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Original Article

Poor Breastfeeding and Pre-mature Birth as Leading Causes of Neonatal Jaundice in a Nigerian Community

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ABSTRACT

Background: Neonatal jaundice is the yellow discoloration of a newborn baby's skin and eyes, caused by an excess of bilirubin—a yellow pigment from red blood cells—in the baby's blood. It is a leading cause of hospitalization in the first week of life worldwide. If inappropriately managed, it can result in significant bilirubin-induced mortality and disability.
Methods: This study was conducted at the Neonatal Intensive Care Unit (NICU) of the Federal Medical Centre, Asaba, Delta State, Nigeria. A descriptive retrospective research design was employed, and a sample of 100 neonates was selected using a stratified random sampling method. Data were collected from the medical records of all neonates admitted for jaundice during the study period. The collected data were analyzed using tables, frequencies, and percentages.
Results: The findings revealed a high incidence of neonatal jaundice among neonates admitted to the NICU, accounting for 100 (40%) of admissions. Of this percentage, female neonates (50.4%) presented with jaundice more frequently than their male counterparts (49.6%). The study identified poor breastfeeding as the leading cause, accounting for 28 (28%) of cases, followed by premature birth 20 (20%), infection 15 (15%), severe anaemia 12 (12%), ABO incompatibility 10 (10%), idiopathic causes 10 (10%), and other causes 5%. No cases of jaundice due to fever were recorded (0%). The types/variants of jaundice identified were: breastfeeding jaundice 42 (42%), physiological jaundice 36 (36%), and other forms 22 (22%).
Conclusion: The incidence of neonatal jaundice is high in the community, affecting male and female neonates almost equally. Jaundice is predominantly of the breastfeeding and physiological types. Among other recommendations, it is advised that government and health workers promote programs to enhance public/parental education on the impact of breastfeeding on neonatal jaundice through campaigns, rallies, and workshops in the community and other similar communities.

Keywords: Breastfeeding, Intensive care, Jaundice, Neonates, Risk factors

Introduction

Jaundice is derived from the French word *jaune*, which means yellow. Neonatal jaundice is the yellow discoloration of the skin, sclera, and mucosa caused by the excess accumulation of bilirubin in the tissues and plasma. It is the most common condition requiring medical attention and hospital readmission in newborns. The yellow coloration of the skin and sclera in affected newborns results from the accumulation of unconjugated bilirubin (1).

In most infants, unconjugated hyper-bilirubinemia reflects a normal transitional

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phenomenon. However, in some infants, serum bilirubin levels may rise excessively, which is a cause for concern because unconjugated bilirubin is neurotoxic and can cause death in newborns and lifelong neurologic sequelae in survivors. Neonatal jaundice is a common condition worldwide, occurring in up to 60% of term and 80% of preterm newborns during the first week of life (2). Clinical signs typically begin on the head and face and then spread down the trunk and limbs as serum bilirubin levels rise. Jaundice in newborns results from increased bilirubin release from the breakdown of red blood cells due to high haemoglobin levels at birth, the reduced lifespan of newborn red blood cells (70–80 days) compared to adults (90–120 days), and reduced hepatic metabolism of bilirubin due to immature hepatocytes. In most cases, this newborn hyperbilirubinemia is a natural transition that resolves by the first week of life as the liver matures.

