

Retrospective Study

Prevalence, Associated Factors and Management of Neonatal Jaundice by Midwives and Nurses of Selected Health Facilities in Fako Division, Cameroon

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ABSTRACT

Background

Neonatal jaundice is a problem commonly faced by neonates and it is responsible for hospital readmissions worldwide.

Aim

To determine the prevalence, associated factors, and management of neonatal jaundice by midwives and nurses.

Methods

A hospital-based cross-sectional and retrospective study was conducted. Copies of a well-structured questionnaire were administered to participants in the maternity and neonatal units of Buea and Limbe Regional Hospitals and the Baptist Hospital Mutengene. The files (230) of neonates admitted in these hospitals from January 2019 to March 2022 were studied and data collected using an extraction sheet. Fifty (50) midwives and nurses who had worked for more than six-months participated in the study. A purposive sampling method was used to select the health facilities while the participants were enrolled using a consecutive convenient sampling technique. Respondents who met the inclusion criteria and gave their consent to participate in the study were included. The study received administrative authorization from the Department of Nursing Faculty of Health Sciences, University of Buea and the Regional Delegation of Public Health South West Region. Data collected were entered using a pre-designed EpiData version 28.0 and analyzed.

Results

The prevalence of neonatal jaundice was 15.2%; 65.7% of the jaundiced neonates were preterm babies, 51.4% of the cases were noticed within the first-week of life, 91.4% had Apgar scores of <6 and 85.7% had low birth weight. The majority of them (68.6%) were resuscitated at birth and more than half were preterm babies. Maternal fever, prolonged labor, premature rupture of the membranes was significantly associated with neonatal jaundice. Half (50%) of the participants reported that they would collect samples for bilirubin only if the baby was still yellow and 82% said it is important to give fluids during phototherapy because it helps keep the baby hydrated.

Conclusion

The prevalence of neonatal jaundice is a cause for concern. Therefore, midwives and nurses are called upon to educate pregnant women on the predisposing factors and should acquire competencies in order to properly manage babies upon diagnosis.

Keywords

Neonatal jaundice; Prevalence; Associated factors; Management; Midwives; Nurses; Fako Division.

INTRODUCTION

Neonatal jaundice also known as hyperbilirubinemia is defined as a yellow coloration of the skin, sclera, and mucous membrane. This is a result of excess deposition (accumulation) of bili-

rubin in the baby's blood stream^{1,2} which is very common in the neonatal period.³ Jaundice is best appreciated clinically when total serum bilirubin (TSBR) levels are above 3 mg/dL; normal serum levels of bilirubin are less than 1 mg/dL.⁴ Bilirubin is the final product of heme degradation (breakdown of red blood cells).⁴

Jaundice is caused by the presence of unconjugated bilirubin (lipid soluble) which is insoluble in water making it difficult to be eliminated. Normally it binds to plasma albumin and it is transported to the liver where it is conjugated with one or two molecules of glucuronic acid making it water-soluble. It is then secreted into bile and eliminated from the body through the intestines.⁵

Neonates have immature conjugation capacity and livers, especially immature neonates; therefore, they cannot excrete the bilirubin at the same rate at which it is produced leading to an increase in bilirubin levels in the neonate's blood.⁵ This is one of the most common clinical signs in neonates, and jaundice is responsible for rehospitalization, especially in low- and middle-income countries (LMICs). Most neonates develop jaundice within the first week of life and in some cases, it is mild and harmless; however, a rapid increase in bilirubin (>20 mg/dL) can reach toxic levels.⁶ This results in complications such as bilirubin encephalopathy and kernicterus⁶ with a significant risk of neonatal mortality and long-term neurological damage such as gross developmental delay.² Approximately 60% of term babies and 80% of premature babies develop jaundice in the first few weeks of life.⁶ In Sub-Saharan Africa neonatal jaundice is the 8th leading cause of neonatal mortality.^{2,6,7}

