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PROFILE AND RISK FACTORS FOR UNFAVORABLE OUTCOMES AMONG PRETERM NEWBORNS HOSPITALIZED AT THE CHAD–CHINA FRIENDSHIP HOSPITAL, N'DJAMENA

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ABSTRACT

Introduction: Prematurity remains a major cause of neonatal morbidity and mortality, particularly in low-resource countries. The objective of this study was to describe the profile and identify risk factors for unfavorable outcomes among preterm newborns. **Patients and Methods:** This was an analytical cross-sectional study conducted from February to August 2023, including all preterm newborns hospitalized during the study period. Demographic, clinical, therapeutic, and outcome data were analyzed. An unfavorable outcome was defined as death, occurrence of a major complication, or hospital stay longer than 14 days. Statistical analysis included the Chi-square test and multivariable logistic regression. **Results:** The incidence of prematurity was 8.4% of neonatal admissions. Overall neonatal mortality was 14.1%. The mean gestational age was 33.8 ± 2.1 weeks, and the mean birth weight was 1,960 ± 650 g. Unfavorable outcomes occurred in 35.9% of newborns. The main associated factors were gestational age <34 weeks (aOR = 4.2; 95% CI: 1.5–11.7), birth weight <1500 g (aOR = 3.8; 95% CI: 1.3–10.9), and hypothermia at admission (aOR = 2.9; 95% CI: 1.1–7.6). **Conclusion:** Prematurity remains a major contributor to neonatal mortality. Strengthening prevention strategies and improving clinical management are essential to reduce mortality.

KEYWORDS: profile; preterm newborn; unfavorable outcome; risk factors; Chad–China Friendship Hospital.

INTRODUCTION

Prematurity, defined as birth occurring before 37 weeks of gestation, remains the leading cause of neonatal mortality worldwide.[1] According to the World Health Organization, approximately 13.4 million preterm births were recorded globally in 2020, representing nearly one in ten live births.[2] Global neonatal mortality is estimated at 18 deaths per 1,000 live births, with prematurity accounting for approximately 35% of neonatal deaths.[3] In sub-Saharan Africa, this proportion often exceeds 40%, particularly in low-resource settings.[4]

In Chad, data from the 2019 Multiple Indicator Cluster Survey (MICS) reported a neonatal mortality rate of 33 per 1,000 live births, with prematurity ranking among the three leading causes of neonatal death, after birth asphyxia and infections.[5] Major complications associated with prematurity include respiratory distress, neonatal infections, hypothermia, and metabolic disorders.[6] These conditions are further exacerbated by

limited access to specialized equipment and inadequate coverage of essential neonatal care services.[7]

The objective of this study was to describe the profile and identify risk factors for unfavorable outcomes among preterm newborns hospitalized at the Chad–China Friendship Hospital in N'Djamena.

PATIENTS AND METHODS

This was an analytical cross-sectional study conducted in the Neonatology Department of the Chad–China Friendship Hospital in N'Djamena, from February 1 to August 31, 2023. All preterm newborns (<37 weeks of gestation) admitted during the study period were included. Newborns with incomplete medical records or presenting with lethal congenital malformations or anomalies incompatible with immediate survival were excluded.

The sample was exhaustive, including all eligible preterm newborns admitted during the study period. Data were collected using a standardized data collection form developed for the study. Information was extracted from admission registers, medical records, neonatal monitoring charts, and treatment sheets.

Collected variables included neonatal characteristics (sex, gestational age, birth weight, Apgar score), complications (infection, respiratory distress, hypothermia), therapeutic interventions (oxygen therapy, antibiotics, incubator use, kangaroo mother care), and outcomes (length of hospital stay, survival status).

An unfavorable outcome was defined as a composite criterion including in-hospital death, occurrence of a major complication (severe respiratory distress, severe neonatal infection, persistent hypothermia despite warming), or hospitalization duration exceeding 14 days. The 14-day threshold was adopted in accordance with WHO recommendations and recent African neonatal studies, where it is considered a validated indicator of clinical severity and increased resource utilization among preterm infants.

Data were entered into Microsoft Excel 2021 and analyzed using SPSS version 26. Proportions were compared using the Chi-square test. Odds ratios (ORs) with 95% confidence intervals (95% CI) were calculated. Multivariable logistic regression was performed to identify independent predictors of unfavorable outcomes, with statistical significance set at $p < 0.05$.

The study received approval from the Dean of the Faculty of Human Health Sciences and the Director of the Chad–China Friendship Hospital. Participant anonymity and data confidentiality were strictly maintained.

RESULTS

Among 924 newborns hospitalized during the study period, 78 were preterm, corresponding to a prevalence of 8.4%. Male newborns predominated, accounting for 53.8% (n = 42). The mean gestational age was 33.8 ± 2.1 weeks.

Regarding the degree of prematurity, 45.0% (n = 35) were moderate preterm infants (32–36 weeks), 38.4% (n = 30) were very preterm (28–32 weeks), and 16.6% (n = 13) were extremely preterm (<28 weeks). The mean birth weight was 1,960 ± 650 g (range: 900–2,400 g). Most deliveries were vaginal (57.7%), while 42.3% were by cesarean section (Table I).

Table I: Characteristics of Preterm Newborns.

Variable	n	%
Sex		
Male	42	53.8
Female	36	46.2
Gestational age (weeks)		
32–36 (moderate)	35	45.0
28–32 (very preterm)	30	38.4
<28 (extreme)	13	16.6
Birth weight		
<1500 g	22	28.2
≥1500 g	56	71.8
Mode of delivery		
Vaginal	45	57.7
Cesarean section	33	42.3

The main complications observed during hospitalization were respiratory distress (56.4%), hypothermia (50.0%), neonatal infection (39.7%), and neonatal jaundice (23.0%) (Table II).

