

Original Research Article

## The Incidence, Risk Factors and Management of Neonatal Jaundice in a Government Hospital, Palakkad District, Kerala

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### ABSTRACT

**Background information:** Neonatal jaundice is caused by excessive bilirubin production or delayed clearance of bilirubin from the blood. It is one of the most frequent problems in the neonatal period that may occur in 60% of term and 80% of preterm babies.

**Aim & Objectives:** The main aim of this study is to find out the incidence, risk factors and management of neonatal jaundice.

**Materials & Methods:** A prospective study was conducted in Govt. W&C Hospital, Palakkad from October 2015 to March 2016. A total of 231 cases were collected by using data entry form. All babies admitted in SNCU were included in the study. The babies were closely monitored by identifying the presence of icterus and serum bilirubin levels measured from clinical laboratory.

**Results:** Out of 231 cases collected 38.09% of mothers were in the age group 21 to 25. 65.36% took 3-4 cups of coffee/ tea per day and 75.32 % had exposure to smoking. 19.04% were born preterm, 54.11% had jaundice in 3or4 day of birth. 78.78% babies were managed by Phototherapy& 21.21% by breast feeding. The causes were low birth weight 58.44%, blood group incompatibilities 58.86%, infections 33.33%, hypoxia 22.07%, refusal or difficulty in feeding 18.61%.

**Conclusion:** Jaundice is one of the major causes of hospitalization in neonates. Several maternal neonatal factors cause neonatal jaundice, but due to the decrease or lack of breast feeding along with the comorbid conditions of baby, the severity of jaundice is increased.

**Keywords:** Neonatal jaundice, Bilirubin, Breastfeeding.

### INTRODUCTION

Neonatal jaundice is a common phenomenon affecting 60% of full term and 80% of preterm babies in first three days of life. Over two-thirds of newborn babies develop clinical jaundice and by adult standard almost all newborn babies are 'jaundiced' during early days of life. Neonatal jaundice may not be a major cause of mortality but it is an important cause of morbidity in the neonatal period and beyond. Because of the crippling complications like kernicterus and other abnormal psychomotor and neurological

sequelae due to hyperbilirubinemia, early recognition and adequate management to prevent these complications are important. [1]

The icterus (yellow color) of the skin and whites of the eyes is caused by excess bilirubin in the blood. Bilirubin is produced by the normal breakdown of red blood cells. Normally, bilirubin passes through the liver and is excreted as bile through the intestines. Jaundice occurs when bilirubin builds up faster than a newborn's liver can break it down and pass it from the body. In neonates, jaundice tends to develop because

of two factors - the breakdown of fetal hemoglobin as it is replaced with adult hemoglobin and the relatively immature hepatic metabolic pathways which are unable to conjugate and so excrete bilirubin as quickly as an adult. This causes an accumulation of bilirubin in the blood (hyperbilirubinemia), leading to the symptoms of jaundice. [2]

Assessment of the causes and risk factors seeks importance for adequate management. Shaheena Kamal et al [3] established that breast feeding/ breast non feeding jaundice emerged as the most common etiology of neonatal jaundice. Other causes include infections, incompatibilities (ABO incompatibility, Rh incompatibility) etc. But Sinem Akgul et al [4] concluded that blood type has no effect on the severity of haemolytic jaundice. In a study conducted by Dakoru Edoghotu Omekwe et al [5] low birth weight is also another major risk factor for jaundice in newborns. According to C G Scrafford et al [6] summarized the risk factors include several known factors namely sex, birth weight, breast feeding patterns, primiparity, and difficult feeding. Adel M Zauk [7] concluded that phototherapy is the simple, safe treatment for neonatal jaundice. Other treatments include intravenous gamma globulin, exchange transfusion and exclusive breast feeding.

This study aims to find out the incidence of, risk factors and management of neonatal jaundice and also the study had made efforts to find out whether any maternal factors have an effect on the occurrence of jaundice. As the rate of jaundiced babies are increasing day by day, it is important to study about the factors influencing jaundice and management outcomes to improve the understanding of jaundice among mothers.

## **MATERIALS AND METHODS**

**Study site:** The study was performed in Govt. W & C Hospital, Palakkad district, Kerala.

**Study design:** The study was designed as a prospective study.

**Study duration:** The duration for data collection was 6 months (October 2015-March 2016)

**Study population:** A total of 231 cases were included in the study.

**Study criteria: Inclusion criteria:** All babies admitted with neonatal jaundice in Special Newborn Care Unit (SNCU) & their mothers. **Exclusion criteria:** Mothers unwilling to participate.

**Data collection Method:** A predesigned Data Entry Form (Mothers data sheet, Neonatal data sheet) and Questionnaire was used to obtain and evaluate the data.

