ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OFNURSING AND MIDWIFERY

ASSESSMENT OF MAGNITUDE AND DETERMINANTS OF NEONATAL JAUNDICE AMONG NEONATES ADMITTED TO NEONATAL INTENSIVE CARE UNIT OF DESSIE TOWN PUBLIC HOSPITALS, AMHARA REGION, ETHIOPIA, 2020

BY

MOHAMMED TESSEMA (BSc)

A RESEARCH THESIS SUBMITTED TO ADDIS ABEBA UNIVERSITY COLLEGE OF HEALTH SCIENCE SCHOOL OF NURSING AND MIDWIFERY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN NEONATAL NURSING.

JULY , 2020

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LIST OF ACRONYMS AND ABBREVIATIONS:

AAU	Addis Ababa University
ANC	Antenatal care
AOR	Adjusted Odd Ratio
APGAR score	Appearance, pulse, grimace, activity, respiration, score
BMH	Boru Meda Hospital
DRH	Dessie referral hospital
COR	Crude Odd Ratio
EDHS	Ethiopian Demographic and Health Survey
G-6PD	Glucose-6-Phosphate Dehydrogenate
HDN	Hemolytic Disease of New Born
HMIS	Health Management Information System
LBW	Low Birth Weight
NICU	Neonatal Intensive Care Unit
NNJ	Neonatal jaundice
MDG	Millennium Development Goal
Rh factors	Rhesus factors
SPSS	Statistical Package for Social Science
WHO	World Health organization

ABSTRACT

Background: Neonatal Jaundice is the most common clinical problems. Globally**,** every year about 1.1 million babies develop it and the vast majority were in sub-Saharan Africa and South Asia, and also it occurs frequently in newborn neonates in the first weeks of life..

Objective:-The aim of this study was to assess Magnitude and Determinants of Neonatal jaundice Among Neonates admitted to Neonatal Intensive Care Unit (NICU) at Dessie Town Public Hospital from March 30 April 30 /2020.

Method: A hospital-based cross-sectional study design was conducted and systematic random sampling techniques were employed. A total of **218** samples were drowning proportionally from the study hospitals.The Data was collected by prepared structured and pretested interviewer guided questionnaire and Checklist and the instrument tool was Adopted and modified after review different literature. Data were cleaned manually, coded, and entered into Epi-Data version3.1 and Analyzed by SPSS version 24 statistical software. Bivariate and multivariate logistic regration Analyses were employed to identify associated factors for neonatal jaundice. After bivariate Regression analysis a variable with P value less than **0.05** were included in multivariable logistic regression analysis. Adjusted odds ratio along with 95% CI was calculated to see the strength of association factors, and also if less than **0.05** was taken as a level of statistical significance.

Result: A total of 209 mothers/ neonate's pairs participated in the study constituting responcel;' rate of 96%.The prevalence of neonatal jaundice was found to be 62(28.4%).Being Neonatal Sepsis [(AOR=3.82(95%CI=1.67,8.09**)]**, Prematurity< 37weeks [AOR=3.92, 95%CI=1.89,9.11)] LowAPGARscore[AOR8..36,95%CI=1.34,39.65)],ABOincompatibility[AOR=6.94(95%CI=1.97,24.42)],Prolongedlabor[AOR=3.69(95%CI=1.05,12.94)]were found to be predictor of neonatal jaundice.

Conclusion and Recommendation:- The prevalence of neonatal jaundice in this study was high. With regard to this high NNJ prevalence, there is need for health care providers in Dessie town public hospitals to put more emphasis on neonatal sepsis and ABO incompatibility all women tested early as possible during ANC follow up and if women blood group O should be always considered ABO setup and also Professionals who are working in NICUs should Adhere to aseptic technigues while carying and conducting neonatal invasive procedure.

Keyword: -Neonatal Jaundice, Magnitude, Determinants, Desire Town, North East Ethiopia

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND

Neonatal jaundice (NNJ) is a very common condition affecting 60% term and 80% of preterm newborns to a variable degree world over (1). If severe jaundice develops it can lead to acute Bilirubin encephalopathy or kernicterus with a significant risk of neonatal mortality and long-term neurodevelopment sequelae such as cerebral palsy, sensor neural hearing loss, intellectual difficulties or gross developmental delays (2).

Neonatal jaundice is a yellowish discoloration of the skin, mucous membranes, and sclera because of the accumulation of unconjugated, non-polar, lipid-soluble Bilirubin pigment in the skin(3). Neonatal jaundice is the most common during the first weeks of neonatal age and important conditions needing medical attention which is about ten percent of breastfed neonates are still jaundiced at one month of age (NICE,2014:Kliegman,2016). It is a common disorder worldwide and an estimated 75% of hospital re-admissions(4).

If the rate of bilirubin production exceeds the rate of its elimination, the result is an increase in total serum bilirubin in this clinical condition called jaundice (Davidson 2014). Neonatal jaundice can be clinically observed at blood concentration of 5mg/dl or greater and cephalocaudal progression of yellowish staining associated with increasing levels of serum bilirubin, it is first seen on the face and when rising level dawn ward to the trunk and followed to all extremities(4).

Neonatal jaundice is most important due to there is a close relationship between the increase in unconjugated bilirubin levels and neurotoxic effects that can lead to long-term complications such as kernicterus, hearing impairment, and cerebral palsy and (5). Neonatal Jaundice is a result of increased release of hemoglobin from the breakdown of red cells due to high hemoglobin at birth, as well as due to reduced life span of newborn red blood cells seventh –eighty compared to that of adults (90–120 days), and decline hepatic metabolism of Bilirubin due to premature Liver and Most neonatal jaundice is a natural transition which resolves by the first week of life with maturing of the liver (6).

Early diagnosis of infants at high risk of dangerous neonatal jaundice plays an important role in facilitating the timely treating of disease within the first 14 days of birth (7). Neonatal jaundice may have serious side effects on the health of infants, consideration should be given to its associated factors in newborns and Kernicterus is one of the most important that complications of the disease are sometimes so dangerous and in the fact jaundice is common causes of admitted to hospitals of newborns, attention can be paid to timely diagnosis and prevention of it. On the other hand, the rapid treatment of jaundice or timely prevention was cost-effective (8).

According to a recent review, sub-Saharan Africa and South Asia were reported as the leading contributors to estimated1.1million babies who would develop severe hyperbilirubinemiaworld wide ever year. so Early identification of infants at risk of severe hyperbilirubinemia is, therefore, even more, crucial for this potentially devastating condition. (9) A study conducted in Calabar, South-South Nigeria neonatal jaundice is a common problem of the hospital admitted to neonatal intensive care and the major associated factors among neonatal jaundice were infection(71.4%), ABO incompatibility (19.1%), Glucose-6-phosphate dehydrogenize(G6PD) deficiency (9.5%) and prematurity GA<37weeks were the most significant factor for neonatal jaundice (10).

1.2 STATEMENT OF THE PROBLEM

Neonatal jaundice is one of the most and nine dangerous signs of neonatal illness recognized by the World Health Organization (WHO)(11). Globally, every year about 1.1 million neonates would be develop neonatal jaundice with or without Bilirubin encephalopathy worldwide yearly. Among those neonates, four hundred eighty-one thousand were term neonates of whom one hundred fourteen thousand died annually and more than sixty-three thousand survive with a moderate or severe disability the vast majority, 75% of affected neonates reside in sub-Saharan Africa, including Ethiopia (12)

A retrospective study conductedin in Africa Karimnagar hospital indicated that neonatal factors preterm delivery (81.5%) ,Low birth weight (93.8%),breast feeding (75.4%) , poor Apgar score (23%) and infections (23%) where as Maternal factors were Poverty (91%), less education (90%), Young age (78.5%), Maternal infections (78.5%), Primigravida (70.8%) were the leading factors associated with NNJ. Among those factors breast feeding (70%), Preterm delivery (64%) poor Apgar score (10%), Low birth weight (78%) and infections (13%), Maternal infections 42 (64%), primigravida 40 (61%)) were the leading factors associated with of neonatal jaundice (13).

A retrospective study conducted India pattern of admissions and outcome in neonatal intensive care(NICU) neonatal jaundice accounts (36%) in all adimission with the factors were ABO incompatibility (11.1%), Rh incompatibility (4.6%), neonatal sepsis (12%), Breast milk jaundice 2.8%, G-6-PD deficiency (0.9%), Prematurity (13%), cephalohematoma (3%) and idiopathic 20.4% were leading cause of the pattern of neonatal admission (14). According to a retrospective study conducted Sub-Saharan Africa on Magnitude and Determinants factors jaundice is a common cause of neonatal admission to the NICU and Onset of jaundice in 1st and 2nd day was 27% and 43% respectively (14). A study conducted Bah Bah MH et al in Nigeria indicated that neonatal jaundice was very high associated with premature neonates and was develop jaundice early after birth than term babies and the average Gestational age in preterm neonates was 32.78-34.82 weeks and Jaundice started 1.88-5.52 days after birth. But, in term babies, the average gestational age was 37.28-39.12 weeks and jaundice started 3.36-6.44 days after birth (15).

A prospective cross-sectional study conducted at Gondar University Hospital shows that major problems that `neonates admission to NICU were Sepsis (77.8%), Hypothermia (57.5%), Low birth weight (32.9%), Jaundice (31.7%), Prematurity (27.4%), birth trauma (16%) were the major contributed factors neonatal jaundice (16). According to a retrospective, a study was conducted GOBS Government Medical College Trivandrum, Kerala, North India on Maternal and Neonatal Determinants of Neonatal Jaundice shows that more than fifty percent neonats admitted to NICU by the case of neonataa jaundice and the Majority determinants of neonatal jaundice were low APGAR score< 7, Gestational age <37weeks, birth asphyxia, Premature rupture membrane, low birth weight <2.5kg ,malpresentation and use of herbal medicine during pregnancy were maijor leading factors of neonatal jaundice (17).

