

**PREVALENCE OF NEONATAL JAUNDICE AT A TERTIARY HEALTH
INSTITUTION IN BENIN CITY, EDO STATE, NIGERIA (2018-2022)**

BY

EZENWA EBERE MERCY

BMS1701938

**DEPARTMENT OF NURSING SCIENCE,
SCHOOL OF BASIC MEDICAL SCIENCES,
UNIVERSITY OF BENIN,
BENIN CITY.**

SEPTEMBER, 2023

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**SUBMITTED TO THE DEPARTMENT OF NURSING SCIENCE, SCHOOL
OF BASIC MEDICAL SCIENCE, UNIVERSITY OF BENIN, BENIN CITY
EDO STATE.**

**IN PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE OF
BACHELOR OF NURSING (B.NSC) IN NURSING SCIENCE, UNIVERSITY
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SEPTEMBER, 2023

DECLARATION

This is to declare that this research project titled PREVALENCE OF NEONATAL JAUNDICE AT A TERTIARY HEALTH INSTITUTION BENIN CITY, EDO STATE (2018-2022) was carried out by Ezenwa Ebere Mercy is solely the result of my work except where acknowledged as being derived from other person(s) or resources.

Matriculation number BMS1701938 in the Department of Nursing Science, School of Basic Medical Science, University of Benin, Benin City.

Signature _____

Date _____

CERTIFICATION

This is to certify that Ezenwa Ebere Mercy an undergraduate student in the Department of Nursing Science, Faculty of Basic Medical Sciences, University of Benin, Edo state, with Matriculation number BMS1701938 completed this work on her as a partial fulfillment of the requirement for the award of Bachelor Degree in Nursing Science (B.Nsc) in Nursing Sciences.

Signature _____

Date _____

Dr.(Mrs) C.A Enuke

(PROJECT SUPERVISOR)

Signature _____

Date _____

Dr.(Mrs) R.E. Esewe

(Head of Department)

Signature _____

Date _____

EXTERNAL EXAMINER

ABSTRACT

The aim of this study is to determine the prevalence of neonatal jaundice in University of Benin Teaching Hospital (UBTH) from 2018 – 2022. The research design adopted for the study is a non-experimental, retrospective research design method and total population sampling method of all the neonatal jaundice cases of children admitted into the special baby unit from January 2018 – 2022. An observational checklist for manual collection of secondary data of admitted children in the unit from their case notes and hospital records was used as instruments of data collection. The data was analyzed using descriptive statistics. The result from the study shows a steady increase in the prevalence of neonatal jaundice with a drop in 2021 and the highest prevalence in 2022. The result shows a steady increase in the prevalence of neonatal jaundice with a drop in 2021 and the highest prevalence in 2022. The study however also identified that that there is a significant association between prevalence of neonatal jaundice in male and female neonates and there is a significant association between clinical factors and outcomes of neonatal jaundice.

Keywords: Prevalence , Outcome , Neonate , Jaundice.

DEDICATION

This work is dedicated to God Almighty, the giver of life, knowledge, wisdom, protection, provision and for the grace to complete this work and to my lovely parent and siblings for their encouragement and support

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My gratitude goes to God Almighty for giving me the grace and wisdom to start and finish this work in good health and for provision during times of difficulties in doing this work.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Jaundice can be described as the yellowish discolouration of the skin and sclera which is usually caused by excessive bilirubin in the skin and mucous membranes (Joseph & Samant, 2021). Neonatal jaundice is one of the most common conditions that require medical attention in new-borns. It appears because of the imbalance between bilirubin production and its excretion (Hegyí & Kleinfeld, 2021). During pregnancy, the mother helps in the excretion of the foetus's bilirubin via placenta. After birth, the new-born must adjust and discard blood bilirubin by itself. This might be elevated values of bilirubin in new-borns up to concentrations causing the yellow colouration of skin and mucosae. This is due to organs immaturity and inability to cope with the rhythm needed for the bilirubin to be extracted from the organism (Haile & Girma, 2020).

Neonatal jaundice is a common physiological occurrence in newborns with over half of term and 80% of preterm neonates in the first week of life showing clinical signs, including yellow discolouration of the skin and sclera resulting from high serum levels of bilirubin. Jaundice is a result of the increased breakdown of red blood cells and/or decreased hepatic excretion of bilirubin (Bolajoko, Kaplan & Hansen, 2018).

Of the 7.6 million deaths estimated to occur in children below the age of 5 years, 40% occurred during the neonatal period. Several reports have indicated the important contribution of severe hyperbilirubinemia to neonatal morbidity and mortality.

Worldwide, an estimated 14.1 million newborns (10.5% of live births) require phototherapy for jaundice; of these, 6 million do not have access to treatment and 2.4 million without access to treatment are in Central and South Asia (Olatubi, et al., 2019). Scrafford, et al (2013) discovered that the incidence of referral for neonatal jaundice was 29.3 per 1,000 live births (95% confidence interval: 26.9, 31.7). Male gender, high birth weight, breastfeeding patterns, warm air temperature, primiparity, skilled birth attendance, place of delivery, prolonged labour, oil massage, paternal education and ethnicity were found to be significant risk factors for jaundice. Current evidence, however, suggests that low- and middle-income countries (LMICs) disproportionately bear the burden of severe neonatal hyperbilirubinemia (Erdeve, 2020). In a review on the global burden of jaundice, sub-Saharan Africa and South Asia were reported to be the leading contributors to an estimated 1.1million babies who would develop severe jaundice worldwide every year (Bhutani, et al., 2019). Another systematic review found that low- and medium-income countries consistently report substantially higher rates of exchange transfusion and bilirubin-induced neurologic dysfunctions (acute bilirubin encephalopathy (ABE) and chronic bilirubin encephalopathy or kernicterus) than in high-income countries (Slusher, et al., 2017).

Over the years, there have been several studies that reported neonatal jaundice as a key contributor to neonatal morbidity and mortality (Bizuneh, et al., 2020, Devi & Vijaykumar, 2017, Roba & Diro, 2017). Due to the lack of harmonized protocols for management and classification of jaundice in low-and middle-income countries, comparison of jaundice across different locations has proven to be difficult (Slusher,

et al., 2017). Neonatal jaundice is the leading cause of illness and death associated with new-borns in Africa especially in West Africa and needs to be prioritized with global intervention (Bizuneh, et al., 2020, Devi & Vijaykumar, 2017, Roba & Diro, 2017).

Due to the relatively higher prevalence of jaundice among neonates in South southern Nigeria and the paucity of studies in Edo State, this study seeks the prevalence of neonatal jaundice among admitted neonates in Special Care Baby Unit (SCBU), University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria.

1.2 Statement of the problem

Current evidence, however, suggests that low- and middle-income countries (LMICs) disproportionately bear the burden of severe neonatal hyperbilirubinemia (Slusher, et al., 2017). According to a world survey, about 1.1 million new-borns would develop severe jaundice annually and majority of them would reside in sub-Saharan Africa and South Asia (Birhanu, et al., 2021). Another systematic review found that low- and medium-income countries consistently report substantially higher rates of exchange transfusion and bilirubin-induced neurologic dysfunctions (acute bilirubin encephalopathy (ABE) and chronic bilirubin encephalopathy or kernicterus) than in high-income countries (Olusanya, Osibanjo & Slusher, 2015).

In Nigeria, about 5.5% of all newborns are estimated to have clinically significant neonatal jaundice requiring phototherapy and/or exchange blood transfusion (EBT),

which is probably one of the highest globally (Olatubi, et al., 2019). Most tertiary institutions are still overwhelmed with exceptionally high rates of EBT daily (Jalo, et al., 2021; Olufunmilola, et al. 2021). Therefore, this study assesses the prevalence of neonatal jaundice in a tertiary health institution in Edo State, Nigeria, between January 2018 – December 2022

1.3 Research Questions

1. What is the prevalence of Neonatal jaundice in University of Benin Teaching Hospital from 2018 - 2022?
2. What is short-term outcome of neonates with jaundice in University of Benin Teaching Hospital from 2018 – 2022?
3. What are the risk factors associated with short term outcome of neonates with jaundice in University of Benin Teaching Hospital from 2018 – 2022?

1.4 Aim and Objectives of the Study

The aim of this study is to determine the prevalence of neonatal jaundice in University of Benin Teaching Hospital (UBTH) from 2018– 2022.

1. To ascertain the prevalence of Neonatal jaundice in UBTH from 2018 – 2022.
2. To determine the short-term outcome of neonates with jaundice in UBTH from 2018– 2022.
3. To elicit the risk factors associated with short term outcomes of neonates with jaundice in UBTH from 20118– 2022.

1.5 Hypotheses

1. There is no significant difference in the prevalence of neonatal jaundice in UBTH based on the sex of the neonates
2. There is no significant association between clinical factors and outcome of neonatal jaundice in UBTH.

1.6 Significance of the Study

The Ministry of Health will focus on the results from this study for enhancing the training of general nurses working in neonatal unit. And with the time, the specialised nurses in neonatology nursing should be the only ones to work in neonatal unit for improvement nursing neonatal. Results from this study will help healthcare policy makers to recognize main neonatal risk factors and how to deal with them. The finding from this study will also help the selected health facility to recognize the most common risk factors of neonatal jaundice at their hospital and how to deal with them. The results will also help in management of neonatal jaundice and in the improvement of nursing and midwife practice related to neonatal jaundice.

1.7 Scope of the Study

The scope of this study covers neonatal jaundice cases at University of Benin Teaching Hospital (UBTH) from 2018 to 2022.

1.8 Operational definitions

Neonatal – This refers to a newborn less than 4 weeks (a month)

Outcome – This refers to the consequence of jaundice, that is whether the patient is

discharged or died

Neonatal Jaundice: This is a yellowish discoloration of a newborns skin and eyes.

Prevalence This refers to the percentage of new-borns who have experienced neonatal jaundice among all the new-borns admitted in neonatal unit in the years 2018 -20202 at the selected hospital.

Fetal Asphyxia: A complete lack or inadequate supply of oxygen by a baby before birth.

