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PERINATAL MORBIDITY AT THE MOI TEACHING AND REFERRAL HOSPITAL, ELDORET

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**ABSTRACT**

**Background:** Perinatal morbidity (PNM) is highest in the developing countries including Kenya. Studies on the perinatal morbidity in Moi Teaching and Referral Hospital (MTRH) have not been carried out. Furthermore, factors associated with PNM are unknown at the MTRH.

**Objective:** To establish the causes and incidence of perinatal morbidity at the MTRH NewBorn Unit (NBU).

**Design:** A retrospective study using case notes.

**Setting:** The NBU of the MTRH in Eldoret, Kenya.

**Subjects:** Babies who were admitted to the MTRH's Newborn Unit from January to December 1997.

**Results:** The perinatal morbidity was 667 per 1000 babies admitted to the NBU. The most common reason for admission was mother under anaesthesia. The most common cause of morbidity was asphyxia. The mean maternal age was 24 years. The mean level of education was 1.7 years. More than fifty five per cent of the mothers were housewives. The mean birthweight was 2.75 kg ( $\pm 0.9$  SD), 55.9% had normal birthweight, 37% were low birthweight and three per cent were large babies. The mean duration of stay in the NBU was 3.8 days.

**Conclusion:** Most of the admissions were Caesarean section babies who did not require admission. Younger mothers were more likely to have babies with neonatal sepsis, convulsions, pneumonia and asphyxia.

**INTRODUCTION**

Few studies have been conducted on perinatal mortality and morbidity in Kenya. Those available were conducted in Nairobi in the late 70's, 80's and early 90's(1-4). Perinatal morbidity and mortality are higher in developing countries than in the developed countries(5-10). Most of the causes of these problems in the developing countries are preventable. They include malaria, urinary tract infections in pregnancy, inability to maintain a proper partogram while monitoring labour resulting in asphyxia, lack of laboratory back up for proper investigation of expectant mothers and babies in NBU, lack of supplies, logistic problems like poor infrastructure making it difficult for mothers to reach health facilities in time or doctors to be reached thus delaying intervention(11-13). These problems result in either morbidity or mortality. This is different from the developed countries, which are concerned about congenital malformations and highly technological third level care(14-18). Indeed congenital malformations are rarely reported in studies from developing countries as opposed to developed countries(1,3). Even metabolic conditions such as hypoglycaemia, hypocalcaemia, and other electrolyte disturbances that are considered of major significance are

rarely reported in studies from developing countries because of inability to carry out these tests(3,19).

No study on perinatal morbidity has been done in Eldoret, which has since become a cosmopolitan city. Many changes have occurred in Eldoret such as the starting of the second Medical school, building of the Eldoret International Airport, setting up of the Central Bank, the District hospital has become a national hospital at par with the Kenyatta National Hospital(KNH). All these are positive changes that should have a positive impact on the health of the population in Eldoret and the surrounding areas of Western Kenya. As a referral hospital, it now serves a larger population and handles more complex cases than before. There is need to have baseline data that shall be reference for future studies on perinatal morbidity. Since the trend in medical education now is to emphasise the local conditions in the teaching of students, this information will assist the health personnel handling neonates and teaching in the institution to teach neonatal medicine with an emphasis on the common perinatal conditions. The findings in this study will be similar to those that would be found in most public hospitals in Kenya. We therefore expect these to be useful information to hospitals within the region. The policies that could be drawn from these findings could be made available to other public hospitals for adoption in their NBUs.

**MATERIALS AND METHODS**

The study was conducted at the Moi Teaching and Referral Hospital (MTRH), Eldoret. The case notes of all the babies admitted to the NBU from January to December 1997 were retrieved except for those who died. Two hundred and twenty five case notes with relevant and adequate information were included in the study, most of which lacked such data as antenatal care, details of the admission, management of labour (like duration of the various stages of labour). Because of this the antenatal care data were excluded from the study. The perinatal period was defined as the time from birth to the age of seven days(20).

A proforma was used to extract data from the patients' charts without identifying them by name. The data extracted included: socio-demographic, previous obstetric history, labour, time from birth to admission to the NBU, duration of stay in the NBU, resuscitation in labour ward and problems encountered in the NBU. The data were entered in a computer and analysed on the SPSS programme. Correlations were done using the Pearson's 2-tailed correlation to determine the significance of some of the relations. The correlations were done between socio-demographic factors, past bad obstetric history, logistic factors, details of the labour, and the problems encountered in the NBU. This assisted in determining the factors that were closely related to the problems encountered in the NBU.

