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(CASE REPORT)

Successfully managed extremely low birth weight baby in a resource limited setting

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Abstract

Birthweight significantly influences the health and nutrition of a newborn. Low birth weight (LBW) is a global problem in both high and low income countries and it carries significant morbidity and mortality. In Nigeria, Prematurity, has been found to be a major cause of LBW. The burden of managing these patients especially those who are extremely low birth weight(<1000g) is high, due to lack of specialized and equipped newborn units, thus survival rate is still low in the country. This is a case report of an extreme low birth weight (ELBW) preterm female baby, who is a second twin, delivered at a gestational age of 23 weeks +5days, with a birth weight of 600g, and was successfully managed and discharged home after 59 days on admission. This highlights that survival rate of ELBW neonates delivered before the age of viability, can be improved even in low income countries(LICs) or Low middle income countries(LMICs) with adequate newborn care and good nursing care.

Keywords: Low Birth Weight; Prematurity; Survival rate; Low-Income Countries

1. Introduction

Low birth weight (LBW) according to World health organization (WHO), is defined as birth weight of <2500 grams (5.5 pounds), it is further classified as extreme low birth weight (ELBW<1 kg), very low birth-weight (VLBW ≥ 1 kg to <1.5 kg) and low birth weight (LBW ≥1.5 kg to<2.5 kg) [1]. The World Health Organization adopted 'A World Fit for Children' declaration with the aim of reducing the global incidence of low-birth weight by one-third [1,2]. Globally about 30 million low birth weight babies are delivered yearly, and 70% of are found in the low-income countries (LIC) or developing nations [1]. The official age of viability in Nigeria is 28 weeks gestational age, but this differs from the definition of age of viability by the Royal college of Obstetricians and gynecologist, that includes babies who are delivered at 23+0 weeks to 24+6 weeks gestation. This shows that babies born at a lower gestational age and birth weight has more chances of survival in HIC than LIC [3]. In Nigeria about 5-6 million LBW infants are born yearly with almost 100, 000 ending in fatality [2]. Mortality and morbidity as well as disability in infancy period is largely determined by weight of child at delivery, thus LBW is an important determinant of newborn survival and health [1,2]. Many studies have shown that LBW is due to preterm birth (before 37 weeks of gestation) or restricted fetal (intrauterine) [4]. About 50 % incidence of low birth weight (LBW) babies is due to prematurity, and pre mature LBW babies especially those whose weights are below 1kg, has rare chances of survival, and when they survive they are at risk of morbidities such as respiratory distress syndrome, necrotizing enterocolitis(NEC) and intraventricular haemorrhage [3,5]. Worldwide, there is improvement in the survival of infants with ELBW, which can be due to accumulated experience of the physician and appropriate care of LBW infants[6] , however, the success in LIC such as Nigeria has not been remarkable as the survival of preterm LBW babies are still low.

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This case report demonstrate that extreme low birth weight preterm babies, delivered before the age of viability in LIC can survive if optimal newborn and good nursing care are employed. Also, continuing reporting of such cases can inform decision for downward review of Nigeria's age of viability for newborn survival. Hence, physicians taking care of such babies, will no longer entertain ethical bias to actively manage them when they present to their facilities.