Neonatal Mortality rate in Ethiopia was 29 in 1000 live births according to the Ethiopian demographic health survey of 2016 and neonatal jaundice is one leading factors(18). A retrospective study conducted in Ethiopia on Magnitude and associated factors neonatal jaundice the proportion was (44.9%) in all adimission of neonates to NICU and among those neonates, 89(25%) of males and 71(19.9%) of females were developed neonatal jaundice. In this study, the associated factors were ABO incompatibility 57(35.6%), sepsis 30(18.8%), idiopathic cause 22(13.8%), breastfeeding jaundice 16(10%) and Rh-incompatibility 14(8.8%) was a predictor of neonatal jaundice (19).

So, I t is clear that neonatal jaundice represents a heavy burden for healthcare services worldwide. Especially sub Sahara Africa. Therefore, the purpose of this study is to determine the magnitude and determinants neonatal of jaundice among neonates admitted to NICU Dessie town public hospitals and it is important, to reduce the risk for future neonates to develop kernicterus, for early intervention and prophylaxis and treatment, to improving prevention, early detection, and management of neonatal jaundice to reducing neonatal deaths by strengthening newborn care and maternal health service.

1.3. SIGNIFICANCE OF THE STUDY

Neonatal jaundice is one of the most common clinical problems. Globally, every year about 1.1 million babies develop It and the vast majority reside in sub-Saharan Africa and South Asia. It occurs frequently in newborn babies in the first weeks of life. It may be harmless but results in "Kernicterus" or "Bilirubin brain damage" when it is severe (13).

Based on my study finding the concerned body was develop strategies to improve the treatment of neonatal jaundice and to reduce the prevalence of neonatal jaundice this will benefit all neonates in the Study Area. The result of this study will help policymakers to plan and deliver necessary training programs for health professionals to give more attention and effective care for neonate regarding the problem.

It also hoped that the result of the study will provide insight to a health care provider in the identification mechanism of common Determinants of neonatal jaundice to overcome the challenges of early diagnosis and its management to prevent developing kernicterus.

It may also help to create awareness to the community based and mothers, on the result finding and health Professionals will give health education to mothers about different determinants of neonatal Jaundice at the time of antenatal clinic and postnatal care follow up which help them to be screened and treated early. Finally, it would also be a baseline for other researchers to do qualitative and other study designs for the future to assess the Magnitude and Determinants of neonatal jaundice.

CHAPTER TWO
LITERATURE REVIEW

2.1 OVERVIEW MAGNITUDE (PREVALENCE) OF NEONATAL JAUNDICE

Globally there were studies conducted Magnitude and determinants of neonatal jaundice in different countries**.** According to a study conducted in India, shows that Magnitude of Neonatal jaundice was 28.6% from those Neonates 21 (0.74%) cases were an account of Bilirubin encephalopathy, and Among these affected cases, 17 (81%) were male and 4 (19%) were female and this major associated factor for neonatal jaundice was an infection, (71.4%), ABO incompatibility (19.1%), and Glucose 6-phosphate-dehydrogenase (G6PD) deficiency (9.5%) were significantly associated factors for neonatal jaundice (10).

A Study conducted by Narayanan level II Care NICU at Sikkim Mani pal Institute of Medical Sciences at Gunstock, Iran on the pattern of admissions and outcome in NICU, more than half percent, 212(54%) neonates were admitted to NICU due to neonatal jaundice, from these jaundiced neonates were due to physiologic jaundice (48%), breast milk jaundice in 4% and the rest (2%) were due to other cause (20). A Study conducted Pakistan on the incidence and associated factors of neonatal jaundice the overall incidence was found 27.6% were Diagnosed as neonatal jaundice and neonates who were jaundice were seen between 1-6 days old in 64% in days of life (21).

According to a cross-sectional study conducted at National District Hospital in Bloemfontein, the prevalence of neonatal jaundice was reported 55.2% and the major determinants were a Black race, maternal smoking during pregnancy, mode of delivery and prolonged labor was the significance for neonatal jaundice(22).

According to a study conducted by Federal Medical Centre Abakaliki, Nigeria on the proportion and determinants of neonatal jaundice accounted for 35% of all NICU admissions and The leading associated factors of neonatal jaundice were septicemia (32.5%) and prematurity (17.5%) (23).

According to a study done in Nigeria, the proportion of neonates 56 males (21%) and 33 females (12%) neonatal jaundice were 89 (33%) found to be jaundiced and The mothers who were divorced and single had more affected who that neonate (50%) and 35.5%, respectively. The proportion rate was also more affected among mothers with secondary levels (36.8%) of education and primary (55.1%) and, than those with a tertiary level of education (8.1%), G-6-phosphate dehydrogenize deficiency, ABO incompatibility and previous sibling with jaundice were found to be major predisposing/etiologic factors associated with neonatal jaundice (24).

According to a study conducted on the prevalence of Neonatal Jaundice and determinant factors in Neonatal Intensive Care Units, Northern Ethiopia where the prevalence was 37.3% with the leading associated factor prolonged labor, neonatal sepsis, ABO incompatibility, and neonatal sex were significance association for neonatal jaundice(25).

According to a study conducted in GB Pant hospital of India, breastfeeding jaundice was the leading factor of jaundice among the identified causes, It accounted for 84 cases of 124 jaundiced neonates, those who had breast milk jaundice and jaundice due to prematurity were 5cases each, Physiologic and pathologic cases of neonatal jaundice were 24 and 6 respectively(26).

According to a retrospective, a study was conducted in the Department of GOBS Government Medical College Trivandrum, Kerala, North India on Maternal and Neonatal Determinants of Neonatal Jaundice. This study shows that the Majority determinants of neonatal jaundice were low APGAR score< 7, Gestational age <37weeks, birth asphyxia, Premature rupture membrane, low birth weight <2.5kg and malpresentation were a significance with neonatal factors.(17)

According to retrospective a study was conducted in Nigeria indicated that the prevalence was 278 (41.8%) and Majority of Neonates was aged between 1-2 days making about 82 (41.2%) of the neonates admitted for neonatal jaundice, there were more cases of NNJ in the males, 121 (60.8%) compared to females 78 (39.2) (27). According to a study done by Kokeb M and Desta T in Ethiopia Neonatal jaundice and prematurity were among the major reason of Neonatal morbidity and mortality admitted to Gondar University Hospital a total of 325 Neonates at this hospital the major problems at admission were cephalohematoma, subgiant

hemorrhage Neonatal Sepsis (77.8%), Hypothermia (57.5%), Low birth weight (32.9%), Jaundice (31.7%), Prematurity (27.4%), birth trauma (16%) were the major contributed factor Neonates were admitted to NICU (16).

2.3 PATHOLOGICAL JAUNDICE

Pathological jaundice appears within 24 hours, increase in serum bilirubin beyond 5mg/dl (85μmol/l)/24hrs, Bilirubin levels with a deviation from the normal range and requiring intervention would be described as pathological jaundice which means Appearance of jaundice within 24 h due to increase in serum bilirubin beyond 5 mg/dl/day, peak levels higher than the expected normal range, presence of clinical jaundice more than 2 weeks and conjugated bilirubin (dark urine staining the clothes) would be categorized under this type of jaundice (27).

2.4 PHYSIOLOGICAL JAUNDICE

Jaundice becomes visible on the 2nd-3rd day usually peaking by the 3rdday at 85-102μmol/l and decreasing to below 34μmol/l between5th and 7thday of life And Study did in India on predictors of neonatal jaundice the 3rdday serum bilirubin of greater than 10.15 mg/dl was used as early predictors of neonatal jaundice and Serum bilirubin in terms is usually less than 12mg/dl and less than 15mg/dl in preterm infants which resolves spontaneously in the first week in terms and 2ndweek in a preterm infant (28). According to a study conducted in India by Goyal M in showed that the prevalence of pathological jaundice was 55.6% (29).

According to Israel-Aiwa and Omoigberale A associated factors for neonatal jaundice in neonates were showed physiological jaundice with the leading cause were Neonatal sepsis, prematurity, G-6PD deficiency were most associated risk factors of this types of jaundice and also Severe neonatal jaundice can be presented to have modifiable associated factors for jaundice particularly in developing countries (30).

2.5 ASSOCIATED FACTORS OF NEONATAL JAUNDICE

2.5.1 SOCIO-DEMOGRAPHIC FACTORS:

According to a study conducted by Hassan Saud Abdul Hussein and Dr. Afifa Radha Azizin Holy Karbala City at Pediatric Teaching Hospital were indicated (83%) of neonate within first age group (1-7) days old was developed neonatal jaundice. Whereas study results indicate that most of the neonates (68%) were male neonates. Regarding neonate's ordinal position in a family with Jaundice, the study results indicate (40%) the first neonate ordinal with jaundice. Finally, the study results indicate that the (90%) of the study samples were (1-7) days duration of the disease (jaundice) (31).

2.5.2 G-6PD DEFICIENCY

According to a study done by Ezzat Khodashenas and Farnaz Kalani-Moghaddam from Iran, A Total of 452 neonate admitted to the hospital due to neonatal jaundice were acounts24 (8.5%) infants had G6PD deficiency (32). According to A study conducted By Hassan Boskabadi, Masoud Omidian, Shahin Mafinejad a total of 1139 admitted infants with neonatal jaundice, who were evaluated for G6-PD enzyme, to 59(5.2%) babies had G-6-PD deficiency from this study should be considered in infants with severe jaundice in a family with a history of significant jaundice or a geographic origin associated with G-6p deficiency (33).