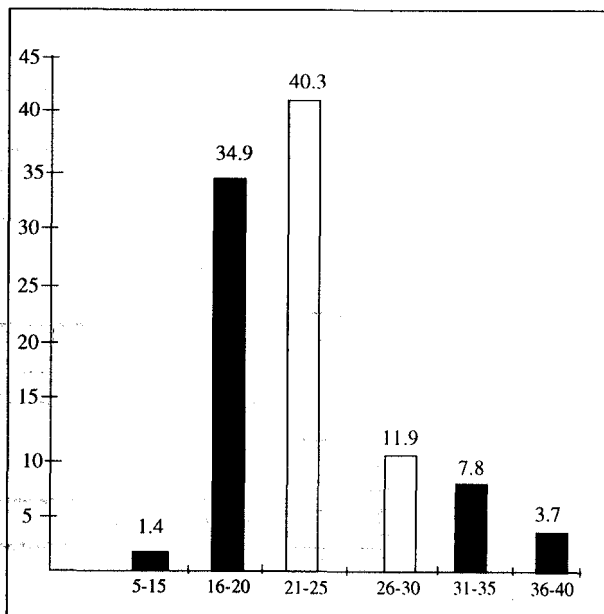
**RESULTS**

Two hundred and twenty five case records were reviewed. The perinatal morbidity was 667 per 1000 admissions to the NBU.

*Maternal information: Mother's age:* The mean age was 23.93±8.9SD) with a range of 14-40 years. This data was missing in five case records. Only five per cent were of extremes of age (1.4% were aged below 15 years and 3.5% were aged above 35 years), (Figure 1).

**Figure 1**

*Distribution of the mothers by age*



**Table 1**

*Previous bad obstetric history*

History	Frequency	%
Still births	8	24.2
Perinatal deaths	3	9.1
Neonatal deaths	2	6.1
Infantile deaths	2	6.1
Abortions	18	54.5
Total	33	100

**Table 2**

*Diagnosis on admission of the mothers*

Diagnosis	Frequency	%
Eclampsia	81	22
Primigravida	50	9.3
Pre-eclampsia	27	11.9
Premature rupture of membranes	21	9.3
Antepartum haemorrhage	9	4
Cephalopelvic disproportion	1	.4
First stage labour	1	.4
Second stage labour	1	.4
Total	191	100

**Table 3**

*Reasons for lower uterine segment Caesarean section*

Reason	Frequency	%
Cephalopelvic disproportion	28	18.2
Foetal distress	20	13
Cord prolapse	6	3.9
Delayed second stage	5	3.9
Obstructed labour	4	2.6
Others	76	49.4
Total	139	100

**Table 4**

*Apgar scores*

Score	One minute		Five minutes		Ten minutes	
	Freq.	%	Freq.	%	Freq.	%
0-3	27	12.3	14	6.2	8	3.8
4-6	61	27.5	42	18.8	20	9.5
7-10	134	59	167	74.8	183	86.5
Total	222	100	223	100	211	100

Note:0-3 asphyxia; 4-6 low apgar score; 7-10 normal. Only eight (3.8%) of the babies had asphyxia after resuscitation at 10 minutes.

*Mother's level of education:* The mean level of education was 1.7 years (±1.01 SD) with a range of 1-8 years. There were 165 missing cases. Ninety five per cent of the mothers had upto two years of education only. No mother had post-primary education.

**Marital status:** One hundred and forty six (64.3%), 29 (12.8%), one (0.4%) and one (0.4%) were married, single, separated and divorced respectively. This data was missing on 48 case records.

**Occupation:** Forty seven (55.3%) were housewives, three (3.5%) were students, two (2.4%) were labourers, four (4.7%) were traders, four (4.7%) were teachers and 23 had other occupations.

