

Original article

Outcome of extremely low birth weight neonates in southern Nigeria.

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Abstract:

Background: Over 90% of neonatal deaths occur in low- and middle-income countries, mostly in sub-Saharan Africa, including Nigeria. Prematurity is related to more than one third of these deaths on a global scale; with the extremely low birth weight (ELBW) category having over a 100-fold mortality risk compared to the normal birth weight (NBW) infants.

There has been significant improvement in outcome of premature infants including ELBW in developed countries over the past three decades. The purpose of this study was to determine the outcome of ELBW infants and to identify the factors associated with survival in a rural hospital in Nigeria.

Method: All the neonates admitted into the unit weighing less than 1000 grams at admission were enrolled. The birth place, gender, gestational age (GA), birth weight, postnatal age, temperature, blood sugar at admission and outcome were documented. None of the babies received surfactant or assisted ventilation.

Results: Twenty-nine out of 992 neonates (3%) admitted into the neonatal unit over the period were ELBW. The survival rates of the inborn and outborn neonates were 33% and 14% respectively.

Conclusions: Factors associated with increased survival were inborn, $GA \geq 28$ weeks, birth weight of 750gm, inborn and admission within two hours of life.

Keywords: Survival, Extreme, Preterm.

Introduction

Preterm deliveries account for 60-75% of perinatal mortality worldwide.^{1,2} Prematurity is related to 40-60% of these deaths; with the extremely low birth weight (ELBW) category having over a 100-fold mortality risk compared to the normal birth weight (NBW) infants.^{3,4} There has been significant improvement in outcome of premature infants in developed countries over the past three decades.⁵⁻⁷ Factors that have contributed to the improved outcome include use of antenatal steroids, surfactant therapy and mechanical ventilation.^{8,9}

The same however cannot be said of developing countries. The purpose of this study was to determine

the outcome of ELBW infants and to identify the factors associated with good outcome.

Study Location

The study was done at the Special Care Baby Unit (SCBU), of Irrua Specialist Teaching Hospital (ISTH), Edo State, Nigeria. Irrua is a rural setting and has a projected population of 129,421.

The SCBU has a capacity for 26 neonates; with an average annual admission rate of 500. The Facilities available include Incubators, Cots and Phototherapy units. There are no facilities for invasive assisted ventilation, parenteral nutrition or surfactant administration. There are Specialist and resident Pediatricians as well as Pediatric and general nurses attending to the babies.

Subjects and Method

All the neonates admitted into the unit weighing less than 1000 grams at admission were enrolled. Data was obtained from patient's case notes.

The information extracted includes the birth place, gender, gestational age (GA), birth weight, postnatal age, temperature and blood sugar at admission. Gestational age was determined by information obtained from the last menstrual period, antenatal ultra-sonography and postnatal gestational assessment (using the New Ballard Score). In addition, morbidities, duration of hospitalization and outcome were also documented. Outcome was classified as died or survived.

Results

General characteristics of the subjects.

Twenty-nine out of 992 neonates (3%) admitted into the SCBU over the period were ELBW. Those delivered in the hospital labour ward (inborn) were 15 (52%) while those delivered outside the hospital (outborn) were 14(47%), there were 2210 live births in the Hospital over the period, putting the incidence rate of ELBW at 7.2/1000 live births. Seventeen (58.6%) of the neonates were male, while 12(41.3%) were female. The duration of hospitalization for discharged neonates ranged from 69 to 92 days with a mean of 81.4 days.

Figure 2 shows that there were no survivors with birth weight less than 750grams, the category with the highest survival rate was the 950gm category. The Figure did not however reflect increasing survival with increasing GA, the numbers are however too small to make draw valid conclusions.

Table 2 reveals that inborn neonates had almost 2.5 fold survival compared to the outborn, while admission within two hours of birth conferred a four-fold survival advantage.

Gestational age was most closely associated with survival, although the relationship did not attain statistical significance. Survival was highest in those 28 weeks and above, while mortality was 100% in those below 26 weeks gestation.