Neonatal hyperbilirubinemia is the most common clinical condition in newborns requiring evaluation and management, and it remains a frequent reason for hospital readmission during the first week of postnatal life (3). Its high prevalence reflects developmental immaturities in red blood cells, the liver, and the gastrointestinal tract, resulting in an imbalance that favors bilirubin production over hepatic–enteric clearance (4). For most neonates, hyperbilirubinemia is a benign postnatal transitional phenomenon with no overt clinical effects. However, a subset of infants will develop more significant hyperbilirubinemia. The estimated occurrence based on peak total serum bilirubin (TSB) severity has been reported as follows: >17 mg/dL (291 μmol/L), defined as significant, in ~1 in 10; >20 mg/dL (342 μmol/L), defined as severe, in ~1:70; >25 mg/dL (428 μmol/L), defined as extreme, in ~1:700; and >30 mg/dL (513 μmol/L), defined as hazardous, in ~1:10,000 live births (5). The crux of hyperbilirubinemia and bilirubin-induced neurotoxicity risk evaluation remains the measurement of TSB interpreted in an hour-specific fashion (6), while the mainstays of intervention are phototherapy and exchange transfusion (7). These are detailed alongside other evaluation strategies, clinical tools, and adjunctive therapies, including several under study that hold promise for future application in managing neonatal jaundice.

Marked hyperbilirubinemia can lead to acute bilirubin encephalopathy (ABE), which may evolve into chronic bilirubin encephalopathy (CBE)—a devastating, permanently disabling neurologic disorder (8) synonymous with kernicterus (American Academy of Pediatrics (9)).

Neonatal jaundice is more common among Nigerian babies than among British ones and less common among Chinese and Malaysian populations. These differences in incidence may be related to genetic differences in bilirubin metabolism during the early neonatal period and the high incidence of G-6-PD deficiency in areas where the condition is prevalent. The relationship between G-6-PD deficiency and the etiology of neonatal jaundice in Nigerian children is demonstrated in this study. Early reports on this relationship in Nigeria involved small sample sizes. Therefore, this study will help strengthen neonatal care and contribute to reduced mortality and morbidity associated with neonatal jaundice by involving healthcare providers in implementing new protocols for managing jaundiced newborns.

Statement of the Problem

Despite the implementation of evaluation and treatment guidelines for neonatal hyper-bilirubinemia by the American Academy of Pediatrics (9) and others to reduce the incidence of severe hyperbilirubinemia and bilirubin encephalopathy, cases of kernicterus continue to occur in the United States, Canada, Europe, and elsewhere (10). In developed countries, population-based estimates for kernicterus in term infants range from 1 in 30,000 to 1 in 200,000 live births (10). The present study assessed the incidence of neonatal jaundice in the NICU of Federal Medical Centre, Asaba. The selected hospital reports many cases of neonatal jaundice, necessitating this assessment.

Aim of the Study

The aim of this research is to explore the incidence of neonatal jaundice in the Neonatal Intensive Care Unit of Federal Medical Centre, Asaba, from January 2018 to December 2020 (two years).

Research Objectives

Based on the stated aim, the following specific objectives were formulated:

1. To determine the number of neonatal jaundice cases admitted to the NICU of Federal Medical Centre, Asaba, from January 2018 to December 2020.
2. To ascertain the causes of neonatal jaundice

among newborns admitted to the NICU of Federal Medical Centre, Asaba, from January 2018 to December 2020.
3. To assess the types of neonatal jaundice suffered by newborns admitted to the NICU of Federal Medical Centre, Asaba, from January 2018 to December 2020.

Research Questions

The research questions guiding this study are:
1. How many cases of neonatal jaundice were admitted to the NICU of Federal Medical Centre, Asaba, from January 2018 to December 2020?
2. What are the causes of neonatal jaundice among newborns admitted to the NICU of Federal Medical Centre, Asaba, from January 2018 to December 2020?
3. What variants/types of neonatal jaundice are common among newborns admitted to the NICU of Federal Medical Centre, Asaba, from January 2018 to December 2020?

Significance of the Study

Future Researchers: The findings will serve as a valuable reference for similar studies on the incidence of neonatal jaundice.

Policy Makers: The study will help policymakers understand how common neonatal jaundice is at Federal Medical Centre, Asaba, and thus implement appropriate management measures.

Neonates: Knowledge of the incidence will prompt health workers to conduct early searches, make prompt diagnoses, and initiate timely treatment to reduce possible complications.

