

Original Research Article

Clinical profile of neonatal hyperbilirubinemia in children medical centre Tehran

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ABSTRACT

Background: Neonatal jaundice is a common finding in newborns especially during the first week of birth. Hyperbilirubinemia in most of the cases is not dangerous and usually results from a physiologic cause. However, due to the capability of unconjugated bilirubin to pass via the blood brain barrier and its neurotoxic effect, proper assessment and management of neonatal jaundice is important for prevention of avoidable neurological complications of NNJ, such as kernicterus.

Methods: This was a descriptive cross-sectional study which studied 220 neonates >34 weeks of GA diagnosed with jaundice admitted in the neonatal ward.

Results: A total of 220 patients with neonatal jaundice were enrolled in the study, 56.8% were male and 43.2% were female. The mean gestational age was 37.56 weeks with 80% of term. The mean birth weight of the study population was 3085.44±540.9 g. The mean total serum bilirubin was 15.908±4.36 mg/dl. In etiology 19.1% were having ABO incompatible, 17.3% were Rh incompatible, 12.7% were IDM, 5.5% were G6PD deficiency, 3% had ABO as well as Rh incompatibility and 0.9% were septic with positive blood culture. Phototherapy (75%) and exchange therapy (5%) was treatment modality during hospitalization.

Conclusions: Neonatal jaundice is an important neonatal condition and needs proper and timely intervention for prevention of avoidable neurological complications. Mostly its physiological but pathological jaundice should also be considered when jaundice appears early or is severe. Intensive phototherapy is most common treatment modality but a significant number needs exchange transfusion.

Keywords: Exchange transfusion, Incompatibility, Kernicterus, Neonatal hyperbilirubinemia, Phototherapy

INTRODUCTION

Neonatal jaundice is a common finding in new-born especially in the first week after birth and is mostly physiological and harmless. A high production of bilirubin is seen in neonates due to increased breakdown of fetal Hb, along with decreased conjugation of bilirubin produced after Hb breakdown due to immaturity of liver enzymes, as well as high enterohepatic recirculation of bilirubin during the first week of life.¹⁻³ However,

unconjugated bilirubin is neurotoxic if its serum levels exceed age-specific thresholds.^{4,5} Jaundice affects at least 60% of full-term and 80% of preterm neonates globally.⁶

Neonatal jaundice is considered pathological and requires further evaluation and assessment if it occurs within 24 hours of birth, if there is significant rise in serum bilirubin level beyond physiologic range at any age (>18 mg/dl in healthy term infants), if it exceeds more than two weeks of age in term infants and three weeks in preterm infants or if it is conjugated hyperbilirubinemia.^{7,8} The other two

forms of neonatal jaundice include breast milk jaundice and breast feeding jaundice, which are diagnosed after ruling out all pathological causes. Breast milk jaundice is prolonged physiological unconjugated hyperbilirubinemia with its onset after the day 5th of life.⁹ Free unconjugated bilirubin is neurotoxic and can damage neurons particularly in the basal ganglia and various brain stem nuclei, resulting in Acute Bilirubin Encephalopathy (ABE) manifested as lethargy, hypotonia, reduced Moro reflex and poor suckling.⁵ With prolonged exposure to free unconjugated bilirubin, ABE can progress to chronic bilirubin encephalopathy or kernicterus causing permanent neuronal disability.^{3,10} Severe unconjugated hyperbilirubinemia is managed using conventional phototherapy.¹¹ Exchange transfusion (ET) is used if the new-born is not responding to even intensive phototherapy. This method is useful in rapidly lowering serum bilirubin concentration.¹²

METHODS

It is a descriptive, cross sectional, retrospective study conducted over a period of five months. Neonates with icterus admitted to Children Medical Centre, Tehran, from March 2021 to July 2021 were selected for the study. From the medical records and lab reports of neonates with jaundice recorded in medical archive of CMC, data was collected and analyzed. A total of 220 neonates were chosen by non-probable or convenient sampling method.

Inclusion criteria

All the neonates >34 weeks of GA referred to the Children Medical Center with diagnosed neonatal jaundice were included.

Exclusion criteria

Neonatal jaundice patients referring to CMC with incomplete data record were excluded. Preterm babies

<34 weeks. and very low birth weight <2 kgs babies were excluded.

Statistical analysis

The collected data of 220 samples with the diagnosis of neonatal jaundice over a period of March 2021 to July 2021 was entered into SPSS statistical software. To compare the means of quantitative variables in qualitative subgroups, independent T test and Chi square test were used and in non-parametric conditions, U-man Whitney is used. Also, ANOVA command was used to compare the means of quantitative variables in several independent groups.

RESULTS

The total number of subjects studied was 220. 125 (56.8%) were males and 95 (43.2%) were females (Table 1). There were 5% (11 of 220) cases that developed icterus on the first day after birth (pathological icterus) and 12.7% (28 of 220) who presented with prolonged icterus (after 14th day).

In majority of the cases (87.3%) icterus was found during the first two weeks after birth. The mean gestational age of the icteric neonates under study was found to be 37.56 weeks (± 1.496).