2.5.3 BREASTFEEDING JAUNDICE

According to a study done by Atkinson LR EG T, JI, I a case of breastfed neonates, mild jaundice may take 10-14 days after birth or may reoccur during the Breastfeeding period and large amounts of Bilirubin rarely accumulate in the blood and cause cerebral lesions, a situation is known as nuclear jaundice, these cuts may be followed by hearing loss, mental retardation, and behavioral disorders, A mild clinical jaundice has been observed in one-third of all breastfed babies in the third week of life, which may persist for 2 to 3 months after birth in a few neonates (34). According to A study conducted in Iran showed that on severe neonatal jaundice leading to exchange transfusion in 2014, the prevalence of breastfeeding jaundice of neonates was 35% in this study onset of jaundice in 40.5% of 93 neonates was on the 2n day and 10 of them were on the 1st day after birth (35).

2.5 .4 BREAST MILK JAUNDICE

A study conducted India the Prevalence of breast milk jaundice accounts 4% of neonatal jaundice was occurred and associated to A diagnosis if the serum bilirubin is predominantly unconjugated and late jaundice have been eliminated the infant is in good health and feeding, and vigorous well and gaining weight adequately and Mothers should be advised to continue breastfeeding at more frequent intervals and bilirubin levels usually declined gradually Discontinuity of breastfeeding is not recommended unless levels exceed 20 mg/dl (14). a study conducted in America was indicated the late onset of (after 4-7 days) was 2 to 4% A strong familial predisposition is suggested by the recurrence of breast milk jaundice in sibling family history (36). A study conducted in Iran in 2014 Magnitude of neonatal jaundice in neonates with a history of jaundice in siblings' family history was reported in 50% of cases (37).

2.5.5 PREMATURITY

A study conducted was done in America indicated Prematurity has been a major associated factor of neonatal jaundice and It is suggested that the term jaundice should be used in preference to physiologic jaundice" when referring to an infant with concentrations of serum Bilirubin of over 10 to 15 mg/100 ml this roughly separates a group of infants who are potentially endangered and for whose jaundice some specific cause can frequently be found this study Kenicteres may vary considerably from premature infants to another and within the same unit from time to time (38). According to a study conducted at Memorial Hospital, Darlington, England, UK The degree of hypoxia at birth and severity of hyperbilirubinemia modulate both bilirubin and hypoxia-related neurologic damage. This paper study the long term neurological injury of hypoxia with the degree of hyper-bilirubinaemia and would fit with hypoxia (low Apgar score) and hyper-bilirubinaemia were strongly associated (39).

2.5.6 NEONATAL INFECTION

A study conducted in the hospital of Nigeria in 2011 prevalence was 35% neonates were admitted to NICU due to neonatal jaundice among those neonates were neonatal infection accounts 27%and 5.2% of them were died due to sepsis and kernicterus. The rest were due to Bilirubin encephalopathy (40). According to a study conducted in Iran indicated that sepsis was a significant cause of unexplained neonatal jaundice. This study recommendation was a

screening test for UTI as part of the evaluation in asymptomatic jaundice infants presenting after five days of life and sepsis workup should be requested in symptomatic infant especially in the first week of life. Neonatal sepsis was found in approximately 10% of jaundiced newborns. The most common infection associated with neonatal jaundice was UTI (16.8%), Sepsis (77.8%) and pneumonia (5.3%). (41)

2.5.7ABO-INCOMPATIBILITY

According to a study was done in Iran a total of 355 (19.7%) of all jaundiced newborn infants were ABO incompatible 98 (27.6%) of the newborns who had ABO incompatibility Indicated ABO-HDN (5.4% of total icteric patients) which indicated the positive direct ant Globulin (direct Coombs' test) and indirect ant globulin (indirect Coombs' test) were diagnostic in 18.2% and 25.5% respectively in affected infant and also the overall prevalence of associated factor with ABO-HDN was 43.7% (42).

2.5.8 RH-INCOMPATIBILITY

according to a study was conducted by trot man et al in at the university hospital of the West Indian on Magnitude and associated factors of neonatal jaundice showed that 3.5% of neonatal jaundice in all admission due to Rh- incompatibility was significantly associated factor for neonatal jaundice (3.5 %) (43).

2.6. CONCEPTUAL FRAME FRAMEWORK:

This conceptual framework was developed after reviewing similar literature and the diagram shows the relationship between neonatal jaundice associated with socio-demographic factors, maternal factors, and Neonatal factors [(44), 27), (35),(41) (42)].

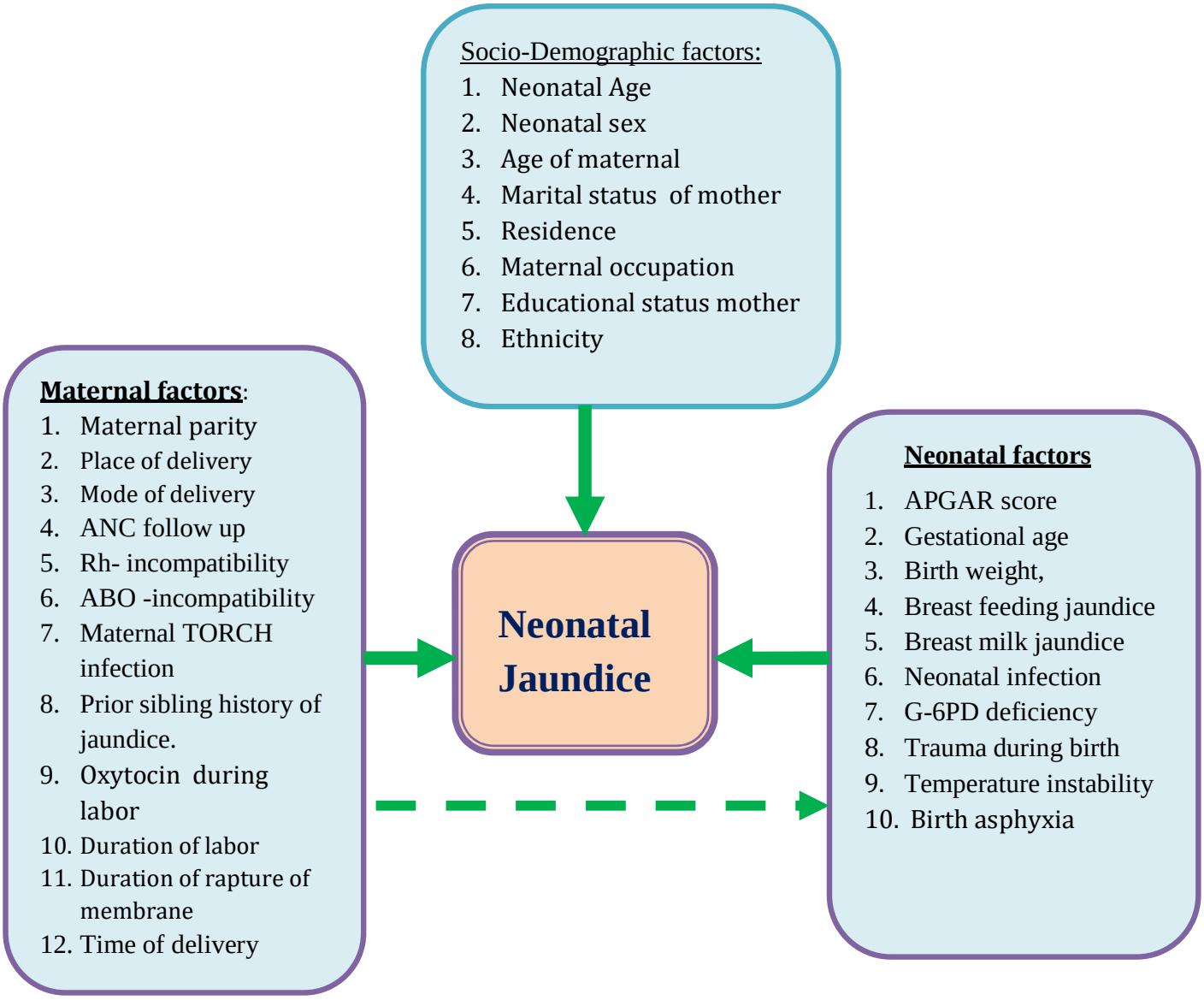


Figure 1: Conceptual framework shows the linkage between Neonatal jaundice and its associated factor in Dessie Town, Amhara region, Ethiopia 2020(N=218).

CHAPTER THREE
OBJECTIVE

3.1. GENERAL OBJECTIVE

- To assess Magnitude and Determinants of neonatal jaundice among in neonates admitted to NICU of Dessie Town public hospitals Amhara region, Ethiopia, from March 30 to April 30/2020

3.2. SPECIFIC OBJECTIVE

- To Determine the Magnitude of Neonatal jaundice among neonates admitted to the NICU of Dessie town public hospitals Amhara region, Ethiopia from March 30 to April 30/ 2020.

- To identify determinants of Neonatal jaundice among neonates admitted to the NICU of Dessie Town public hospitals Amhara region, Ethiopia, from March 30 to April 30/2020.

CHAPTER FOUR

METHOD AND MATERIAL

4.1. STUDY AREA AND SETTING

Dessie town is the capital city of the south wall which is located 401km away from Addis Ababa, the capital city of Ethiopia and 480 km from Bahirdar, the capital city of Amharic regional state. Dessie town has a total population of 151,174, of whom 72,932 are men and 78,242 women. The majority were Muslim, with 58.62% reporting that as their religion, while 39.92% were Orthodox and1.15% were Protestants. the Languages spoken include Amharic(94.89%), Tigrigna (3.79%), and the remaining 0.67% speak other languages **(45).** The Town has six hospitals among those four private and two public hospitals. There are only two hospitals that can serve the neonatal intensive care unit (NICU).