2. Case report

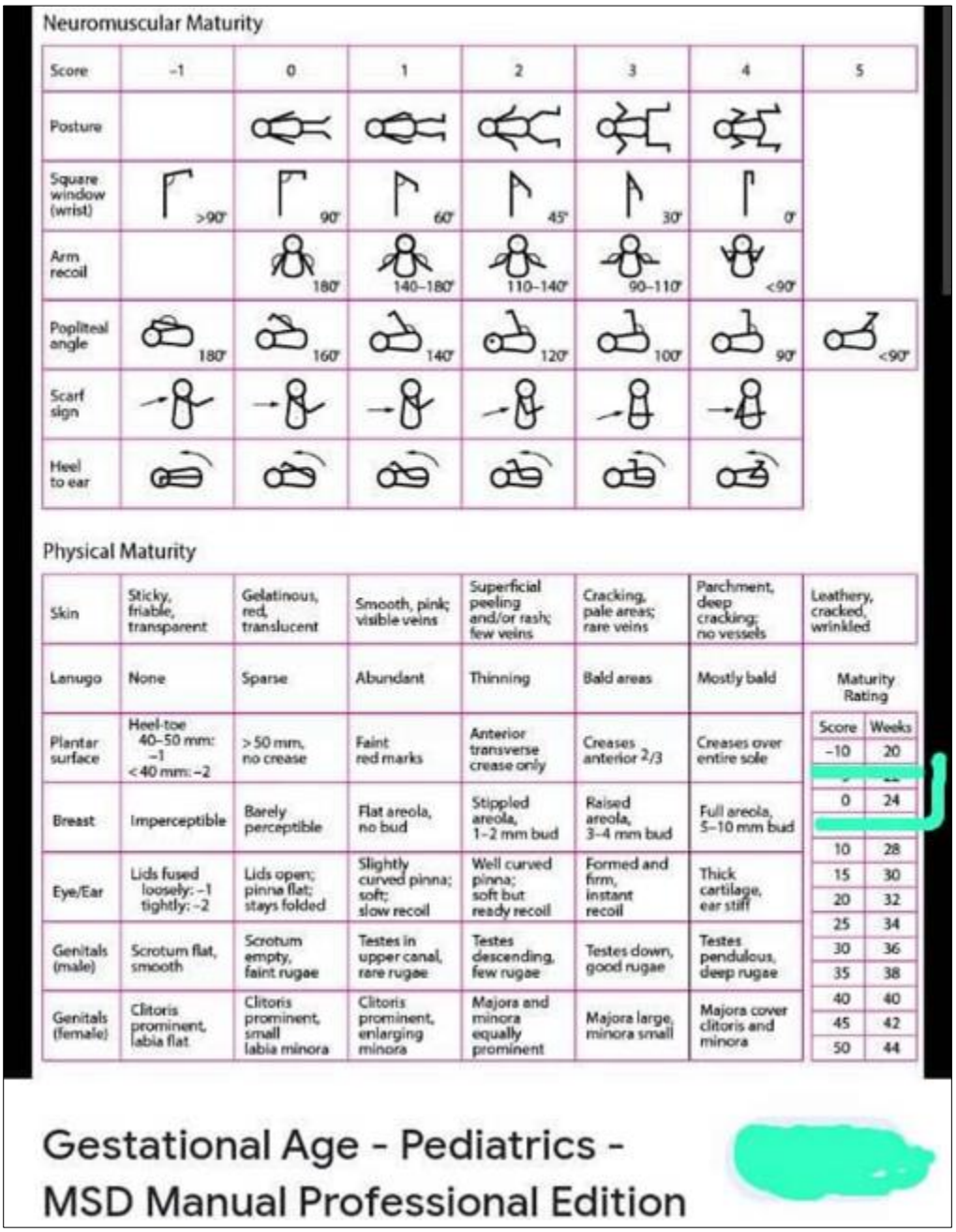

Figure 1 Gestational age estimation using ballard scoring sheet

C.O was a 4 hour old preterm extremely low birth weight(ELBW) female neonate delivered vaginally in a private hospital to an unbooked 24 year old P $^{1+0}$ (1 Alive), with no background ill health. The pregnancy was uneventful until 23 weeks +5 days of gestation, when she entered into labor following an abdominal trauma deliberately inflicted by a neighbor, who punched her on the abdomen with his elbow. This was followed by bleeding per vagina, and lower abdominal pain that necessitated her going to a nearby health center, where she was receiving antenatal care. She was sent for an abdominal scan, which later came out and showed it was a twin pregnancy, and also detected placenta Previa. A nurse at the primary health facility, treated her, and later discharged her home on the fourth day. However, patient's

