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OUTCOMES FOR PRETERM BABIES DURING THE NEONATAL PERIOD IN KISII TEACHING AND REFERRAL HOSPITAL, KENYA

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Abstract

Purpose: Preterm birth is a global problem with the greatest burden experienced in sub-Saharan Africa and South Asia. In Kenya it is estimated that 12.3/100 live births are born preterm and prematurity is the leading cause of death in the first month of life, contributing to 35% of all neonatal mortality. In high income countries survival rate for preterm babies has increased due to offering care that is evidence based. However, in middle and low income countries the uptake of desired practices is low leading to poor outcomes. The aim of the study was to describe the outcomes for preterm babies during the neonatal period in Kisii Teaching and Referral Hospital (KTRH).

Methods: A cross sectional descriptive study was conducted in the newborn unit of KTRH between April and May 2015. Fifty three preterm babies' parents consented to participate in the study through census sampling method. Data was collected using a checklist and analyzed using descriptive statistics.

Results: Thirty three (62%) preterm babies were born in the facility and 20(38%) were referred from other facilities. The outcomes experienced included respiratory distress syndrome 30(56.6%), feeding difficulties 28(52.8%), jaundice 12(22.6%), Hypothermia 1(1.9%), anemia 5(9.8%), hypoglycemia 1(1.9%), sepsis 4(7.5%), hemolytic disease of the newborn 1(1.9%), necrotizing enterocolitis 1(1.9%) and death 26(49.1) where 19(73.1%) had RDS, and 17(65.4%) had difficulty in feeding.

Conclusion: Respiratory distress syndrome and difficulty in feeding were the most common complications experienced by the preterm baby.

Recommendations: This study recommends prompt and adequate management of preterm babies diagnosed with RDS and feeding problems

Keywords: *Outcomes, Neonatal period, preterm, Kisii Teaching and Referral Hospital*

1.0 INTRODUCTION

A preterm is a baby born before the end of the 37th gestation week, regardless of birth weight (Fraser, Cooper, and Nolte, 2010). Preterm babies are mainly classified according to the gestational age as extremely preterm for babies born less than 28 weeks, very preterm for babies born between 28 weeks and <32 week and lastly moderate or late preterm for those babies born between 32 to <37-week gestation (Blencowe *et al.*, 2013).

They can also be classified according to their weight as; low birth weight (LBW) babies for those weighing below 2500 grams at birth, very low birth weight (VLBW) babies for those weighing below 1500 grams at birth and extremely low birth weight (ELBW) babies for those who weigh below 1000 grams at birth (Fraser *et al.*, 2010; Perry, Hockenberry, Lowdwemilk, & Wilson 2010).

Preterm birth rates appear to be increasing in most of the countries where data is available. The increase could be due to improved registration of most preterm babies associated with increase viability and improved gestational assessment. Other possible reasons would be due to increases in maternal age, access to fertility treatment, multiple pregnancies and underlying health problems in the mother with an increase in provider initiated preterm births in moderate and late preterm infants (Blencowe *et al.*, 2013; Howson *et al.*, 2013). Majority of the countries in low and middle-income regions, it is not possible to estimate trends in preterm birth over time as a result of insufficient data to provide reliable evidence of a time trend for preterm birth over all. Some countries in some regions like South and Eastern Asia have data suggesting that there is an increase of preterm birth rates over time (Blencowe *et al.*, 2013).

Mortality rate increases with decreasing gestational age and babies who are both preterm and small for gestational age are even at higher risk. Babies born at less than 32 weeks represent about 16% of all preterm birth and mortality is highest among them especially those from low-income countries. In high income countries half of the babies born at 24 weeks may survive while in low income setting, half of the babies born at 32 weeks still die due to lack of basic simple care (Blencowe *et al.*, 2013).

In 1990, around 60% of babies born at less than 28 weeks' gestation survived in high income settings with approximately two thirds surviving without impairment. Ninety-five percent of those born at 28-32 weeks survived with more than 90% surviving without impairment (Blencowe *et al.*, 2013). In contrast, in many low income countries only 30% of those born at 28-32 weeks survive with almost all those born at <28 weeks dying in the first few days of life (Lawn *et al.*, 2013).

