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Risk factors and outcome of preterm births at a teaching hospital in Jos, North Central Nigeria

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Abstract: *Background/Aim:* Preterm birth is a major pregnancy complication that imposes tremendous long-term medical and financial burdens on affected children, families, and the healthcare system. The aim of this study was to find out the prevalence, risk factors, and outcome of preterm babies admitted to Bingham University Teaching Hospital's inborn Special Care Baby Unit.

Methods: It was a retrospective study of the medical records of all preterm babies delivered in the hospital from January 2021 to June 2022.

Results: A total of 1,160 live births occurred in the hospital during the study period out of which 196 (16.9%) were admitted. Of these, 100 (51.0%) were preterm's with gestational ages ranging from 24 to 36 weeks with a mean gestational age of 31.24 weeks (±2.78).Birth weight ranged from 650g to 2450g with a mean of 1530.22g (±414.11). There were 47 males and 53 females (M: F 0.89:1) and 63 (63.0%) were delivered via caesarean section. The duration of hospital stay ranged from 1 to 182 days with a median of 9and IQR of 11 days. Preterm premature membrane rupture and preeclampsia were the two most frequent risk factors for prematurity. Jaundice was the most prevalent morbidity seen, closely followed by anaemia. The overall mortality rate was 20%.

Conclusion: Prematurity continues to be a major contributor to infant morbidity and mortality in our hospital, thus there is a need to improve the quality of health care delivery in order to improve survival rate of these newborns.

Keywords: Prematurity, Outcome, Morbidity, Mortality

Introduction

Prematurity is a global public health problem that causes major morbidity during the perinatal, neonatal, and childhood years, as well as being the primary cause of death for children under the age of five.[1-6] In fact, due to global concern about the burden of preterm delivery, November 17th has been declared as World Prematurity Day.[3,7]

Every year, an estimated 15 million babies are born preterm.[1,6,8] The rate of preterm birth across countries ranges from 5% to 18% of babies born.[9] Preterm birth causes one million deaths each year, with over 90% of deaths occurring in developing countries and is a risk factor in more than half of all neonatal deaths.[10]

As of 2010, Africa and South Asia accounted for more than 60% of preterm births, with Nigeria ranking third after India and China, with over 773 600 preterm births.[5-6, 11] In Nigeria, about 40 - 60% of neonatal deaths are related to preterm birth, and of the survivors, 10%–15% have significant handicaps.[12-15] Studies done in various parts of Nigeria have reported varying prevalence of preterm births from as low as 11.8% in Ilorin,[16] 15.4% in Akure,[17] 16% in Delta,[18] 24% in Bayelsa,[19] to as high as 32.86% in Maiduguri.[12]

Data obtained from this study would add to the existing pool of data on prematurity as well as form a basis for advocacy programs aimed at improving maternal and neonatal care delivery in our environment.

Materials and Methods

This retrospective study was carried out among all preterm babies admitted from January 2021 to June 2022 into the inborn Special Care Baby Unit (SCBU) of Bingham University Teaching Hospital, a faith based private tertiary hospital located in Jos, Plateau State, North central region of Nigeria. The case record files of these babies were extracted and information concerning the age at presentation, the gender, the reason for preterm

delivery, the comorbidities encountered during the period of admission, duration and the outcome of admission were obtained.

Ethical clearance for the study was obtained from the Health Research Ethics Committee of the Hospital with reference number NHREC/21/05/2005/00971.

Retrieved data were collected with the aid of a structured study proforma and entered into a personal computer and subsequently analyzed with SPSS Version 21. Data were arranged in charts and associations were tested for statistical significance using chi- square. Multivariate logistic regression was used to determine factors associated with mortality. Odds ratio situated within 95% confidence interval (95% CI) was used to estimate effect size for multivariate logistic regression. The level of significance *p* was set at <0.05.

Results

A total of 1,160 live births were recorded in the hospital during the study period out of which 180 (15.5%) were born preterm and 980 (84.6%) term,152 (13.1%) were low birth weight, 44 (3.8%) were very low birth weight, and 25 (2.2%) were extremely low birth weight. Of these live births, 196 (16.9%) were admitted into the SCBU out of which100 (51.0%) were preterms with gestational ages ranging from 24 to 36 weeks (Table 1) with a mean gestational age of31.24 weeks (±2.78). The birth weight ranged from 650g to 2450g with a mean birth weight of 1530.22g (±414.11).

There were 47 males and 53 females (M: F 0.89:1) and 63 (63.0%) were delivered via caesarean section, 28 (28.0%) via spontaneous vaginal delivery and 9 (9.0%) had missing data concerning mode of delivery. The duration of hospital stay ranged from 1 to 182 days with a median of 9and IQR of 11 days. Of the 100 preterm babies included in this study, 20 died giving an overall mortality rate of 20.0%; among whom 14 (70.0%) of them were males. The sex specific mortality rate was 29.8% for males and 11.3% for females; χ^2= 5.309 with a *p* value of 0.02.