condition did not improve, necessitating presentation at a nearby private hospital. At the hospital, she was found to be in labor, and after a day at the hospital, she delivered the twin babies vaginally. Mother could not recall if both twins cried immediately at birth. Due to difficulty in assessing incubator nursing for the babies, they were advised by a relative to bring the babies to COOUTH –Amaku. Babies were brought into our facility 4hrs after delivery, wrapped in a cotton clothing on May 20, 2022. Apgar score at delivery could not be ascertained, as there were no accompany notes. Mother could not recall the first day of her last menstrual period last menstrual. Estimated gestational age was 23 weeks +5 days from the obstetric scan done prior to delivery, Ballard score estimation gave a score of zero (0) which is in keeping with gestational age of 24 weeks. See fig 1.

Figure 2 Photo of baby C.O on the day of admission is shown in fig 2 below

Figure 2 Photo of baby C.O on the day of admission

The second twin was male, who on presentation had no sign of life.

Physical examination of the female twin showed an extreme small but appropriate for age baby in no obvious respiratory distress, globally pink, anicteric, acyanosed, subnormal temperature of 35 °C, lanugo hairs, with weight of 0.6 kg, length of 29 cm and head circumference of 23 cm, which were all appropriate for age. See fig 3 above.

Oxygen saturation with pulse oximeter on room air was 88%. The rest of the physical examination findings were normal. The initial investigations done were normal except for the presence of hypoglycemia shown by random blood sugar of 42mg/dl. She was admitted into the out born section of our special care baby unit (SCBU), initially placed on a radiant warmer, and later transferred to the incubator set at optimal temperature for maintaining body temperature while ensuring minimal insensible water loss, she was nursed lying supine while ensuring proper soft bedding support to prevent bedsores. She was started on intranasal oxygen via nasal prongs after which oxygen saturation improved, and was later connected to improvised bubble continuous positive airway pressure (CPAP). She received IN02 therapy for 49 days post-natal, with target SPO2 set at 91-100%.

Intravenous 10% glucose water was also commenced at 80mls/kg in 24hrs @ 2 drops/min to maintain euglycemia. After 48hrs she was maintained on 4.3% Dextrose in 1/5TH saline and 50% D/W at 100ml/kg/24hrs adjusted to meet daily fluid requirement based on the quantity of breast milk child received in the last 24 hrs. Intramuscular Vitamin K1 1 mg start was given on the first day of presentation to prevent hemorrhagic disease of the newborn. She also received prophylactic antibiotics (Ceftazidime), which was switched to intravenous Meropenem on the 5th to 12th day of life on account of suspected neonatal sepsis. Aminophylline was given to prevent apnea of prematurity, as caffeine citrate was not readily available in our immediate environment. Prophylactic phototherapy was commenced but stopped on day 10 post natally, when the result of serum bilirubin was 3.2 mg/dl. Trophic feeding by Nasogastric gavage was commenced with 1.5 mls of expressed breast milk 3 hourly on the 2nd day of life. The volume was gradually increased every two days while ensuring, there was no aspirate nor tensed abdomen as child was at risk of necrotizing enterocolitis (NEC). She was maintained on breast milk diet throughout the hospital stay while setting caloric goal at 100-120kcalories of energy. He was making urine and stool adequately. Child was switched to cup feeding on the 50th day on admission , and NG tube removed on day 54 while child continued oral feeding via cup and soon, initially done by the nurses , but

subsequently by the mother after she had been duly taught and had observed the SCBU nurses fed child with. She had ophthalmia neonatorum on the 19day of life for which she received chloramphenicol eye drop for 1 week. Mother was involved in the care of baby as soon as she reported to our unit. She made adequate supply of expressed breast milk (EBM), gave child emotional stimulation by smiling to the child while standing beside the incubator, at least once per day. However, minimal handling was maintained to reduce the risk of infection. The child's father also gave the wife adequate emotional support.