Preterm birth is considered a syndrome because it occurs due to a variety of reasons (Blencowe *et al.*, 2013; Villa *et al.*, 2012). According to Blencowe *et al.*, (2013) and Fraser *et al.*, (2010), the causes can be classified into two broad subtypes; spontaneous preterm birth and provider initiated preterm birth.

Blencowe *et al.*, 2013 states that spontaneous preterm birth can be due to abrupt onset of labour or following pre-labour premature rupture of membranes (PPROM). Factors leading to spontaneous preterm birth can be due to maternal or fetal factors. Maternal factors include young maternal age or advanced maternal age, short inter-pregnancy intervals, low body mass index,

cervical insufficiency, infections like urinary tract infections, HIV, malaria, bacterial vaginitis; lifestyle e.g. stress, excessive physical work or long time standing, smoking and excessive alcohol consumption. Fetal factors include; multiple pregnancy, sex, ethnicity, congenital abnormalities.

Provider initiated preterm birth are those births that are initiated by the providers before 37 completed weeks of gestation. They are also referred as induction of labour or elective causes or medically terminated pregnancy (Fraser *et al.*, 2010). Factors leading to elective birth could be maternal or fetal indications or due to other none medical reasons (Villa *et al.*, 2012).

Maternal reasons for elective birth include; severe pre-eclampsia, uterine rupture, cholestasis, underlying maternal conditions e.g. renal disease, hypertension, obesity, diabetes (Blencowe *et al.*, 2013; Fraser *et al.*, 2010). Fetal reasons for elective caesarean include fetal distress, fetal growth restriction with abnormal stress, rhesus incompatibility, congenital abnormality (Fraser *et al.*, 2010). There are also placental reasons associated with preterm birth; placenta abruption, placenta previa, chorioamnionitis, placenta giant chorioangioma, circumvallate placenta (Villa *et al.*, 2012).

Preterm babies face many challenges due to immaturity. These challenges include; feeding difficulties due to lack of coordinated sucking and swallowing process which start at 34 week gestation. Preterm babies need help to feed and are more likely to aspirate (Lawn *et al.*, 2012).

Premature babies are at a high risk of dying once they get an infection. Most neonates who die from neonatal sepsis are preterm (Lawn *et al.*, 2012; MOH 2012). It is estimated that sepsis in preterm babies is about 30-60% while mortality rate due to sepsis is 40-70% (Darmstadt & Donolo's, 2000).

Preterm babies get respiratory distress syndrome (RDS) due to lung immaturity and lack of surfactant in the alveoli resulting in collapsing lungs that take extra pressure to inflate (Lawn *et al.*, 2012). Majority of babies below 32 week gestation develop RDS. A study done in Eritrea found that RDS carried a poor prognosis with >90% mortality. In another study done in Philadelphia indicated that 41.0% preterm and 18.8% of the late preterm babies developed respiratory distress making a total of 59.8% (Bastek *et al.*, 2008). This can be reduced by administration of corticosteroids to women at risk of preterm labour or are in preterm labour (Lawn *et al.*, 2013; Waiswa, 2010).

Preterm babies develop jaundice due to immature liver which cannot metabolize bilirubin. In severe jaundice where bilirubin level is above 165 $\mu\text{mol/l}$ (10 mg/dl) the preterm babies have a higher risk of kernicterus since their blood brain barrier is less well developed to protect the brain (Lawn *et al.*, 2012; Fraser *et al.*, 2010). A study done in Philadelphia designated that 75.4% of the preterm and 40.6% of the late preterm developed jaundice (Bastek *et al.*, 2008).

One in every five preterm develops Intraventricular Hemorrhage (IVH) the first few days after birth. It has been associated with the severity of RDS and hypertension (Lawn *et al.*, 2012). Another complication preterm babies may experience is necrotizing enterocolitis. It is a rare condition which affects the intestinal wall of every premature baby. It is ten times more common in babies who have been fed with formula feeds as compared to those fed on breast milk (MOH, 2012).

Retinopathy of prematurity (ROP) is also another problem faced by premature infants. It is due to abnormal proliferation of the blood vessels around the retina of the eye. It is more severe if the baby is given too high levels of oxygen (Lawn *et al.*, 2012; Fraser *et al.*, 2010).