Breast Milk Jaundice: Jaundice due certain substance in breast milk which blocks bilirubin breakdown.

Breastfeeding Jaundice: Jaundice caused by inadequate intake of breast milk.

CHAPTER TWO

LITERATURE REVIEW

2.1 CONCEPTUAL FRAMEWORK

2.1.1 Concept of Neonatal Jaundice

Neonatal jaundice or neonatal hyperbilirubinemia results from elevated total serum bilirubin (TSB) and clinically manifests as yellowish discoloration of the skin, sclera, and mucous membrane. The term jaundice derives from the French word "jaune," which means yellow. It is the most commonly encountered medical problem in the first two weeks of life and a common cause of readmission to the hospital after birth. Gale *et al.*, (2001) Approximately 60% of term and 80% of preterm newborns develop clinical jaundice in the first week after birth. Mitra & Rennie (2017) In most cases, it is a mild, transient, and self-limiting condition and resolves without treatment referred to as "physiological jaundice." However, it is imperative to distinguish this from a more severe form called "pathological jaundice." Failure to identify and treat this entity may result in bilirubin encephalopathy and associated neurological sequelae. There are two distinct types of Neonatal hyperbilirubinemia.

2.1.2 Etiology

Unconjugated hyperbilirubinemia is the more common type and is either physiological or pathological. Physiological jaundice accounts for 75% of neonatal hyperbilirubinemia and results from a physiological alteration in neonatal bilirubin metabolism. Healthy adults have a normal TSB level of less than 1mg/dl in contrast to neonates, where TSB levels are physiologically higher. Even in healthy full-term

newborns, there is an increased bilirubin load owing to increased red blood cells (RBC) mass and a decreased RBC lifespan. Clearance of bilirubin is also compromised due to impaired activity of uridine diphosphate glucuronosyltransferase (UGT), the enzyme needed for bilirubin conjugation. The UGT enzyme in a newborn has an activity of about 1% of the adult level.

Leung & Sauve (1989) moreover, these infants also have increased enterohepatic circulation, further contributing to elevated TSB levels. Physiological jaundice typically appears after 24 hours of age, peaks at around 48-96 hours, and resolves by two to three weeks in full-term infants. Mitra & Rennie (2017) Jaundice is considered pathological if it presents on the first day of life, TSB is more than the 95th centile for age based on age-specific bilirubin nomograms, levels rise by more than 5 mg/dL/day or more than 0.2 mg/dL/hour, or jaundice persists beyond 2 to 3 weeks in full-term infants.

American Academy of Pediatrics Subcommittee on Hyperbilirubinemia (2004) based on the mechanism of bilirubin elevation, the etiology of unconjugated hyperbilirubinemia can be subdivided into the following three categories:

Increased Bilirubin Production

Immune-mediated hemolysis - Includes blood group incompatibilities such as ABO and Rhesus incompatibility. Non-immune mediated hemolysis - includes RBC membrane defects like hereditary spherocytosis and elliptocytosis; RBC enzyme defects like glucose-6-phosphate dehydrogenase (G6PD) deficiency; pyruvate kinase deficiency; sequestration like cephalohematoma, subgaleal hemorrhage, Intracranial

hemorrhage; polycythemia, and sepsis.

Decreased Bilirubin Clearance

Crigler-Najjar type I & II, and Gilbert syndrome.

Miscellaneous Causes

Other miscellaneous etiologies include the infant of a mother with diabetes, congenital hypothyroidism, drugs like sulfa drugs, ceftriaxone, and penicillins, Intestinal obstruction, pyloric stenosis, breast milk jaundice, breastfeeding jaundice.

Exaggerated hemolysis, either immune or non-immune mediated, is the most common cause of pathological hyperbilirubinemia in newborns. Immune-mediated hemolysis is seen with blood group incompatibility such as ABO/RH incompatibility and leads to hemolytic disease of newborns (HDN). In HDN, due to ABO incompatibility, preformed maternal anti-A and anti-B antibodies of immunoglobulin (Ig) G subclass cross the placenta and cause hemolysis and UHB in newborns with blood type A, B, or AB. Although the direct Coombs test is used to aid diagnosis, the sensitivity and positive predictive value for predicting severe UHB are low.

Shahid & Graba (2012) ABO incompatibility between mother and fetus exists in about 15% of pregnancies, but HDN due to ABO incompatibility is seen only in 4% of newborns with ABO incompatibility. In Rhesus (Rh) incompatibility, an Rh-negative mother who has been previously exposed to Rh-positive RBCs usually from a previous pregnancy or miscarriage, becomes sensitized and develops antibodies against Rh antigen. Initially, sensitization produces IgM antibodies that cannot cross the placenta. However, during subsequent pregnancies, the antibody

class switch produces IgG antibodies which can cross the placenta, causing RBC hemolysis in the fetus with Rh-positive blood. The Rh antigen is very immunogenic, and the resultant HDN is usually severe, often leading to hydrops in fetuses or severe UHB in newborns. The American College of Obstetricians and Gynecologists (ACOG) has recommended that all Rh-negative pregnant women receive anti-D immune globulin at 28 weeks of gestation and again following delivery if the infant is Rh-positive/unknown ACOG practice bulletin (1990).

Non-immune causes of UHB include RBC enzyme defects, RBC membrane defects, hemoglobinopathies, sepsis, sequestration, and polycythemia. The glucose-6 phosphatase dehydrogenase (G6PD) enzyme deficiency is the most common RBC enzyme defect and is transmitted as an X-linked recessive trait. G6PD protects RBCs against oxidative damage by generating NADPH (nicotinamide adenine dinucleotide phosphate hydrogenase) from NADP (nicotinamide adenine dinucleotide phosphate). When exposed to oxidant stressors like illness, certain medications, dyes, and foods like fava beans, G6PD deficient RBCs are hemolyzed, causing anemia and hyperbilirubinemia. More than 200 different types of mutations are known to cause G6PD deficiency.

Gómez-Manzo et al., (2016) the clinical presentation varies depending on the variant, and some newborns may develop severe hyperbilirubinemia and bilirubin encephalopathy. Pyruvate kinase deficiency (PKD) is another enzyme deficiency that causes hemolysis and may present as UHB in newborns. It is an autosomal recessive (AR) disorder caused by a defect in Adenosine triphosphate (ATP) synthesis

machinery. In PKD, RBCs and, in particular, young RBCs have shortened life span resulting in anemia and UHB Grace et al., (2015). UHB due to RBC membrane defects includes hereditary spherocytosis (HS) and hereditary elliptocytosis (HE). HS, also known as Minkowski Chauffard disease, is the most common RBC membrane defect caused by mutations in RBC membrane proteins. Da Costa et al., (2019) most cases are transmitted as an autosomal dominant (AD) trait and can present in the neonatal period with UHB.

Perrotta *et al.*, (2018) hereditary elliptocytosis is another type of RBC membrane defect that is mostly asymptomatic but rarely does cause UHB in the neonatal period.

Gallagher (2015) Most cases are transmitted as AD traits caused by mutations in RBCs structural membrane protein. The elliptical-shaped RBCs in HE are trapped in the spleen leading to extravascular hemolysis and elevated TSB. RBC sequestrations from cephalohematoma, subgaleal hemorrhage, and Intracranial hemorrhage are also important causes or risk factors for UHB in the neonatal period due to increased bilirubin load. Polycythemia is another entity associated with an increased risk of UHB in newborns. Clinical conditions associated with polycythemia are intrauterine growth restriction (IUGR), infant of diabetic mothers (IDM), large for gestational age (LGA), maternal smoking, high altitude, twin to twin transfusion, and placental transfusion (delayed cord clamping/umbilical cord milking). Studies have shown that placental transfusion reduces the incidence of postnatal anemia and leads to improved neurodevelopmental outcomes among term and preterm infants.(McDonald et al., 2019; Fogarty et al., 2018) This practice has gained

popularity, but at the same time, it may also increase the risk of hyperbilirubinemia.(Fenton et al., 2018; Nakagawa et al., 2019).

Indirect hyperbilirubinemia due to decreased bilirubin clearance usually results from quantitative or qualitative defects in the uridine diphosphate glucuronosyltransferase (UGT) enzyme. Gilbert syndrome, Crigler–Najjar syndrome type 1, and Crigler–Najjar syndrome type 2 are three prototype disorders resulting from an abnormality in the UGT enzyme. Gilbert syndrome is the most common of these and results from a mutation in the UGT1A1 gene resulting in decreased UGT production leading to unconjugated hyperbilirubinemia. Bosma et al., (2019) Gilbert syndrome typically presents as mild jaundice at times of stress in the absence of hemolysis or liver dysfunction. Anderson & Calkins (2020) Presentation in the neonatal period is rare and is usually associated with G6PD. Kaplan (2017) Crigler-Najjar syndrome type 1 is an AR disorder resulting from a complete absence of UGT activity. Affected patients present with severe hyperbilirubinemia in the first days of life, often leading to bilirubin encephalopathy. Patients with Crigler-Najjar syndrome type 2 retain some of the activity of UGT enzymes. As such, the TSB levels are not that high, and patients rarely develop bilirubin encephalopathy. Maruo (2016) breast milk jaundice and breastfeeding jaundice are two other common etiologies of UHB in newborns. Breastfeeding jaundice, also known as breastfeeding failure jaundice, occurs in the first week of life and is due to inadequate intake of breast milk leading to dehydration and sometimes hypernatremia. Leung & Sauve (2019) breastfeeding failure leads to decreased intestinal motility and decreases the elimination of

bilirubin in the stool or meconium. Breast milk jaundice occurs late in the first week, peaks in the second, and usually resolves by two weeks of age. It is thought to be mainly due to inhibition of the UGT enzyme by pregnanediol and deconjugation of conjugated bilirubin in the intestines by beta-glucuronidase present in breast milk. (Grunebaum et al., 2021; Preer & Philipp 2021) other miscellaneous causes of UHB include IDM, gastrointestinal obstruction, congenital hypothyroidism, certain medications. IDMs often have polycythemia which is mainly responsible for the increased incidence of jaundice in these infants. Rubarth, (2019) UHB in congenital hypothyroidism is related to decreased hepatic uptake of bilirubin, impaired UGT activity, and sluggish gut motility. Gastrointestinal obstruction promotes increased bilirubin recycling by augmenting the enterohepatic circulation. When used in the neonatal period, certain medications may also worsen UHB by displacing bilirubin from albumin, affecting albumin binding. Amin,(2004) Sepsis can also predispose a newborn to UHB by causing oxidative damage to RBCs, increasing bilirubin load Maisels & Kring (2019).