Non-Governmental Organizations (NGOs): The study will highlight the need for NGOs to fund training and retraining programs on the prevention and management of neonatal jaundice, equipping healthcare workers with the knowledge and skills required to prevent complications and mortality.

Nurses: Findings will assist nurses in the prevention, early detection, and management of neonatal jaundice to reduce mortality and morbidity.

Scope of the Study

The study is limited to the records of neonates in the NICU of Federal Medical Centre, Asaba.

Operational Definition of Terms

Incidence: The number of cases of physiologic and pathologic jaundice admitted to Federal Medical Centre, Asaba, from January 2018 to December 2020.

Methods

This section outlines the plan and specific steps used to conduct the research (11). It includes the introduction, study area, study population, study design, sample size and sampling methods, data collection methods and procedures, data analysis, study limitations and problems, ethical considerations, and conclusion.

Research Design

Research designs are types of inquiry within quantitative, qualitative, and mixed methods approaches that provide specific procedural direction (12). A retrospective descriptive design was used to collect data. This design was relevant because it allowed the researcher to obtain more information about characteristics within a field of study where little is known. This hospital-based, case-control study with a cross-sectional design was conducted from January 2018 to December 2020 at the NICU of Federal Medical Centre, Asaba, Delta State. It is a cross-sectional study involving three key information-driven and information-intensive professional groups in the hospital: neonatal consultants, pediatricians, pediatric residents, nurses, and general medical practitioners managing neonates.

Area of the Study

The study was conducted at Federal Medical Centre, Asaba, Nigeria. The hospital was established on August 12, 1998, following the Federal Government of Nigeria's policy to establish a Federal Medical Centre in states without a Federal Teaching Hospital. It is located along Nnebisi Road, by FMC Roundabout, Asaba, Delta State, Nigeria. The hospital has twelve departments: Administration, Anaesthesia, Dental, Family Medicine, Finance/Accounts, Hospital Information Management, Internal Medicine, Nursing, Obstetrics & Gynaecology, Ophthal-mology, Paediatrics, Pathology, Pharmacy, Physiotherapy, Public Health, Radiology, Surgery, and Works. The hospital had a staff strength of 1,850 at the time of the study.

This study was conducted specifically in the NICU of Federal Medical Centre, Asaba. The unit has 22 cots and serves as a tertiary referral centre for neighbouring states such as Bayelsa and Edo. As a tertiary healthcare facility, it receives a large number of patients, as Asaba is a highly commercialized and industrialized city with low

and affordable service costs. The area is known for cohabitation of multiple ethnic groups, with socioeconomic classes ranging from peasant fishermen, farmers, and street hawkers to top-class civil servants and business executives.

Population of the Study

The study population consisted of the total number of newborn files (inborn and out-born) recorded in the admission and discharge register of the neonatal unit of Federal Medical Centre, Asaba, from January 2018 to December 2020. The tables below represent the distribution of the population for the three years under study.

Sample and Sampling Technique

A stratified random sampling technique was used. From a study population of 650, a sample size of 250 was drawn using Taro Yamane's formula for sample size calculation.

Sample size calculation using Taro Yamane's formula

$$n = \frac{N}{1+N(e)^2}$$

n=sample size

N=Population under study

e= margin of error (0.05)

$$n = \frac{650}{1+650(0.05)^2}$$

$$n = \frac{650}{1+650(0.0025)}$$

$$n = \frac{650}{1+1.6}$$

$$n = \frac{650}{2.6}$$

$$n = 250$$

Instrument for Data Collection

The researcher used a tool developed by Hanneke Brits (2018), who conducted a similar study on risk factors associated with neonatal jaundice. This tool focused on data categories such as demographic information and the incidence of neonatal jaundice. The researcher employed retrospective auditing as the instrument, retrieving document files of newborns diagnosed with neonatal jaundice from January 2018 to December 2020.