Anemia is due to delay in producing red blood cell as the bone marrow is immature (Lawn *et al.*, 2012).

Each year it is estimated that, 1.2 million babies are pre-maturely born in developed countries; 3.8 million preterm babies are born in middle income countries while 10.0 million are born in low income countries (Lawn *et al.*, 2012). Africa has the highest rate of preterm birth in the world at 11.9% and Eastern Africa has a rate of 14.3% (Beck *et al.*, 2010). In Kenya, 2010 it was estimated that 12.3% births are preterm babies making it to rank number 48 in the world (WHO, UNICEF and March of Dimes, 2012). Knowing the outcomes of preterm babies born at Kisii Teaching and Referral Hospital will help the hospital administration to plan for their care in terms of drugs, equipment, supplies and health care providers.

The purpose of this study was to describe the preterm outcomes during the neonatal at Kisii Teaching and Referral Hospital in order to inform policy. The objective of the study was to describe the preterm outcomes during the neonatal period at Kisii Teaching and Referral Hospital.

2.0 METHODS

The study was carried out in Kisii Teaching and Referral Hospital, which is a county referral hospital located in South Western Kenya. (Oparanya, 2010). It is the largest government owned hospital in the county. It serves as referral hospital in South Western Kenya; covering South Nyanza, South Rift and the entire Gusii region (Akama *et al.*, 2012).

The population in this study was all preterm babies admitted into the newborn unit, between 28^{0/7} to 36^{6/7} gestational weeks. The study used a cross sectional descriptive design which describes the outcomes for preterm babies during the neonatal period in the newborn unit, in Kisii Teaching and Referral Hospital.

Census method was used whereby all 53 preterm babies born during the period of study were recruited into the study as they were admitted. The outcome of the preterm was evaluated from the records (notes, cardex, partograph and nursing care plans) for a maximum of 28 days, from birth until discharge, transfer, referral or death and entered into the check list. Completed check list were coded and entered into the computer using statistical package for social sciences (SPSS) version 20. Data was summarized using descriptive statistics (frequencies, means and standard deviations). Chi-square test was used to check for significant relationship between categorized variables of interest (maternal age, antenatal steroids, and mode of delivery, birth weight, gender and gestational age) and death. Results were considered significant at $\alpha=0.05(p<0.05)$.

Ethical clearance was done by the Moi University, Institutional Research and Ethics Committee (IREC). Then permission was also sort from Kisii county research and ethics committee and Kisii Teaching and Referral Hospital Administration. The researcher further informed the unit manager of newborn unit and nurse in-charge of the newborn unit of the research and asked them to give permission. All participants were required to sign an informed consent which explains the

purpose of the study, benefits and risks before commencing the study. Human right that required protection was put into consideration. This included right to privacy, right to anonymity and confidentiality, protection from discomfort and harm and right to fair treatment.

3.0 FINDINGS

Fifty three check list for the preterm baby were completed. More than half 32(60.4%) of the babies were female and 21(39.6%) were male. The mean Apgar score of the preterm babies was 6.4(Sd1.9) and 7.1(Sd1.9) at 1 minute and 5 minutes respectively. More than half 32(60.4%) had a birth-weight of between 1501-2500 grams (fig 1)