## **RESULTS**

A total of 231 cases was included in the study, out of which 127(54.97%) were male babies and 104(45.02%). From all the admissions in Special Newborn Care Unit (SNCU), 67.34% babies had neonatal jaundice with and without comorbidities. Table 1 shows the distribution of mothers of jaundiced babies according to sociodemographic characteristics which include age, past pregnancy history, social history, antenatal care history, gestational age and type of delivery. 38.09% of mothers were in the age group ranging between 21 to 25 who se babies had neonatal jaundice. 44.15% of mothers had history of abortion, 2.59% had history of IUD (intrauterine death), 42.42% of mothers had family history of abortion, premature birth, congenital abnormalities, low birth weight, neonatal jaundice and other neonatal complications and 3.98% had undergone fertility ayurveda treatments. About 74.89% mothers were multigravidae and 72.72% mothers were primiparous.

The social history includes 39.82% had only school education, 54.97% mothers had occupation. Other important findings were 65.36% of mothers took 3-4cups of coffee/ tea per day, 5.19% of mothers used betel-tobacco, and 75.32 % of mothers had exposure to smoking in their home or work places. Painkillers, birth control pills and

other OTC drugs were used by 45.88%, 17.74% and 58.44% of mothers respectively.

8.22% missed antenatal visits and 3.03% of mothers had no antenatal care taken during their pregnancy period. Gestational age of mothers who are more prone to neonatal jaundice ranged between 37.1 to 40 weeks. 48.48% mothers had Normal Vaginal Delivery and 45.88% had caesarian section.

Table 2 shows the distribution of neonates according to birth characteristics, incidence, risk factors and management of neonatal jaundice which include type of birth, birth weight, birth size, haemoglobin level, day at which jaundice occurred, area of body with icterus and serum bilirubin levels as per Kramer's rule, type and duration of therapy given and possible predisposing factors for neonatal jaundice. Out 231 jaundiced babies, 80.95% were born term and 19.04% were born preterm. 55.84% of neonates had a birth weight ranged from 1.5 to 2.499kgs and 58.48% of them was small for gestational age.

#### **Distribution of neonates according to clinical findings:**

About 67.95% of neonates had haemoglobin levels >17g/dl. A majority of percentage of jaundices neonates had bilirubin levels ranged from 16.0 to 20.9 mg/dl.

**Distribution according to incidence of jaundice:** For most of the babies the yellowish colouration was developed in the third or fourth day of birth which is about 54.11% and in 29.00% of babies had jaundice in fifth or sixth day. Only 11.68% had developed jaundice in one or two days.

**Distribution according to therapy or management of neonatal jaundice:** out of 231 jaundiced neonates, 78.78% had given phototherapy. The therapy recommended was phototherapy(PT) and exclusive direct breast feeding in which 58% had given DSPT(double surface PT), 8.22% had given SSPT (single surface PT), 0.86% had given TSPT (triple surface PT) and 11.68% had given combination phototherapy. Remaining

21.21% of jaundice was managed by breast feeding alone.

**Table 1: Distribution of mothers according to sociodemographic characteristics**

Variables	Frequency	Percentage (%)
<b>Age</b>		
<20	25	10.82
21 – 25	88	38.09
26 – 30	81	35.06
31 – 35	24	10.38
>36	13	5.62
<b>Past pregnancy history</b>		
Abortion history	102	44.15
History of IUD	6	2.59
Family history	98	42.42
Undergone Fertility treatment	9	3.98
<b>Gravida</b>		
Primigravidae	58	25.10
Multigravidae	173	74.89
<b>Parity</b>		
Primiparous	168	72.72
Multiparous	63	27.27
<b>Social history Educational status</b>		
School	92	39.82
Diploma	88	38.09
Degree	51	22.07
<b>Occupation</b>		
Yes	127	54.97
No	104	45.02
<b>Food habits</b>		
Vegetarian	8	3.46
Non vegetarian	223	96.53
<b>Others</b>		
Coffee-tea (>3 to 4 cups per day)	151	65.36
Use of betel-tobacco	12	5.19
Exposure to smoking	174	75.32
<b>Use of drugs</b>		
Painkillers	106	45.88
Birth control pills	41	17.74
Other OTC drugs	135	58.44
Prescribed drugs only	95	41.12
<b>Antenatal care history</b>		
Attended all antenatal visits	205	88.74
No antenatal visits	7	3.03
Missed antenatal visits	19	8.22
Not taken medications regularly	43	18.61
<b>Gestational age</b>		
<34	6	2.59
34 - 37	38	16.45
37.1 - 40	179	77.48
>40	8	3.46
<b>Type of delivery</b>		
Normal vaginal delivery	112	48.48
Assisted vaginal delivery	13	5.62
Caesarian section	106	45.88

38.09% of neonates were relieved by 24 to 48 hours of phototherapy and only 2.16% was kept in phototherapy for >97 hours. All the babies were improved their jaundiced condition by the therapies given and were relieved completely.