Among the preterms, 8 (8.0%) had missing records of birth weight, 9 (9.0%) were extremely low birth weight, while 35 (35.0%) were very low birth weight. (Table 2)

Of the 92 babies who had birth weights recorded, 69 (75.0%) were discharged home, 7 (7.6%) were discharged against medical advice and 16 (17.4%) died. Death occurred more frequently in those that were extremely low birth weight *p* = < 0.001 (Table 2).

As shown in Table 3, the commonest potential risk factor for preterm birth was pretermrupture of membranes (PROM) in 36 (34.3%) of the patients followed by preeclampsia 21 (20.0%) and multiple gestation 14 (13.3%) respectively.

Figure 2 shows the clinical outcome according to the gestational age; the outcome was better at higher gestational age of greater than 30 weeks and worst with gestational age less than 30 weeks.

Table 4 shows that neonatal jaundice 24 (28.9%) was the most prevalent morbidity seen, closely followed by anaemia in 23 (27.7%).

Possible factors associated with outcome like gender, gestational age, birth weight, mode of delivery and presence of PROM were entered into a multiple regression model; since birth weight and gestational age were highly correlated (Pearson's correlation coefficient, r = 0.79, *p*= 0.000)only birth weight was entered into the model. Birth weight and male gender remained independent predictors of mortality. The odds of a female surviving preterm delivery was 5.699 times higher than that of a male surviving (Table 5).

Table 1: Gestational age and sex distribution

Gestational Age (weeks)	Sex		Total
	M	F	
24	2	0	2
25	1	2	3
26	0	1	1
27	3	0	3
28	1	3	4
29	2	4	6
30	6	8	14
31	10	6	16
32	3	8	11
33	4	5	9
34	6	5	11
35	5	3	8
36	1	2	3
Missing	3	6	9
Total	47	53	100

Table 2: Birth weight category, gender and mortality rate

Birth Weight Category (g)	No	Gender		Mortality (%)
		Male	Female	
650 to 999	9	2	7	6 (66.7)
1000 to 1499	35	19	16	7 (20.0)
1500 to 2450	48	22	26	3 (6.3)
Missing	8	4	4	4 (50.0)
Total	100	53	47	20 (20.0)

χ^2=22.42, *p* = < 0.001

Table 3: Potential Risk Factors for Preterm Delivery

Risk Factors	Frequency	Percent
Preterm rupture of membranes	36	34.3
Preeclampsia	21	20.0
Multiple gestation	14	13.3
Antepartum haemorrhage	9	8.5
Spontaneous preterm labour	7	6.7
Fetal distress	5	4.8
Eclampsia	4	3.8
Maternal chronic hypertension	3	2.9
Maternal cardiac disorder	3	2.9
Maternal Chorioamnionitis	2	1.9
Teenage Mother	1	0.9

* Multiple responses observed

Table 4: Associated morbidities in relation to outcome

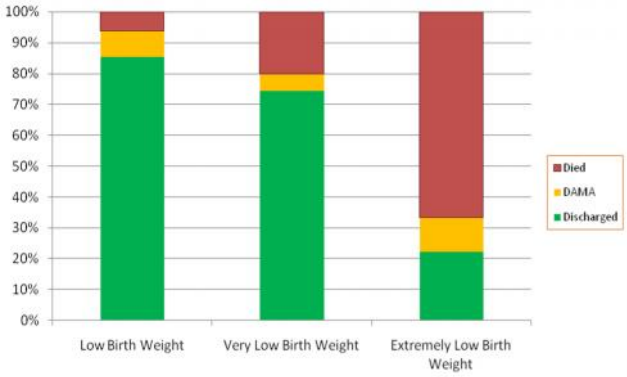
Morbidity	Discharged	DAMA	Died	Total
Neonatal Jaundice	19 (79.2)	3 (12.5)	2 (8.3)	24 (100.0)
Anaemia	21 (91.4)	1 (4.3)	1 (4.3)	23 (100.0)
Respiratory problems	6 (50.0)	0 (0.0)	6 (50.0)	12 (100.0)
Neonatal sepsis	4 (66.6)	1 (16.7)	1 (16.7)	6 (100.0)
Gastrointestinal anomalies	3 (60.0)	0 (0.0)	2 (40.0)	5 (100.0)
Asphyxia	2 (50.0)	1 (25.0)	1 (25.0)	4 (100.0)
Hypoglycaemia	1 (25.0)	0 (0.0)	3 (75.0)	4 (100.0)
Congenital heart disease	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
Necrotizing enterocolitis	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)
Haemorrhagic disease of the newborn	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)
Malaria	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)
Total	60 (72.3)	6 (7.2)	17 (20.5)	83 (100.0)