She had anaemia of prematurity on the 24th day postnatal, the packed cell volume estimation showed 0.19l/l. She was transfused with 36ml of sedimented cells, 12mls daily for 3/7 days in aliquots of 4mls every 1hr. Post transfusion Packed Cell Volume (PCV) 48hrs later was 0.43l/l, and subsequently she was placed on subcutaneous erythropoietin on the 45th day of life, 50IU every alternate day.

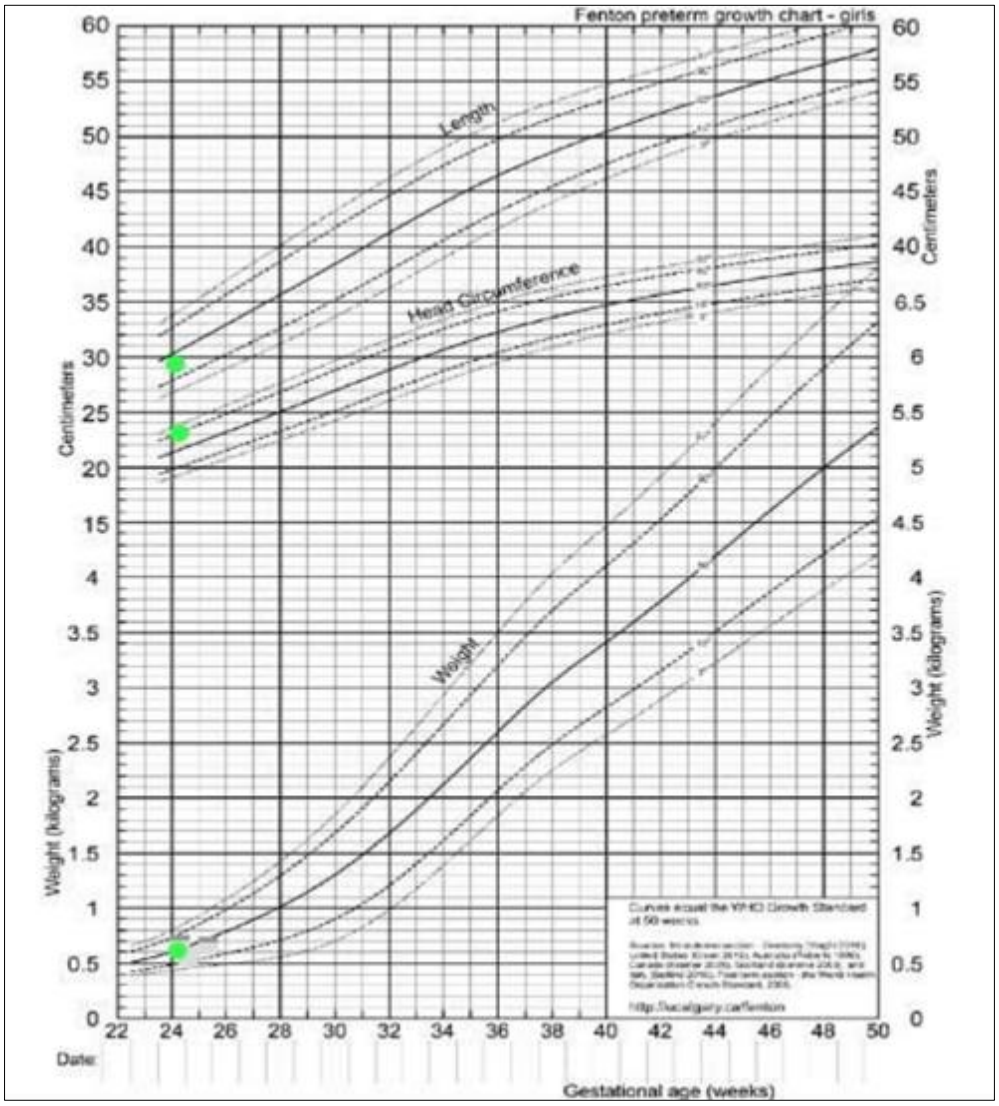

Figure 3 Fenton TR Gestational age estimation for Preterm babies

Blood investigations which included retroviral screening, full blood count (FBC), Hepatitis B and C screening, malaria parasite, blood culture, serum bilirubin were done. Result are as in Table 1 below