Conjugated hyperbilirubinemia, also referred to as neonatal cholestasis, is characterized by elevation of serum conjugated/direct) bilirubin (> 1.0 mg/dL) and is due to impaired hepatobiliary function. Distinguishing CHB from UHB is critical because cholestatic jaundice/CHB is almost always pathologic and warrants prompt evaluation and treatment. Fawaz et al., (2017) the causes of neonatal cholestasis/CHB are extensive and can be classified into the following categories:

Obstruction of biliary flow: Biliary atresia, choledochal cysts, neonatal sclerosing

cholangitis, neonatal cholelithiasis

Infections: CMV, HIV, rubella, herpes virus, syphilis, toxoplasmosis, urinary tract infection (UTI), septicemia

Genetic causes: Alagille syndrome, alpha-1 anti-trypsin deficiency, galactosemia, fructosemia, Tyrosinemia type 1, cystic fibrosis, progressive familial intrahepatic cholestasis (PFIC), Aagenaes syndrome, Dubin-Johnson syndrome, Bile acid synthesis disorders (BSAD)

Miscellaneous: Idiopathic neonatal hepatitis, parenteral nutrition induced cholestasis, gestational alloimmune liver disease/neonatal hemochromatosis, hypotension,

2.1.3 Epidemiology

Unconjugated hyperbilirubinemia is a commonly encountered problem in the neonatal period. It is estimated that about 60% of term and 80% of preterm newborns will present with clinical jaundice with TSB >5 mg/dl. Mitra & Rennie (2017) however, only about 10% of newborns are estimated to require phototherapy for jaundice. Bhutani (2019) physiological jaundice is considered the most frequent cause of clinical jaundice after the first day of life, accounting for approximately 50% of cases. Alkhotani et al., (2019) around 15% of breast-fed infants will develop UCH lasting for more than three weeks. Winfield & MacFaul (2018) only a minority of infants with neonatal jaundice have a pathological cause of jaundice. The incidence of severe hyperbilirubinemia, defined as TSB >25 mg/dl, is about 1 in 2500 live birth. Among these, ABO incompatibility followed by G6PD deficiency is the most frequently identified cause identified. Sgro et al., (2016) newborns with

Southeast and Far East Asian ancestry have higher recorded TSB levels than their White and African counterparts. (Ding et al., 2021; Bhutani et al., 2019) Neonatal jaundice also appears to be more common in people living at high altitudes and those living around the Mediterranean Sea, especially in Greece. The incidence of acute bilirubin encephalopathy is seen at a rate of approximately 1 in 10,000 live births, whereas the incidence of chronic bilirubin encephalopathy is lower, with an estimated incidence of 1 in 50,000 to 100,000 live births. Paediatric Child Health (2017), however in developing nations, the estimated occurrence of kernicterus is much higher.

Conjugated hyperbilirubinemia is much less common compared to UCH, with a frequency of around 1 in 2500 term infants. Dick et al., (2019) the most common identifiable cause of cholestatic jaundice in the neonatal period is Biliary atresia accounting for about 25% to 40% of all cases, followed by infections and TPN-induced cholestasis. Fawaz et al., 2017; Gottesman et al., 2015 It is estimated that 60% to 70% of patients with BA will eventually require liver transplantation in childhood, and BA remains the most common indication for a pediatric liver transplant (D'Alessandro 2017).

2.1.4 Pathophysiology

Bilirubin is produced from the catabolism of heme, a breakdown product of hemoglobin, in the reticuloendothelial system (RES). First, heme is converted to biliverdin, releasing iron and carbon monoxide via the action of enzyme heme oxygenase (Dennery et al., 2021) Biliverdin is then converted to bilirubin by the

enzyme biliverdin reductase. This unconjugated bilirubin is hydrophobic and is transported in circulation to the liver bound to albumin, where it is conjugated with glucuronic acid in the smooth endoplasmic reticulum by the enzyme uridine diphosphate-glucuronosyltransferase (UGT). Conjugated bilirubin is water-soluble and is then excreted in bile and into the gastrointestinal (GI) tract, where it is mostly excreted in feces after being metabolized by intestinal bacterial flora. Some of the conjugated bilirubin is deconjugated in the GI tract by the action of beta-glucuronidase and is reabsorbed through the enterohepatic circulation.

Newborn infants have higher TSB levels than adults owing to higher hemoglobin levels at birth, along with a shorter RBC life span and limited conjugating ability of the newborn liver. As such, full-term newborns normally have peak serum bilirubin concentrations of 5 to 6 mg/dl compared to adult levels of <1 mg/dl. Pathological jaundice in neonates is related to increased production of bilirubin in RES, impaired hepatic uptake, deficient conjugation of bilirubin, and/or enhanced enterohepatic circulation of bilirubin (Dennery et al., 2021).

In severe hyperbilirubinemia, unbound and unconjugated bilirubin crosses the blood-brain barrier and binds to the brainstem, hippocampus, cerebellum, globus pallidus, and subthalamic nuclei (Mitra & Rennie 2017). At the cellular level, bilirubin inhibits certain mitochondrial enzymes, inhibits DNA and protein synthesis, induces breaks in DNA strands, and hampers phosphorylation (Chuniaud et al., 2016). Bilirubin also impairs tyrosine uptake and alters the normal functioning of N-methyl-D-aspartate–receptor ion channels (Amato et al., 2019; Hoffman et al.,

2019). These mechanisms are implicated in the pathogenesis of bilirubin toxicity that clinically manifests as bilirubin-induced neurologic dysfunction (BIND) and bilirubin encephalopathy. The duration of exposure to bilirubin and the amount of bilirubin in the brain determines the severity of brain damage. However, the TSB level does not correlate well with bilirubin toxicity in the absence of hemolysis. (Dennery et al., 2021) preterm infants are even more vulnerable to the toxic effects of free unconjugated bilirubin. This is in part related to comparatively lower serum albumin level, CNS immaturity, and concurrent comorbidities like intraventricular hemorrhage, periventricular leukomalacia, sepsis, necrotizing enterocolitis, and bronchopulmonary dysplasia Watchko et al., (2019). Conjugated hyperbilirubinemia results from abnormalities in the uptake, metabolism, transport, and/or excretion of bile salts and bilirubin. Benchimol (2019) these abnormalities increase bile acid in the liver that promotes the proliferation of bile ducts and fibrosis. Bile acid is also responsible for inflammation and apoptosis of hepatocytes culminating in hepatocellular injury and cirrhosis. Trauner et al., (2018). Deficient bile secretion in cholestasis results in malabsorption of fat and fat-soluble vitamins that often leads to failure to thrive with vitamin A, D, E, and K deficiencies Chen et al., (2018).

2.2 Empirical Studies

Sahoo, et al., (2016) conducted a study to assess the incidence, various risk factors in newborns with clinical jaundice progressing to jaundice needing treatment and to assess no of neonates requiring phototherapy & exchange transfusion in ASRAM hospital, during May 2013 to July 2014. The present study was a prospective

hospital based study involving all neonates who were born at ASRAM Medical College and Hospital, a tertiary care centre, Eluru, West Godavari District, Andhra Pradesh. The results showed that out of 560 newborns, 273 (48.8%) newborns developed clinical jaundice. Out of 273 newborns with clinical jaundice, 166 (61%) newborns developed physiological jaundice and 107 (39%) newborns developed non physiological jaundice requiring therapeutic intervention in the form of phototherapy or exchange transfusion. The study concludes that the leading cause of pathological jaundice is breastfeeding jaundice, ABO incompatibility and prematurity.

Acharya and Paneru (2020) conducted a study to find out the prevalence and etiology of neonatal jaundice in neonates admitted to Neonatal Intensive Care Unit (NICU) of Nepalgunj Medical College Teaching Hospital (NGMCTH) Kohalpur, Banke. It was a prospective cross sectional hospital based study conducted from November 2018 to November 2019 in Neonatal Intensive Care Unit of Nepalgunj Medical College Teaching Hospital. All neonates with clinical jaundice and hyperbilirubinemia with total serum bilirubin of ≥ 7 mg/dl were subjected to complete history taking, through physical examination and investigations. The results showed that out of 892 neonates who developed clinical jaundice, 640 neonates whose parents gave consent were included in the study. The prevalence of neonatal jaundice was found to be 39.85% with male to female ratio of 1.79:1. In the present study pathological jaundice was seen in 74.94% whereas physiological jaundice in 23.66%. Among the various etiologies of pathological jaundice, neonatal sepsis (44.52%) was found to be the most common cause followed by ABO

incompatibility (12.18%) and Rh incompatibility (7.03%). Conclusively, the study reported that the prevalence of neonatal jaundice in present study was 39.85% and the most common cause was neonatal sepsis .The prevalence of jaundice was more in preterm than in term neonates. Neonatal jaundice is very common morbidity in NICU especially in preterm babies.

Brits, et al., (2018) published a study that determined the prevalence of neonatal jaundice and secondly to explore its risk factors in healthy term neonates. It was done in the maternity ward, National District Hospital, Bloemfontein, South Africa. In this cross-sectional study, mothers and infants were conveniently sampled after delivery and before discharge. The mothers were interviewed and their case records were reviewed for risk factors for neonatal jaundice and the clinical appearance and bilirubin levels of the infants were measured with a non-invasive transcutaneous bilirubin meter. The results showed that a total of 96 mother-infant pairs were included in the study. The prevalence of neonatal jaundice was 55.2%; however, only 10% of black babies who were diagnosed with jaundice appeared clinically jaundiced. Normal vaginal delivery was the only risk factor associated with neonatal jaundice. Black race and maternal smoking were not protective against neonatal jaundice as in some other studies. In conclusion, more than half (55.2%) of healthy term neonates developed neonatal jaundice. As it is difficult to clinically diagnose neonatal jaundice in darker pigmented babies, it is recommended that the bilirubin level of all babies should be checked with a non-invasive bilirubin meter before discharge from hospital or maternity unit as well as during the first clinic visit on day

3 after birth.