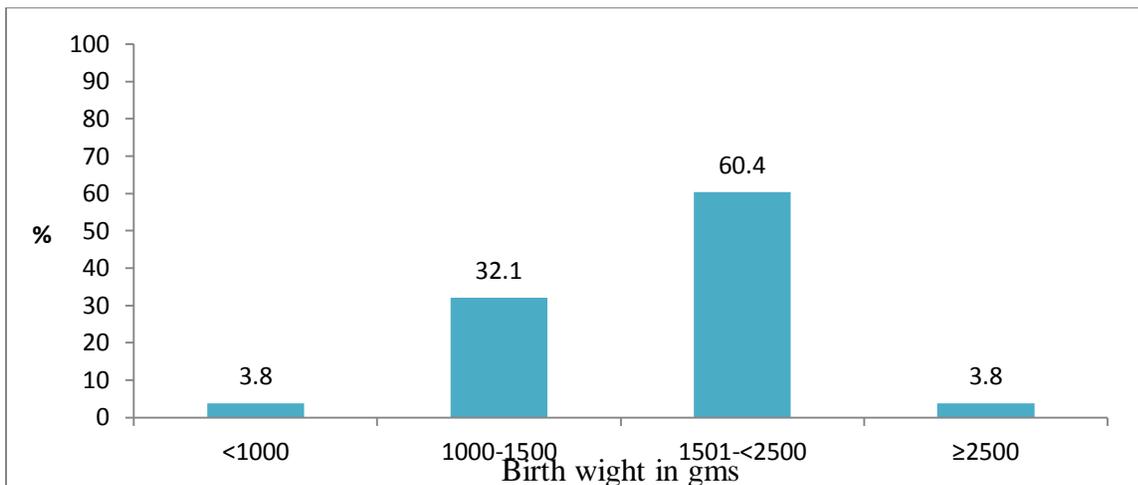


Fig 1: Birth weight of the preterm baby (gms)

Slightly more than half 30(56.6%) had gestational age of between 28 and 32 weeks while 23(43.4%) were between 32 and 36 weeks (see figure 2).

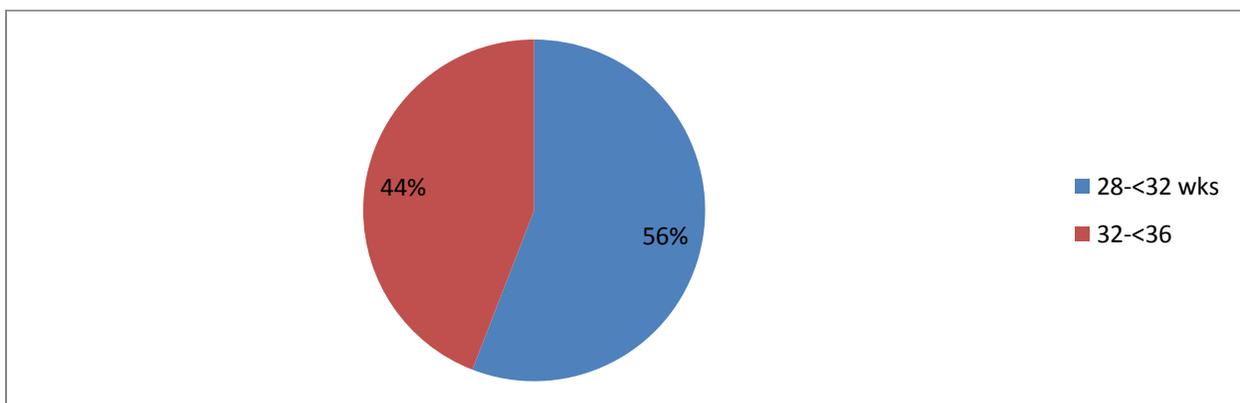


Fig 2: Gestational age

Majority of the preterm babies 30(56.6) experienced RDS, 28(52.8) experienced difficulty in feeding and 12(22.6) experienced jaundice (see table 1).

Table 1: Morbidity experienced by the preterm within 28 days

Morbidity	Frequency (%)
Respiratory distress syndrome	30(56.6)
Difficult in feeding	28(52.8)
Jaundice	12(22.6)
Anaemia	5(9.8)
Sepsis	4(7.5)
Hemolytic disease of newborn	1(1.9)
Hypoglycemia	1(1.9)
Hypothermia	1(1.9)
Necrotizing enterocolitis	1(1.9)

Among the 33 preterm babies born in the hospital 18(54.5%) were discharged while 15(45.5%) died. Those who were referred from other facilities were 20 and 11(55.0%) died while 9(45.0%) were discharged. The difference was not statistically significant ($\chi^2=0.450$, $p=0.500$).

Among the 26 preterm that died, 5(19.2%) died within 12 hours after delivery, 8(30.8%) died between 12 hours and 24 hours after delivery, 5(19.2%) died within day 1 to 3, 7(26.9%) died within 4-7 days after delivery while only 1(3.8%) 8-14 days after delivery and none died between 15-28 days as indicated in figure 3.

