2.2. Study Procedure

After the validation of our research protocol and data collection sheet, we sought ethical clearance from the institutional ethics board of the Faculty of medicine and biomedical sciences and authorization to do research from the management of both health facilities. After obtaining these, we started recruitment.

All women who gave birth to twins were invited to participate in our study. A sheet containing the objectives of our study, the procedure and the constraints and advantages related to our study were given to them, after counselling, as well as an informed consent form was provided to the participants to sign.

We recruited 66 twin deliveries during the period of study. Then we divided the study population into 2 groups, 37 participants had complications during and 29 participants without any complications.

2.3. Data Collection and Analysis

The data was collected and entered into a database created using Epi info version 7. Statistical analysis was performed using SPSS software (Statistical Package for the social sciences) version 20. Measures of central trend (mean, mode, median) and dispersion (standard deviation, proportion, interquartile range) were used to describe the continuous variables. Categorical variables were described as percentage, proportion, and/or frequency. The Chi-square test was used to compare proportions and the Student's t test to compare means. A p-value of less than 0.05 was considered statistically significant.

3. Results

3.1. The Prevalence and Distribution of Complications of Twin Deliveries

We identified 66 cases of twin delivery during the study period, 37 of which had at least one complication, giving a prevalence of complications of 56.0%.

The various complications are shown in **Table 1**.

Table 1. Distribution of complications of twin delivery.

Group	Complications	Number N = 37	Proportion (%)
Maternal	Post-partum hemorrhage	3	4.54
	Perineal tear	3	4.54
	Cervical tear	1	1.51
Fetal	Early neonatal infection	8	12.12
	Non-reassuring fetal state	7	10.60
	Intra uterine fetal demise	4	6.06
	Cord prolapse	2	3.03
	Hand prolapse	2	3.03
	Mechanical dystocia	4	6.06
Obstetrical	Retention of second twin	2	3.03
	Dynamic dystocia	1	1.51

3.2. Sociodemographic Profile of the Study Population

Concerning the sociodemographic profile, age group less than 30, students and low level of education are statistically associated with complications of twin deliveries (**Table 2**).

The ages of the pregnant women ranged from 18 to 37 years with a mean age of 27.49 ± 5.06 years in the case group against 18 to 37 years with a mean of 29.9 ± 5.42 years in the control group. Age under 30 multiplied the risk of occurrence of complications during twin birth by 8. A statistically significant association between the age group 18 to 30 and complications of twin births ($p = 0.00 < 0.05$) was noted.

Regarding profession, we can see that female students were the most represented in the group of cases (29.7%) while in the second group a clear predominance of the homemaker profession was noted (37.9%). There was a significant association between student status and the occurrence of complications during twin birth. Secondary level of education was the most represented in the two groups (57%). On the other hand, there was a significant association between the level of primary education and the complications of twin birth ($p = 0.00 < 0.05$).

Regarding marital status, single women had the majority among the cases (54.1%) and the controls () and were 1.16 times more likely to experience complications during twin birth. However, this association was not statistically significant.

3.3. Association of Clinical and Reproductive Parameters with Complications of Twin Birth

3.3.1. Follow-Up of Pregnancy

Concerning prenatal consultation, 45.9% in the case group had had less than

Table 2. Distribution of participants with respect to age group, occupation, level of formal education and marital status.

Variables	Categories	Complications (N = 37) n (%)	no complications (N = 29) n (%)	OR (95% CI)	p-value
Age range (years)	≤20	9 (24.3)	5 (17.2)	8.33 (1.30 - 5.09)	0.00
	20 - 30	10 (27.0)	6 (20.7)	8.15 (9.78 - 71.06)	0.03
	30 - 40	15 (40.5)	11 (37.9)	5.09 (0.13 - 13.1)	0.09
	≥40	3 (8.1)	7 (24.1)	-	
Occupation	Civil servant	2 (5.4)	7 (24.1)	1.21 (0.72 - 20.34)	0.78
	Private sector	3 (8.1)	0 (0.0)	-	0.998
	Informal sector	10 (27.0)	6 (20.7)	-	0.326
	Homemaker	3 (8.1)	11 (37.9)	-	0.248
	Students	13 (35.1)	3 (10.3)	5.09 (3.65 - 7.10)	0.00
	Unemployed	6 (16.2)	2 (6.9)	-	
Level of education	Primary	10 (27.0)	5 (17.2)	1.48 (3.30 - 6.63)	0.00
	Secondary	21 (56.8)	17 (58.6)	-	
	Higher	6 (16.2)	7 (24.1)	-	
Marital status	Married	12 (32.4)	13 (44.8)	1.34 (0.13 - 1.30)	0.797
	Single	20 (54.1)	13 (44.8)	1.16 (0.15 - 0.85)	0.88
	Cohabiting	5 (13.5)	3 (10.33)	-	