Birhanu, et al., (2021) carried out a study aimed at determining the rate and predictors of neonatal jaundice in the northwest, Ethiopia. A prospective cohort study design was conducted at Debre Markos comprehensive, specialized Hospitals using 334 neonates from October 1, 2019, to June 30, 2020. Using a systematic random sampling technique, the study subjects were drawn. Data were entered into the Epi-Data™ Version 4.2 and analyzed using STATA™ Version 14.0. The Kaplan- Meier survival curve was used to estimate the survival time. A generalized Log rank test was used to compare the survival curves of different categorical variables. Finally, both bivariable and multivariable Cox-proportional hazards regression models were used to identify the predictors of neonatal jaundice. The results showed that the overall incidence rate of jaundice among neonates was 4.5 per 100 person-hours. Long duration of labor [ARR = 3.5; 95% confidence interval (CI), (2.8– 8.7)], being male neonates [ARR= 5.2; 95% CI (3.5–7.3)], “O” blood group mothers [ARR = 4.5; 95% CI (3.4–10.3)], and having neonatal sepsis 3.4 [ARR=3.4; 95% CI: (2.5–6.1)] were predictors. Conclusively the study reported that the incidence rate of jaundice was higher in this study than the finding of the previous one. Being male, prolonged duration of labor, “O” blood group mothers and sepsis were the significant predictors. Hence, an effort has to be made to decrease the incidence rate of neonatal jaundice through improving newborn care and timely intervention for neonates with sepsis and delivered at a long duration of time as well as the neonates born from “o” blood type mothers are our recommendation.

Olatubi, et al., (2019) assessed the occurrence of neonatal jaundice among neonates admitted between January 2007 – December 2016 in a tertiary health institution in Ondo State, Nigeria. A descriptive retrospective research design was used for the study conducted in the Neonatal Ward of a tertiary health institution in Ondo State. Data were collected using a self-structured checklist. Ethical clearance was obtained from the hospital Ethical Committee. Data was analyzed using SPSS; both descriptive and inferential statistics were used. Results showed that a total of 715 neonates were admitted in the hospital during the period, 88 (34.2%) were admitted on their first day of birth. There were more male neonates admitted for jaundice than female 146 (56.8%). The highest incidence of neonatal jaundice in the hospital during the years under review occurred in 2008 (32 neonates); while the least was recorded in 2016 – 9 neonates. A total of 257 neonates were admitted for neonatal jaundice over the 10 year period under review. The serum bilirubin level reduced from 13.76 ± 8.04 on admission to 3.43 ± 2.34 at discharge. Only 61 (23.7%) of the neonates had exchange blood transfusion performed. Also, 36 (14.0%) neonates developed complications of neonatal jaundice, of which 25 (69.4%) died from these complications. A concerted effort should be made to create awareness about neonatal jaundice among women of reproductive age, and emphasis should be placed on the importance of early diagnosis and treatment of NNJ.

Scrafford (2019) quantified the incidence of and risk factors for neonatal jaundice

among infants referred for care from a rural, low-resource, population-based cohort in southern Nepal. The study participants were 18 985 newborn infants born in Sarlahi District in southern Nepal from May 2003 through January 2006 who participated in a cluster-randomised, placebo controlled, community-based trial to evaluate the effect of newborn chlorhexidine cleansing on neonatal mortality and morbidity. Jaundice was assessed based on visual assessment of the infant by a study worker and referral for care. Adjusted relative risks (RR) were estimated to identify risk factors for referral for neonatal jaundice using Poisson regression. The incidence of referral for neonatal jaundice was 29.3 per 1000 live births (95% confidence interval: 26.9, 31.7). Male sex, high birth weight, breastfeeding patterns, warm air temperature, primiparity, skilled birth attendance, place of delivery, prolonged labour, oil massage, paternal education and ethnicity were significant risk factors (P-values < 0.01). After multivariable adjustment, sex, birth weight, difficulty feeding, prolonged labour, primiparity, oil massage, ambient air temperature and ethnicity remained important factors. Among infants with difficulty feeding, exclusive breastfeeding was a risk factor for neonatal jaundice, whereas exclusive breastfeeding was protective among infants with no report of difficulty feeding. Conclusively, several known risk factors for neonatal jaundice in a low-resource setting were confirmed in this study. Unique observed associations of jaundice with ambient air temperature and oil massage may be explained by the opportunity for phototherapy based on the cultural practices of this study population. Future research should investigate the role of an infant's difficulty in feeding as a potential modifier

in the association between exclusive breastfeeding and jaundice.

Awe, et al., (2021) assessed the prevalence of jaundice among neonates admitted in the special care baby unit (SCBU) Ekiti State University Teaching Hospital (EKSUTH). The survey was retrospective in nature, it employed secondary data that consisted of relevant information relating to newborns delivered at the study location between January 2018 to December 2019. The total of inborn admitted to the SCBU during the study period was 622. The neonates had an average admission age of 1.78 ± 4.50 days and an average hospital stay duration of 4.2 ± 4.51 days. The prevalence of neonatal jaundice was 15%, and one-tenth of the neonatal deaths within the period was attributable to jaundice. Furthermore, term neonates had a significantly higher risk of having neonatal jaundice compared to preterm neonates. Only 6.2% of preterm babies had jaundice as opposed to 17.2% in term babies. The occurrence of neonatal jaundice and its related mortality cannot be overlooked. The results indicate that a portion of neonates were still affected in recent time. Healthcare centres need to be equipped with adequate treatment facilities to effectively manage the disease burden.

Chime, Egenede & Arute (2021) determined the prevalence and predisposing factors of Neonatal Jaundice in a health-care facility in Delta State. Methods: 272 babies (aged 1 – 30 days) the Neonatal Clinic of the Department of Child Health, Central Hospital, Warri, Delta State between June 2009 and June 2010 were examined daily

for evidence of jaundice. Those with serum bilirubin $315\text{mg}/100\text{ml}$ were subjected to additional clinical and laboratory investigations to determine the predisposing/etiologic factors for jaundice. The socio-demographic data of their mothers were assessed using a semi-structured questionnaire. The data generated were analyzed. The result showed that of the 160 male and 112 female babies sampled, 56 males (21%) and 33 females (12%) were found to be jaundiced. Majority of the cases (72.4% males, 70.8% females) had known predisposing/etiologic factors. The mothers who were single and divorced had relatively higher cases of jaundiced babies (50% and 35.5%, respectively). The prevalence rate was also higher among mothers with primary (55.1%) and secondary levels (36.8%) of education, than those with tertiary level of education (8.1%). Glucose-6-phosphate dehydrogenase deficiency, ABO incompatibility and low birth weight were found to be major predisposing/etiologic factors. Neonatal jaundice was common among the babies in the health facility studied and was higher among mothers who had low level of education and babies whose parents had divorced.

West and Aitafo (2020) carried out a study to determine the prevalence of hypoglycaemia, its' associated risk factors and clinical outcome among inborn neonates. This prospective study was conducted in the Neonatal Unit of the Rivers State University Teaching Hospital from April 2019 to March 2020. The results showed that of the 468 neonates admitted, 71 (15.2%) had hypoglycaemia with M:F ratio of 1.6:1. Hypoglycaemia was more common with presentations on the first day of life, those who commenced breastfeeding from day 2 of admission and above and

had hypothermia. The commonest clinical features in hypoglycaemic neonates were difficulty in breathing (45.1%), seizures (7.0%) and cyanosis (5.6%), although there was no statistical significance ($P>0.05$). Maternal risk factors significantly associated with neonatal hypoglycaemia were Gestational Diabetes ($P<0.0001$) and Prolonged rupture of membranes ($P=0.003$). More neonates with probable sepsis, neonatal jaundice, prematurity and Macrosomia were hypoglycaemic though not of statistical significance ($P>0.05$). Of the 71 neonates with hypoglycaemia, 3 (4.2%) died.

Haile and Girma (2020) assessed the prevalence and contributing factors of neonatal jaundice among neonates admitted to neonatal intensive care unit at St. Paul Hospital Millennium Medical College, from January 1 to December 31, 2018. Addis Ababa, Ethiopia, 2019. A cross-sectional institution based retrospective study was conducted on 338 samples selected using systematic random sampling taken from a one year retrospective review of medical records. These neonates were admitted to neonatal intensive care unit at St. Paul Hospital Millennium Medical College from January 1 to December 31, 2018. Addis Ababa Ethiopia. Data was collected by a structured checklist format then entered and analyzed using SPSS 23. Bivariate and multivariate logistic regressions were conducted to identify contributing factors of neonatal jaundice considering p-value less than 0.05. The results showed that among 338 total neonates enrolled under this study the prevalence of neonatal jaundice was found to be $p=45$ (13.3%), $CI=1.83-1.90$. The factors which show statistically significant relationship between hyperbilirubinemia were inadequate breast feeding

with AOR = 30.770 (CI=9.974-94.929), followed by presence of cephalhematoma AOR=9.627(CI=2.651-34.958) and neonatal infection or sepsis having AOR =4.690 (CI=1.529-14.390), maternal age AOR=.092 (CI=.016-.528), and breast milk jaundice AOR=.026 (CI=.003-.206) both do not reach statistical significance. By identifying the contributing factors earlier, we may be able to modify them and reduce the need for neonatal intensive care unit admissions for Neonatal Hyperbilirubinemia.