Dessie referral hospital was established in 1954 E.C during the regime of Emperor Haile Silas. The hospital Has NICU with 34 beds, 12incubators, and 6 Kangaroo mother care beds. the NICU unit has 4 senior pediatricians with 22 pediatric residents from a different level of seniority,6 GP and 36 BSc (Bachelor of Science) nurse according to the registered the NICU 8yward 2020. It is a public hospital, which has Medical, Surgical, Gynecology and obstetrics, emergency, and psychiatric OPDs and it has a NICU service.

Boru Meda Hospital (BMH) is found in the Eastern Amhara South Wollo zone in Dessie town, which is found about 416 km far apart from Addis Ababa, the capital city of Ethiopia. It was established in **1947** E.C. Through the support of a missionary organization that was primarily focused on dermatology and ophthalmic services. Now the time it has Medical, Surgical, Gynecology and obstetrics emergency and dermatological problem and the other public hospital in Dessie Town can serve neonatal intensive care unit service. NICU has a 10-bed term side 4 bed in preterm,4 incubators, and 4-bed kangaroo mother care(KMC) service and also has 2 signor pediatrician, 4 GP, and 16 BSC (Bachelor of Science) nurse cording to register of the NICU ward.

4.2. STUDY DESIGN AND PERIOD

- Hospital-based cross-sectional study design was conducted in Dessie Town public hospitals Amhara region, Ethiopia from March 30 to April/30/2020.

4.3 SOURCE OF POPULATION AND STUDY POPULATION

4.3.1 SOURCE OF POPULATION

- All neonates who were admitted NICU of Dessie town public hospitals fromMarch30 to April 30 /2020.

4.3.2 STUDY POPULATION

- All randomly selected neonates who were admitted to NICU Dessie Town public hospitals and postnatal age of ≤ 28 days during the study period.

4.4. INCLUSION AND EXCLUSION CRITERIA.

4.4.1. INCLUSION CRITERIA

- All neonates with Postnatal age ≤ 28 days old after birth and admitted to NICU of Dessie Town public hospital with neonatal jaundice during the study period.

4.4. 2 EXCLUSION CRITERIA.

- Neonate whose mother was critically ill or unable to give informed consent.
- Neonates whose information in the medical record (chart) was incomplete.
- Readmission with the same medical problem (NJ) during the study period.

4.5. SAMPLE SIZE DETERMINATION

The sample size was calculated using a single population proportion formula. 44.9% prevalence of neonatal jaundice in Ethiopia from the 2017 study was taken with a 95% confidence interval and 5% marginal error (19).

$$N = \frac{(z\alpha/2)\times p(p)}{W^2}$$

$$N = \frac{(z\alpha/2)\times (1-p)}{W^2}$$

$$N = \frac{(1.96)^2 \times 0.449(1-0.449)}{0.0025} = 380$$

Based on this data calculated sample size was 380 but since the estimated total populations in the study hospitals were 414 according to the recent data one-month HMIS data; which was less than 10,000. So the following correction formula was used.

Therefore:-

$$nf = \frac{ni}{1+ni/N} = \frac{380}{1+380/414} = 198$$

Assumptions:u

nf= final sample size

ni= initial sample size=380

N=total estimated neonates with their mother in the study area during data collection time=414

By considering 10 % none response rate of participants are added 10 % of the sample size which was 20. So the final sample size **218** Newborns. So the total sample size for each hospital was proportionally allocated as seen below the number of neonates selected from each hospital will be proportional to their cause flow during the study period.

4. 6. SAMPLING PROCEDURE

There are a total of two public hospitals in Dessie town that provide neonatal intensive care unit (NICU) service. The total sample size was 218 neonates were selected from the two public hospitals.

All neonates from the two public hospitals that we're admitted to NICU day and night during the study period were considered for the study. The numbers of neonates admitted to NICU from each hospital were proportionally allocated from the total average number of neonates admitted to the NICU during the study period from all hospitals. List of a participating mother with neonate pairs were obtained from the last month's average number of admitted neonates to NICU in both hospitals and the sampling frame of neonates admitted flow rate. Then the participants were selected in every 2 neonates with a mother by using a systematic random sampling technique until the required sample size was obtained and the starting neonates were selected by a simple random sampling method. The number of neonates with jaundice case were found to be neonatal chart(card) information.

The Proportionate allocation is done by this formula

Whereas:-

Ni= is the sample size of the j^{th} both hospitals

NJ =is population size of the j^{th} both hospitals

N = Total number of neonates admitted to NICU per Month in Both hospitals.N =N1 (DRH=390) +N2 (BMGH=34) =414 and n =218 which was the total sample size. By calculating the sample size for each hospital the sample size for DRH is 218×390/414=198, the sample size was for BMH=218×**2**4/414=**14.**So the total sample size was for each hospital proportionally allocated as seen below diagram.

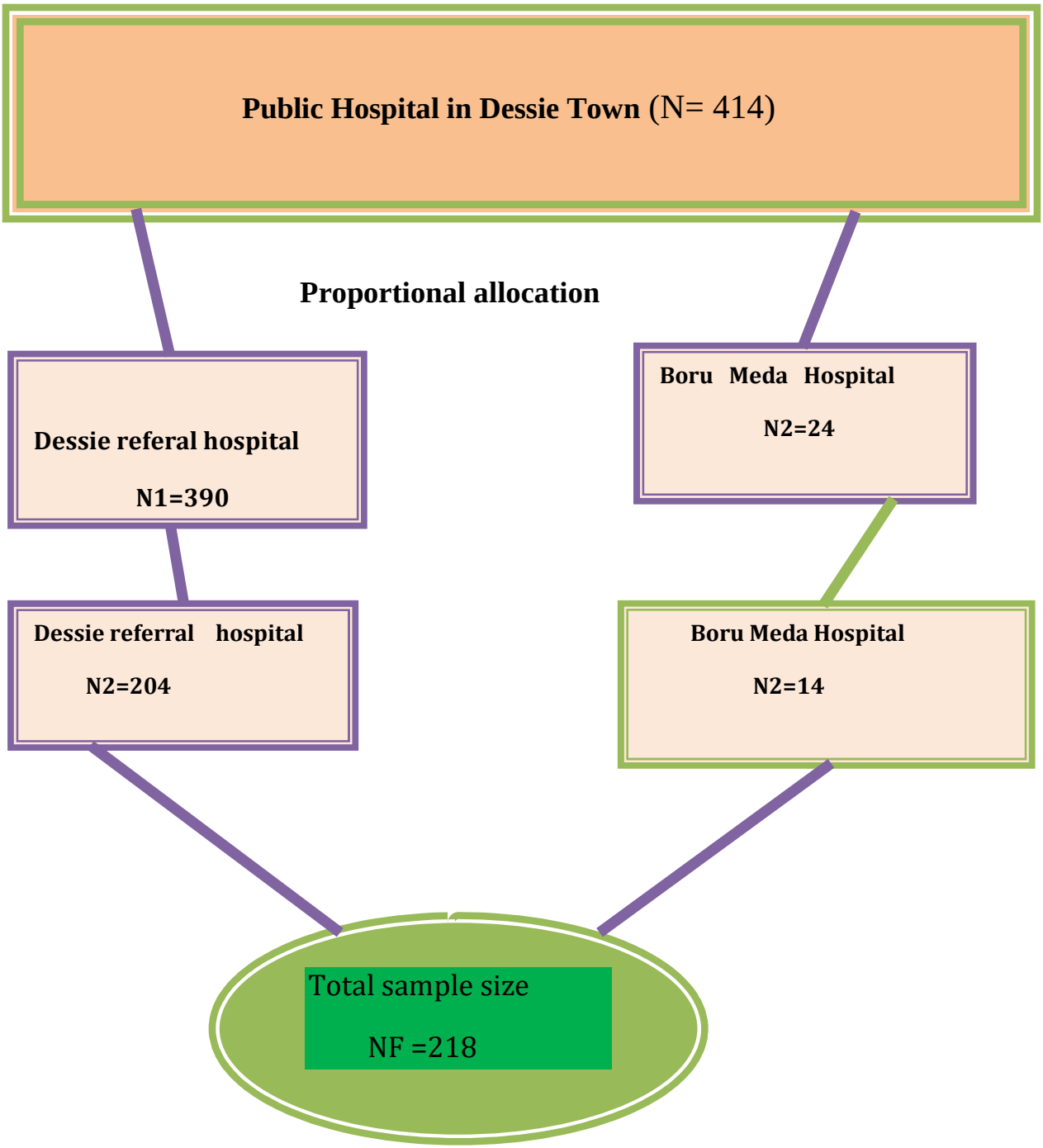


Figure 2:-Schematic presentation of the sampling procedure for the Magnitude and associated factor for Neonatal jaundice among neonates admitted to the NICU Dessie Town Public hospitals Amhara region, Ethiopia 2020.

4.7. STUDY VARIABLE

4.7.1. DEPENDENT VARIABLE

- Neonatal jaundice

4.7.2. INDEPENDENT VARIABLE.

Socio-demographic factors:

- Age of the neonate
- Maternal age
- Residence
- The ethnicity of
- Neonatnatal Age
- Marital status of the mother
- Educational status mother
- Maternal occupation

Maternal factors:

- Maternal parity of
- Place of delivery
- Mode of delivery
- Rh- incompatibility
- Hepatic/liver infection
- Duration of rupture of membrane
- Maternal TORCH infection
- family /Prior sibling history of jaundice.
- ANC follow up
- ABO -incompatibility
- Duration of labor
- Time of delivery

Neonatal factors:

- APGAR score
- Gestational age
- Birth weight
- Breastfeeding jaundice
- Breast milk jaundice
- Neonatal infection
- G-6PD deficiency
- Trauma during birth
- Temperature instability
- Birth asphyxia

4.8 OPERATIONAL DEFINITION

Prevalence of neonatal jaundice:-The number of neonates with neonatal jaundice in percentage from the total admitted during the data collection period.

Low birth weight: The neonatal birth weight less than 2,500 grams.
Neonate: An infant from birth to 28 days of age.