**Distribution according to possible predisposing (risk) factors for neonatal jaundice:** according to this study 29.43%

jaundice was due to OA blood group incompatibility, 18.61% due to OB blood group incompatibility and 10.82% was due to Rh group incompatibility. 21.21% of jaundice occurred due to decreased rate of breastfeeding due to the admission of babies in Special Newborn Care Unit due to other diseased conditions. 33.33% of the jaundiced babies had various infections like

respiratory infections, sepsis etc, 22.07% had hypoxia condition and 58.44% was low weight babies.

Lack of breastfeeding was identified in 18.61% of mothers due to refusal to feed or difficulties in feeding like poor sucking, decreased breast milk etc.

**Table 2: Distribution of neonates according to the birth characteristics, incidence, risk factors and management of neonatal jaundice**

Variables	Frequency	Percentage (%)
<b>Type of birth</b>		
Term birth	187	80.95
Preterm birth	44	19.04
<b>Birth weight in kgs</b>		
<1	1	0.43
1 – 1.499	5	2.16
1.5 – 2.499	129	55.84
2.5 – 4.599	95	41.12
>4.6	1	0.43
<b>Birth size</b>		
SGA	135	58.44
AGA	95	41.12
LGA	1	0.43
<b>Haemoglobin levels in g/dl</b>		
<10.9	0	0
11.0 – 13.9	3	1.29
14.0 – 16.9	71	30.73
17.0 – 19.9	96	41.55
20.0 – 22.9	57	24.67
>23.0	4	1.73
<b>Age in days at which jaundice occurred</b>		
<1	0	0
1 – 2	27	11.68
3 – 4	125	54.11
5 – 6	67	29.00
7 – 8	10	4.43
9 – 10	1	0.43
>10	1	0.43
<b>Area of icterus &amp; Bilirubin levels in mg/dl</b>		
Head & neck (<10)	33	14.28
Chest (10 – 15.9)	36	15.58
Lower body & thighs (16 – 20.9)	88	38.09
Arms & legs below knees (21 – 25)	51	22.07
Palms & soles (>25)	23	9.95
<b>Duration of phototherapy in hours</b>		
<24	21	9.09
24 – 48	88	38.09
49 – 72	52	22.51
73 – 96	16	6.92
>97	5	2.16
<b>Type of therapy given for jaundiced babies Phototherapy + breast feeding</b>		
TSPT	2	0.86
DSPT	134	58.00
SSPT	19	8.22
Combination PT	27	11.68
Breast feeding alone	49	21.21
<b>Possible predisposing (risk) factors for neonatal jaundice</b>		
OA incompatibility	68	29.43
OB incompatibility	43	18.61
Rh incompatibility	25	10.82
Breast feeding incompatibility	49	21.21
Infections (respiratory, sepsis etc)	77	33.33
Hypoxia	51	22.07
Low birth weight	135	58.44
Refusal to feed or difficulty in feeding by mothers	43	18.61

**Table 3: Feeding pattern of neonates with jaundice during their first five days of hospitalization**

Feeding pattern	First day	Second day	Third day	Fourth day	Fifth day
IV FLUIDS alone	29 (12.55%)	-	-	-	-
EBM alone	8 (3.46%)	5 (2.16%)	1 (0.43%)	-	-
IVF + EBM	180 (77.92%)	124 (51.94%)	58 (25.10%)	41 (17.74%)	5 (2.16%)
EBM + DBF	3 (1.29%)	53 (22.94%)	71 (30.73%)	54 (23.37%)	22 (9.52%)
DBF	11 (4.76%)	49 (21.21%)	101(43.72%)	136 (58.87%)	204 (88.31%)

Table 3 shows the distribution of feeding pattern of neonates with jaundice during their first five days of hospital admission. In the first day, 77.92% of babies had given Intravenous fluid and Expressed Breast milk; only 4.76% babies had given direct breastfeeding. In the second day 51.94% had given IVF and EBM, only 21.21% had given direct breast feeding. In the first two days direct breast feeding was low in majority of the population, indicating that lack of breast feeding is one of the major reasons for emergence of jaundice.

## DISCUSSION

In the present study, it was observed that 38.09% of mothers were in age group 21 to 25. In a study conducted by Manjubala Dash [8] in Puducherry 42% of mothers was in this age group while in a study done by D.V.Krishnaveni [9] 55% of mothers were in this age group. The differences may be due to community variations and past-present pregnancy histories like abortion history, history of IUD, Family history and fertility treatments undergone. According to this study, 72.72% mothers were primiparous. In a study by Scrafford et al [6] primiparity was one of the reasons for incidence of jaundice.