**Table 5**

*Reasons for admission and problems encountered in the Newborn Unit (NBU)*

Item	Reason for admission to NBU	Problems in NBU
Mother under general anaesthesia	111 (63.4%)	0
Asphyxia	59 (37.7%)	59 (39.3%)
Prematurity	45 (25.7%)	45 (30%)
Respiratory distress syndrome	9 (5.1%)	9 (5%)
Caput succedenum	3 (1.7%)	3 (2%)
Talipes equino varus	2 (1.1%)	2 (1.3%)
Neonatal sepsis	0	7 (4.7%)
Convulsions	0	4 (2.7%)
Aspiration	0	2 (1.3%)
Meningitis	0	2 (1.3%)
Apnoea	0	1 (0.7%)
Others	0	20 (34%)
Total	239 (100%)	150 (100%)

**Parity:** One hundred and seven (48%) were primigravidae, 101 (45.3%) were para 1-4, 15 (6.7%) were para 5-10. Only 6.7% were grand multiparae.

**Labour:** One hundred and forty three (81.7%) of the mothers were in labour on admission. Of these 82.5% and 17.5% were in first and second stages of labour respectively. The mean duration of first stage of labour was 23.63 hours ( $\pm 29.5$  SD) with a range of 1-43 hours. This data was missing in 190 case records. Five mothers were in first stage of labour for more than 24 hours. One mother was in labour for 43 hours. The mean duration of second stage was 21.74 minutes ( $\pm 27.66$  SD). The data were missing on 202 case records. For most mothers second stage lasted five minutes. Two mothers had delayed second stage lasting more than 30 minutes.

**Partogram:** A partogram was maintained in 60 cases only. There were 165 case records missing this data.

**Baby's information:** There were 115 (55.9%) male and 92 (44.2%) female babies. In eighteen case records this data was missing.

**Birth weight:** The mean birthweight was 2.75 kg ( $\pm 0.9$  SD) with a range of 0.95 kg to 4.4 kg. Twenty two case records were missing this data. One hundred and eighteen (55.9%) of the babies had normal birthweight, 78 (37%) had low birthweight below 2.5kg. and six (3%) were more than four kilogrammes.

**Duration of stay in NBU:** The mean duration of stay in NBU was 3.84 days ( $\pm 6.84$  SD) with a range of 1 to 42 days. Forty nine case records were missing this data.

**Mode of delivery:** The modes of delivery were lower uterine segment Caesarean section (LUSCS), 117 (53.2%), spontaneous vertex delivery (SVD), 84 (38.5%), breech 16 (7.3%), and vacuum extraction one (0.5%). The most common mode of delivery was LUSCS probably because the hospital is a tertiary referral hospital catering mainly for high-risk mothers and has a policy of delivering all premature babies thought to be viable by LUSCS.

**Time lapse before admission:** The mean time lapse was 60 minutes (range 0-645 minutes).

**Gestational age by dates:** There were 120 (61.8%), 41 (18%), and 41 (20.2%) term, post-dates, and premature babies respectively.

**Correlations:** There was a positive correlation between the duration of stages 1 and 3 of labour and past history of infantile death ( $R=0.45$  and  $r=0.65$ ). This could have been due to difficult first stage of labour that was recurrent in subsequent pregnancies. The birthweight was dependent on maternal age ( $r=0.273$ ,  $p=0.02$ ) The older mothers gave birth to babies with higher birthweight.

Asphyxia had a strong positive correlation with the mode of delivery ( $r=0.31$ ,  $p<0.001$ ), Babies born by Caesarean section were more likely to be asphyxiated, probably because the indications for the caesarean section caused asphyxia. Prematurity was strongly correlated to mode of delivery ( $r=0.470$ ,  $p=0.000$ ). The more premature the more likely it was that the baby had been born by LUSCS. This may be due to the current policy in most centres that premature babies of 32-36 weeks gestation who are thought to be viable are born by LUSCS to avoid birth trauma.

Gestational age by dates and respiratory distress syndrome (RDS) were strongly negatively correlated ( $r=-0.8975$ ,  $p=0.001$ ). The younger the baby the more likely it was to have RDS which is expected.

The maternal age had a strong positive correlation with a previous history of abortion ( $r=0.3066$ ,  $p<0.001$ ). This could be either due to cervical incompetence or chromosomal aberrations. The older mothers had more history of previous abortion. A history of abortion was also strongly correlated to a previous history of infantile deaths ( $R=0.341166$ ,  $p<0.001$ ). The causes of the abortions may also have been responsible for the infantile death.