four contacts against 3.4% in the control group. There was a statistically significant association between a number of prenatal contacts less than four (04) and the occurrence of complications during twin birth ($p = 0.02 < 0$ five-fold increase). The association between not having performed any ultrasound and the occurrence of complications during childbirth was statistically significant ($p = 0.04$) and the risk was multiplied by 3 (Table 3).

3.3.2. Pathologies during Pregnancy and Timing of Diagnosis

The most common infectious complication of pregnancy was malaria among cases (35.1%) and controls (27.6%). The diagnosis of twinning was most often made before labor in the cases (48.4%) and control (42.4%) groups. However, it

Table 3. Distribution of participants according to elements of pregnancy follow-up.

Variables	Categories	Complications N = 37 n (%)	No Complications N = 29 n (%)	OR (95% CI)	P
Number of prenatal consultations	≤4	17 (45.9)	1 (3.4)	5.76 (12.20 - 27.24)	0.02
	5 - 7	17 (45.9)	4 (13.8)	0.81 (0.03 - 2.03)	0.90
	≥8	3 (8.2)	24 (82.8)	0.38 (0.12 - 1.22)	0.101
Ultrasound scans done	T1	4 (10.8)	0 (0.0)	-	-
	T2	3 (8.1)	2 (6.9)	1.77 (0.76 - 3.40)	0.207
	T3	1 (2.7)	0 (0.0)	0.49 (0.05 - 4.50)	1
	T1, T2, T3	12 (32.4)	17 (58.6)	1.37 (0.12 - 2.23)	0.96
	T1 and T2	2 (5.4)	1 (3.4)	1.67 (0.05 - 4.50)	0.96
	T2 and T3	9 (24.3)	7 (24.1)	1.31 (0.63 - 2.98)	0.98
	None	6 (16.2)	2 (6.9)	2.65 (1.08 - 4.65)	0.04

T1: first trimester, T2: second trimester, T3: third trimester.

was made during labor or after the birth of the first twin in the group of cases (7.6%) and controls (1.16%). The association between complications and the diagnosis of twinning during labor was statistically significant (**Table 4**).

3.3.3. Presentation of Twins and Route of Delivery

A statistically significant association was demonstrated between vaginal delivery of the first twin and the occurrence of complications (**Table 5**).

3.3.4. Placentation of Twins and Delivery

Considering the placentation of the twin pregnancies, the bichorionic diamniotic placentation was the most common in the case (40.5%) and control (55.2%) groups. However, no statistically significant association was noted between the placentation of twins and the occurrence of complications. The majority of deliveries, in the case (62.2%) and control (41.4%) groups, were performed by residents and interns (all levels combined). A statistically significant association between the provider's experience (residents versus midwife) and the occurrence of complications was noted ($p = 0.00$). Concerning the duration of birth of the second twins, it exceeded fifteen minutes in the group of cases in 58.3% and in the group of controls in 5.6%. There was a statistically significant association between a time of birth greater than fifteen minutes and the occurrence of complications (**Table 6**).

The APGAR scores at the fifth minute was 7 to 10 in 85.7% of first twins in the cases group and in 100% for the control group. The APGAR score of the second twin at the fifth minute was between 7 and 10 for cases in 81.1% and for controls in 96.6%. The first twin's birth weight range was 1500 g to 2449 g for

Table 4. Distribution of cases and controls with respect to complications of pregnancy and timing of diagnosis of twinning.