Several factors are associated with neonatal jaundice within the first weeks of life. These include genetics, events during pregnancy blood group incompatibility, gestational age, nutrition, haemorrhage, and even infections.⁸ Some babies are more likely to have severe jaundice and higher bilirubin levels than others; hence, new-borns are expected to be closely monitored after birth for early diagnosis of neonatal jaundice and prompt treatment.^{3,7} If neglected or poorly treated, neonatal jaundice or hyperbilirubinemia can cause severe neurological damage (bilirubin encephalopathy or kernicterus) which leads to hearing loss, poor development, learning disabilities, seizures, and in severe cases death of the neonate.⁸

Guidelines have been established for the effective management of neonatal jaundice for instance, the Canadian Paediatric Society and the National Institute for Health and Clinical Excellence (NICE).^{9,10} The American Academy of Pediatrician Practice guidelines recommends that before any infant is discharged, the total bilirubin of that infant should be measured.¹¹ The midwife or nurse has a role to play in the early identification and management of neonatal jaundice.¹¹ Little data exist on the prevalence, associated factors, and management of neonatal jaundice in the South West Region of Cameroon. Thus, this study sought to determine the prevalence, identify associated factors and determine the care of new-borns presenting with jaundice. This is to create awareness among midwives and nurses regarding neonatal jaundice, the need for early detection, and prompt management to avoid complications that may lead to permanent neurological damage and possibly death of the newborn.¹²

METHODS

A hospital-based descriptive cross-sectional and retrospective study was conducted from the 28th of October, 2021 to the 30th of June, 2022 to determine the prevalence, identify associated factors, and determine the care of new-borns presenting with jaundice in Fako

Division of the South West Region of Cameroon. Fako Division is made up of seven municipalities: Buea, Limbe I, Limbe II, Limbe III, Muyuka, Tiko, and West Coast. These areas are mainly inhabited by the Bakwerians, although many other tribes also reside among them. Both qualitative and quantitative approaches were used to collect and process data. A data extraction form was used to collect data from records of neonates admitted from January 2019 to March 2022. In addition, a questionnaire made up of both open and closed-ended questions was used to collect data from nurses and midwives. The target population was made up of all nurses and midwives who were working in the maternity and neonatal units. All nurses and midwives who have been trained to deliver healthcare services to pregnant women and neonates during the process of childbirth, postpartum period, and readmission of neonates and who gave their consent to participate in the study were included. Eligible participants were recruited from the Buea Regional Hospital (BRH), Baptist Hospital Mutengene (BHM), and Limbe Regional Hospital (LRH).

These hospitals were purposively selected because they receive many pregnant women and serve as referral and teaching hospitals. In addition, they have well-equipped maternity and neonatal units with well-trained and experienced nurses and midwives as well as specialists who can better manage neonates.

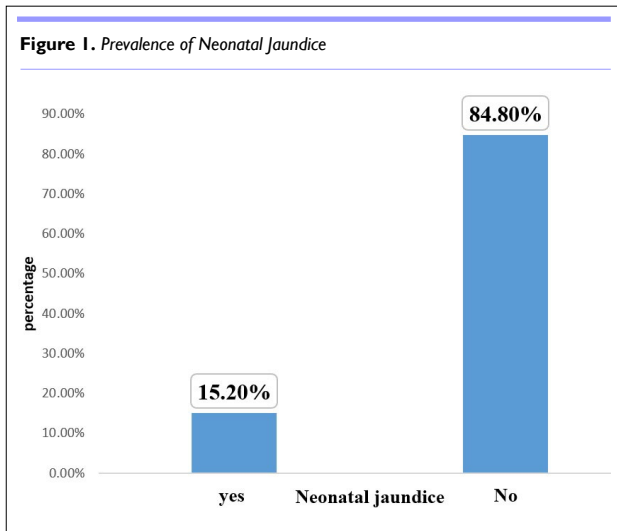
All files registered for neonates who were born between January 2019 to March 2022 were included in the study, and files of neonates diagnosed with neonatal jaundice (TSBR levels greater than 3 mg/dL) and placed on phototherapy⁴ were noted. Also, a sample of 55 nurses and midwives, who had been working for more than 6-months, selected by purposive and consecutive convenient sampling techniques participated in the study.