Preterm: Gestational age less than 37weeks.

Prolonged labor:- A labor lasts more than 24 hours

Premature rupture of membrane (PROM):- is rupture of the fetal membranes after the 28thweeks Of GA and before the onset of labor.

Normal birth weight: The neonate weightbetween2.5kg and 4kg.

Neonatal Jaundice: - Neonates diagnosed as jaundiced by health professionals.

Physiological Jaundice:-clinical jaundice appears after 24 hours of age and clinical jaundice resolve by 1 week in term and 2 weeks in preterm infants.

Breast Milk Jaundice:- Late-onset jaundice beginning after 4-7th day of life which is caused by increased reabsorption of unconjugated Bilirubin.

Breastfeeding jaundice:- Occurs in the first few days (2-3) days of life and related to decreased breast milk intake and decreased frequency of feeding as well as a history of formula feeding that may indicate the occurrence of breastfeeding jaundice.

Pathological Jaundice: It is evident on the 1st day of life and clinical jaundice persisting for more than 1 week in full-term infants or 2 weeks preterm infants.

4.9. DATA COLLECTION TOOL AND PROCEDURE

The Data was collected by prepared structured and interviewer guided questionnaires, checklist, and the instrument tool was Adopted and modified from review different literature [(44),(27), (35),(41) (42)]. Data was conduct By five BSc Nurse and Supervisors was checked the collected data daily for Completeness. The questionnaire had three parts socio-demographic factors, Neonatal factors, and maternal factors for neonatal jaundice. The supervisor and data collectors were trained for one day on the Aim of the study, the relevance of the study, procedures during interviewing, the confidentiality of client information, eligibility criteria, respondents' right, informed consent, ways of approach during data collection and interview Period.

4.10 DATA QUALITY ASSURANCE

The questionnaire was prepared in English and translated to Amharic, and back-translated to English by two language experts to check for consistency of the questionnaire. Both supervisors and data collectors were closely followed for the data collection process. Before the actual data collection pretest was conducted 11(5%) of the study population at Woldia General Hospital two weeks before the actual data collction to evaluate the clarity of questions and validity of the instrument and reaction of respondents to the questions. Maintenance of the privacy and confidentiality of the respondents as well as good communication skills between respondents and interviewer that was gained through a training session of both data collectors &supervisors will contribute to the quality of the study. Every day all questionnaires were reviewed and checked at the end of the data collection period and any errors were corrected accordingly with supervisor and data collectors.

4.11 DATA ANALYSIS AND PROCESSING

The Data was cleaned manually, coded, and entered into Epi Data version 3.1 and analyzed by SPSS version 24 statistical software. Bivariate and multivariate logistic regression analyses were employed to identify determinants for neonatal jaundice. After bivariate logitic regression analysis, P-value<0.05 was taken as a cut-off point to select variable eligible for multiple logistics regression models. Which used to control possible confounders variables. Then 95% Confidence interval was used to see the precision of the study variable. Finally, P-value was less

than **0.05** the statistical association was considered as a significant variable. Then the result was interpreted and presented using statements, tables, figures, texts, and pie charts as awhole.

4.12 ETHICAL APPROVAL

Ethical clearance was obtained from the institutional review board of Addis Ababa University College of health sciences school of Nursing and Midwifery and Official letter of permission was written to the respective hospitals. Verbal consent was obtained from each participant's anonymity and confidentially was kept. The interview was conducted in a private environment convenient for the participants. Respondents had the right not to participate or withdraw from the study at any stage.

4.13 PRESENTATION AND DISSEMINATION OF THE DATA:

The research finding of this study was presented to Addis Ababa University College of health sciences school of Nursing and Midwifery partial fulfillment of the master of neonatal nursing. The finding will be shared/ submitted to the Dessie town administration health bureau and concerned hospitals. Subsequently, attempts should be made to present it on scientific conferences and published it on scientific journals.

CHAPTER FIVE
RESULTS:

5. 1 SOCIO-DEMOGRAPHIC CHARACTERISTICS:

A total of 209 newborn baby/mother pairs participated in the study constituting a response rate of 96%. The mean age of mothers was 28.68 years and (SD=6.2). More than half of the respondents (60.8%) were found age group 20-35 and .the majority of the mothers 192(88.2%) were Amhara in ethnicity. More than three-quarters of the mothers 188 (88.2%) were married and 120 (54.85) mothers were urban residence. Maternal educational status, 32(14.8%) of the respondents were unable to read and write and More than half of the mothers were housewives [**Table1**].

Table 1: Socio-demographic factor for neonatal jaundice in Dessie town public hospitals Amhara region, Ethiopia 2019/20.

Variable (N=218)	Category	Frequency(N)	Percent (%)
Age of the mother	< 20	15	6.9
	20-35	132	60.6
	36-50	71	32.5
Marital status	Single	30	13.8
	Married	188	86.2
Maternaleducational status	Not read and write	32	14.8
	Read and write	29	13.4
	Primary education	108	49.5
	Secondary education	26	11.9
	Diploma and above	23	10.6
Residence	Urban	120	54.8
	Rural	98	45.2
Ethnicity	Amhara	192	88.2
	Tigre	8	3.7
	Oromo	15	6.8
	Others	3	1.3
Mother Occupation	Government employee	20	9.3
	Farmer	60	27.4
	Merchant	7	3.5
	Housewife	131	59.8

5.2 MATERNAL FACTORS FOR JAUNDICE

More than half 146 (67.0%) of the respondents were Multi Para and 72(33.0%) of the respondents were prime Para. Regarding mode of delivery 202(92.2%) were spontaneous vaginal delivery (SVD) whereas 11 (5.1%) were C-section(C/S). With regard to the place of delivery 118 (54%) were hospitalized and six (2.8%) were home delivery and 192 (88.2%) had No previous sibling with jaundice, 206 (94.5%)) of the mothers were had ANC follow up, and also 26(11.9%) were taking substance during pregnancy. Of which Alcohol taking, herbal medication, and chat chewing were (57.7%), (11.5%) and (30.8%) respectively, and regarding chronic medical illness only (5.5%) mothers who had medical chronic illness **(Table 2a).**

Table 2a:-Maternal factor for neonatal jaundice in Dessie town public hospitals, Amhara region, Ethiopia, 2019/20.

Variable(N=218)	Category	Frequency(N)	Percent (%)
Parity	Prime Para	72	33
	Multi Para	146	67
Maternal BGand Rh- factor	A	59	26.9
	B	66	30.1
	AB	27	12.4
	O	57	26.6
	Unknown	9	4
Chronic Medical illness	Yes	12	5.5
	No	206	94.5
Mode of delivery	SVD	202	92.7
	C/S (C-section)	11	5
	Instrumental	5	2.3
Place of delivery	Home	6	2.8
	Health center	94	43.2
	Hospital	118	54
Timing of delivery	Day	43	19.7
	Night	175	80.3

(b) (**Continued**).

Variable(N=218)	Category	Frequency(N)	Percent(%)
Substance during pregnancy	Yes	26	11.9
	No	194	88.1
Types of substance abuse	Alcohol taking	15	57.7
	Herbal Medication	4	15.4
	Chat chewing	7	26.9
History prolonged PROM	Yes	23	10.6
	No	195	89.3
Infection during pregnancy	Yes	27	12.4
	No	194	87.6.
ANC follow up	Yes	206	94.5
	No	12	5.5
Trimester of ANC follow up	1^{st}	9	4.4
	2^{nd}	50	24.3
	3^{rd}	56	27.2
	4^{th}	91	44.1
Prolonged labor	Yes	21	9.6
	No	198	90.4
Oxytocin during labor	Ye s	72	32.4
	No	147	67.6
Family/sibling history of jaundice	Yes	26	88.1
	No	192	11.9

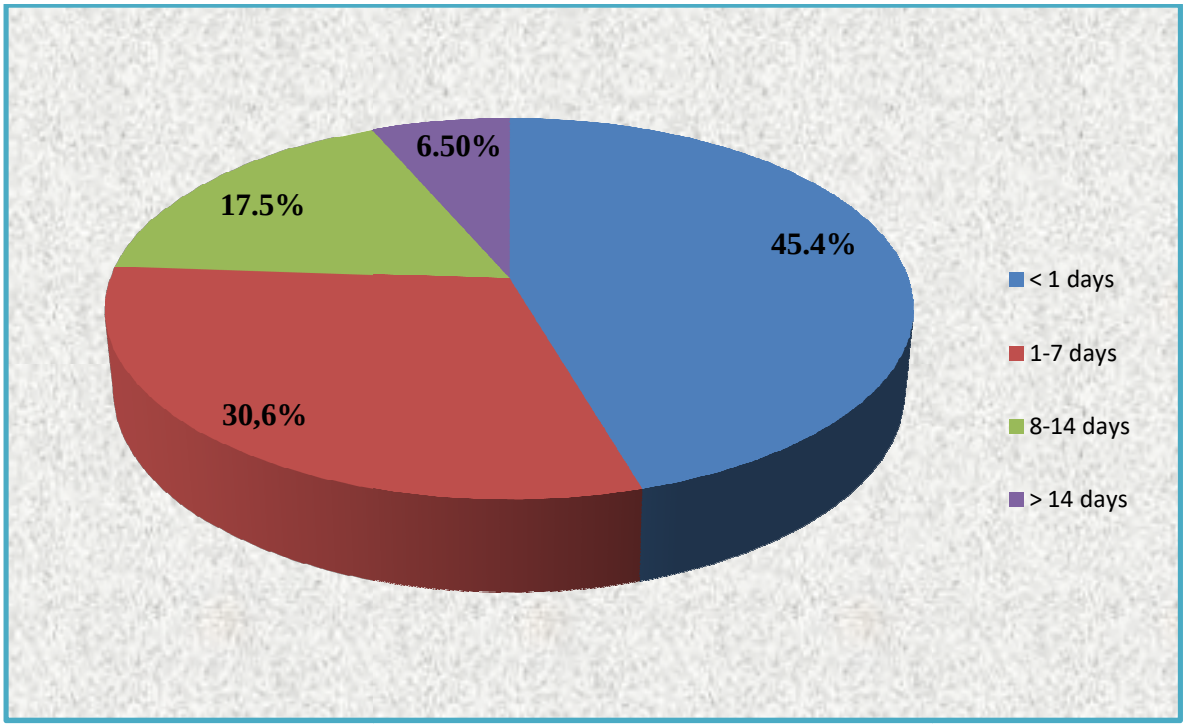
5.3 NEONATAL FACTOR FOR JAUNDICE

More than fifty percent of neonates were male infants and the majority of the age group found between 1-7 days 164 (75.2%). The majority of neonates (68.8%) were LBW, and 146 (66.9% neonates were on Breastfeeding [**Table 3**].