Screening for congenital heart disease with echocardiography, metabolic screening and magnetic resonance imaging (MRI) to r/o complications like intraventricular hemorrhage, and auditory brain ear response test (ABER) were not done, as resources were limited.

Kangaroo mother care was commenced when child was 1.5 kg, a week prior to discharged, and mother was encouraged to continue at home, for optimal temperature and bonding.

She was discharged on day 59 (ie 32 weeks plus 6 days). At discharge neither home oxygen, nor gavage feeding was required, weight, and, occipito-frontal circumference (OFC) at discharge were 1.5kg and 27cm. She was taking a total of 171ml/kg/day of expressed breast milk. She was given a Multivitamin syrup on discharge. Baby went home in a stable state of health, and was billed for follow up in our newborn clinic 2 weekly. During her follow up visit in clinic at a corrected age of 40 weeks [September 9, 2022], she weighed 2.35 kg OFC; 32.5 cm. Clinically, she was stable and had commenced her routine immunization vaccines. Fig 4 below is a picture of baby C.O at discharge.

Table 1 Investigation flow chart

Investigation	**Dates**					
	21/5/22	**30/5/22**	**6/6/22**	**13/6/22**	**16/6/22**	**27/6/22**
WBC mm^3	6.9	16.3				
Neutrophils%	88.4	68.6				
Lymphocytes%	11,6	17.3				
Serum bilirubin(mg/dl)		3.3				
Haematocrit (L/L)	0.49	0.37	0.36	0.19	0.43(post transfusion)	0.42
Mean corpsular haemoglobin(pg)	43.4	37.7				
Mean cell volume(FL)	111	106				
Mean cell haemoglobin concentration(g/dl)	39.3	35.4				
Platelets x 10^9		60				
Retroviral screening	Negative					
Hepatitis B& C screening	Negative					
Malaria parasite	Negative					
Blood group				A^+		