Variables	Categories	Complications	no complications	OR (95% CI)	P
		N = 37 n (%)	N = 29 n (%)		
Infectious disease during pregnancy	Malaria	13 (35.1)	8 (27.6)	1.8 (0.18 - 1.82)	0.8
	Pyelonephritis	1 (2.7)	0 (0.0)	-
	Cystitis	0 (0.0)	1 (3.4)	-	0.99
Non-infectious diseases	Threatened STP	1 (2.7)	1 (3.4)	1.21 (6.6 - 22.3)	0.00
	PRM	1 (3.4)	0 (0.0)	-
	Diabetes	0 (0.0)	1 (3.4)	1.47	0.99
	PTL	2 (5.4)	0 (0.0)	-	1
	None	19 (51.4)	18 (62.0)	-
Timing of diagnosis of twinning	Before labor	32 (48.4)	28 (42.4)	0.46 (0.01 - 11.52)	0.64
	During labor	5 (7.6)	1 (1.6)	-	0.03

STP: spontaneous termination of pregnancy. PRM: premature rupture of the membranes. PTL: preterm labor.

Table 5. Distribution of cases and controls with respect to presentation and mode of delivery of twins.

Variables	Categories	Complications	no complications	OR (95% CI)	P
		N = 37 n (%)	N = 29 n (%)		
Presentation 1 st twin	Cephalic	27 (73.0)	19 (65.5)	0.73 (0.31 - 1.72)	0.481
	Breech	10 (27.0)	10 (34.5)	1.16 (0.32 - 4.20)	0.823
Presentation 2 nd twin	Cephalic	25 (67.6)	15 (51.7)	0.26 (0.287 - 2.871)	0.190
	Breech	11 (29.7)	14 (48.3)	6.22 (2.23 - 22.37)	0.000
	Transverse	1 (2.7)	0 (0.0)	-	-
Delivery route of 1 st twin	Cesarean	16 (43.2)	11 (37.9)	0.54 (0.09 - 3.11)	0.492
	Vaginal	21 (56.8)	18 (62.1)	1.34 (1.02 - 4.33)	0.030
Delivery route of 2 nd twin	Cesarean	19 (51.4)	11 (37.9)	2.80 (0.49 - 15.82)	0.240
	Vaginal	18 (48.6)	18 (62.1)	1.35 (0.21 - 8.41)	0.241

58.8% in the case group and 80.8% in the control group. In the majority of cases (63.9%) and controls (72.0%), the birth weight of the second twin was between 1500 g and 2500 g. No association between these fetal variables and the occurrence of birth complications was statistically significant.

4. Discussion

4.1. Limits of the Study

This study fills a gap in the literature on the factors related to complications of twin births in Cameroon. Our results may guide the development of strategies for the management of twin pregnancies in order to prevent complications from

Table 6. Distribution of cases and controls with respect to placentation type, birth attendant and duration of delivery of second twin.

Variables	Categories	Complications N = 37 n (%)	No complications N = 29 n (%)	OR (95% CI)	P
Placentation of twins	Monochorial BA	7 (18.9)	8 (27.6)	0.12. (0.012 - 1282)	0.090
	Monochorial MA	8 (21.6)	4 (13.8)	0.28 (0.026 - 3.119)	0.310
	Bichorial BA	15 (40.5)	16 (55.2)	0.13 (0.015 - 1.221)	0.750
Birth attendant	Mid-wife	7 (18.9)	10 (34.5)	0.85 (1.98 - 3.65)	0.000
	Resident/intern	23 (62.2)	12 (41.4)	2.33 (6.38 - 8.50)	0.000
	Gynecologist	6 (16.2)	7 (24.1)	1.04 (0.10 - 1.042)	0.207
	Nurse	1 (2.7)	0 (0.0)	-	-
Delivery time of twin 2	<15 min	20 (41.7)	28 (58.3)	0.88 (0.25 - 3.03)	0.835
	≥15 min	17 (58.3)	1 (5.6)	2.45 (1.14 - 5.26)	0.019

BA: biamniotic. MA: monoamniotic.

twin birth in the future, especially in our country. However, some limitations should be noted, in particular the modest number of twin pregnancies recruited due to the short duration of the study. Being a retrospective study, uncertainties about the ages of the pregnancies could not be ruled out.