Table 3: **Neonatal factor for Neonatal jaundice in Dessie town public hospitals Amhara region, Ethiopia 2019/20 (N=218).**

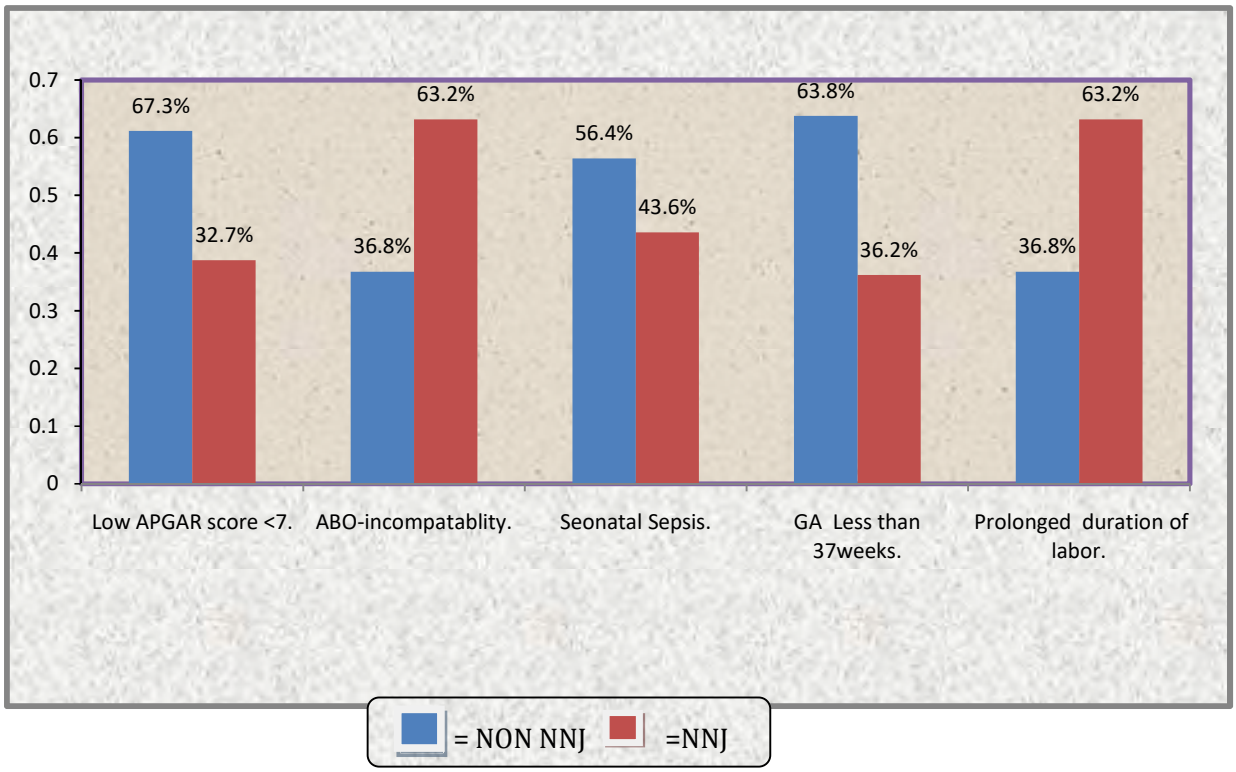
Variables	Category	Frequency (N)	Percent (%)
Neonatal sex	Male	110	50.5
	Female	108	49.5
Neonatal age	1-7 days	164	75.2
	8-28 days	54	24.8
Birth weight	Less than 2.5kg	150	68.8
	More than 2.5kg	68	31.2
Gestational Age	< than 37 weeks	133	61
	> than 37weeks	85	39
Low APGAR score	Less than 7	108	49.5
	More than 7	110	50.5
BGand Rh-factor	A	52	23.9
	B	92	42.2
	AB	28	12.8
	O	46	21.1
Neonatal sepsis	Yes	55	25.3
	No	163	74.7
RH-incompatibility	Yes	12	5.5
	No	206	94.5
ABO incompatibility	Ye s	19	8.7
	No	207	91.3
Birth trauma	Yes	31	14.2
	No	187	86.8
Bilirubin encephalopathy	Yes	1	0.5
	No	217	99.5
Birth asphyxia	Yes	12	5.5
	No	206	94.5
Methods feeding	Breast feeding	146	66.9
	Formula feeding	25	11.5
	Mixed feeding	26	11.9
	Mainteinance fluid	21	9.7

Figure 3: Neonatal age with the onset of neonatal jaundice in Dessie town public hospitals Amhara, region Ethiopia, and 2019/20.



Neonatal age with onset neonatal jaundice indicated that less than 1 days, 1-7 days, 8-14 days, and more than 14 days were 28 (45.4%), 19(30.6%),11 (17.5%) and 4 (6,5%) were respectively [Figure 4].

Figure 4: Neonatal factor for associated with neonatal jaundice in Dessie town public hospitals Amhara, region Ethiopia, and 2019/20.



More than fifty percent of neonates who had a diagnosis with ABO incompatibility, and those mothers"s had prolonged duration of labor (67.2%) and (63.2%) were respectively more likely to developing Neonatal jaundice (**figure 4**).

5.4 PREVALENCE OF NEONATAL JAUNDICE

The prevalence of neonatal jaundice among Neonates admitted to the neonatal intensive care unit (NICU) of Dessie Town public hospitals was found 28.4% (62).

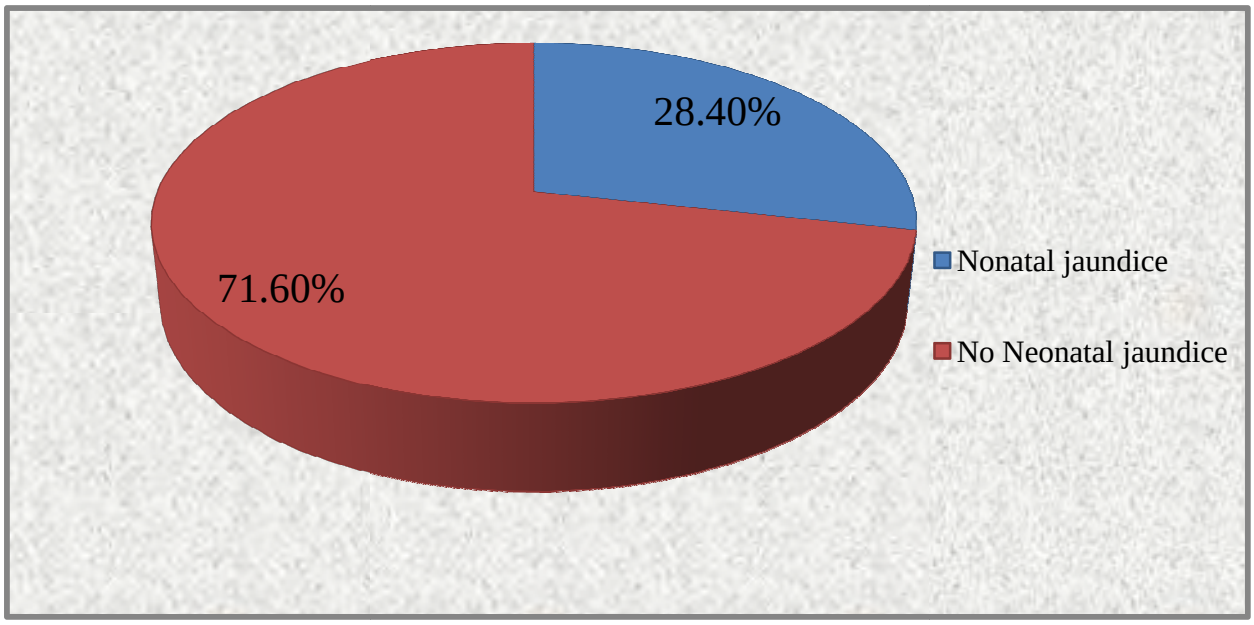


Figure 5: The prevalence of Neonatal Jaundice among neonates Admitted to Neonates NICU in Dessie town Public hospitals in the Amhara region, Ethiopia 2019/2020.

Binary and multivariate analysis of factors associated with neonatal jaundice.

In the bivariate analysis, any possible confounders were not controlled, and assessing the independent effects of the covariates was difficult. So, enter the method of logistic regression technique was used to assess the independent effect of explanatory variables on neonatal jaundice. to avoid an excessive number of variables and unstable estimates in the final model, a variables with only a P-value less than 0.05 in the bivariate analysis were taken into multivariate logistic regression analysis, and finally a P value less than 0.05 were taken as the level of statistical significance.