Discussion

Low birth weight infants contribute significantly to childhood morbidity and mortality.¹⁻³ The contribution of ELBW to neonatal admissions is usually very small, however they have the longest hospital stay and require intensive care facilities and neonatal specialist care more than other neonates.¹²

In this study, ELBW constituted three percent of neonates admitted into the neonatal unit. This was higher than those recorded by Trotman et al, Shankar et al and Okoji and Oruamabo who had 1%, 1.07% and 1.9% respectively. This higher number could have been related to the involvement of women in farming activities in this predominantly agrarian rural community which may predispose to preterm labour. In addition, there was no other health facility equipped to care for extreme preterm neonates in the locality.

The survival rate of the inborn neonates in this study was 33%, none of whom received surfactant or assisted ventilation, this was similar to the 32% survival rate reported by Velaphi et al in South Africa, higher than the 12% and 10% reported by Ali in Trinidad/Tobago and Okoji and Oruamabo in Port-Harcourt, Nigeria respectively, where there was limited or no access to surfactants.^{15,16,14} The survival rate was however less than 52% and 47% reported by Suthida et al and Trotman and Lord in India and Jamaica respectively, where surfactant administration and mechanical ventilation were part of the routine care provided.^{11,12}

Birth weight of 750g or more was associated with higher survival rates. This was comparable with the study by Trotman et al, where neonates weighing 751-999g had almost five-fold survival compared to those between 600-749g.¹² The same trend was reported by Suthida et al, Shankar et al and Velapi et al.^{11,13,15} The relationship between birth weight and outcome is more likely to be related to the GA.

An inverse relationship exists between gestational age and survival rate of ELBW. We observed the highest mortality for babies delivered at gestational age ≤ 26 weeks and the highest survival rates in those ≥ 28 weeks. This was similar to findings by Suthida et al, Trotman and Lord and Shankar et al.¹¹⁻¹³ This is not unexpected, as the alveolar phase of lung development commences at 26 weeks gestation. Therefore severe respiratory distress syndrome would be the most common cause of early neonatal mortality in this extreme preterm neonates and survival is highly unlikely without exogenous surfactant administration and mechanical ventilation.¹⁷

Fourteen percent of outborn neonates in this study survived compared to 33% of the inborn. The reasons for higher mortality in neonates delivered outside our facility are quite obvious: acute complications like hypothermia, hypoglycemia, apnea, intraventricular haemorrhage and infections are likely to have occurred in the setting of delayed presentation and poor transport conditions. The use of antenatal steroid may also have improved the survival among the inborn group. The lower survival rate found among those admitted after two hours of birth is also related to the complications associated with delay and poor transport. These findings are therefore not entirely surprising as preterm neonates are best transported in-utero.

Neonatal transport services are virtually nonexistent in this part of the world, it is therefore imperative to further educate healthcare providers on the need to appropriately refer women with preterm membrane rupture or contractions. Furthermore the education of women during antenatal care should emphasize the implications of liquor drainage and febrile illness before term. Regionalization of Perinatal services, as practiced in other climes like United Kingdom, may also improve newborn survival in Nigeria.

In developed countries where there is almost universal access to mechanical ventilation, surfactant administration and parental nutrition, survival rates as high as 40-55% for neonates weighing 601-750g and 60- 85% for those weighing 751-1000g, have been documented.^{7,8}

This study shows a direct relationship between duration of admission and cost of treatment. This huge economic burden can be minimized through obstetric measures that are aimed at preventing preterm delivery, through close monitoring of high risk pregnancies and judicious use of tocolytics to prolong gestation. These measures need to be optimized in order to decrease the number of ELBW infants delivered with the associated morbidity and mortality and the attendant huge economic burden particularly in resource poor settings like ours. It is also imperative to stress the need to strengthen and escalate health insurance schemes in Nigeria, especially in rural and suburban areas like our locale. This is because the practice of out-of-pocket funding for healthcare in a society where over 50% of the population live below the poverty line has prevented many from seeking appropriate healthcare services.