4.2. Profil of Maternal and Early Neonatal Complications

4.2.1. Maternal Complications

The complications most frequently found in our series were postpartum hemorrhage which occurred in 4.54% of cases with the incriminated etiology of uterine atony (5%), retention of placental debris (1.7%), a cervical tear (1.7%) followed by perineal tears in 4.54%. Our results are close to those of Fadhlaoui *et al.* in 2012 in Tunisia who reported a postpartum hemorrhage rate of 4.2% [12]. However, Zedini *et al.* in Tunisia reported three vulvo-perineal tears (1.6%) and 16 cases of postpartum hemorrhage (9%) [13]. These results are lower than figures reported by Traoré *et al.* in Mali in 2019; they reported a postpartum hemorrhage occurrence of 12.6% [14]. This could be because we conducted our study in reference hospitals where the multidisciplinary teams are experienced. This rate is close to that reported by Zedini *et al.* in Tunisia; they found 10.7% in case of vaginal delivery [13]. This similarity could be explained by the fact that in our series cesarean delivery was the less prone to complications in the management of labor in twin pregnancies.

A multicenter study carried out by the world health organization showed that the maternal mortality rate was three times higher in the event of multiple pregnancies than in the event of a single pregnancy [15]. However, in our study, we did not record any maternal deaths.

Distocia accounted for 7.57% of obstetrical complications in our series, this figure is lower than those obtained by Kabuyanga *et al.* in 2013 in the Democratic Republic of Congo and Traoré in 2010 in Mali, who respectively, reported a prevalence of 33.6% and 16.96% [14] [15].

4.2.2. Fetal Outcome

1) Antepartum

The frequency of intra uterine fetal death during twin pregnancies is between 2% and 7% according to publications [9]. We recorded 4 cases of intra uterine fetal death (6.03%), including two in the 1st twin (3.3%) and 2 in the 2nd twin (3.3%). Nwankwo *et al.* reported a slightly higher frequency of 7.3%. According to Boubkraoui in Morocco, the frequency of stillbirths was higher ($P = 0.011$) in twins (2.31%) than in singletons (0.54%) [4]. Thus, Santana *et al.* reported a frequency of fetal death in 3.6% of cases for the first twin versus 5.7% for the 2nd twin [16]. The causes of fetal death in utero may be the same as in the case of a single pregnancy: maternal arterial hypertension, placental abnormalities. In addition, there are specific causes in twin pregnancy: twin-twin transfusion syndrome, and cord entanglement in mono-amniotic pregnancy. We recorded a case of intrauterine fetal death of a second twin with mummy appearance in the second trimester of pregnancy associated with twin-twin transfusion syndrome (1.7%) which was complicated by the death of the remaining twin at 30 weeks. In the other two cases, the fetal deaths occurred in the context of severe pre-eclampsia.

2) Intrapartum and neonatal

Of the 132 fetuses, the overall frequency of fetal and perinatal complications was 46.62% (47/132), dominated by early neonatal infections (12.12%), followed by non-reassuring fetal condition (10.6%). These complications were more common in the second twin (28.3%) than in the first (18.3%). Non-reassuring fetal status occurred twice as often in the second twin (21.7% versus 11.7%). This higher rate could be the consequence of cord prolapse and fetal hypoxia secondary to uterine retraction after expulsion of the first twin. The non-reassuring fetal state was complicated by intrapartum death in 6.7% of cases. Cord prolapse was 4 times more common with the 1st twin. This is the consequence of the premature rupture of the membranes but also of a lack of adaptation of the fetus to the maternal pelvis leading to abnormal presentations. Cord and hand prolapses were each observed in 3.03% of cases.