Onyearugha, Onyire and Ugboma (2021) conducted a study to determine the occurrence, aetiological and other associated factors of neonatal jaundice in Federal Medical Centre Abakaliki, Southeast Nigeria with a view to determining strategies for prevention, using patients' and maternal case folders and Neonatal Intensive Care Unit (NICU) admission register, all cases of neonatal jaundice (NNJ) admitted to Federal Medical Centre, Abakaliki from January 1st 2008 to December 31st 2009 were retrospectively studied. The study revealed that NNJ accounted for 35% of all NICU admissions. The leading aetiological factors of NNJ were septicaemia (32.5%) and prematurity (17.5%). Significant bilirubinaemia, septicaemia, contact with naphthalene ball contaminated clothes occurred significantly more in the outborn than in the inborn babies 40(48.2%) vs 66(63%) $p = 0.000$, 33(50%) vs 17(42.5) $p = 0.046$, 6(9.1%) vs 0(0.0%) $p = 0.045$ respectively. Significantly more mothers of outborn than of inborn babies were unbooked and took herbal medications in pregnancy. Overwhelming majority of the subjects (89.6%) developed jaundice within the 1st week of life. Significantly more inborn than outborn were preterm and

exclusively breastfed, 25(30.1%) vs 14(19.7%) $p = 0.001$; 75(90.4%) vs 9(12.7%) $p = 0.000$ respectively. Also, significantly more outborn than inborn babies had exchange blood transfusion and kernicterus, 27(38%) vs 5(6%) $p = 0.000$; 14(19.7%) vs 1(1.2%) $p = 0.000$ respectively. Hence, there is need for sustained education of the general populace on the essence of regular antenatal supervision of pregnancy and delivery in appropriate health care facility to ultimately curb the incidence of severe NNJ.

Oyapero, Disu and Njokanma (2018) conducted a study to determine the clinical and sociodemographic correlates of NNJ in a cohort of neonates presenting at a Tertiary health Facility in Lagos, Nigeria. One hundred and fifty consecutive neonates that presented at the neonatal unit of the hospital were enlisted for the study after checking them with set inclusion and exclusion criteria. The transcutaneous bilirubin (TcB) readings of the individuals were obtained on the forehead, sternum and abdomen of the calm neonate in a supine position and blood samples for total serum bilirubin estimation were drawn from a peripheral vein within 10 min of TcB measurement. Results: One hundred and fifty neonates were included in the study of which 89 (59.33%) were males and 61 (40.67%) were females. Mothers that had only a primary level of education had babies that presented with significantly higher bilirubin values ($P = 0.000$). Male neonates, those that presented after 48 h, those between 40 and 42 weeks' gestational age and those that were <2.5 kg birth weight also had higher values though it was not statistically significant. Those that were delivered at home or in a church, delivered by an auxiliary nurse or a traditional birth

attendant and those with jaundice extending to the sole of the feet also presented with significantly higher mean bilirubin scores ($P = 0.000$). Conclusion: Majority of individuals in this study with NNJ were males, while those delivered at home or in a church or by traditional birth attendants and auxiliary nurses and had mothers that were poorly educated had higher mean bilirubin values. It is thus imperative that advocacy is increased to intervene on modifiable risk factors for this condition.

Pius, et al., (2017) To determine the prevalence, indications and outcome of exchange blood transfusion at the Special Care Baby Unit of the University of Maiduguri Teaching Hospital, Maiduguri. Methods: This is a retrospective study which examined the records of babies admitted into the SCBU between 1st January to December 31st 2014 with the aim of determining the prevalence of EBT at the Special Care Baby Unit (SCBU) of the University of Maiduguri Teaching Hospital (UMTH), Maiduguri. The indications for EBT and mortality among babies who had EBT are also highlighted. Results: A total of 639 babies with gestational ages between 30 weeks to 42 weeks were admitted into the Special Care Baby Unit (SCBU) over the period of 12 months. Of this number, 64 (10%) had neonatal jaundice. Thirty (46.9%) of the 64 neonates with NNJ had EBT, their pre-EBT, serum bilirubin (SB) level ranged from 15mg/dL to 28.5mg/dL with mean of 21.5 ± 13.0 mg/dL, while the post EBT SB ranged from 3.0mg/dL to 11.3mg/dL with mean of 7.2 ± 8.3 mg/dL. The aetiological risk factors of severe hyperbilirubinaemia in the newborns who had EBT include ABO incompatibility 17(56.7%), sepsis 12 (40.0%), prematurity 10(33.3%). Out of 30 neonates had EBT, 25 (83.3%) survived and were

discharged, 5(16.7%) died and 3 with bilirubin encephalopathy, 1 with severe perinatal asphyxia with hypoxic ischaemic encephalopathy stage II while the fifth death was a preterm extreme low birth weight. Conclusion: In our setting, the prevalence of exchange blood transfusion is high and this is because a large number of our patients had severe NNJ at presentation, some with bilirubin encephalopathy. Exchange blood transfusion remains one of the most reliable and effective treatment modality to prevent bilirubin encephalopathy especially in settings where babies are brought late to health facility. Effort at health education of the population at risk, especially pregnant women on early recognition and referral to appropriate health facility for prompt treatment to prevent severe NNJ and bilirubin encephalopathy is highlighted. Patil and Bedmutha (2019) Present study was undertaken to study clinical profile of neonates with jaundice at our tertiary care center. Material and Methods: This prospective, observational study was conducted in neonates with jaundice admitted in NICU or neonatology ward during study period, with serum bilirubin more than 10 mg/dL. Results: During study period 340 newborns were considered for present study. 159 newborns (47 %) developed jaundice after 72 hours of birth. Only 14 % developed jaundice within 24 hours of birth. 56 % babies were male as compared to 44% female babies. Babies delivered at more than 37 weeks gestational age (70 %) were most common, while only 7% babies were delivered between 28-32 weeks gestational age. 2500 - 4000 gm birthweight babies were 66 %, while 28% babies had birthweight less than 2500 gm. Incidence of neonatal jaundice was 58%, 31% and 10% in vaginal delivery, caesarean section,

instrumental delivery respectively. Physiological jaundice (36.17%), prematurity (13.53%), breast feeding (12.65%), idiopathic (12.35 %), were most common causes noted in our study. Conclusion: Male gender, 2500 - 4000 gm birthweight, vaginal delivery, physiological jaundice, prematurity were common causes associated with neonatal jaundice in our study. Parental counselling and monitoring of baby is most important in management of neonatal jaundice.

Jamir, et al., (2018) to assess the etiological factors of neonatal hyperbilirubinemia and therapeutic interventions in a tertiary care hospital in the north eastern region of India. Methods: A prospective cohort study was carried out in the Department of Biochemistry, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur for a period of two years. One hundred fifty newborns with jaundice aged up to 28 days, both term and preterm were included in this study. Careful clinical assessments were done to assess the possible etiologies. Serum bilirubin was determined by colorimetric method as described by Jendrassik and Grof. Monitoring of serum bilirubin was done by serial measurements once a day in the morning. Results: Significant hyperbilirubinemia (TSB>15mg %) was seen in 58 (38.7%) neonates while 92 (61.3%) had TSB<15mg%. There was no significant difference in the mean serum bilirubin values between neonates of different birth weights and maturity. The most common etiological factor for neonatal hyperbilirubinemia was found to be physiological (60.7%) Pathological cause constituted 39% of the neonates. Deficiency of enzyme G6PD (12%) was found to be the commonest cause of pathological neonatal hyperbilirubinemia, followed by prematurity (8.7%) and sepsis

(5.3%). Conclusion: Phototherapy is effective in most cases but exchange transfusion should also be considered if it failed. Due to high incidence of G6PD deficiency in this, it is recommended to introduce qualitative test of this enzyme as a routine laboratory investigation for all icteric neonates so as to achieve early diagnosis and prevention of adverse consequences of neonatal hyperbilirubinemia.

Kolawole, Obueh and Okandeji-Barry (2018) studied the prevalence of neonatal jaundice among newborn babies in Eku Baptist Community Hospital in Delta State between January 2007 and May 2013. A total of 2,509 neonatal case folders were reviewed to determine the prevalence, pattern of occurrence, and associated risk factors of neonatal jaundice among the newborn babies aged between 1 and 28 days. Neonatal jaundice accounted for a total prevalence of 52.6 in 1000 of the total number of cases reviewed. There was significant prevalence ($p \leq 0.05$) of neonatal jaundice in males (67.4) than in females (43.6). The risk factors of neonatal jaundice identified were sepsis (66.7%), prematurity (15.2%), lack of breast feeding (9.0%), ABO incompatibility (5.2%), and anaemia (3.8%). Two deaths were recorded from neonatal jaundice due to sepsis. Although the prevalence of neonatal jaundice was low, there is need to educate women on regular antenatal checks and delivery in appropriate health care facility in order to curb the incidence of neonatal jaundice.

Mbah, et al., (2022) conducted a cross-sectional study to determine the incidence and the significant risk factors to neonatal jaundice in FMC, Jalingo. Four hundred and

thirty three neonates admitted to special baby care unit (SBCU) FMC, Jalingo with their mothers were surveyed. Data were collected through a data extraction format looking on the medical records of the neonates (from 1st January, 2021 to 31st August, 2021) and interviewing the mothers. Data were transferred to an Excel data sheet and results were summarized by frequencies and percentages (categorical variables). Logistic regression analysis was used to determine the strength of the risk factors to neonatal jaundice while the significance was tested at $p\text{-value} \leq 0.05$. The findings revealed that the incidence of neonatal jaundice in FMC Jalingo was 40.18% while the significant risk factors were age group 41 - 50 years (I = 15.01%, OR: 2.970 at 95% CI: 1.566 - 5.634, $p = 0.000$), spontaneous vaginal delivery (I = 18.01%, OR: 1.382 at 95% CI: 0.940 - 2.033, $p = 0.000$), premature rupture of membrane (I = 24.94%, OR at: 2.252 at 95% CI: 1.520 - 3.337, $p = 0.000$), hypertension in pregnancy (I = 21.02%, OR: 1.831 at 95% CI: 1.240 - 2.703, $p = 0.002$). Others were breech fetal presentation (I = 23.33%, OR: 2.689 at 95% CI: 1.809 - 3.995, $p = 0.000$), birth asphyxia (I = 22.40%, OR: 3.469 at 95% CI: 2.3105.210, $p = 0.000$), significant bruising (I = 22.86%, OR: 1.705 at 95% CI: 1.157 - 2.513, $p = 0.007$), neonatal sepsis (I = 21.02%, OR: 1.688 at 95% CI: 1.145 - 2.488, $p = 0.008$) and congenital hemolytic anemia (I = 21.71%, OR: 1.723 at 95% CI: 1.169 - 2.540, $p = 0.006$). Therefore, the need for all concerned to ensure the incidence is reduced and the risk factors identified early and tackled.