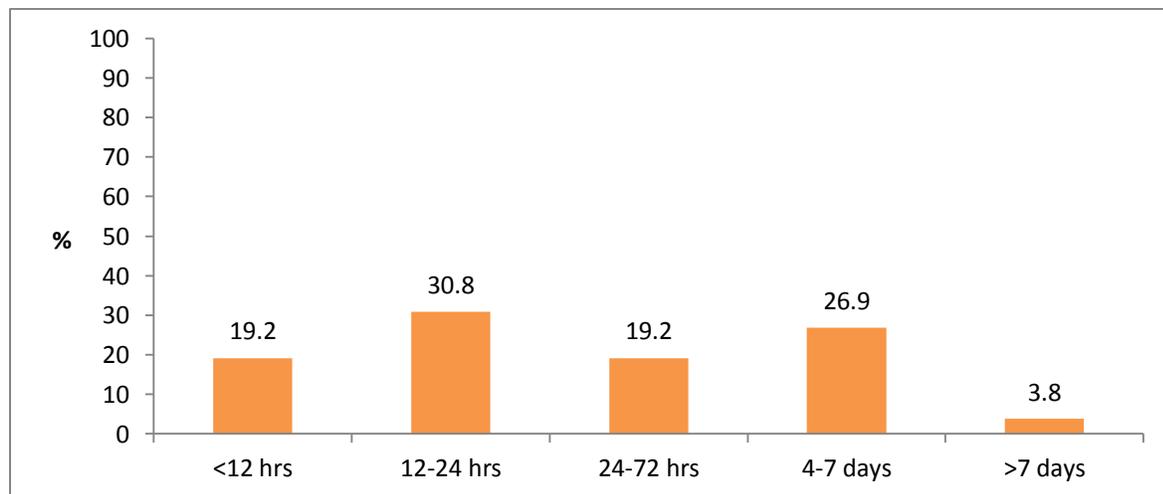


Fig 3: Time of death after delivery

Among the 26 preterm babies who died, 1(3.8%) had hypothermia, 17(65.4%) had difficulty in feeding, 1(3.8%) had sepsis, 19(73.1%) had RDS, 7(29.0%) had jaundice, 1(3.8%) had hypoglycaemia, 1(3.8%) had haemolytic disease of the new-born, 1(3.8%) had NEC and 5(19.2%) had anaemia.

As indicated in table 2, maternal age, antenatal steroids, mode of delivery, birth weight, gender, and gestational age were not significantly associated with death ($p<0.05$).

Table 2: Factors associated with the outcome (death)

Factor	Outcome		χ^2 -value	P-value
	Alive	Dead		
Maternal age				
<20	7(50)	7(50)		
20-24	5(39.5)	8(61.5)		
25-29	7(77.8)	2(22.2)	4.815	0.303
30-34	4(36.4)	7(63.6)		
>35	4(66.7)	2(33.3)		
Antenatal steroids				
Yes	6(54.5)	5(45.5)	0.072	0.788
No	21(50)	21(50)		
Mode of delivery				
Vaginal delivery	17(45.9)	20(54.1)	1.225	o.268
c/s	10(62.5)	6(37.5)		
Birth weight				
<1000	0(0)	2(100)		
1000-1500	6(35.3)	11(64.7)	5.252	0.086
1501-2500	20(62.5)	12(37.5)		
>2500	1(50)	1(50)		
Gender				
Female	14(45.2)	17(54.8)	0.719	0.397
Male	12(57.1)	9(42.9)		
Gestation age				
28-<32	14(48.3)	15(51.7)	0.078	1.000
32-36	12(52.2)	11(47.8)		

4.0 DISCUSSION

Slightly more than half of the preterm babies experienced RDS 29(54.7%). This findings are similar to a study done in Philadelphia where only 41.0% preterm and 18.8% of the late preterm babies developed respiratory distress making a total of 59.8% (Bastek, *et al.* 2008). This can be reduced by administration of corticosteroids to women at risk of preterm labour or are in preterm labour (Lawn *et al.*, 2013; Waiswa, 2010).

In this study, 28(52.8%) preterm babies experienced difficulties in feeding. Preterm babies experience feeding difficulties due to lack of coordinated sucking and swallowing process which start at 34 week gestation (Lawn et al., 2012). Those who are less than 1 kg should be fed by parenteral nutrition and those less than 1.5 kg fed by cup or spoon (WHO, 2011).