The tool was divided into three sections designed to determine: (1) the number of neonatal jaundice cases admitted to the neonatal intensive care unit, (2) the causes of neonatal jaundice among newborns admitted to the neonatal care unit, and (3) the types of neonatal jaundice suffered by newborns admitted to the neonatal care unit of Federal Medical Centre, Asaba, from January 2018 to December 2020. Additional data were collected from the hospital records department for the specified study period.

Face Validity

Face and content validity were determined by the researcher's supervisor, who ensured that the reviews aligned with the objectives of the study.

Reliability of the Instrument

For reliability testing, the researcher conducted a pilot study involving 14 neonates admitted to the neonatal unit to pre-test the instrument. The Pearson Correlation Coefficient was used to determine the reliability of the instrument. A coefficient value of 0.65 indicated that the research instrument was reliable; therefore, it was adopted for obtaining the desired information for the study.

Method of Data Analysis

Data generated from the study were summarized and presented in tables using frequencies and simple percentages. Descriptive statistical methods were applied for analysis using Statistical Package for the Social Sciences (SPSS) version 22.

Ethical approval

Formal permission was obtained from the heads of all units used for data collection. No names or identifying data were collected on the study instruments. The researcher maintained the required interpersonal relationships and rapport with the nurses and hospital staff. All sources of information were duly acknowledged, and the confidentiality of all information sources was maintained.

Results

This chapter presents the results from the data collected in the study. A total of 250 subjects participated, and data were collected from

Table 1. shows that the ages of the subjects are 0-7 days 90 (36%), 8 - 14 days 74 (30%), 15 21 days 52 (20%),22 - 28days 34 (14%)

n=250

Item	Frequency	percentage%
Age		
0-7days	90	36
8-14days	74	30
15-21days	52	20
22-28days	34	14
Gender		
Female	126	50.4
Male	124	49.6
Birth weight		
Below 1kg	0	0
1-2kg	68	27
2-3kg	82	33
3-4kg	100	40
Maternal age		
Below 19	28	11
20-34	132	53
35-49	90	36
Ethnicity		
Igbo	120	48
Yoruba	30	12
Hausa	40	16
Ijaw	25	10
Others	35	14

medical records and neonatal files. The results are presented in tables with frequencies and percentages.

For the gender, among jaundiced neonates, as indicated in the table, females constituted a higher number 126 (50.49%) than their male counterpart 124 (49.6%)

For the birth weight, the majority of jaundiced neonates were between 3 4kg 100 (40%) followed by 2 -3kg 82 (33%) and none was below 1kg 0 (0%).

For the maternal age, the age range of 20 - 34 was presenting the highest number of jaundiced newborns 132 (53%) while below 19 has the lowest 28 (11%).

Under Ethnicity, majority of the mothers were Igbo 120 (48%) while Ijaw was the least 25 (10%).

Cases of neonatal jaundice was admitted in neonatal Intensive Care Unit of Federal Medical Centre, Asaba from January 2018 to December 2020