Saeedi, et al., (2020) conducted a research aimed to evaluate the etiologies of jaundice in the neonates who were admitted on the first day of life. In this

retrospective cross-sectional study, all the neonates with gestational age of more than 35 weeks with jaundice in the first day of life who were admitted in Vali-e-Asr Hospital, Tehran, Iran, during 2015-2018 were investigated. Data including gestational age, delivery type, birth weight, sex, neonatal age (hours), maternal disease, maternal age, parity, maternal and neonatal blood group, serum levels of bilirubin and haemoglobin, reticulocyte count, peripheral blood smear results, glucose-6-phosphate dehydrogenase (G6PD) activity and therapeutic interventions were evaluated. Of the 1512 neonates who were admitted for neonatal jaundice, 230 had first-day jaundice (15.6%). Of 230 neonates 46.1% were male, 73.9% were delivered by cesarean section, 40% of their mothers had an underlying disease. The mean birth weight and bilirubin level were 3040 ± 6.02 gr and 7.87 ± 2.73 mg/dl, respectively. Most common etiologies were ABO incompatibility 41%, Rh incompatibility 14.3%, simultaneous ABO and Rh incompatibility 3.4%, caput succidanum and cephalohematoma 4.9%, G6PD deficiency 2.6%, sepsis 2.1% and others 2%. All patients received phototherapy, 1.3% received intravenous immunoglobulin (IVIG), 1.7% underwent exchange transfusion and 2.6% received both IVIG and exchange transfusion. In the present study, ABO incompatibility was the commonest etiology for the first day jaundice and the main reason for exchange transfusion in neonates. Blood type screening at the antenatal period and by cord blood sampling may result in early diagnosis and prompt treatment and can prevent the serious complications of jaundice in the neonates.

Oluwafemi, et al., (2019) conducted a study to document the prevalence, risk factors

and short-term outcome of babies with neonatal jaundice in a secondary health facility with free health services in South-West Nigeria. Babies were recruited from both in-born and out-born arms of the Special Care Baby Unit (SCBU). It was a prospective study of all babies admitted for neonatal jaundice from January to December 2014; the babies were followed up till discharge. Patients' information including socio-demographic characteristics, risk factors, treatment modalities and outcomes were collected and entered directly into an Excel sheet. The results showed that there were a total of 1,309 admissions: 734 males and 575 females giving a M: F ratio of 1.3:1. NNJ was present in 125 (9.5%) of them. Thirty-five (28%) of the affected babies were preterm babies while 90 (72%) were term babies. Ten (8%) of them presented within the first 24 hours of life, 103 babies (82.4%) presented between 1st and 7th day of life while 12 (9.6%) presented after the 7th day of life. Neonatal sepsis, prematurity, perinatal asphyxia and prolonged rupture of membrane (PROM) were the leading causes and risk factors for NNJ in our setting. One hundred and seven (85.6%) of them had only phototherapy as treatment modality while 18 (14.4%) had exchange blood transfusion (EBT). One hundred and twenty babies (96%) were discharged alive, 5 (4%) had bilirubin encephalopathy and 2 babies (1.6%) died. Their study concluded that Neonatal Jaundice is common in their setting with possible dire consequences. Health education of the public on its associated modifiable risk factors is desirable.

Rasul et al., (2018) examined the outcomes of various treatments for neonatal hyperbilirubinemia (NH) used in the Khulna Medical College Hospital in

Bangladesh. All of the jaundiced newborns in the neonatal ward between 2005 and 2008 were included in the study. Total serum bilirubin and fractional levels were measured in all cases, regardless of the degree of jaundice. NH was classified as mild, moderate or severe depending on the bilirubin level; mild NH was treated with a sunbath, moderate NH was treated with phototherapy, and severe NH was treated with exchange transfusion. The results from the study showed that of 1981 neonates, 426 (22%) were diagnosed with NH. Physiological jaundice (26.7%) was most common, followed by the jaundice of prematurity (20.9%). Haemolytic jaundice was primarily caused by ABO incompatibility (11.3%) and Rh incompatibility (5.4%). Exchange transfusion (ET) was performed in 22 patients; four (18.2%) died as a result of hazards that could have been avoided with skilled monitoring. Twelve (2.8%) individuals with jaundice died. Kernicterus developed in nine (2.1%) children, four of whom survived with neurological sequelae. The study concluded that ABO incompatibility is twice as common as Rh incompatibility. The majority of kernicterus patients died in the acute phase.

Nyangabyaki-Twesigve et al., (2020) carried out a study to determine the prevalence, treatment outcome and describing factors associated with hyperbilirubinaemia in neonates admitted to St Francis hospital, Nsambya. The study was a cross sectional study. A total of 242 files of babies with a preliminary diagnosis of hyperbilirubinaemia were retrieved retrospectively. Relevant data was extracted from the files and analysed using STATA version 14.0. The results showed that the prevalence of significant hyperbillirubinaemia was 22.7% (55/242). Seventy-seven

percent of the babies admitted did not require treatment for hyperbilirubinaemia. No factors were found to be significantly associated with significant hyperbilirubinaemia. The case fatality for severe hyperbilirubinaemia was 20% (6/30); half of these babies had haemolytic disease of the newborn. The study therefore recommends that establishment of local guidelines will prevent unnecessary admissions and ensure timely treatment is administered. Longitudinal studies are required to discover factors associated with neonatal hyperbilirubinaemia in this region.

Ragasudhin et al., (2021) conducted a retrospective study to audit early term neonatal short-term outcomes at a private medical college Neonatal Intensive Care Unit. This descriptive cross-sectional study was carried out between July 2020 and December 2020. Neonates with a gestation age of 37 weeks and 0 days to 38 weeks and 6 days born were included. The results showed that a total of 137 early term delivery data were obtained. Hypothyroidism (23%) and gestational diabetes (23%) were found to be the most common associated antenatal problems. The most common morbidity out of 137 early term neonates was neonatal jaundice 91(66.4%) followed by respiratory distress which affected 38 (28%) neonates. This study establishes the high incidence of neonatal jaundice and respiratory morbidities in early term neonates. Hence it is better to avoid elective lower segment caesarian section (LSCS) before 39 weeks of gestation provided there are no medical indications for the same.

2.3 Theoretical Framework

A middle-range theory by Meleis (2010) known as Transitions Theory is a useful guiding framework for exploring neonatal readmission to the hospital. It incorporates the three functions of theory which are to describe, explain and predict phenomena of interest (Butts & Rich, 2015). Transitions Theory addresses the central focus of nursing, which is to enable clients (individuals, families and communities) to navigate and adapt to life transitions and changes (Kralik, Visentin, & van Loon, 2006). This is especially true when life changes result in health-illness events or health-related behaviors (Chick & Meleis, 1986). Several types of life transitions have been described in the nursing literature such as developmental, situational, health/illness, and organizational changes (Schumacher & Meleis, 1994). Becoming a mother is a developmental transition and adding a new member to the family unit, following the birth of a child, is a situational transition. Meleis's Transitions Theory can be used to examine the conditions, barriers, facilitators and nursing therapeutics related to neonatal readmission during these transition conditions.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter elaborates on the methods and procedures that was employed in this study. It was discussed under the following headings: research design, research setting, population target, sample size, sampling technique, instrument, data collection, validity/reliability of the instrument, data collection, method of data analysis and ethical consideration.

3.1 Research design

The study adopted a non-experimental, retrospective research design method. This design was adopted because the researcher aims at determining the frequency of the different variable under the period of study and this involved description of event, situation and the number of times (frequency) of occurrence of a given phenomenon over a period of time.

3.2 Research setting

This study was carried out in University of Benin Teaching Hospital (UBTH), specifically the Special Care Baby Unit (SCBU), Pediatric Department. Edo state is an inland state in the Central southern part of Nigeria. The special care baby unit of the hospital is a 50-bed ward. It provides care to babies born in the hospital and others referred from elsewhere in Edo State and neighboring States.

3.3 Target population

The target population for this study consisted of all babies admitted in the unit from January 2018 to December 2022.

3.4 Sample size

The sample size for this study incorporates all the cases of children admitted into the unit from January 2018– 2022.

3.5 Sampling technique

Method of sampling to be used was purposive sampling.

3.6 Instrument for data collection

The instrument to be used was observational checklist for manual collection of secondary data of admitted children in the unit from their case notes and hospital records.

3.7 Validity of the instrument

The instrument's validity was ensured by proper scrutiny by an expert and a research statistician to ensure both face and content validity. They ensured that the checklist measured its intending variables and this was approved by the supervisor.

3.8 Reliability of the instrument

According to Polit & Beck (2008), the reliability of a measuring tool can be assessed in various ways. Reliability of an instrument is the consistency of an instrument in collecting the same data. The aspects that have received major attention are stability, internal consistency and equivalence. A reliable instrument is one that can produce

the same results if the behaviour is measured again by the same scale (Colin & Julie, 2006). We adopted the reliability of the medical officers to be able to document appropriate information based on their training.

3.9 Method of Data collection

A retrospective method of review of hospital record books and patient's case notes at the medical records of all admitted children into the unit from 2018- 2022. Data collection was done with the assistance of a medical record officer in the facility.