Jaundice was experienced by 12(22.6%), of the preterm babies different from a study done in Philadelphia which indicated that 75.4% of the preterm and 40.6% of the late preterm developed jaundice (Bastek *et al.*, 2008).

Sepsis was developed in 4(7.5%) of the preterm babies in the study which contrasts with the study done in Philadelphia which found 44.3% of the preterm and 7.2% of the late preterm babies developed sepsis (Bastek et al., 2008). In North America, sepsis in preterm babies is estimated at 30-60% (Darmstadt, & Dinolos, 2000). The number tends to be lower in the study since all preterm babies are initiated antibiotic treatment as soon as they are admitted in the unit.

Five (9.4%) of the preterm babies developed anemia in this study while a study done in Philadelphia found 1.6% of preterm babies and 1.4% of the late-preterm babies developed anemia (Bastek *et al.*, 2008).

One (33.3%) of the preterm who were measured temperature had hypothermia. A study done in Philadelphia found that 9.8% of the preterm babies and 1.4% of the late preterm babies developed temperature instability (Bastek *et al.*, 2008). In another study of 189 neonates found that 11.1% of the babies were hypothermic. Yet another study in Uganda on neonatal hypothermia rectal temperatures were taken at 10, 30 60 and 90minutes postpartum found that 29, 82, 83 and 79% of the newborns were hypothermic (Byaruhanga *et al.*, 2005). In this study temperature measurement was not routinely done or documented suggesting that there might have been preterm babies who might have had hypothermia but it was not realized.

Only1(1.9%) preterm baby experienced hypoglycemia in this study which is far way different from a study done in Philadelphia which found 36.1% of the preterm babies and 34.8% of the late preterm babies developed hypoglycemia (Bastek *et al.*, 2008). Checking of the blood sugar was not routinely done to all preterm babies and this might suggest that some preterm babies might have been in hypoglycemic state without notice.

In this study, 1(1.9%) preterm baby developed hemolytic disease of the newborn. Studies indicate that it is a rare condition and highly fatal, reason for administration of vitamin K at birth to all neonates (Fraser *et al.*, 2010).

Only 1(1.9%) developed NEC which is similar to a study done in Philadelphia where only 8.2% of the preterm babies developed NEC and none developed NEC among the late preterm (Bastek *et al.*, 2008).

Five (9.8%) developed anemia which is almost similar to a study done in Philadelphia where 1.6% of the preterm developed anemia and 1.4% of the late preterm babies (Bastek *et al.*, 2008).

Among the 26 preterm that died, 5(9.4) died within 12 hours after delivery, 8(30.8%) died between 12 hours and 24 hours after delivery, 5(9.4%) died within day 1 to 3, 7(26.9%) died within 4-7 days after delivery while only 1(3.8%) 8-14 days after delivery. According to

Hedstrom et al., 2014, it is estimated that up to 50% of all neonatal deaths occur within the first 24 hours after birth and 75% by one week of age.

Among those who died, 1(3.8%) had hypothermia, 17(65.4%) had difficulty in feeding, 1(3.8%) had sepsis, 19(73.1%) had RDS, 7(29.0%) had jaundice, 1(3.8%) had hypoglycaemia, 1(3.8%) had haemolytic disease of the new-born, 1(3.8%) had NEC and 5(19.2%) had anaemia. In a study done in Eritrea found that RDS had poor prognosis with >90% mortality ($p < 0.05$) (Shar, Zemichael & Meng, 2012), mortality rate due to sepsis is estimated at 40-70% among preterm babies (Darmstadt & Dinolos, 2000). In another study done in rural Uganda, RDS affected 28% of all neonates (Hedstrom *et al.*, 2014).

5.0 CONCLUSION

Respiratory distress syndrome and difficulty in feeding were the most common complications experienced by preterm babies in this study. Almost half of the preterm babies admitted died and they died from difficulty in feeding, RDS, jaundice, anaemia, hypothermia, hypoglycemia, haemolytic disease of the newborn and necrotizing enterocolitis.

6.0 RECOMMENDATIONS

This study recommends prompt and adequate management of preterm babies diagnosed with RDS and feeding problems

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