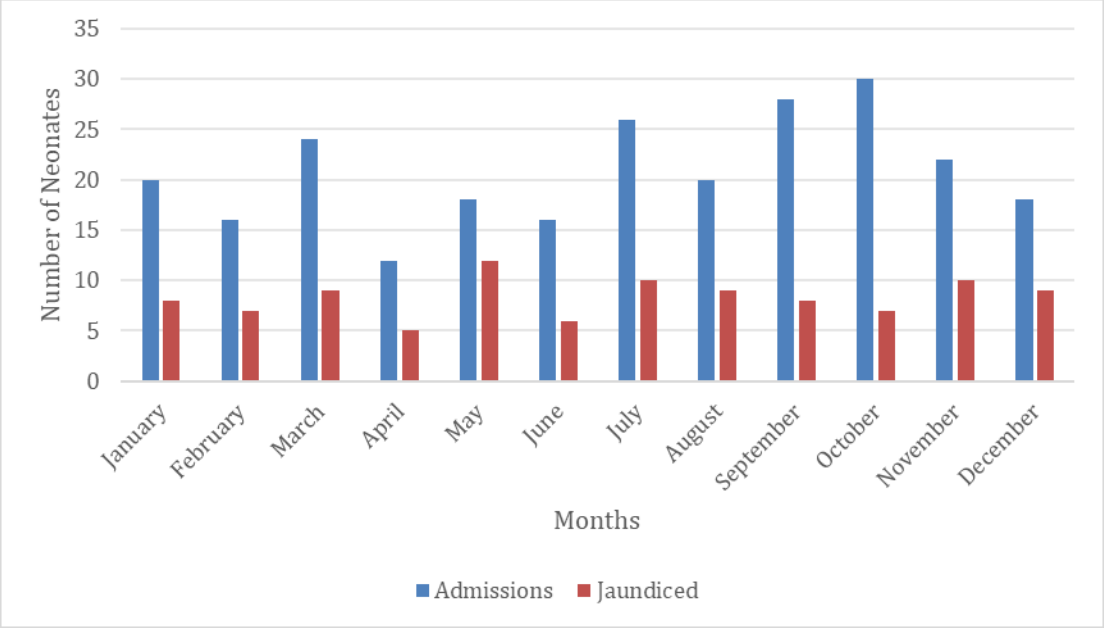

Figure 1. Number of cases of neonatal jaundice admitted from January 2018 to December 2020. Out of 250 neonates admitted, the overall incidence of neonatal jaundice was 100 (40%). The highest incidence was recorded in May 12 (66.7%) followed by December 9 (50%) and November 10 (45.5%). The least was recorded in October 7 (23.3%).

Discussion

The study revealed a high rate of neonatal jaundice among neonates admitted to the neonatal unit from 2018 to 2020, as indicated by an overall incidence of 100 (40%). This finding aligns with a previous retrospective study conducted at Federal Medical Centre, Abakaliki (13), which determined the incidence of neonatal jaundice in neonates admitted from January 1, 2010, to December 31, 2011, and concluded that neonatal jaundice

Causes of neonatal jaundice in newborns admitted into the neonatal intensive care unit of Federal Medical Center, Asaba from January 2018 to December 2020