4.3. Elements of Clinical and Reproductive Profile Associated with Complications of Twin Delivery

4.3.1. Age

In our series, the age of the participants varied from 18 to 40 years with a mean of 28.55 ± 5.32 years. The peak frequency of complications (39.4%) was observed in the 30 to 40 years age group. This is similar to figures reported by Boubkraoui in Morocco in 2016 and Kouamé in Ivory Coast in 2012. The mean ages were

29.71 [4] and 28.8 years [17] respectively with extremes of 15 and 50 years. Our results are also similar to those of Zedini *et al.* in Tunisia who in 2020 found a mean age of 30.7 ± 5.2 years with extremes ranging from 19 to 45 years [13]. However, Blondel *et al.* reported that an increase in maternal age is associated with an increased risk of twin pregnancies, in parallel with the increase in the level of follicle-stimulating hormone, which would induce multiple fertilizations [18]. Accordingly, in Quebec, the proportion of twin pregnancies is 3.3% among women aged 40 - 45, compared to 2% for women aged 20 - 24 [19].

Age below 30 years was associated with an increased risk of complications during twin birth. Indeed, it multiplied the risk of occurrence of complications by 8. De la Calle *et al.* in 2021 in Spain reported a risk of unfavorable obstetric outcome with a multiplication of the risk of complications by 1.8 when the maternal age was over 40 years [20]. However, in the latter study, only bichorial-biamniotic twins were taken into account.

4.3.2. Occupation

Homemakers were the most represented at 46%, but student status was significantly associated with a high risk of complications during childbirth. This concurs with the result of Bertrand Traoré *et al.* in 2019 in Bamako in which homemakers represented 70.3% [14]. The plausible explanation for the association between student status and complications could be inherent to their relatively low socio-economic status and their younger ages.

4.3.3. Level of Formal Education

The secondary level of education was the most frequent in the group of cases (56.8%) and controls (58.6%) but the primary education level carried a higher risk of complications.

4.4. Clinical and Reproductive Characteristics

4.4.1. Reproductive Characteristics of the Population

In our series, primiparas represented 28.78% of the sample, pauciparas 22.72% and multiparas 18.18% (le reste % est ou) and this variable was not statistically associated with the occurrence of complications during childbirth. However, Thera *et al.* [4] reported in their study in 2016 that multiparous women represented more than half of their sample (55.61%), pauciparas 24.23% and primiparas 20.16% [3]. Our results are also different from those reported by Boubkraoui *et al.* where primiparity was present in 41.54% of cases [4]. We have not found an explanation for these differences in results.

4.4.2. Clinical Characteristics of the Population

1) Prénatal consultation, morphology and diagnosis of twinning

The mean number of prenatal contacts was 3.8 ± 2.1 with extreme values of 1 and 12 contacts. Up to 25.75% of the participants had less than four (04) prenatal contacts. When we referred to the current recommendations, only 02 participants met the criteria for adequate follow-up of a twin pregnancy. This indicates

a lack of recourse to health promotion services. The majority of participants being primiparous, ignorance of the stakes of pregnancy could be a contributing factor. A good proportion (12.12%) of patients had not performed any ultrasound and the diagnosis of twinning was made during labor in 9% of our patients. These latter parameters increased the risk of complications occurring during childbirth. However Thera *et al.* in 2017 in Mali reported that 84.50% of patients had had at least one prenatal contact, 34.57% had done an ultrasound scan, the diagnosis of twinning was made during labor or after the birth of the first twin in 40.18% and that all these factors complicate management and worsen the prognosis of the second twin [3].

2) Type of twin pregnancy

Bichorial diamniotic pregnancies accounted for 46.9% of cases, against only 18.18% of monochorial mono-amniotic pregnancies. There were also 15 cases of diamniotic monochorial pregnancy in our series (22.72%). This is in agreement with data from the literature. Tunisian authors reported, in a similar study, proportions of 66.9% for diamniotic dichorionic pregnancies, 11.5% for diamniotic monochorionic pregnancies and 3% for monoamniotic monochorionic pregnancies. This trend may reflect the trend of occurrence of the various twinning types and actual propensity of each type. Unfortunately, we did not have the data of all the cases of these pregnancy types that were delivered. No statistically significant association was found between the type (chorionicity) of twin pregnancy and the occurrence of complications. This finding endorses the work of Théra *et al.* in 2017 in Mali, which showed no association between the type of twin pregnancy and complications [3].