The average duration of admission was 81 days for the ELBW neonates who survived in this study; this is due to poor weight gain. This is not unrelated to

the lack of parenteral nutrition. In addition to poor weight gain, the neonates are also at increased risk of neonatal hypocalcemia and micronutrient deficiencies.¹⁸ Problems associated with prolonged hospitalization are nosocomial infections, caregiver burnout and lack of space to admit other neonates. The practice of kangaroo mother care can significantly shorten hospital stay for preterm neonates.

This report shows that in spite of limited resources and access to neonatal intensive care facilities, a decent survival rate can be achieved for babies up to 28 weeks gestational age weighing greater than 750

g. The use of improvised bubble continuous positive airway pressure (BCPAP) may be an effective low-cost intervention for respiratory support to improve survival.¹⁹

In conclusion, the outcome of ELBW in this centre is similar to those with similar infrastructure in developing countries. The provision of sophisticated equipments is crucial to the improvement of neonatal outcome in the long term, however, there is a need to adapt low-cost technology, improve antenatal care services, health seeking practices and referral practices to achieve progress in the immediate period in resource-limited environments.

Table 1: Physical Characteristics of the subjects

Parameter	Mean +/- S.D	Range
Gestational age (weeks)	26.8 +/- 1.6	24 - 29.8
Birth weight (gm)	816 +/- 105	600 – 950
Age at admission (hrs)	2.8 +/- 4.9	0.1 – 20
Temperature at admission(°C)	35.2 +/- 0.5	35 – 36.9
Blood sugar at admission (mmol/L)	2.9 +/- 1.8	0.7 – 8.7

S.D: Standard deviation.

Table 2: Outcome based on birth place, gestational age and postnatal age on admission.

VARIABLE	FREQ	% SURVIVAL	P
Birth place			
Inborn	15	33	0.445
Outborn	14	14	
Gestational age (weeks)			
24 – 25.9	7	0	0.066
26 – 27.9	12	25	
28 – 29.9	10	40	
Postnatal age (hours)			
≤ 2	17	35	0.218
> 2	12	9	

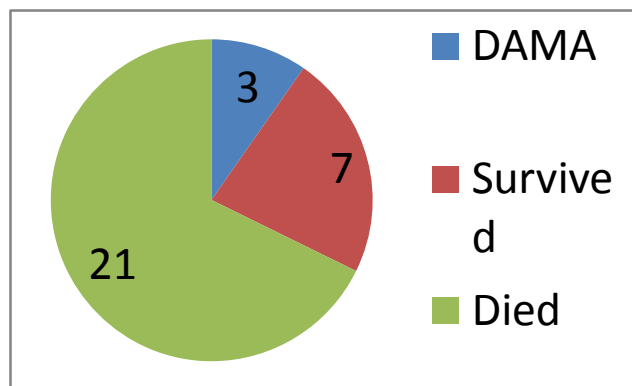
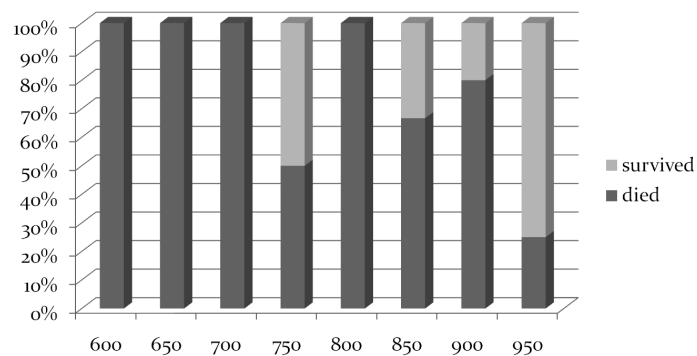


Figure 1: General outcome of the neonates



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