n=100

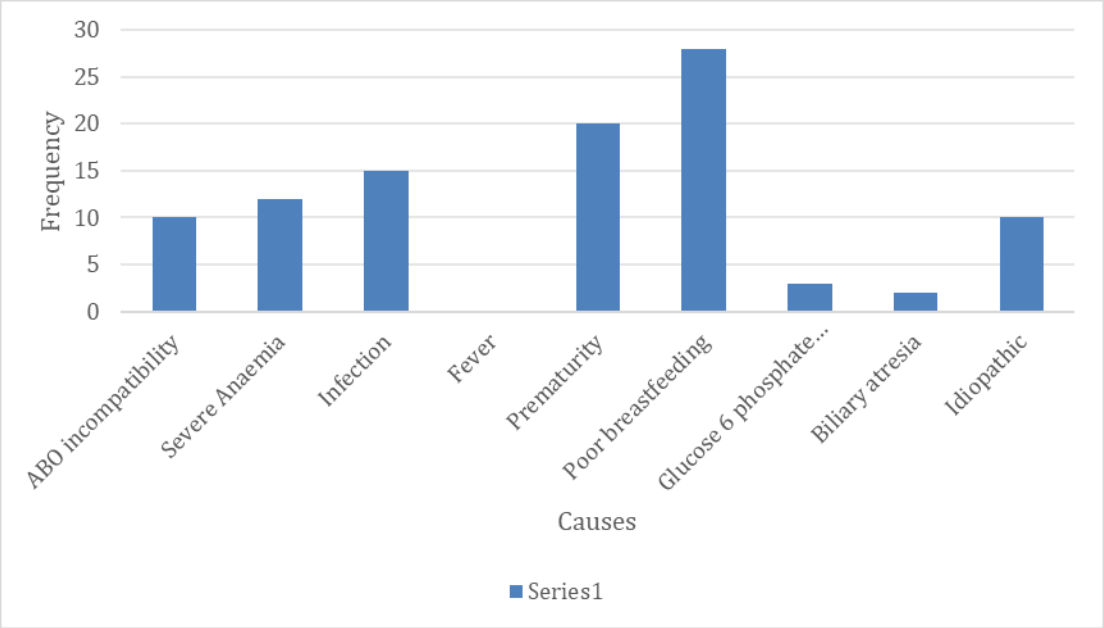

Figure 2. Causes of neonatal jaundice. The study shows that the lead causes of neonatal jaundice is poor breastfeeding 28 (28%), followed by prematurity 20 (20%) and infection 15 (15%), ABO incompatibility accounted for 10 (10%) and neonatal jaundice due to fever was not accounted for in the study 0 (0%).

Types or variants of neonatal jaundice are common among the newborns admitted into the intensive care unit of federal medical center Asaba from January 2018 to December 2020

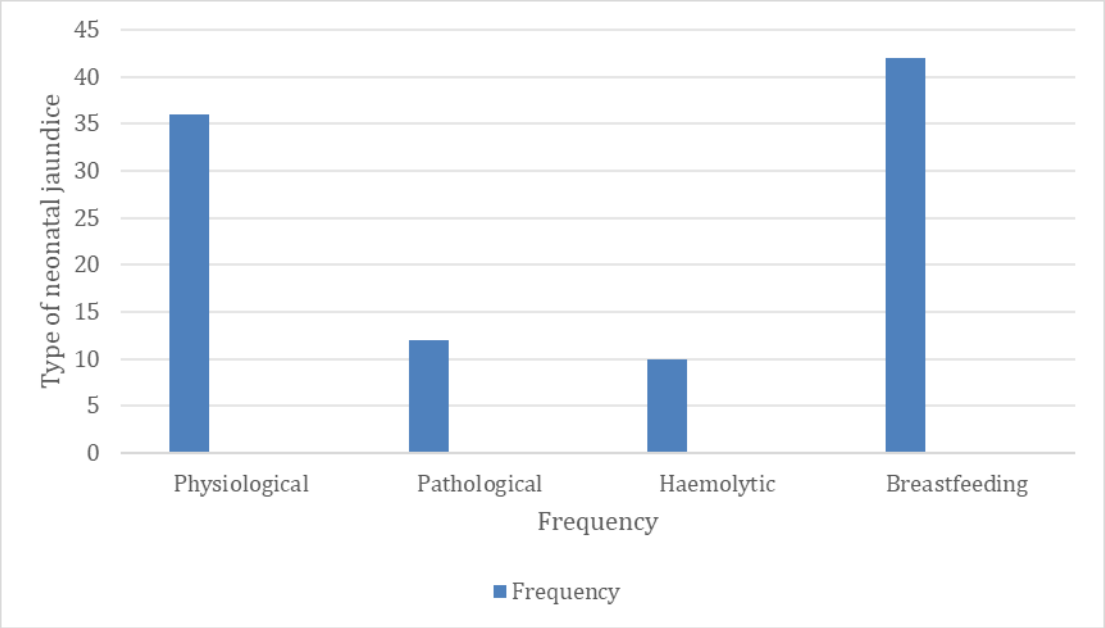

Figure 3. Types of neonatal jaundice common among the neonates. Table shows that out of 100 neonates admitted into neonatal intensive care unit, the type of jaundice observed to be most prevalent was Breastfeeding 42 (42%) followed by Physiological 36 (36%) and the least was Haemolytic jaundice 10 (10%)

accounted for 35% of all neonatal admissions during that period. The findings also correspond to a previous report (14) from a prospective study that determined the incidence and various risk factors associated with neonatal jaundice. It was also observed that among 560 neonates, 273 (48.4%) developed clinical jaundice. This indicates that neonatal jaundice is prevalent and demands the attention of healthcare providers.

