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Original Research Article

Neonatal Hyperbilirubinemia: An Experience of 212 Cases From a Tertiary Care Setup

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Abstract: Etiological factors leading to hyperbilirubinemia vary among different geographic regions. The present study was planned to study the pattern, causes, risk factors, treatment and outcome of neonatal hyperbilirubinemia in a tertiary care setup from northern India. A retrospective cohort of jaundiced neonates seeking care for their illness at this tertiary care centre during formed the study population. All treated cases of neonatal hyperbilirubinemia were analyzed and data on gender, gestation age, mode of delivery, blood group incompatibility, sepsis, parity and birth weight were obtained. The commonest cause of neonatal hyperbilirubinemia was physiological jaundice (41.04%). Mean bilirubin values for pathological cases (18.11± 5.54 mg/dl) were higher than physiological jaundice (12.06 ± 3.59 mg/dl). Top three causes of pathological hyperbilirubinemia were ABO incompatibility (32.55%), Rh incompatibility (11.79%) and breast feeding (6.13%). Mean age of presentation with jaundice was three days. Majority (48.58%) of the cases had their total bilirubin levels equal to or below 15mg/dl. Almost all the neonates showed improvement with phototherapy and exchange transfusion. Hyperbilirubinemia is a commonly encountered problem in our NICUs. ABO and Rh incompatibility are mainly responsible for pathological jaundice. Phototherapy is found to be a safe and cost-effective way to manage neonatal jaundice.

Keywords: Neonatal, hyperbilirubinemia, pathological, physiological, phototherapy

INTRODUCTION

Neonatal hyperbilirubinemia is one of the commonest causes of admission of neonates in the Neonatal intensive care units. Jaundice may be noticed in 60% of term babies and 80% of pre-terms [1]. Incidence of neonatal jaundice is around 60~70% in Western countries and even higher among newborns of Asian ethnicity [2]. Neonatal jaundice is associated with increased unconjugated bilirubin concentrations caused by the breakdown of red blood cells. Bilirubin can damage neurologic tissue and lead to bilirubin-induced neurologic dysfunction [3].

Bilirubin is potentially toxic to the central nervous system hence early detection and appropriate management of neonatal jaundice is of paramount importance, especially when bilirubin even in physiological ranges may cause permanent neuronal injury [4, 5]. Although a safe threshold for total serum bilirubin has not been defined, most physicians have adopted a bilirubin level more than 20 mg/dl as indicator of vulnerability to neurotoxicity [6].

Etiological factors leading to hyperbilirubinemia vary among different geographic regions. Even the bilirubin concentrations considered harmful or neurotoxic may vary with geographical conditions and ethnic groups [7]. Therefore this study was planned to analyze and ascertain the pattern, causes, risk factors, treatment and outcome of neonatal hyperbilirubinemia in a tertiary care setup from northern India.

MATERIALS & METHODS

The current study was planned and executed by the Department of Pediatrics in collaboration with other departments of a tertiary care health center of Northern India. A retrospective cohort of jaundiced neonates seeking care for their illness at this tertiary care centre during formed the study population. In this

study, all the jaundiced neonates with serum bilirubin > 5mg/dl admitted in PNC and NICU wards over a period of ten months were included in the study. The data were collected retrospectively. Study tools were records of the study subjects such as information from MRD department and clinical case sheets. During the study period a total of 226 jaundiced neonates were eligible to enter in this study but data of 14 jaundiced neonates was discarded from the analysis because it was found incomplete while data cleaning. Thus finally data of 212 jaundiced neonates was analyzed.

A proforma was designed to capture such details. Details of newborns admitted to the neonatal intensive care units with a diagnosis of Neonatal hyperbilirubinemia irrespective of other associated illnesses were studied. Serum bilirubin was monitored 12 hourly for all babies and after 2 hours and 6 hours following all exchange transfusions. The physical examination findings revealing the presence of cephalohematoma or suspicion of sepsis was noted. A complete hemogram including reticulocyte count, hematocrit, total and differential leucocyte counts, blood grouping for mother and baby (ABO and Rh blood typing), blood culture, direct Coomb's test and screening for G6PD deficiency were done as a part of jaundice workup for all babies. Special investigations like T3, T4 and TSH levels, direct-reacting bilirubin and Liver function tests, TORCH antibodies and metabolic screening were undertaken in selected cases. Phototherapy and exchange blood transfusion were used to treat hyperbilirubinemia as per standard guidelines. The course of events on phototherapy (age of starting, duration, rate of fall of serum bilirubin, complications etc) and exchange transfusion (i.e. number of exchange transfusion per neonate, complications and mortality) were also noted down. Various details of newborns like sex, weight, geatation, parity of mother, history of oxytocin administration during labour, were also recorded. Serum bilirubin was also noted. Serial measurements were undertaken as per the requirements of individual case till serum bilirubin returned to the physiological range.