3.10 Method of data analysis

The data was analysed with the Statistical Package for Social Sciences (SPSS) version 26.0 for windows. It was analysed using descriptive statistics such as mean and inferential statistics such as chi square and multivariate logistics regression. The level of significance was set at $p < 0.05$.

3.11 Ethical consideration

The researcher obtained a letter of identification from the Department of Nursing Science of the University of Benin, Benin City. Permission to carry out the study was obtained from the ethical review committee of the University of Benin Teaching Hospital, Benin City, Edo State.

CHAPTER FOUR

RESULT

This chapter provide the tables of results in accordance with the stated objectives and hypothesis , the sample size consisted of all cases admitted into the unit from 2018-

2022

Table 4.1: Demographic characteristics of participants

	Frequency	Percentage
Gender		
Male	789	47.1
Female	885	52.9
Age at presentation		
<24 hours	1273	76.0
1 – 7 days	345	20.6
>7 days	56	3.3
Place of delivery		
Inborn	734	43.8
Outborn	940	56.2
Birth Order		
1 st	621	37.1
2 nd	301	18.0
3 rd	428	25.6
Others	324	19.4

Table 4.1 shows the demographic characteristics of participants. It shows that 885(52.9%) are females, 1273(76.0%) presented at <24 hours, 940(56.2%) were delivered in the facility, 621(37.1%) are first child of their parents.

Table 4.2: Admissions and cases of Neonatal Jaundice in SCBU, UBTH from 2018 - 2022

Years	No of admission	No with NNJ
2018	976	234
2019	1163	355
2020	1203	384
2021	1236	276
2022	1247	425

Table 4.2 shows the admissions and cases of Neonatal Jaundice in SCBU, UBTH from 2018 – 2022. It shows that admission into SCBU is on the increase yearly; while the number of cases with Neonatal jaundice follows same except a sharp drop in 2021 and peaked in 2022.

Figure 4.1: Prevalence of Neonatal Jaundice (2018- 2022)

Figure 4.1 shows the prevalence of Neonatal Jaundice (2018- 2022). It shows a stead increase in the prevalence with a drop in 2021 and the highest prevalence in 2022.

Table 4.3: Outcome of Neonatal Jaundice

	No of cases	Percentage
Died	121	7.2
Discharged	1178	70.4
Discharged against medical advice (DAMA)	375	22.4

Table 4.2 shows the short term outcome of children with neonatal Jaundice. It shows that majority of the children were discharged, while 121(7.2%) died, the remaining 375(22.4%) requested they are discharged against medical advice.

Table 4.4: Risk factors

	No of cases	Percentage
Sepsis	752	44.9
Prematurity	339	20.3
Asphyxia	329	19.7
ABO incompatibility	127	7.6
Multiple diagnoses	127	7.6
Total	1674	100.0

Table 4.3 shows the risk factors to neonatal jaundice. It shows that majority 752(44.9%) of the children presented with sepsis, while 127(7.6%) presented multiple diagnoses.

Hypotheses Testing

Hypothesis One: There is no significant difference in the prevalence of neonatal jaundice in UBTH based on the sex of the neonates

Table 4.5: Prevalence of neonatal jaundice by sex of neonates

	Bad outcome	Good outcome	No of cases	χ^2	p
Male	532	257	789	88.823	<0.01
Female	767	118	885		
Total	1299	375	1674		

Table 4.6 shows the prevalence of neonatal jaundice by sex of neonates. It shows that there is a significant association between prevalence of neonatal jaundice in male and female neonates. We therefore reject the null hypothesis.

Hypothesis Two: There is no significant association between clinical factors and outcome of neonatal jaundice in UBTH.

Table 4.6: Association between clinical factors and outcomes of neonatal jaundice

	Bad outcome	Good outcome	χ^2	p
Sepsis	532	220	112.562	<0.001
Prematurity	293	46		
Asphyxia	301	28		
ABO incompatibility	104	23		
Multiple diagnoses	69	58		
Total	1299	375		

Table 4.7 shows the association between clinical factors and outcomes of neonatal jaundice. It shows that there is a significant association ($p<0.05$) between clinical factors and outcomes of neonatal jaundice. We therefore reject the null hypothesis.

CHAPTER FIVE

DISCUSSION OF FINDINGS

This chapter provides the discussion of findings in accordance to the stated objectives and hypothesis, implications for nursing, summary, conclusion, recommendation and suggestion for further studies.

5.1 Discussion of Findings

5.1.1 Prevalence of Neonatal Jaundice (2018- 2022)

Findings of this study show a steady increase in the prevalence of neonatal jaundice with a drop in 2021 and the highest prevalence in 2022. This is in contrast with the study carried out by Olatubi, et al., (2019) in Ondo, Nigeria where the highest incidence of neonatal jaundice in the hospital during the years under review occurred in 2008; while the least was recorded in 2016. Onyearugha, Onyire and Ugboma (2021) also found that in Abakaliki, Nigeria, neonatal jaundice accounted for less than half of all neonatal intensive care unit admissions during the period under review. Awe, et Al., also found that in Ekiti State University Teaching Hospital (EKSUTH) a portion of neonates with neonatal jaundice were still affected in recent time. Chime, Egenede, Arute (2021) also found out that in Warri, Delta state, neonatal jaundice was common among the babies in the health facility studied and was higher among mothers who had low level of education and babies whose parents had divorced. The increasing prevalence of neonatal jaundice found in the present study suggests that the condition is still a major scourge in our society today and

both individuals and the medical community are still grappling with the challenges it fosters.

5.1.2 Outcome of Neonatal Jaundice

Evaluation of the outcome of neonatal jaundice among respondents showed that majority of the children were discharged, less than half requested they are discharged against medical advice, and others died. This is similar to the report of a study by Pius, et al., (2017) conducted in Maiduguri, where majority of the neonates survived and were discharged while less than one third died. In contrast, the findings of Olatubi, et al., (2019) in Ondo, Nigeria revealed that majority of the neonates developed complications of neonatal jaundice, and half died from these complications. This suggests the need for more advanced medical procedures aimed at eradicating neonatal jaundice in Nigeria. This is especially important considering the finding of the present study which showed that there is a significant association between prevalence of neonatal jaundice in male and female neonates as well as a significant association between clinical factors and outcomes of neonatal jaundice. In line with the sustainable development goal 3 which advocates for good health and well wellbeing, the findings of this study suggests the need for adequate treatment facilities to prevent mortality and complications arising from neonatal jaundice.

5.1.3 Risk factors associated with short term outcomes of neonates with jaundice

In this study, risk factors associated with short term outcomes of neonates with jaundice were found to be sepsis and multiple diagnoses. This is similar to the findings of Acharya and Paneru (2020) in a study conducted in Kohalpur, Banke which reported sepsis as a risk factor associated with short term outcomes of neonates with jaundice. In contrast, Brits, et al., (2018) found that in South Africa, normal vaginal delivery was a risk factor associated with neonatal jaundice. Furthermore, Sahoo, et al., (2016) also reported that in India, ABO incompatibility and prematurity were found to be risk factors associated with short term outcomes of neonates with jaundice. Also, in Ethiopia, Birhanu, et al., (2021) found that long duration of labor, being male neonates, “O” blood group mothers, and having neonatal sepsis were risk factor associated with short term outcomes of neonates with jaundice. In Nepal, Scrafford (2019) found that male sex, high birth weight, breastfeeding patterns, warm air temperature, primiparity, skilled birth attendance, place of delivery, prolonged labour, oil massage, paternal education and ethnicity were significant risk factors. This suggests the need to create awareness about neonatal jaundice among women of reproductive age.

5.1.4: There is no significant difference in the prevalence of neonatal jaundice in UBTH based on the sex of the neonates

The findings from this study revealed that there is a significant difference in the prevalence of neonatal jaundice in UBTH based on the sex of the neonates. This is in

line with a study by West & Ataifo (2020) which revealed a significant relationship between prevalence of neonatal jaundice and the sex of the neonates.

5.1.5: There is no significant association between clinical factors and outcome of neonatal jaundice in UBTH.

The findings from this study revealed that there is a significant association between clinical factors and outcome of neonatal jaundice in UBTH. This is in contrast with Mbah et al, (2022) which revealed that there is no significant association between the clinical factors and the outcome of neonatal jaundice.

5.2 Implication to Nursing

1. Evidence from this study could help in management of neonatal jaundice and in the improvement of nursing and midwife practice related to neonatal jaundice
2. It will aid prompt identification of risk factors and their modification thereby reducing the need for intensive care unit admissions for Neonatal Hyperbilirubinemia.

5.3 Limitation of the study

The limitation of this study is in the fact that it is hospital based and the retrospective nature of the research coupled with the challenge of missing data.

5.4 Summary

This study seeks to assess the prevalence of neonatal jaundice in University of Benin Teaching Hospital (UBTH) from 2011 – 2020. The study was outlined into five

chapters. Chapter one of this study dealt with the introduction of the topic, statement of problem, objectives of the study, research questions, hypotheses and scope of study, the significance of the study and operational definition of terms. Relevant literature were reviewed in chapter two on the subject under discourse, theoretical framework and empirical review of related studies were also discussed in this chapter. Chapter three dealt with research methodology which adopted non-experimental, retrospective research design method and total population sampling method of all the neonatal jaundice cases of children admitted into the special baby unit from January 2018 – 2022. An observational checklist for manual collection of secondary data of admitted children in the unit from their case notes and hospital records was used as instruments of data collection. Analysis and interpretation of data were discussed in chapter four, tables with percentage and means represented information. The result from the study shows a steady increase in the prevalence of neonatal jaundice with a drop in 2021 and the highest prevalence in 2022.

5.5 CONCLUSION

This study assessed the prevalence of neonatal jaundice in University of Benin Teaching Hospital (UBTH) from 2011 – 2020. The result shows a steady increase in the prevalence of neonatal jaundice with a drop in 2021 and the highest prevalence in 2022. The study however also identified that there is a significant association between prevalence of neonatal jaundice in male and female neonates and there is a significant association between clinical factors and outcomes of neonatal jaundice.