4.4.3. Birth Attendant Qualification and Duration of Delivery of Second Twin

Most deliveries (53%) were performed by residents and interns, and a delay of more than fifteen minutes between the birth of the two babies was observed in 27% of cases. These parameters are known to significantly increase the risk of complications during twin deliveries. Théra *et al.* in 2017 in Mali reported that the absence of a skilled birth attendant, and a delay of 15 minutes or more between the births of the first and second twins were the main negative factors during twin delivery [3]. Residents and interns are trainees in obstetrics and gynecology, even though they are medical doctors. However, there is a risk of selection bias, given that they are always on the frontline of management of cases considered difficult.

The mean gestational age at delivery was 35.73 weeks \pm 2.3 (30 to 40 weeks). Labor most often occurred between 35 - 37 weeks of gestational amenorrhea (48.48%). The 16.7% of deliveries that occurred before 35 weeks of amenorrhea had a statistically significant association with the occurrence of complications. Fadhlaoui *et al.* in 2012 in Tunisia reported a similar mean gestational age at delivery 35 \pm 2 weeks [12], while Aston *et al.* had underlined an excess neonatal mortality of very preterm infants born vaginally: 7/40 (17.5%) versus 5/62

(8.0%), even though this difference was not statistically significant [21].

5. Conclusions

The frequency of maternal and fetal complications of twin births is very high in our milieu. Immediate postpartum hemorrhage and soft tissue lesions are the most common maternal complications. Fetal complications are the more common and are dominated by early neonatal infections and non-reassuring fetal status.

The socio-demographic characteristics associated with complications are age below 30 years and primary level of education. The elements of pregnancy follow-up associated with complications are first diagnosis of twinning during labor and poor or no pregnancy follow-up. Obstetrical elements associated with birth complications were cesarean delivery of second twin, delivery by resident/intern and duration of delivery of second twin greater than fifteen minutes.

We suggest increased efforts to improve the training of health personnel in management of twin delivery and measures to improve access to quality antenatal care at all levels.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Boubli, L., Olivier, S., Puech, F. and Boog, G. (1995) Les grossesses gémellaires. Ed Obstétrique, Paris, 332-342.
- [2] Pison, G. (2000) Près de la moitié des jumeaux naissent en Afrique. *Population et Sociétés*, (360): 1-4.
- [3] Théra, T., Mounkoro, N., Traore, S.O., Hamidou, A., Traore, M., Doumbia, S., *et al.* (2018) Accouchement gémellaire en milieu africain: Une analyse de 10 ans dans le district de Bamako au Mali. *The Pan African Medical Journal*, **29**, Article No. 21. <https://doi.org/10.11604/pamj.2018.29.21.14277>
- [4] Boubkraoui, M.E.-M., Aguentaou, H., Mrabet, M. and Barkat, A. (2016) Morbimortalité périnatale dans les grossesses gémellaires dans une maternité marocaine de niveau 3. *The Pan African Medical Journal*, **23**, Article No. 80.
- [5] Kouam, L. and Kadom-Moyo, J. (1995) Les facteurs de risque foetal dans les accouchements gémellaires: Une analyse critique de 265 cas. *Revue Française de Gynécologie-Obstétrique*, **90**, 155-163.
- [6] Hall, J.G. (2003) Twinning. *The Lancet*, **362**, 735-743. [https://doi.org/10.1016/S0140-6736\(03\)14237-7](https://doi.org/10.1016/S0140-6736(03)14237-7)
- [7] Gabilan, J.C. (1991) Mortalité et morbidité périnatale. In: Papiernik-Berkhauer, E. and Pons, J.C., Eds., *Les Grossesses Multiples*, Doin, Paris.
- [8] Santana, D.S., Cecatti, J.G., Surita, F.G., Silveira, C., Costa, M.L., Souza, J.P., *et al.* (2016) Twin Pregnancy and Severe Maternal Outcomes: The World Health Organization Multicountry Survey on Maternal and Newborn Health. *Obstetrics & Gynecology*, **127**, 631-641. <https://doi.org/10.1097/AOG.0000000000001338>