Maternal age was negatively correlated to such problems in the NBU as asphyxia (0.0679), pneumonia ( $r=-0.0065$ ), convulsions ( $r=-0.0655$ ) and neonatal sepsis (0.0496). The younger mothers were more likely to have babies with these problems than the older ones,

## DISCUSSION

The perinatal morbidity and mortality rates are influenced by factors that operate prepartum, intrapartum and postpartum. These include, intrauterine infections, (like malaria), anaemia, high blood pressure, pre-eclampsia, eclampsia, foetal distress, difficult or prolonged labour, and inability to resuscitate a newborn(21-34). It is

important to evaluate the contribution of all these on perinatal morbidity but this was not possible in this study.

In this study most of the mothers were married teenagers with levels of formal education of less than eight years. None of these factors had any impact on the early neonatal morbidity. It was not possible to get information on the antenatal care the mothers had received and what they had suffered from. Most mothers (81.7%), were already in labour on admission. Of these 82.5% were in the first stage of labour and 17.5% were in the second stage of labour. The mean duration of first stage was 23.63 hours with a range of 1 to 43 hours. Five mothers had prolonged first stage. The mean duration of second stage was 21.74 minutes. Only two mothers had delayed second stage. The foetal well being was monitored in only 60 cases using a partogram. There were no electronic foetal monitors in this hospital, hence the foetoscope was used to monitor. The foetal heart rate, maternal cervical dilatation and blood pressure were recorded. This is a cheap way of foetal monitoring that is known to improve results. It is, however, known that the best way of monitoring foetal well being is the electronic method where the electrode is applied to the scalp of the baby. Though the electronic foetal monitoring method has been available in the USA for twenty years, it is not yet available at the MTRH or any other public hospitals in Kenya. It was not possible to do such foetal monitoring tests as contraction stress, non-stress and the biophysical profiles. It was also not possible to do blood gas analyses (BGAS) to determine the cord acid-base status, which would have been used in the diagnosis of perinatal asphyxia. According to the American Academy of Paediatrics and the American College of Obstetricians and Gynaecologists, the diagnosis of perinatal asphyxia requires a profound umbilical arterial metabolic acidosis or mixed acidemia (pH <7), persistence of an Apgar score below 3 for longer than five minutes, neonatal neurological sequelae and multiple organ system dysfunction. In our circumstance, the Apgar score was the main factor considered in the diagnosis of perinatal asphyxia(34). This would generally appertain in most public hospitals in the developing world particularly in Africa.

The majority (63.4%) of the babies admitted were LUSCS babies mainly for warmth and observation as their mothers recovered from general anaesthesia. No patients born before arrival (BBAs) were admitted to the NBU because the hospital admits all BBAs to the main Paediatric wards unlike KNH where BBAs less than 24 hours of age are admitted to the NBU(3). The other reasons for admission were asphyxia, prematurity, respiratory distress syndrome, Caput succedenum and talipes equino varus, respectively. In the KNH study the reasons for admission were not listed. However, the results showed that 59.8% of these admissions were low birth weight (LBW), of which 79.3% were appropriate for gestational age (AGA). About twenty per cent were small for gestational age (SGA), and 1.8% were large for gestational age (LGA). Nearly sixty two per cent were term and 1.7% were post term(3). The differences

between these studies were that one was prospective and the clinical assessments done by paediatricians or Paediatric residents while the other was retrospective and the clinical assessment was done by the midwives in labour ward. Thus, the midwives were not able to categorise the birthweights into AGA, SGA, and LGA. However, analysis of the birthweight showed that 34.5% of our babies were of low birthweight, 1.3% were large babies and the rest were of normal birth weight. This was probably due to the policy of admitting all babies delivered by LUSCS. A change in policy would relieve the NBU staff of two thirds of the admissions. There should be provision for the babies in the postnatal wards so that there are heaters or incubators with nurses to take care of these babies until their mothers are out of anaesthesia. This would improve the level of care of babies in the NBU.

Asphyxia was the second most common reason for admission. This was because the diagnosis was made in labour ward by the midwife receiving the baby. The midwife therefore made the diagnosis based on the APGAR score because her clinical acumen and laboratory facility could not allow her to make the diagnosis taking into account the criteria discussed above(21-34). However, this compared well to the practise in most hospitals in this country. Thus, the asphyxia in this study was inaccurate but could be compared to previous studies in this country. If asphyxia was considered to be persistence of APGAR score less than three for five or more minutes, then there were 14 cases of asphyxia on admission. The midwives need more training to enable them take into account the other parameters in the definition of asphyxia other than apgar score. Alternatively, where there are Paediatricians, they should attend the delivery of highrisk babies and make accurate diagnoses backed by better laboratory services. Babies born by LUSCS were more likely to be asphyxiated. The common indications for LUSCS were CPD and foetal distress, which usually result in low APGAR score and therefore asphyxia. However there was no significant correlation between asphyxia and these indications of LUSCS.