The study population composed mainly of term neonates (37-41 weeks) with the percentage of 80% (176 of 220). The other 20% (44 of 220) belonged to the late preterm group (34- 36 weeks).

The mean birth weight of the study population was 3085.44 g (3085.4 ± 540.900), in which 78.6% (173 of 220) neonates had normal birthweight, 17.3% (38 of 220) had low birth weights and 4.1% (9 of 220) had macrosomia (birth weight >4000 g).

Table 1: Illustrates the percentage of females and males in the study population.

	Frequency	Percent	Valid percent	Cumulative percent
Male	95	43.2	43.2	43.2
Female	125	56.8	56.8	100.0
Total	220	100	100.0	

In our study 5.5% (12 of 220) were G6PD deficient, 19.1% (42 of 220) were ABO incompatible with 61.9% OA incompatibility (OA>OB), 17.3% (38 of 220) were Rh incompatible, 3.6% had both ABO and Rh incompatibility (Table 2). 0.9% of the admitted neonates were found to be septic with positive blood culture (Table 3).

The mean total serum bilirubin in this study was found to be 15.908 mg/dl with the maximum and minimum values

of 29.2 mg/dl and 4.2 mg/dl respectively. The mean of days of hospitalization in this study was 3.71 days (± 2.976).

In this study, all patients received phototherapy out of which, intensive phototherapy was used in 75% (165 of 220) of the icteric neonates, double phototherapy with the valid percentage of 18.2% (40 of 220) stood as the second most used phototherapy in the study population. The frequency of the use of single phototherapy in this study population was found to be 6.8% (15 of 220) (Table 4).

Table 2: Illustrates the frequency of major risk factors assessed in the study group.

Risk Factor	Present	Percentage	Absent	Percentage
Significant weight loss	21	9.54	199	90.45
GDM in mothers	28	12.73	192	87.27
G6PD deficiency	12	5.45	208	94.55
History of NNJ in sibling	15	6.82	205	93.18
ABO incompatibility	42	19.09	178	80.9
RH incompatibility	38	17.3	182	82.7
Both ABO & Rh incompatible	8	3.6	212	96.36

11 out of 220 icteric neonates required exchange therapy out of which 2 were premature with gestational age between 34-35 weeks with a mean total serum bilirubin level of 26.6 mg/dl. The other 9 neonates were born term,

had blood group incompatibility (5 ABO incompatibilities, 2 Rh incompatibility and 1 with both) and the mean total serum bilirubin levels in these neonates was 24.31 ± 2.24 mg/dl.

Table 3: Demonstrates the frequency of results of blood culture done in study group.

	Frequency	Percentage
Positive	2	0.9
Negative	218	99.1

Table 4: Illustrates the frequency of different types of phototherapies used for treatment of the study patients.

	Frequency	Percent	Valid percent	Cumulative percent
Double	40	18.2	18.2	18.2
Intensive	165	75.0	75.0	93.2
Single	15	6.8	6.8	100.0
Total	220	100.0	100.0	

DISCUSSION

In the year 2009-2010, a prospective study was conducted by Saki et al of Namazi Hospital, Shiraz University of Medical Sciences, Shiraz Iran.¹³ This study was done on 170 hyperbilirubinemic neonates who were admitted to Namazi Hospital from February 2009 to February 2010 and among these neonates 99 (58.2%) were male and 71 (41.8%) were females. Based on the findings of the study the major risk factors were male sex, history of NNJ in the previous sibling, early herbal medicines instead discharge from hospital, NVD, breastfeeding, and use of referring to a doctor when the neonate developed jaundice. Major causes of NNJ in the study were found to be ABO and Rh incompatibility (5.9%), G6PD deficiency (25.5%), sepsis (12%) other causes such as spherocytosis and immune hemolytic anemia (3.5%), and unknown (53.1%). Our results were similar to Saki et al.¹³

A retrospective study by Bujandric et al, done on 398 neonates who underwent exchange transfusion between the years 1997 to 2013, in Vojvodina, Serbia, the major risk factors of severe hyperbilirubinemia in neonates were determined.¹⁴ The results were almost similar to our study.

Limited time duration for the conduction of study was the limitation.

CONCLUSION

In this descriptive review, we presented the information regarding the demographic, etiologic and laboratory features of neonates with icterus. Neonatal jaundice was more common among boys than girls, especially during the first week of neonatal period. The mean gestational age of the study population was 37.56 week and 80% were term neonates. Around 17.3% had a low birth weight. The mean age of hospitalization was 7.38 ± 6.4 days. There was no well recognized and diagnosed case of bilirubin induced encephalopathy in this study. The blood group of majority of neonates was A+ and blood group O+ was more prevalent in the mothers. In this study 5% neonates presented with pathological jaundice and 72% of these had blood group incompatibility (ABO and Rh). The other findings of this study includes ABO incompatibility (19.1%), Rh incompatibility (17.3%), low birth weight (17.3%), GDM (12.7%), history of NNJ in sibling (6.8%), G6PD deficiency (5.5%) and sepsis (0.9%). Intensive phototherapy was the most common form of treatment used for management of icterus in the study population; only 11 of 220 patients were required to undergo exchange transfusion.

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