5.5. FACTORS ASSOCIATED WITH NEONATAL JAUNDICE

IN Multivariate logistic regression analysis Low APGAR score, ABO-incompatibility, neonatal Sepsis, Prolonged labor, Rh-incompatibility, and Gestational Age less than 37weeks were found to be an independent predictor of neonatal jaundice. However, birth trauma, residence, Birth asphyxia, PROM, time of delivery,maternal parity, and Family/sibling history were not associated with neonatal jaundice.

This study had shown that prolonged duration of labor had a significant effect on the development of neonatal jaundice. The odds developing of jaundice were about more likely observed neonatal jaundice among neonates who were born with a long duration of labor compared with neonates who were born in normal labor [AOR=3.69(95%CI=1.05,12.94)].

Newborn neonates who were delivered before a Gestational age of 37 weeks were 3 times more likely to develop neonatal jaundice when compared to babies born at a gestational age of 37 weeks and more [AOR=3.92, 95%CI=1.89, 9.11)] and likewise, Neonates had low APGAR score < 7 eight times more likely to develop neonatal jaundice when compared to neonates who had normal APGAR score [AOR=8.36 (95%CI=1.34, 39.65)].

In this study, neonatal sepsis and ABO incompatibility had a significant association with the dependent variable. The odds of neonatal jaundice among neonates who had neonatal sepsis were three times more likely observed Neonatal jaundice compared with those neonates who had no neonatal sepsis was confirmed [(AOR=3.82(95%CI=1.67,8.09**)]**. Similarly, Neonates had ABO incompatibility diagnosis 6 times more likely to develop neonatal jaundice compared with those neonates who had no diagnosis of blood type incompatibility [AOR=6.94(95%CI= 1.97,24.42)] [Table 4].

Table 4:-. Bivariate and Multivariate logistic regression analysis of maternal and neonatal factors for neonatal jaundice Neonates were admitted to NICU in Dessie town Public hospitals in the Amhara region, Ethiopia 2019/20 (N=218).

Variable	Category	Neonatal Jaundice		COR [95%CI]	AOR [95%CI]
		Yes	No		
Maternal parity	Prime Para	30(36.1%)	53(63.9.%)	1.82[1.00,3.32]	1.54[0.74,3.19]
	Multi Para	32(23.7%)	103(76.3%)	1	1
Residence	Urban	28(23.3%)	92(76.7%)	1	1
	Rural	34(34.7%)	64(63.3%)	1.75[1.96,3.16]	1.84[0.99,3.38]
PROM	Yes	11(45.8%)	13(54.2%)	2.37[1.00,5.63]	1.38[0.22,8.78]
	No	51(26.3%)	143(73.7%)	1	1
Gestational Age	< 37weeks	48(36.2%)	85(63.8%)	2.86[1.46,5.62]	**3.92[1.89,9.11]***
	> 37weeks	14(16.5%)	71(83.5%)	1	1
Time of delivery	Day	27(62.8%)	16(37.2%)	3.75[1.42,7.88]	4.14[0.78,9.16]
	Night	35(20%)	140(80%)	1	1
Birth asphyxia	Yes	8(57.1%)	6(32.3.%)	5.63[1.63,19.45]	3.10[0.64,15.09]
	No	54(26.5%)	150(73.5%)	1	1
Neonatal Sepsis	Yes	24(43.6%)	31(56.4%)	2.55[1.34,4.85]	**3.82[1.67,8.09)***
	No	38(23.3%)	125(76.7%)	1	1
Prolonged labor	Yes	12(63.2%)	7(36.8%)	4.91[1.92,12.54]	**3.69[1.05,12.94] ***
	No	50(25.1%)	149(74.9%)	1	1
Sibling history	Yes	16(42.1%)	22(57.9%)	2.12[1.03,4.38]	2.01 [0.75.5.45]
	No	46(26.7%)	134(73.3%)	1	1
ABO incompatibility	Yes	12(63.2%)	7(36.4%)	5.11[1.91,13.69]	**6.94[1.97,24.42)***
	No	47(23.6%)	152(76.4%)	1	1
LowAPGAR score	< than 7	49(32.7%)	101(72.3%)	2.80[1.52,7.03]	**8.36 [1.34,39.65]***
	> than 7	13(19.1%)	55 (78.9%)	1	1
Rhincompatibility	Yes	7(58.3%)	6(41.7)	3.18[1.02,9.88]	1.82[0.42,8.04]
	No	55(27.7%)	150(76.3%)	1	1

(*=a variable that has statistically significant at **p value <0.05** with 95%CI).

AOR=Adjusted Odd Ratio,**COR**=Crude Odd Ratio and **PROM**=Premature rapture ofMembrane.

CHAPTER SIX

6.1 DISCUSSION

Neonatal jaundice has significant importance on neonatal morbidity and mortality worldwide. The vast majority of the affected neonates reside in sub-Saharan Africa and South Asia (12). A little bit of data was available on the prevalence and factors associated with neonatal jaundice in Ethiopia. This study aimed at assessment of prevalence and predictors of neonatal jaundice among neonates admitted to the neonatal intensive care unit in Dessie Town.of public hospitals.

In the study, the prevalence of neonatal jaundice was found 62 (28.4%) and This was consistent studies done were conducted in India and Pakistan [(10, 21)]. But it was lower than the prevalence of retrospective study conducted in Ethiopia (19),and Nigeria (27). This inconsistency may be due to differences in the study area, time gaping, and methodology. This study also lower than a retrospective study conducted in Nigeria (24**).** This discrepancy between the findings may be due to the time gap between the study periods and the different study areas, study Design, and the skills of data collectors. Likewise, This finding was also lower than compared to the findings from the retrospective study conducted in Sub-Saharan Africa (14). Inconsistency may be due `to a difference in the skills of data Collectors, study area, and study design.

This study was also lower than a case-control study conducted at Bloemfontein (22). The discrepancy of this finding might be the different study areas, study design, and skills of data collectors. This study also a little bit lower than the study conducted in Southeast Nigeria (23). kjhBesides the difference in methodology, time gaping, and the study setting may be the reason behind. This study also shows a little bit lower than the study was conducted in Northern Ethiopia (25). The discrepancy of this finding might be explained by the different study areas, time gaping, and skills of data collectors, and also this study was not a consistent case-control study conducted by Gondar University (16). This difference could be due to the different study areas, study design, and methodology reason behind.

This study had shown that neonatal sepsis had a significance effect on developing neonatal jaundice. The odds of jaundice were ten times higher among neonates who had no sepsis diagnosis compared with neonates who had no sepsis diagnosis. This finding supported as the possible causes of neonatal jaundice in studies were conducted in Nigeria (10), South Indian (13), and Israel-Aiwa(30). This might be because hemolysis, hepatocellular damage, ileus, and/or acidosis may occur as a result of sepsis. These factors may increase bilirubin production (hemolysis), decrease bilirubin removal (liver cell damage) and increase reabsorption of bilirubin or and decrease l liver function that leads to accumulation of serum bilirubin in the body supported by a study was conducted in Iran (41).

ABO incompatibility had a significance effect on developing neonatal jaundice. The odds of jaundice was more likely developing jaundice among neonates had ABO incompatibility compared neonates who had not ABO-incompatibility. This finding was supported studies conducted in Nigeria (24) and also southeast Indian (10). The possible explanation would be the mother had O blood group and the fetus had A or B blood group by this condition some fetal RBCs cross the placenta and enter the maternal circulation which can occur hemolysis infant RBC which leads to neonatal jaundice and also a hemolytic disease of the newborn when maternal IgG antibodies with specificity for the ABO blood group system pass through the placenta to the fetal circulation where they can cause hemolysis of fetal red blood cells which can lead to fetal anemia and the result could be jaundice [(14)].

This study had shown that prematurity had a significant effect on developing neonatal jaundice. The odds jaundice was six times higher among neonates who had delivered before term gestational age compared with neonates who had delivered on appropriate gestational age (at term weeks). This result is in line with studies done by Nigeria and Ethiopian (16, 23). That Preterm babies have immature livers with decreased ability to process bilirubin and also Preterm neonates are also more likely to be stressed and, therefore, are at risk for an impaired blood-brain barrier. Further, preterm neonates often have low serum protein and thus have fewer bilirubin binding sites with a resultant increased likelihood of free bilirubin, So. gestation age plays an important role in determining neonatal jaundice. Infants who were delivered prematurely were at higher risk to have jaundice which prone to developing

jaundice due to immaturity of their bilirubin conjugating system at a higher rate of hemolysis, increased enterohepatic circulation and decreased caloric intake which leads develop jaundice (38).

This study revealed that neonates with low APGAR scores had higher odds of developing neonatal jaundice compared to those neonates who had normal APGAR scores. This finding was supported by studies conducted in Nigeria (13). It is fact that APGAR core is the overall indicator for the state of the newborn in the extrauterine environment and neonates with low APGAR score could be in a state of bradycardia asphyxia and sepsis which could be leaders to neonatal jaundice (39).

Moreover, the study revealed that prolonged duration of labor had a significant effect on the development of neonatal jaundice. The odds ratio of jaundice was about 3 times more likely developing jaundice among neonates who were born with a long duration of labor compared with those neonates who born in normal labor. This finding was in line with findings in (25) and (22). This might be contributed to bruising and swelling of the scalp of newborns because of the pressure excessive applied by health attendants as a solution for prolonged labor, in turn, increases the risk of jaundice by rising bilirubin level in the bloodstream which leads to developing neonatal jaundice.

6.2 STRENGTH AND LIMITATION

6.2.1 STRENGTH

- Instruments (Questionnaire) used to collect data were adopted from validated sources and pretested in the local context with required modification and the Data collection procedure was used to face to face and observation checklist had performed.
- The study was hospital-based quantitative designed so, This method was to improve the research outcomes as qualitative study complement and strengthen the quantitative study

6.2.2 LIMITATIONS

- The study was conducted with a cross-sectional study design so, it cannot formulate effect and cause relationship.
- Private health facilities were not included therefore findings as not Generalizable.
- During the data collection period, there may be selection or misclassification or information bias.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

This study shows that the prevalence Neonatal jaundice Dessie town public hospitals south wollo zone amhara region Ethiopia was found to 62(28.4%).