Prematurity was the third most common reason for admission. Since the NBU relied mainly on heaters, to maintain warmth most premature babies may have died of hypothermia though this did not feature in the problems encountered in the NBU. This may also be due to the fact that the clinicians in the NBU are usually medical officer interns. The more premature the more likely a baby was to be born by LUSCS as this is the current policy of delivering all prematures thought to be viable by LUSCS to avoid birth trauma. Prematurity accounts for 68% and 5.4% morbidity and mortality respectively in some studies(30).

Other reasons for admission to the NBU included respiratory distress syndrome (RDS) (5%) which is low, may be because the midwives did not recognise it. Premature babies of gestational age below 34 weeks normally develop RDS. Very few patients were admitted due to congenital malformations with only one patient admitted due to talipes equinovarus. The midwives

diagnosed neither congenital heart disease nor any other congenital abnormality most probably because of lack of expertise. Thus, if Paediatricians attended to all difficult deliveries and all LUSCS, congenital malformations would be recognised and admissions reduced. This is unlike in the developed countries where congenital malformations form a large proportion of the admissions(18).

The study identified ten common causes of perinatal morbidity as RDS (6%), neonatal sepsis (4.7%), convulsions (2.7%), caput succedenum (2%) talipes equinovarus (1.3%), meningitis (1.3%), aspiration (1.3%), and apnoea (0.7%). The diagnoses were based on the clinicians' clinical acumen with minimal laboratory back up. This explained the lack of metabolic disorders such as hypoglycaemia and hypocalcaemia which required laboratory back-up to make. This was similar to the KNH study where these diagnoses were not recorded(3). These are known causes of significant morbidity and mortality in NBU(19). Most babies were full term and of normal BW hence less prone to infections and RDS than the LBW and preterms. The BW was not categorised into AGA, SGA and LGA so it was therefore not possible to compare our BWs with the KNH BWs. Kasirye and Musoke(19) found that respiratory distress, infections and asphyxia respectively were the common causes of morbidity in their NBU. This was similar to our findings though the order was different. In the KNH study, neonatal apnoea and hypothermia were common. In our study, apnoea was rare while hypothermia was not reported at all probably because of lack of appropriate temperature regulation. Jaundice was found to occur in 37.5% of the KNH babies and none was reported in our study. These discrepancies were due to the difference in-patients studied. In our study most patients were full term and of normal BW while in the KNH study they were LBW and preterms. The younger mothers were more likely to have babies with neonatal sepsis, convulsions, and asphyxia as expected as the younger mothers gave birth to more preterm babies.

Logistic problems like proximity to the health facility, time taken to arrive at the hospital while in labour, time taken by the doctor to intervene after arrival at the hospital, equipment available in the hospital, supplies in the hospital, ability to resuscitate the baby, time taken from when the decision to operate is made to when LUSCS is done and the time between birth to admission in the NBU could all affect the outcome. Some of these have been shown to result in high perinatal morbidity and mortality and maternal mortality(13). The current study analysed the impact of some of these on the problems encountered in the NBU but none of these had any significant impact on any of the problems encountered in the NBU. This lack of impact could have been due to a large number of missing data in the case records. We also could not analyse the prenatal factors because most of the information was missing in the case records. These are still pertinent to us because of our level of development. While developed countries are looking at the effect of third level care on the perinatal

morbidity and mortality(14-17), we still have to look at these basic factors that can easily be rectified and result in lower morbidity and mortality. A prospective study needs to be done in which this information will be looked for and the impact on the outcome analysed

In conclusion, over 60% of the admissions were Caesarean section babies that did not need admission to the NBU. The most common problem encountered in the NBU was asphyxia. Maternal age was a major predisposing factor to the occurrence of most causes of perinatal morbidity. The need to modernise the health information system at the hospital for easy retrieval is stressed. Paediatricians should attend all high-risk deliveries and all Caesarean section deliveries. The NBU should be equipped with basic equipment and laboratory back up. The normal term babies born by Caesarean section should be admitted to the postnatal ward. A prospective study should be carried out to include the perinatal mortality cases.

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