Before administering, the questionnaire was pre-tested by administering five copies to five nurses and midwives who were not part of the study population. Their responses confirmed the clarity and validity of the questions. Copies of the questionnaire were then administered to the study participants who completed the various sections of the questionnaire.

This study was authorized by the Department of Nursing, Faculty of Health Sciences, University of Buea, Cameroon. Administrative authorization was first obtained from the Regional Delegation of Public Health and then from the heads of the various health facilities. Before responding to the questionnaire each respondent gave her consent by signing the consent form. Data collected were entered into Epi Data Version 3.1 and analysed using the statistical package for the social sciences (SPSS) version 28.0. Data were analysed using the quantitative method. Open-ended questions were analysed using the systematic process of thematic analysis where ideas or viewpoints were grouped under umbrella terms or keywords. The chi-Square (χ^2) test of equality of proportion was used to compare proportions for significant differences as well as to measure the association between the study indicators and background information. Data were presented using frequency tables and charts. All statistics were discussed at the 95% confidence level (CL), Alpha (α)=0.05. Using frequency tables and charts, the percentages of responses were determined.

RESULTS

Out of the 230 files of neonates studied 35 were files of babies diagnosed with neonatal jaundice giving a prevalence of 15.2% (Figure 1).



Out of the 35 babies with neonatal jaundice male babies 19 (54.3%) were the most representative, 32 (91.4%) had an Apgar score of <6, 30 (85.7%) had a birth weight of <2500 g and 24 (68.6) were resuscitated at birth. More than half 23 (65.7%) were preterm babies, 28 (80%) were on exclusive breastfeeding, for 9 (25.7%) babies the jaundice was diagnosed after 7-days and all 35 (100%) of the babies were on phototherapy and empiric antibiotic therapy. Apgar score and birth-term were significantly associated with neonatal jaundice (Table 1).

The age range of the mothers of about half of the babies with jaundice 18 (51.4) was 26-35, only 1 (2.9%) had multiple

Variable	Overall (N=230) n (%)	Jaundiced Population (N=35) n (%)	p-value
APGAR⁵			
≥6	215 (93.5)	3 (8.6)	<0.001
<6	5 (2.2)	32 (91.4)	
Birth Weight⁵			
≥2500 g	213 (92.6)	5 (14.3)	0.015
<2500 g	7 (3.0)	30 (85.7)	
Gender			
Male	116 (49.6)	19 (54.3)	0.030
Female	114 (50.4)	16 (45.7)	
Resuscitated			
Yes	69 (30.0)	24 (68.6)	0.040
No	161 (70.0)	11 (31.4)	
Birth Term			
Pre-term	33 (14.3)	23 (65.7)	0.002
Term	196 (85.3)	12 (34.3)	
Post-term	1 (0.4)	0	
Exclusive Breastfeeding⁵			
Yes	209 (90.7)	28 (80.0)	
No	11 (4.8)	7 (20.0)	
Jaundice Diagnosis⁵			
<24 hours		8 (22.9)	
1-7-days		18 (51.4)	
>7-days		9 (25.7)	
Phototherapy			
Yes		35 (100)	
Empiric Antibiotic Therapy			
Yes		35 (100)	

NB:
\$=missing values in corresponding variables, since not many are ignored.
p-value describes association between co-variables for the jaundiced group.