All the proforma were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 20 (IBM, Chicago, USA). The results were expressed using appropriate statistical methods.

RESULTS

Data of 212 study subjects was analyzed in this study. The mean age of neonates was 3.83 ± 2.6 days. The mean age of mothers was 23.7 ± 3 years. The mean gestation age was calculated to be 38.01 ± 2 weeks. Around one fourth of neonates were preterm. Mean bilirubin values for pathological cases (18.11± 5.54 mg/dl) were significantly higher than physiological jaundice (12.06 ± 3.59 mg/dl). The mean age of presentation with jaundice was three days. ABO and Rh incompatibility cases presented earlier on (within 3-4 days) with jaundice than breast feeding jaundice cases (6-7 days).

Physiological jaundice was most common form (41.04%) of hyperbilirubinemia. Top three causes or aggravating factors of pathological hyperbilirubinemia were ABO incompatibility (32.55%), Rh incompatibility (11.79%) and breast feeding (6.13%). Single cases of Significant bruising, Hypothyroidism and Galactosemia were also noted down (Table 1).

Table 1: Causes and factors aggravating hyperbilirubinemia among study subjects

Cause or aggravating factor		Number of cases	Percentage
Physiological		87	41.04
Pathological	ABO incompatibility	69	32.55
	Rh incompatibility	25	11.79
	Breast feeding	13	6.13
	Birth asphyxia	6	2.83
	Sepsis	5	2.36
	Idiopathic	4	1.89
	Significant bruising	1	0.47
	Hypothyroidism	1	0.47
	Galactosemia	1	0.47

Majority (48.58%) of the cases had their total bilirubin levels equal to or below 15mg/dl mainly comprising the physiological cases of hyperbilirubinemia (Table 2).

Table 2: Distribution of bilirubin levels among study subjects

Bilirubin levels (mg/dl)	**Number of cases**	**Percentage**
Equal to or < 15	103	48.58
15-20	52	24.53
20-25	46	21.69
>25	11	5.18

Almost all the neonates showed improvement with phototherapy and exchange transfusion. Sixteen physiologically jaundiced neonates improved without any active treatment. They were advised daily sun exposure until improvement. Exchange transfusion was given only in six severe cases of jaundice due to ABO incompatibility (Table 3).

Table 3: Management modality used among study subjects

Management modality used	**Number of cases**	**Percentage**
Phototherapy	190	89.62
Exchange transfusion	6	2.83
No treatment required	16	7.54

DISCUSSION

The etiology and risk factors for indirect neonatal hyperbilirubinemia is varied and multifactorial. The causes and risk factors associated were ABO and other blood group incompa- tibilities, glucose-6-phoshate-dehydrogenase deficiency, infections, prematurity, male gender, ethnicity, breastfeeding and early hospital discharge [8]. Knowing the risk factors and causes would help in devising strategies in managing hyperbilirubinemia and also in counselling parents.

We observed that around one fourth of neonates were preterm. Prematurity is a prominent risk factor for neonatal hyperbilirubinemia. Another study from Gujarat observed that 30% cases to be preterm babies like our study [9]. Preterm babies are at risk of developing jaundice due to the immature liver. Generally babies with bilirubin levels above 20 mg/dl are considered to be at higher risk of developing kernicterus, however several studies have shown kernicterus to appear at much lower levels of 10 -18 mg/dl in premature infants [10].

In our study, most common risk factor was ABO incompatibility. These observations are similar to the results of other study from Turkey [11]. Another study from Iran disclosed that the most common causes of severe indirect hyperbilirubinemia were sepsis, blood group incompatibility, G6PD deficiency, and unknown [12]. Sepsis was found to be commonest cause of pathological jaundice in studies from Shimla and Bangladesh respectively [13, 14]. Another study by Narang A *et al.* found G6PD deficiency (17%) to be the leading cause of pathological jaundice followed by sepsis (9 %) [15].

Almost all the neonates showed improvement with phototherapy. A majority of jaundiced neonates recover with phototherapy, very few who don't, need to undergo exchange transfusion that removes partially hemolysed and antibody coated blood cells [5]. Recently even Intravenous immunoglobins have been used as additional treatment modality in cases of blood group incompatibility to reduce the bilirubin levels [7]. With such efficient treatment modalities available, all that is needed is to identify such neonates at risk. A Taiwanese study evaluated data on 11,328 children and concluded that neonatal jaundice increases the rate and complications of childhood allergic rhinitis [16]. This suggests that children treated for neonatal hyperbilirubinemia may require further childhood follow up.

CONCLUSION

On the basis of findings of this study it can be concluded that hyperbilirubinemia is a common problem encountered in our Neonatal Intensive Care Units. Physiological hyperbilirubinemia is commonest cause of jaundice. ABO and Rh incompatibility are mainly responsible for pathological jaundice. Phototherapy is found to be a safe and cost-effective way to manage neonatal jaundice.

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