Causes of neonatal jaundice among newborns admitted to the neonatal intensive care unit of Federal Medical Centre, Asaba, from January 2018 to December 2020

The study revealed that the leading causes of neonatal jaundice in newborns admitted during the study period were poor breastfeeding 28 (28%), prematurity 20 (20%), and infection 15 (15%). This finding agrees with previous observations that the main causes of neonatal jaundice were septicemia (32.5%), poor breastfeeding (27%), and prematurity (17.5%) (15).

Types of neonatal jaundice common among neonates admitted to the Intensive Care Unit of Federal Medical Centre, Asaba, from January 2018 to December 2020

The study also revealed that the majority of neonates admitted for neonatal jaundice had breastfeeding jaundice 42 (42%), followed by physiological jaundice 36 (36%).

Suboptimal intake jaundice, also called breastfeeding jaundice, most often occurs in the first week of life when breastfeeding is being established. Newborns may not receive optimal milk intake, leading to elevated bilirubin levels due to increased reabsorption of bilirubin in the intestines. Inadequate milk intake may also delay the passage of meconium. Meconium (the first stool) contains large amounts of bilirubin, which is then reabsorbed into the infant's circulation. In most cases, breastfeeding can, and should, continue, as more frequent feedings can reduce the risk of jaundice (16).

Breastfeeding Jaundice and Breast Milk Jaundice

Sometimes, jaundice occurs when a baby does not get enough breast milk. This type, which starts in the first few days of life, is referred to as breastfeeding failure jaundice or breast-non-feeding jaundice. This means the baby is breastfed but does not receive sufficient milk (16).

However, some babies who receive sufficient breast milk may still develop jaundice. This is termed breast milk jaundice. The exact mechanism behind this condition is unknown, but it is believed that certain substances in the mother's milk may inhibit the infant's liver's ability to process bilirubin (17). It is likely caused by factors in maternal milk that enhance bilirubin absorption from the intestine and factors that interfere with specific proteins in the baby's liver responsible for breaking down bilirubin (17).

Although several aetiological factors are associated with neonatal jaundice, there are no previous studies on the types of jaundice common among neonates in this context. Therefore, poor breastfeeding remains a leading cause of neonatal jaundice in this hospital.

Findings also showed that neonatal jaundice affects a considerable number of neonates; therefore, nurses should direct their efforts toward educating the public, especially women of childbearing age, about neonatal jaundice and the importance of breastfeeding—particularly exclusive breastfeeding for the first six months, as recommended by the World Health Organization (WHO). There is also a need to educate them on other predisposing factors and their management (15).

Conclusion

The incidence of neonatal jaundice at Federal Medical Centre (FMC), Asaba, is high, and poor breastfeeding practice has been identified as a leading cause. Consequently, every preventive measure must be implemented, and timely treatment of neonatal jaundice is essential to prevent complications and death.

Phototherapy is a common treatment for jaundice. Other therapeutic options include temporary additional feeding with mother's expressed breast milk, donor human milk, or infant formula. In rare cases, temporary interruption of breastfeeding may be required.

Programs that enhance proper public education on the impact and complications of neonatal jaundice should be promoted by the government and health workers through campaigns, rallies, and workshops.

Malaria treatment should be encouraged during pregnancy to avoid haemolytic anaemia, which predisposes the fetus to jaundice.

Efforts should be made to provide more antenatal centres, especially those closer to rural communities, to improve accessibility for pregnant mothers to conventional delivery methods and prompt diagnosis of jaundice.

More health workers should be trained by the government and non-governmental organizations

(NGOs) on the management of neonatal jaundice.

Acknowledgments

None.

Conflicts of interest

The authors declare no conflict of interest related to this study.

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