Table 2. Maternal Factors Associated with Neonatal Jaundice

Variables	Overall (N=230) n (%)	Neonatal Jaundice (N=35) n (%)	p-value
Mothers Age (years)			
18-25	78 (33.9)	12 (34.3)	0.083
26-35	121 (52.6)	18 (51.4)	
36-45	31 (13.5)	15 (42.9)	
Number of Times She has been Pregnant			
1-2	115 (50.0)	21 (60.0)	0.784
3-4	75 (32.6)	9 (25.7)	
>4	40 (17.4)	5 (14.3)	
Gestational Age of the Pregnancy			
Preterm	34 (14.8)	20 (57.1)	0.0125
Term	178 (77.4)	5 (14.3)	
Post date	18 (7.8)	10 (28.6)	
Multiple Gestation			
Yes	20 (8.7)	1 (2.9)	0.97
No	210 (91.3)	34 (97.1)	
History of Gestational Hypertension			
Yes	20 (8.7)	12 (34.3)	0.198
No	210 (91.3)	23 (65.7)	
History of Gestational Diabetes			
Yes	24 (10.4)	12 (34.3)	0.198
No	206 (89.6)	23 (65.7)	
PROM			
Yes	12 (5.2)	10 (28.6)	0.023
No	218 (94.7)	25 (71.4)	
Continuous Labour Status			
Normal progression	154 (67.0)	14 (40.0)	0.111
Induced	40 (17.4)	12 (34.3)	
Augmented	36 (15.7)	9 (25.7)	
Labour was Prolonged			
Yes	91 (39.6)	27 (77.1)	0.045
No	139 (60.4)	8 (22.9)	
Maternal Fever			
Yes	19 (8.3)	13 (37.1)	0.003
No	211 (91.7)	22 (62.9)	
Mode of Delivery			
Vaginal	107 (46.5)	23 (65.7)	0.794
Caesarean section	123 (53.5)	12 (34.3)	

gestations, 10 (28.6%) had premature rupture of membranes, 12 (34.3%) had a history of gestational hypertension while 12 (34.3%) had a history of gestational diabetes. Bivariate analysis between maternal variables and neonatal jaundice shows that maternal fever, prolonged labour, and premature rupture of membranes were significantly associated with neonatal jaundice (Table 2).

Concerning the 50 nurses and midwives who took part in the study; the majority 38(76%) were females, 26 (52%) were in the age range 20 and 30-years, 33 (66%) were midwives, 34 (78%) had bachelor's degree and 24 (42%) of the participants had less than 5 years of experience (Table 3).

Variable	n (%)
Age (years)	
20-30	26(52)
30-40	15(30)
>40	9(18)
Gender	
Male	12(24)
Female	38(76)
Profession	
Midwife	33(66)
Nurse	17
Level of Education	
Bachelor's	34(78)
Diploma	2(4)
HND	2(4)
Masters	6(12)
SRN	6(12)
Years of Experience	
<5	21(42)
5-10	13(26)
11-15	7(14)
>15	9(18)

When the participants were asked how one could first recognize jaundice in a newborn; 28 (56%) said through the yellow coloration of palms, soles of the feet, and eyes, 25(50%) of the participants reported that they would collect samples for bilirubin only if the baby was still yellow. About three-quarter of the participants 37 (74%) said that the duration of phototherapy depends on the doctor's order, 41(82%) said it is important to give fluid during phototherapy because it helps keeps the baby hydrated and 23 (46%) reported breasts feeding is planned for every 2-hours (Table 4).

DISCUSSION

This study was conducted to emphasize the importance of early identification and proper management of neonatal jaundice to reduce its prevalence and complications.