Table II: Neonatal Complications Observed.

Complication	n	%
Respiratory distress	44	56.4
Hypothermia	39	50.0
Neonatal infection	31	39.7
Neonatal jaundice	18	23.0
Metabolic disorders	11	14.1
Congenital malformations	3	3.8
No major complication	9	11.5

Regarding therapeutic modalities, 52 preterm newborns (66.6%) received oxygen therapy, 58 (74.3%) received antibiotic therapy, 26 (33.3%) were managed using kangaroo mother care, and 8 (10.3%) were placed in an incubator (Table III).

Table III: Therapeutic interventions administered to preterm newborns.

Type of care	n	%
Oxygen therapy	52	66.6
Antibiotic therapy	58	74.3
Kangaroo mother care	26	33.3
Incubator	8	10.3

Phototherapy	12	15.4
Intravenous infusion / venous access	49	62.8

The mean length of hospital stay was 11 ± 6 days (range: 2–28 days). Among the 28 unfavorable outcomes identified, 11 corresponded to deaths (14.1%), 17 to severe complications, and 12 to prolonged hospital stays (>14 days). Some newborns presented more than one criterion simultaneously.

Table IV: Distribution of outcomes.

Outcome	n	%
Favorable outcome	50	64.1
Unfavorable outcome	28	35.9
Death	11	14.1
Severe complications	17	21.8

Multivariable analysis identified several factors significantly associated with unfavorable outcomes, namely gestational age <34 weeks (aOR = 4.2; 95% CI: 1.5–11.7; p = 0.003), birth weight <1500 g (aOR = 3.8; 95% CI: 1.3–10.9; p = 0.005), Apgar score <7 at 5 minutes (aOR = 2.8; 95% CI: 1.0–8.3; p = 0.02), and hypothermia at admission (aOR = 2.9; 95% CI: 1.1–7.6; p = 0.03).

Table V: Factors associated with unfavorable outcomes among preterm newborns.

Factors	Adjusted OR (95% CI)	p
Gestational age <34 weeks	4.2 (1.5–11.7)	0.003
Birth weight <1500 g	3.8 (1.3–10.9)	0.005
Apgar score <7 at 5 minutes	2.8 (1.0–8.3)	0.02
Hypothermia at admission	2.9 (1.1–7.6)	0.03

DISCUSSION

In our series, the prevalence of prematurity was 8.4% of neonatal admissions. This rate is close to those reported in Burkina Faso, as well as those observed in Yopougon and Cameroon.[8–10] This prevalence is also comparable to data reported in several African countries, with rates ranging between 10% and 12%.[11]

In contrast, a markedly higher prevalence of 21.4% was reported at the Mother and Child Hospital of N'Djamena, probably due to its role as a national referral center receiving more severe cases.[12]

The neonatal mortality rate observed in our study was 14.1%, a finding consistent with recent African data, which estimate neonatal mortality among preterm infants to range between 12% and 25%.[11,13] This mortality rate is similar to those reported in Burkina Faso and Yopougon, but lower than that observed in Dakar.[13]

At the Mother and Child Hospital of N'Djamena, Souam et al. reported a much higher mortality rate (42.4%), reflecting a more severe clinical profile with a high proportion of extremely preterm infants and referrals from other health facilities.

In our department, deaths among preterm infants accounted for more than half of in-hospital neonatal deaths, confirming the major contribution of prematurity to neonatal mortality, as highlighted in several African studies.[11,13]

The main factors associated with unfavorable outcomes in our study were low gestational age, low birth weight, hypothermia, and a low Apgar score, all of which have been widely reported in the literature.[14–17]

Gestational immaturity remains a major prognostic determinant. In Abidjan, Tano et al. showed that preterm infants born before 32 weeks of gestation had significantly higher mortality rates.[14] In Niger, Harouna et al. reported similar findings.[15] Our results are consistent with these data, showing a 4.2-fold increased risk of unfavorable outcomes among preterm infants born before 32 weeks of gestation. At the Mother and Child Hospital of N'Djamena, advanced gestational age was also identified as an independent predictor of survival.[12]

Low birth weight (<1500 g) is another major determinant of survival. Comparable results have been reported in Niger, Senegal, and Cameroon.[10,13,15] At the Mother and Child Hospital, survival also increased with better nutritional status at birth.[12]

Hypothermia at admission represents another important aggravating factor. In Nigeria, Sanni et al. demonstrated that hypothermia doubled mortality, while in Central Africa, Kazadi et al. reported an increased risk of complications associated with hypothermia.[16,17] Our findings confirm this trend, with a 2.9-fold increased risk of unfavorable outcomes in the presence of hypothermia. At the Mother and Child Hospital of N'Djamena, the absence of respiratory distress—often exacerbated by hypothermia—was also associated with improved survival.[12]

An Apgar score below 7 is a well-documented unfavorable prognostic factor, particularly in studies from Niger and Senegal.[13,15] At the Mother and Child Hospital, a normal Apgar score was strongly associated with better survival.[12]

Regarding therapeutic aspects, the management strategies implemented in our department—oxygen therapy, antibiotic therapy, and kangaroo mother care—contributed to improved survival. Kangaroo mother care has been shown to significantly reduce mortality in the Cochrane meta-analysis, as well as in the experience of several African countries.[11,18] In Chad, data from the Mother and Child Hospital also confirm that early

management and adequate thermal protection substantially improve survival among preterm infants.[12]

CONCLUSION

Prematurity remains a major contributor to neonatal mortality. In our study, low gestational age, low birth weight, hypothermia, and a low Apgar score were the main factors associated with unfavorable outcomes. Strengthening immediate neonatal care, thermal protection, and the implementation of kangaroo mother care is essential to improve survival among preterm infants.

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