Figure 4 Picture of baby C.O at discharge

3. Discussion

LBW can result in significant morbidity and mortality in newborn infants as well as sequel in later life [1,7,8]. The prevalence of LBW in Sub-Saharan Africa is 9.47% [9]. A population based study done in Nigeria in 2013 showed a prevalence of 7.3% [9]. However, it differs across different states in Nigeria. In River state Ugboma et al reported 8.3%, Mbazor and Umeora reported 3.4% in Benin [8], and in Jos Yilgwan et al reported 12.7% [10]. The reason for the differences observed in the prevalence, is not clear but may be due to different incidence of preterm delivery, and different ethnicity of the study population [11]. The greatest proportion of these adverse outcome are seen in ELBW preterm (birth weight < 1kg), delivered before the age of viability of 28 weeks in Nigeria [2,3]. In our environment, the most common cause of LBW babies is prematurity due to preterm deliveries, 12.6% of which was attributed to multiple gestation, as seen in the index case being discussed. Nigeria has been reported as the country with highest incidence of multiple pregnancy worldwide [8,12]. Other risk factors for LBW includes; maternal (inadequate nutrition, young age, disease conditions etc); fetal (congenital malformation, fetal diseases etc), and environmental (smoking, substance abuse, and other pollutants [1]. In high-income countries, approximately 95% of LBW babies are born between 28 -32 weeks survives, with 70 % of them having no sequel [13]. This is contrast to what is seen in low-income countries such as Nigeria, where only 30% of LBW babies, delivered between 28-32 weeks survive, and virtually all LBW preterm delivered before 28weeks of gestation die within the first few weeks of life [13]. These extreme LBW preterm babies contribute significantly to neonatal mortality in LIC. This is supported by the finding in a study done by Osuaorah et al in Enugu, which showed 80% case fatality rate for ELBW babies, 41 % and 17% for VLBW babies and LBW babies respectively, showing that ELBW babies are twenty four times more likely to have fatal outcome more than LBW babies [1]. Also a prospective study done in India reported a mortality rate of 100% in babies weighing < 1kg (ELBW) [2]. Neonatal morbidities seen among LBW babies are neonatal jaundice, birth asphyxia, septicaemia, respiratory distress, hypothermia, hypoglycaemia, anaemia, NEC, intraventricular haemorrhage, apnea etc. as well as long-term sequele such as developmental and neurological deficits [8,4,14]. Jayalakshmi Pabbati et al in India reported most common morbidities to be neonatal jaundice(40.09%), and respiratory distress(18.16%) in LBW babies, whereas apnea, birth asphyxia and respiratory distress where seen more in preterm LBW babies [5]. This is similar to a study by Osuorah et al that showed that apneic attacks, and hypoglycaemia were also commoner in ELBW babies compare to LBW babies [1]. Hypoglycaemia, hypothermia, neonatal sepsis and anaemia of prematurity were observed in our index case, which was treated.

The rate of survival of ELBW babies in HICs has improved over the decades [7]. This is due to employment of modern technology that allows many of these preterm LBW neonate to survive, but such care is yet to be widely accessible in LICs or LMICs [5]. In the LICs or LMICs, management of preterm LBW babies particularly the ELBW babies is characterized with difficulties, occasioned by scarcity of resources and very low coverage of the National Health Insurance Schemme leading to poorly equipped special care baby units, thus survival rate remains low [15]. However, there have been reports of survival of LBW babies in some centres in Nigeria. Ikechebelu et al in Nnewi, South Eastern Nigeria reported the survival of VLBW baby delivered before the age of viability, who weighed 1.03kg, this could be due to use of antenatal steroid prior to delivery [16]. Audu LI also noted that there is 50% survival rate of LBW babies born at 26 weeks of gestation, but low survival rate for extreme preterm LBW babies [3].

Despites the lack of modern facilities for neonatal care in our environment, the case discussed above has shown that appropriate care of LBW infants including ELBW babies is achievable. Ensuring optimal feeding with only breast milk, temperature maintenance, clean cord care, minimal handling to prevent infection, early detection and treatment of infections and complications, can reduce mortality rate of LBW babies, thereby increasing survival rate. Also, this report has strengthened the reports and recommendation from previous authors for downward review of age of viability in Nigeria (currently at 28 weeks), as babies born before 28 weeks age of viability are increasingly surviving. However, there is need for close follow up of these children to ensure that they do not develop sequel of LBW in the future.

There is need to strengthen the country's health system, especially in the areas of highly equipped new born special care units, capacity building of relevant staff and upscaling maternal, neonatal and child health care; as well as making the NHIS effective and accessible to eliminate out-of-pocket health care spending.

4. Conclusion

Extreme low birth weight, preterm babies can survive in low income countries despite inadequately equipped neonatal intensive care units, if optimal newborn care, good nursing care, and early initiation of kangaroo mother nursing is utilized in managing such babies. Hence, age of fetal viability in Nigeria can be reviewed downwards as babies considered not viable are increasing surviving with optimal care.

Compliance with ethical standards

Acknowledgments

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Statement of ethical approval

Approval was obtained from the hospital health research ethical committee.

Statement of informed consent

The parents of Baby O.C gave a verbal consent concerning reporting their baby's case for publication. They also consented to the pictures that were taken during admission being used for the publication.

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