5.6 RECOMMENDATIONS

1. Government and multinational agencies should make concerted efforts to create awareness about neonatal jaundice among women of reproductive age, and emphasis should be placed on the importance of early diagnosis and treatment of neonatal jaundice.
2. Healthcare centres need to be equipped with adequate treatment facilities to effectively manage the disease burden.
3. Advocacy should be increased with the aim of tackling modifiable risk factors for neonatal jaundice.

5.7 SUGGESTIONS FOR FUTURE STUDIES

1. A comparative study can be conducted among neonates from other health facilities besides those in the University of Benin Teaching Hospital.
2. Future research should investigate the role of an infant's difficulty in feeding as a potential modifier in the association between exclusive breastfeeding and jaundice.

REFERENCES

- “Prevalence and Contributing Factors of Neonatal Jaundice in Neonatal Intensive Care Unit at St Paul’s Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2019.” *Journal of Health, Medicine and Nursing*, vol. 74, no. 74-03, May 2020, <https://doi.org/10.7176/jhmn/74-03>.
- Aa, Roba, and DH Diro. “Morbidities, Rate and Time Trends of Neonatal Mortality in Dilchora Referral Hospital, Dire Dawa, Ethiopia, 2012-2018.” *Austin Med Sci*, vol. 2, no. 1, 3 Nov. 2018, p. 1019. Accessed 20 Sept.2023.
- Abdo, R. A., Halil, H. M., Kebede, B. A., Anshebo, A. A., & Gejo, N. G. (2019). Prevalence and contributing factors of birth asphyxia among the neonates delivered at Nigist Eleni Mohammed memorial teaching hospital, Southern Ethiopia: a cross-sectional study. *BMC Pregnancy and Childbirth*, 19(1). <https://doi.org/10.1186/s12884-019-2696-6>
- Benahmed, N., San Miguel, L., Devos, C., Fairon, N., & Christiaens, W. (2017). Vaginal delivery: how does early hospital discharge affect mother and child outcomes? A systematic literature review. *BMC Pregnancy and Childbirth*, 17(289). <https://doi.org/10.1186/s12884-017-1465-7>
- Bhutani, V. K., Zipursky, A., Blencowe, H., Khanna, R., Sgro, M., Ebbesen, F., Bell, J., Mori, R., Slusher, T. M., Fahmy, N., Paul, V. K., Du, L., Okolo, A. A., de Almeida, M.-F., Olusanya, B. O., Kumar, P., Cousens, S., & Lawn, J. E. (2013). Neonatal hyperbilirubinemia and Rhesus disease of the newborn: incidence and impairment

estimates for 2010 at regional and global levels. *Pediatric Research*, 74(S1), 86–100.

<https://doi.org/10.1038/pr.2013.208>

Birhanu, M. Y., Workineh, A. A., Molla, Y., Abebaw, E., Arora, A., & Bazezew, Y. (2021).

Rate and Predictors of Neonatal Jaundice in Northwest Ethiopia: Prospective Cohort Study. *Journal of Multidisciplinary Healthcare*, Volume 14, 447–457.

<https://doi.org/10.2147/jmdh.s298034>

Bizuneh, A. D., Alemnew, B., Getie, A., Wondmieneh, A., & Gedefaw, G. (2020).

Determinants of neonatal jaundice among neonates admitted to five referral hospitals in Amhara region, Northern Ethiopia: an unmatched case-control study. *BMJ Paediatrics Open*, 4(1), e000830. <https://doi.org/10.1136/bmjpo-2020-000830>

<https://doi.org/10.1136/bmjpo-2020-000830>

Brits, H., Adendorff, J., Huisamen, D., Beukes, D., Botha, K., Herbst, H., & Joubert, G.

(2018). The prevalence of neonatal jaundice and risk factors in healthy term neonates at National District Hospital in Bloemfontein. *African Journal of Primary Health Care & Family Medicine*, 10(1). <https://doi.org/10.4102/phcfm.v10i1.1582>

<https://doi.org/10.4102/phcfm.v10i1.1582>

Devi, D. S., & Vijaykumar, B. (2016). Risk factors for neonatal hyperbilirubinemia: a case

control study. *International Journal of Reproduction, Contraception, Obstetrics and*

Gynecology, 6(1), 198. <https://doi.org/10.18203/2320-1770.ijrcog20164657>

Erdeve, O. (2020). Management of neonatal jaundice in low-income and middle-income

countries. *BMJ Paediatrics Open*, 4(1), e000845.

<https://doi.org/10.1136/bmjpo-2020-000845>

Girma. (2020). Prevalence and Contributing Factors of Neonatal Jaundice in Neonatal

Intensive Care Unit at St Paul's Hospital Millennium Medical College, Addis Ababa,

- Ethiopia, 2019. *Journal of Health, Medicine and Nursing*.
<https://doi.org/10.7176/jhmn/74-03>
- Greco, C., Arnolda, G., Boo, N.-Y., Iskander, I. F., Okolo, A. A., Rohsiswatmo, R., Shapiro, S. M., Watchko, J., Wennberg, R. P., Tiribelli, C., & Coda Zabetta, C. D. (2016). Neonatal Jaundice in Low- and Middle-Income Countries: Lessons and Future Directions from the 2015 Don Ostrow Trieste Yellow Retreat. *Neonatology*, *110*(3), 172–180. <https://doi.org/10.1159/000445708>
- Hegy, T., & Kleinfeld, A. (2021). Neonatal hyperbilirubinemia and the role of unbound bilirubin. *The Journal of Maternal-Fetal & Neonatal Medicine*, 1–7.
<https://doi.org/10.1080/14767058.2021.2021177>
- Joseph, A., & Samant, H. (2023b, February 12). *Jaundice*. PubMed; StatPearls Publishing.
<https://www.ncbi.nlm.nih.gov/books/NBK544252/>
- Kassa, R. T., Gudeta, H., Assen, Z. M., Mulugeta Demlew, T., & Teshome, G. S. (2018). Neonatal Hyperbilirubinemia: Magnitude and Associated Etiologic Factors among Neonates Admitted at Tikur Anbessa Specialized Hospital, Ethiopia. *Journal of Pregnancy and Child Health*, *05*(04). <https://doi.org/10.4172/2376-127x.1000384>
- Lake, E. A., Abera, G. B., Azeze, G. A., Gebeyew, N. A., & Demissie, B. W. (2019). Magnitude of Neonatal Jaundice and Its Associated Factor in Neonatal Intensive Care Units of Mekelle City Public Hospitals, Northern Ethiopia. *International Journal of Pediatrics*, *2019*, 1–9. <https://doi.org/10.1155/2019/1054943>
- Limaso, A. A., Dangisso, M. H., & Hibstu, D. T. (2020). Neonatal survival and determinants of mortality in Aroresa district, Southern Ethiopia: a prospective cohort study. *BMC*

Pediatrics, 20(1). <https://doi.org/10.1186/s12887-019-1907-7>

- M Ochoga, Eseigbe, E. E., AM Onoja, M Aondoaseer, Samba, B. N., Abah, R. O., & Abdallah, R. (2021). Pattern of Blood Transfusion in the Special Care Baby Unit of Benue State University Teaching Hospital in Makurdi North-Central Nigeria. *Journal of Research in Basic and Clinical Sciences*. <https://doi.org/10.46912/jrbcs.93>
- Olatubi, M., Ibitoye, O., Sadibo, O., Bolarinwa, O., & Adamolekun, M. M. (2019). Prevalence of neonatal jaundice at a tertiary health institution in Ondo state, Nigeria. *Journal of Pre-Clinical and Clinical Research*, 13(3), 114–117. <https://doi.org/10.26444/jpccr/111773>
- Olusanya, B. O., Kaplan, M., & Hansen, T. W. R. (2018). Neonatal hyperbilirubinaemia: a global perspective. *The Lancet Child & Adolescent Health*, 2(8), 610–620. [https://doi.org/10.1016/s2352-4642\(18\)30139-1](https://doi.org/10.1016/s2352-4642(18)30139-1)
- Olusanya, B. O., Osibanjo, F. B., & Slusher, T. M. (2015). Risk Factors for Severe Neonatal Hyperbilirubinemia in Low and Middle-Income Countries: A Systematic Review and Meta-Analysis. *PLOS ONE*, 10(2), e0117229. <https://doi.org/10.1371/journal.pone.0117229>
- Olusanya, B. O., Teeple, S., & Kassebaum, N. J. (2018). The Contribution of Neonatal Jaundice to Global Child Mortality: Findings From the GBD 2016 Study. *Pediatrics*, 141(2), e20171471. <https://doi.org/10.1542/peds.2017-1471>
- Slusher, T. M., Zamora, T. G., Appiah, D., Stanke, J. U., Strand, M. A., Lee, B. W., Richardson, S. B., Keating, E. M., Siddappa, A. M., & Olusanya, B. O. (2017). Burden of severe neonatal jaundice: a systematic review and meta-analysis. *BMJ*

Paediatrics Open, 1(1), e000105. <https://doi.org/10.1136/bmjpo-2017-000105>

Yismaw, A. E., & Tarekegn, A. A. (2018). Proportion and factors of death among preterm neonates admitted in University of Gondar comprehensive specialized hospital neonatal intensive care unit, Northwest Ethiopia. *BMC Research Notes*, 11(1). <https://doi.org/10.1186/s13104-018-3970-9>

APPENDIX

OBSERVATIONAL CHECKLIST

**DEPARTMENT OF NURSING SCIENCE
SCHOOL OF BASIC MEDICAL SCIENCES
UNIVERSITY OF BENIN
BENIN CITY.**

RESEARCH TOPIC: PREVALENCE OF NEONATAL JAUNDICE AT A TERTIARY HEALTH INSTITUTION IN BENIN CITY, EDO STATE . (2018 -2022)

Proforma for collecting data on Neonatal jaundice, maternal risk factors and outcome from 2018 – 2022 at UBTH

SN	Years	Age at presentation	Sex	Mode of delivery	Gestational age	Birth weight	Risk factors	Outcome (Discharge, DAMA, Died)	Diagnosed	Non-Diagnosed
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
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