It was found to be affected by low APGAR score less than7,prematurity(gestational age< 37weeks),Blood type incompatablity,prolonged duration of labor and Neonatal sepsis.

7.2 RECOMMENDATION

For Health Facility:

ABO incompatibility was among the leading factors of neonatal jaundice which can be preventable. Therefore, all women should be tested for the mother blood group as early as possible during antenatal follow up and if the women's blood group O during follow up should be considered ABO setup so, early prevention and detecting neonatal jaundice mandatory.

For health Workers:

Professionals who are working in NICUs should Adher to aseptic technigues while carying and conducting neonatal invasive procedure. And they must be consider the risk of resistance, misdiagnosis, and mismanagement neonatal infection.likewise, Midwife should be ealy Detecting and prevention prolonged duration of labor by identifing cause of prolonged labor should be considered. Prematurity and low APGAR score also a predictor of neonatal jaundice. So all midwives could be alert and early prevention of preterm labor during antenatal care follow up and the time of labor and delivery can manege early detecting and prevention of asphyxia also considered.

For south Wollo zone & Dessie city health office:

Plan and deliver necessary training programs for health professionals especially midwife and NICU nurses to give more attention regarding to infectin prevetion,preterm labor and prolonged duration labor and also Community-based training and health education to address mothers about prevention, clinical symptoms, and complications of neonatal jaundice and focusing to take action timely before complication of neonatal jaundice happened.

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9.ANNEXES:

ANNEX I: - I INFORMATION SHEET

ADDIS ABABA UNIVERSI COLLEGE OF HEALTH SCIENCE SCHOOL OF NURSING AND MIDWIFERY

Title of Research: Assessment of Magnitude and Determinants of neonatal jaundice of among Neonates admitted to Neonatal intensive care unit (NICU) Dessie Town, Amhara region, Ethiopia, March 30 to April 30 /2020.

Institution: Addis Ababa University, College of Health Sciences, School of Nursing, and Midwifery (Post Graduate Program).

Name of sponsor: Addis Ababa Administration City of health Bureau (AAACHB)

Principal Investigator: - Mohammed Tessema Gebeyehu (BSc)

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Background Information: - Neonatal jaundice represents a condition that results in significant impacts on healthcare systems, particularly in developing countries. So Neonate suffering to jaundice is more likely to develop “Kernicterus" or "Bilirubin brain damage” compared to neonates without jaundice likewise, those Neonates are experienced more mortality and morbidity, due to both in the short and long term Complications. Therefore the purpose of this study is to assess the magnitude and determinants of neonatal jaundice among neonates admitted to NICU in Dessie Town Public hospitals, Amhara region, Ethiopia from March 30 to April 30/2020.

ANNEX II:-CONSENT FORM

The questionnaire and Checklist for assessment of Magnitude and determinants of Neonatal jaundice among neonates admitted to NICU in Dessie town public hospitals, Amhara region, Ethiopia from March 3o to April 30/2020.

INTRODUCTION:

Hello!! My name is …… I am here on behalf of Mr. Mohammed Tessema Gebeyehu. Who is a master's student at Addis Ababa University, college of health Science School of the department of nursing and midwifery? He is working thesis on the Assessment of magnitude and Determinants of neonatal jaundice among neonates admitted to NICU Dessie Town public hospital, Amhara region, Ethiopia.

Purpose:- The result of the study will help the ministry of health and other responsible body to plan necessary training for the clinician who works in the NICU which supports them to improve their knowledge regarding the to prevent and treatment of the Neonatal Jaundice.

Risks: - The study will take time for you it maybe 30-40 minutes to answer questions and may have a little discomfort while you may be distracted by bad memories. But does not have any risk.

Confidentiality: All information gathered from the logbook and patient file will be kept confidential. Any of the patient's personal information will be not registered. The records of this study will be kept private.

1. Yes, I have understood the above information and I am volunteering to participate in a study Magnitude and determinants neonatal jaundice Desire Town public hospital in Amhara region, Ethiopia from March 30 to April 30 /2020.

Signature _____Date_____

Data collector's signature_____Date_____

2. No if you are not voluntary please stop here.

If you are voluntarily participating in the study: I kindly request you to provide your genuine response for the interview. Thank you for your volunteer participation.

Contact Address of the Principal Investigator:

Name: - Mohammed Tessema Gebeyehu
Cell:-Phone 0920252213=093090830

E-Mail:-Mohammedtessema2018@gmail.com

ANNEX III: - ENGLISH VERSION QUESTIONER

This was a data collection format Questioner to assess the Magnitude and Determinants of Neonatal jaundice among neonates in Dessie town public hospitals in the Amhara region, Ethiopia from March 30 to April 30/2020.

Name of Data collector_____Date_____Qualification_____

Data Collector agreement

"I certify that I have filled the questionnaire in accordance with the training that is given to me and instructions stated in it. I have confirmed that the information **"it's correct."**

Signature_____Date_____

Name of hospital_____

Neonatal Medical Record number (code) _____

Checked by supervisor for completeness: - Supervisors Name_____ signature _____

Part I:Socio-Demographic Characteristics of the mother:			
Serial No.	Questions	Choice for response	Skip To
101	Age of the mother in years	_____years	
102	Marital status	1.Single 2.Married 3. Divorced 4. Widowed 5. Cohabited	
103	Residence	1. Urban 2. Rural	
104	Maternal Occupation	1. Government employee 2. farmer 3. Merchant 4. Handcraft makers 5. Housewife 6. Daily laborer	
105	Maternal Educational background	1. Read and write 2. Read and write 3.1-6Grade 4.7-12 grade 6. Diploma and above	

106	Ethnicity	1. Amhara 2. Tigre 3. Oromo 4.Others(specify)_____	
Part II:-Maternal Risk Factors for neonatal jaundice			
Serial No.	Question	Choice of answer	Skip To
201	Maternal parity	1.Prmi Para 2.Multi Para	
202	Maternal blood group & RH Factor	----------	
203	Did she have any chronic Medical illnesses during pregnancy??	1.yes 2.No	
204	Mode of delivery	1.SVD 2.C/S (C-section) 3. instrumental	
205	Time of delivery	1.Day 2.Night	
206	Place of delivery	1. Home 2. Health center 3. Hospital	
207	Did she has taken Oxytocin during labor	1.Yes 2.No	
208	Did the Mother have taken substances during pregnancy!	1.Yes 2.No	If No skip To Q 210
209	What types of substance abuse?	1.Alcohol 2.Herbal medication 3.Chat 4.Others(specify)_____	
210	Did she have Prolonged Duration of labor	1.Yes 2, No	
211	What is the Duration of lab or in hours	_____hours	
212	Did she have history prolonged rupture of membrane	1.Yes 2.No	
213	Previous history with NNJ in on the family	1.Yes 2.No	
214	Did you have ANC follow up for the current pregnancy	1. Yes, 2. No	If No skip To Q 215
215	Timenster of ANC follow up	_____	

Part III: Socio-Demographic al Characteristics of the Neonate			
Serial No.	Questions	Choice of answer	Skip TO
301	Age of neonate in days	----------days	
302	Neonate's sex	1.Male 2.Female	
303	Gestational age at birth (weeks)	_____Weeks	
304	Birth weight at birth (grams)	_____Grams.	
Part VI: Neonatal risk factor of jaundice			
401	**Did the Neonates develop jaundice!**	1.Yes 2.No	
402	What Management is to given the neonates?	1. Photo therapy 2. Blood transfusion 3. Both phototherapy and exchange blood transfusion 4.Other(specify)_____	
403	Did neonates have birth asphyxia	1.yes 2.N0	
404	Blood Group and RH factor	----------	
405	What is the Five minute APGAR score	1.More than 7 2. Less than 7	
406	Did the Neonate develop Bilirubin Encephalopathy?	1.Yes 2.No	
407	Neonatal age at onset of jaundice (Days).	----------Days	
408	Did have Neonatal Sepsis	1. Yes 2. No	
409	Did you have Rh-incompatibility?	1. Yes 2. No	
410	Did you have ABO- incompatibility?	1. Yes 2. No	
411	Did you have G-6PDs deficiency?	1. Yes 2. No	
412	Birth trauma during delivery	1. Yes 2. No	
413	Other(Specify)	_____.	
414	Neonate's feed methods	1. Breast feeding 2. Formula feeding 3. Mixed feeding 4.Others(specific)_____	

Annex VI: STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my own orginal work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this research thesis .

NAME: Mohammed Tessema (BSc).

Signature: _____Date_____

Place: Addis Ababa University, College of Health Sciences, School of Nursing and Midwifery, Department of Nursing and Midwifery

Date of submission: _____

RESEARCH ADIVISORS: `

1. **MAIJOR advisor**:Hussen Mekonnen(BSc,MPH,PhD)

   Signature_____Date_____

2. **Co-Advisor**: Tsion Alemu(BSc,MScN)

   Signature_____Date_____

ANNEX V:APPROVAL BY THE BOARD OF EXAMINATION

As a member of the Board of Examiners of the MSc Thesis-Open Defense Examination, I certify that I have read and evaluated the Thesis prepared by Mohammed Tessema and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirements for the degree of Master of Science in Neonatal Nursing.

1.Examainers:

(1)._____ _____ __ _____

Chair Person Signature Date

(2). _____ _____ _____

Examiner Signature Date

2.DEPARTMENT HEAD:

NAME_____Rank _____ Signature _____Date_____

Examiner Signature Date:

Final approval and acceptance of the Thesis are contingent upon the submission of its final copy to the Council of Graduate Studies through the Candidate's Department or School Graduate Committee.