Table 5: Logistic regression of factors predicting outcome of preterm delivery

Variable	Odds Ratio	95% CI	*p* value
Birth Weight	1.005	1.002 – 1.008	<0.001
Sex	5.699	1.183 – 27.445	0.030
Duration of hospital stay	1.002	0.973 – 1.032	0.910
Mode of delivery	2.895	0.544 – 15.402	0.213
Presence of PROM	3.904	0.745 – 20.471	0.107

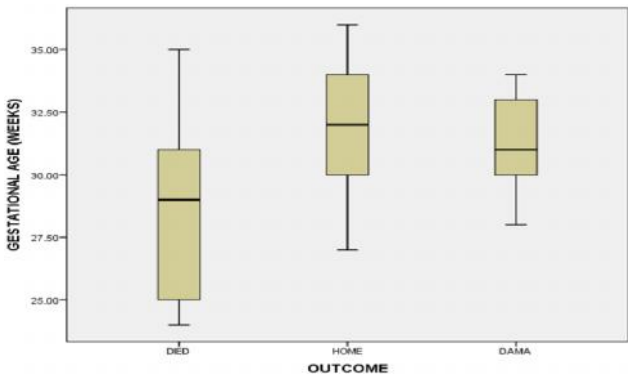
CI = confidence interval

Fig 1: Outcome of preterm births based on birth weight



χ^2 = 20.511; *p* = 0.000, DAMA = Discharged against medical advice

Fig 2: Box plot of outcome of preterm delivery based on gestational age



χ^2 = 39.193; *p* = 0.026; DAMA = Discharged against medical advice

Discussion

Our study showed that the prevalence of preterm births in our hospital (15.5%) was comparable to the findings in Enugu (16.9%) [3], Lagos(16.8%) [10] and Delta (16.0%) [19] Nigeria. It was however, higher than the 5.7% reported by Akintayo et al[14] in Ekiti, South West and 6.9% [20] in Kano, North West Nigeria. The reasons for these differences could be as a result of variations in study setting, duration, as well as ethno-geopolitical differences. The level of competition with other facilities that care for preterm deliveries could also explain the differences.

The commonest risk factor for prematurity in our study was premature rupture of membranes (PROM) followed by pre-eclampsia and multiple gestations. PROM has been identified in other studies in Nigeria,[13,16,19] Cameroon, [21] and Brazil [22] as a significant risk factor for preterm delivery. Pre-eclampsia as a risk factor for preterm delivery was noted in this study and is comparable with reports from other studies.[18,20] A population-based case control study by Davies et al[23] in Aberdeen found a significant positive association between preeclampsia and preterm birth. Multiple gestations ranked third as a risk factor for preterm birth in the present study. This is similar to the finding of Kunle-Olowu et al[19] in Okolobiri, Bayelsa State Nigeria. Other studies have also documented that babies born to women with multiple gestational pregnancies were at increased risk of being born preterm.[16, 24-26]

The commonest morbidity noted in patients in the present study was jaundice, followed by anaemia and respiratory problems. Previous studies in Abuja, Nigeria[27] and Pakistan[28] have also reported jaundice as the most prevalent morbidity in preterm babies. This is not surprising as jaundice has been previously reported to occur in about 80% of preterm babies.[29] Alamnehet al[30] in Ethiopia noted that babies born at gestational age less than 32 weeks were more likely to develop anaemia. Another study by Mah et al[31] in Cameroon has also noted similar findings.

The overall mortality rate in preterms was 20.0%. This finding is comparable to 18.7% mortality rate noted by Diala et al[8] in Jos University Teaching Hospital but lower than the 28.4% of a study carried out in Makurdi [13] and the 30.1% reported in Sokoto.[26] Mortality was higher in the male preterms compared to their female counterparts as has been reported in previous studies.[19, 32] We found that the odds of a female surviving preterm birth was over five times that of their male counterparts. This finding is consistent with a report from the study by Trotman et al in Jamaica that gestational age and female gender are independent predictors of survival in preterm babies.[33]Birth weight and gestational age were found to

be significant predictors of survival in preterm newborns, as has been substantiated by other studies.[8,12,13,19]
This study was not without some limitations. Because the study was retrospective, data about certain possible factors such as socio-demographic details of parents, and crucial obstetric history were not investigated because they were mostly unavailable. In addition, there were some missing records like the birth weight and gestational ages of some of the patients included in the study.

Conclusion

Prematurity continues to be a major contributor to infant morbidity and mortality in our hospital. Among preterm infants studied, decreasing gestational age, extreme low birth weight, and male gender are related with mortality. Interventions aimed at reducing extreme prematurity and intrapartum complications are recommended to reach global neonatal mortality targets. Thus, there is a need to improve the quality of health care delivery in order to improve survival rate of these newborns.

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