According to the findings of this study, the overall preva-

lence of neonatal jaundice was 15.2%; this is lower when compared to a study that revealed a prevalence of 52.6%.¹³ However, the prevalence of neonatal jaundice within the first weeks of life was high (51.4%). The finding is in contrast to what was found in the study conducted in Nigeria at Eku Baptist Community Hospital in Delta State, which showed that 70.5% of new-borns developed neonatal jaundice within the first week of life.¹³ Also, our study showed that more than half of the jaundiced neonates were males; indicating that male babies are more susceptible to neonatal jaundice than female babies. This is similar to the study conducted in Nigeria in a Community Hospital in Delta State which showed that there were more male new-borns (67.4%) with jaundice than females.¹³ Our finding is in contrast to a study conducted in Ibadan, which found that jaundiced female infants were presenting a significantly higher number (53.9%) than male infants.¹⁴ Again, our study revealed that the majority of jaundiced neonates had a birth weight of less than 2500 g. This could be because prematurity is a predisposing factor for neonatal hyperbilirubinemia.¹⁵ This finding is in line with that of a study carried out in Kabgayi District Hospital Rwanda which showed that the majority of jaundiced new-borns had weight lower than 2500 g at birth.¹⁶

Concerning the risk factors for neonatal jaundice, this study confirmed several known risk factors for jaundice in neonates including low birth weight, prematurity, male sex, exclusive breastfeeding, and prolonged labour among others. According to Thielemans et al exclusive breastfeeding, G6PD deficiency, ABO incompatibility, and premature birth are confirmed risk factors for neonatal hyperbilirubinemia.¹⁷ In addition, our study revealed that prolonged labour was strongly associated with jaundice. This is most likely due to the clinical relationship between longer labour duration and cephalohematoma, a known cause of severe hyperbilirubinemia. Some established predisposing factors in literature such as multiple gestation and maternal age were not important risk factors in our study population. Literature reveals that known predisposing factors for neonatal jaundice are low birth weight, hyperbilirubinemia in siblings, premature birth, and infant of diabetic mother.¹⁸ It is well-documented that there is an increasing risk of significant hyperbilirubinemia with low birth weight¹⁹ along with a disproportionate number of late-preterm infants accounting for hospital readmissions for the management of jaundice and hyperbilirubinemia.²⁰

The number of multiple births in our study population was small (N=20) therefore, may have limited the statistical power to detect a significant association between twins and neonatal jaundice, if one exists. While exclusive breastfeeding has historically been an important predictor for jaundice, the mechanism behind the association is not well understood. Breastfeeding accounts for most term infants with bilirubin >12 mg/dL.²¹ Human milk inhibits the conjugation of bilirubin²² with infants who are breastfed having three times the risk of bilirubin levels >12 mg/dL.²² The interaction between exclusive breastfeeding has been discussed extensively in the literature as a potential biological mechanism explaining exclusive breastfeeding as a primary risk factor for hyperbilirubinemia.²³

A study conducted on risk factors for severe neonatal

Table 4. *The Nurse and Midwife Role in the Management of Jaundice*

Statements	n (%)
Neonatal jaundice could first be recognized in a new born by:	
Visual; yellow palms, soles of the feet and eyes	28(56)
Yellow coloration within <24 hrs of age	9(18)
Bilirubin level >10 mg/dL	13(26)
Samples are collected to check or measure bilirubin levels before discharge:	
Yes, most often	16(32)
Yes, if the baby looks yellow	25(50)
No	9(18)
When a baby is diagnosed with jaundice collection of sample is done	50(100)
The baby should be exposed to light during phototherapy for:	
24 hrs	4(8)
48 hrs	6(12)
72 hrs	3(6)
As prescribed by the doctor	37(74)
Additional fluids are necessary during phototherapy:	
Yes	41(82)
No	9(18)
Fluids are given to hydrate the baby	41(100)
During phototherapy breastfeeding is planned for:	
2hourly	23(46)
4hourly	2(4)
When necessary	17(34)
as prescribed by the doctor	8(16)
Guidelines are used to aid management of jaundice:	
Yes	41(82)
No	9(18)
Guidelines such as:	
WHO	30(73)
NICE	11(26.8)
Educating the parents and involving them during monitoring aids in management because:	
It helps in planning feeding	8(16)
It aids in continuity of care at home	42(84)