Another important findings in the study was 65.36% of mothers had taken >3-4 cups of coffee or tea per day, in a study conducted by Justin. C. Konje [10] demonstrated that maternal caffeine intake is associated with an increased risk of fetal growth restriction. This may be considered as a factor that leads to neonatal complications. In another study by Verena Sengipel et al [11] Caffeine intake was consistently associated with decreased BW and increased odds of SGA. 75.32% of mothers had exposure to smoking either in their home or in workplaces. Many studies established that smoking or exposure to

smoke will adversely affect the foetus and may cause many neonatal complications. 45.88% of mothers used painkillers, 117.74% of mothers used birth control pills and 58.44% mothers used other OTC drugs. 18.61% of the mothers had taken medicines irregular, which may be another factor lead to complications.

In this study, 19.04% were born preterm that is less than 37 weeks of gestation and 80.95% were born term that is gestational age greater than 37 weeks. Shaheena Kamal et al [3] and Babita Agarwal [2] concluded that prematurity is a risk factor for neonatal jaundice. There was 58.44% low birth weight or SGA babies, Mahmud Hossain et al [1] established that low birth weight babies have a significantly higher tendency to develop jaundice.

According to the clinical laboratory findings, 67.95% of jaundiced babies had haemoglobin levels greater than 17g/dl. Babita Agarwal [2] mentioned that haemolysis is one of the main causes of increased bilirubin in the blood. In this study, 38.09% babies had serum bilirubin level in a range from 16-20mg/dl, that is 70.11% babies had bilirubin levels >15mg/dl. Shiyam Sundar Tikmani et al [12] found that only 22.4% babies had bilirubin >15mg/dl. This variation may be due to the difference in maternal and neonatal characteristics.

Phototherapy and breast feeding were the therapies given for the 231 jaundiced babies, 72.72% and 21.21% respectively. In the conducted by Dakoru Edoghotu Omekwe et al [5] exchange blood transfusion and phototherapy was done and the management outcomes were measured. This difference may be due to epidemiological variations and jaundice severity.

The risk factors that were found out in this study were 29.43% OA blood group incompatibility, 18.61% OB blood group incompatibility and 10.82% Rh group incompatibility. 21.21% of jaundice occurred due to decreased rate of breastfeeding due to the admission of babies in Special Newborn Care Unit due to other diseased conditions. 33.33% of the jaundiced babies had various infections like respiratory infections, sepsis etc, 22.07% had hypoxia condition and 58.44% was low weight babies. Lack of breastfeeding was identified in 18.61% of mothers due to refusal to feed or difficulties in feeding like poor sucking, decreased breast milk etc. In the study done by Kalakheti BK et al [13] concluded that ABO incompatibility was a major risk factor for neonatal jaundice. Shaheena Kamal et al [3] concluded breast none feeding was the main cause of breast feeding. Sinem Akgul et al [4] concluded ABO blood group has no effect on the severity of jaundice.

The feeding pattern was tabulated in this study by analyzing the daily treatment chart of the hospitalized babies and came to a conclusion that the babies who are admitted in SNCU with other neonatal complications lack frequent breast feeding and thus jaundice has developed in the third or fourth day in most of the cases. For the babies admitted with neonatal jaundice alone has also developed due to the decrease in the frequency of breast feeding, insufficient breast milk or refusal to feed the baby. Along with lack of breast feeding, the comorbid conditions like respiratory infections, sepsis, hypoxia (transient tachypnoea, birth asphyxia etc.) increased the severity of neonatal jaundice.

## CONCLUSION

Neonatal jaundice is one of the major causes of hospitalization in neonates. Early recognition of the cause of jaundice in neonates is very important as delay in management may lead to serious complications or even death. The maternal factors like age, past pregnancy history

which include abortions, IUD, family history, multigravidity, primiparity, use of coffee-tea (3-4 times/day), exposure to smoking, use of painkillers, birth control pills, other OTC drugs, irregular treatment during pregnancy, gestational age plays a major role in the incidence of neonatal jaundice.

The causes and risk factors for jaundice in babies include premature birth, low birth weight, increased haemoglobin levels, blood group incompatibility (OA incompatibility, OB incompatibility, Rh incompatibility), breast feeding incompatibility, infections (respiratory infections, sepsis etc.), hypoxia(transient tachypnoea, birth asphyxia), refusal to feed or difficulty in feeding by mothers.

Due to the decrease or lack of breast feeding along with the comorbid conditions of the baby, the severity of jaundice is increased leading to increased bilirubin level in the blood or delayed excretion of bilirubin from the body. Phototherapy and exclusive breast feeding were the therapies given to the jaundiced neonates and all the babies were relieved from the diseased state.

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