- [9] Lumme, R.H. and Saarikoski, S.U. (1988) Perinatal Deaths in Twin Pregnancy. A 22 Years Review. *Acta Geneticae Medicae et Gemellologiae*, **37**, 47-54. <https://doi.org/10.1017/S000156600004256>
- [10] Lopriore, E., Stroeken, H., Sueters, M., Meerman, R.-J., Walther, F. and Vandembussche, F. (2008) Term Perinatal Mortality and Morbidity in Monochorionic and Dichorionic Twin Pregnancies: A Retrospective Study. *Acta Obstetrica et Gynecologica Scandinavica*, **87**, 541-545. <https://doi.org/10.1080/00016340802050668>
- [11] Aisien, A.O., Olarewaju, R.S. and Imade, G.E. (2000) Twins in Jos Nigeria: A Seven-Year Retrospective Study. *Medical Science Monitor*, **6**, 945-950.
- [12] Fadhlaoui, A., Hassis, A., Khrouf, M., *et al.* (2012) L'accouchement des grossesses gémellaires. Expérience de la maternité de l'hôpital Aziza Othmana: A propos de 117 cas. *La Tunisie Médicale*, **90**, 136-143.
- [13] Zedini, C., Bannour, R., Bannour, I., *et al.* (2020) L'accouchement des grossesses gémellaires et pronostic materno-fœtal dans un Centre Universitaire Tunisien de niveau 3: Étude rétrospective à propos de 399 cas. *Pan African Medical Journal*, **36**, Article No. 237. <https://doi.org/10.11604/pamj.2020.36.237.19179>
- [14] Chata, T. (2015) Grossesse et Accouchement gémellaires dans le Service de Gynécologie-Obstétrique du Centre de Santé de Référence de la Commune II du district de Bamako. Thèse en ligne. <https://www.bibliosante.ml/bitstream/handle/123456789/987/15M74.pdf>
- [15] Kabuyanga Kabuseba, R., *et al.* (2013) Facteurs prédictifs et issues des accouchements dystociques à Goma, RDC. *Revue Médicale Des Grands Lacs*, **2**, 265-282. <http://grandlacs-med-journal.com>
- [16] Santana, D.S., Silveira, C., Costa, M.L., Souza, R.T., Surita, F.G., Souza, J.P., *et al.* (2018) Perinatal Outcomes in Twin Pregnancies Complicated by Maternal Morbidity: Evidence from the WHO Multicountry Survey on Maternal and Newborn Health. *BMC Pregnancy Childbirth*, **18**, Article No. 449. <https://doi.org/10.1186/s12884-018-2082-9>
- [17] Kouamé, A.D. (2012) Pronostic néonatal dans l'accouchement du 2ème jumeau au centre hospitalier de Cocody. Société de l'Anesthésie Réanimation d'Afrique Francophone. <https://web-saraf.net/Pronostic-neonatal-dans-l.html>
- [18] Blondel, M. and Kaminski, M. (2002) L'augmentation des naissances multiples et ses conséquences en santé périnatale. *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*, **31**, 725-740.
- [19] Institut de la statistique Québec (2001) Les naissances: Les jumeaux, le poids des nouveau-nés et la mortalité infantile. Extrait de la publication sur la situation démographique au Québec. 1-8.
- [20] De la Calle, M., Bartha, J., Garcia, L., Cuerva, M.J. and Ramiro-Cortijo, D. (2021) Women Aged over 40 with Twin Pregnancies Have a Higher Risk of Adverse Obstetrical Outcomes. *International Journal of Environmental Research and Public Health*, **18**, 13117. <https://doi.org/10.3390/ijerph182413117>
- [21] Aston, K.I., Peterson, C.M. and Carrell, D.T. (2008) Monozygotic Twinning Associated with Assisted Reproductive Technologies: A Review. *Reproduction (Cambridge, England)*, **136**, 377-386. <https://doi.org/10.1530/REP-08-0206>