hyperbilirubinemia in Nigeria showed that risk factors such as race, primiparity, sibling treated for jaundice, low birth weight, and weight loss are associated with severe neonatal jaundice.²⁴ On the contrary, literature shows that risk factors for Malaysian neonates such as gender, low birth weight, and gestational age of neonates were not associated with neonatal jaundice.²⁵ Other studies revealed that obesity in pregnancy is associated with hyperbilirubinemia in neonates (neonatal jaundice), with a high-prevalence in Hawaiians and Pacific Island women.²

Regarding the participants' characteristics, our study showed that female respondents were the most represented. This could be due to the fact that females are more involved in nursing, our finding agrees with that of Sampson et al.²⁷ In addition, our study revealed that majority of the participants were Bachelor's Degree holders. This could be explained by the fact that the status of nursing is fast changing in Africa and as a result, many higher institutions of learning in Cameroon are training Bachelor's Degree

holders in nursing and midwifery in order to meet the challenges of the 21st Century. Our finding concurs with those of Tasew et al²⁸ and Eta et al²⁹ who also reported that majority of their respondents had completed their first degree.

In line with the management of neonatal jaundice our study showed that majority of the nurses and midwives were aware of the importance of rehydration for a baby who is undergoing phototherapy. Phototherapy causes photodegradation of bilirubin in the baby's skin. This form of physical therapy has been shown to be an efficient method of lowering the serum bilirubin (SBR) and is usually effective.³⁰ One of the complications of phototherapy is an increased insensible water loss which can eventually lead to dehydration. It is important to maintain normal hydration and enteral nutrition of the jaundiced newborn infant. This may be achieved by encouraging breastfeeding, the provision of additional oral fluids or may require the intravenous administration of fluids if the baby is becoming dehydrated and cannot drink.³¹ There is

no evidence to support the administration of excessive quantities of fluid and most infants will not need extra fluids. However, if the baby is having trouble breast-feeding, is losing weight, or is dehydrated baby formula or expressed milk to supplement breast-feeding will be suggested.³²

CONCLUSION

This study revealed that the prevalence of neonatal jaundice is 15.2% which is a cause for concern. It was found that maternal fever, prolonged labour, premature rupture of membranes, and prematurity were predisposing factors for neonatal jaundice, and these factors were significantly associated with neonatal jaundice. Overall, the nurses and midwives were found to be aware of their roles in the management of neonatal jaundice. However, the recommended guidelines put in place should be taken into consideration to aid in effective the management of neonatal jaundice. In addition, pregnant women with risk factors should be closely monitored and treatment instituted on time. Midwives and nurses are called upon to educate pregnant women on the predisposing factors and should acquire competencies to properly manage babies upon diagnosis. Therefore, seminars should be organized regularly to improve and update knowledge and skills in the management of neonatal jaundice. This could go a long way to reduce the prevalence of neonatal jaundice and prevent its complications.

LIMITATIONS OF THE STUDY

This was a retrospective and cross-sectional study thus, the researcher is likely to encounter the issue of missing data; however, this was very insignificant and did not affect the results. Also, this study used a questionnaire to collect data; the disadvantage is that it does not produce rich data; in this case, participants' knowledge cannot be fully assessed. To compensate for the limitation open-ended questions were included and copies of the questionnaire were administered on a face-to-face basis. The data from the closed and open-ended questions together gave us a broad understanding of the nurses and midwives' roles regarding the care of a neonate with jaundice. Furthermore, our study did not present and analyse the neonates' serum bilirubin levels which could have brought out the range for these neonates hence, a study should be conducted in this regard.

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AUTHORS' CONTRIBUTION

All authors participated in all steps of the study from its commencement to writing. That is, conception and design, acquisition of data, analysis and interpretation of data as well as drafting and or revising and approving the final manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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