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Original Research Article

Mortality Profile, Risk Factors, and Aetiology Associated with Neonatal Hyperbilirubinemia

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Abstract:

Background: The most usual and chronic early disease that affects the newborn is Hyperbilirubinemia otherwise called jaundice. This disease often requires immediate treatment and detection and may also require readmittance to the hospital for complete diagnosis. The occurrence of hyperbilirubinemia in neonates is estimated to be 65% - 85% approximately. This study deals with the analysis of etiology, risk factors and morbidity of hyperbilirubinemia in neonates at a tertiary care hospital.

Materials and Methods: It was a prospective study which was conducted at a tertiary care centre in BMIMS Pawapuri (Nalanda) Bihar with newborn babies and also babies aged from 0 to 28 days were included in this study.

Results: A total of 50 neonatal babies were included in this study of which 30 were male and 20 were female babies. Of the 50 neonatal babies selected, 15 were less than 37 weeks development and the remaining 35 were more than 37 weeks development.

Conclusion: The primary cause for neonatal hyperbilirubinemia was ABO incompatibility and spontaneous jaundice continued by Rh factor and blood poisoning by bacteria. Elevated bilirubin levels are the initial symptoms of hyperbilirubinemia. Phototherapy is an excellent tool for diagnosing this disease in neonates and helps in reducing the levels of bilirubin in newborn babies.

Introduction

Hyperbilirubinemia, otherwise called jaundice, is the habitual and provoking disease that affects the neonates in the first week [1]. The occurrence of hyperbilirubinemia in neonates is estimated to be 65% - 85% approximately. It is also the main reason for prolonged hospital stay and readmittance during the first week of life [2]. Mostly jaundice occurs in adults when the level of bilirubin is higher than 2-3 mg% and for newborn babies' hyperbilirubinemia occurs when the level of bilirubin is greater than 5-6 mg% [3, 4].

Hyperbilirubinemia or jaundice invades when an adequate amount of bilirubin is not exported by the liver for a long period of time [5]. As a result, skin turns yellow as it reacts with the bile pigments and so elevated levels of bilirubin is the initial sign of hyperbilirubinemia [6]. This disease may be of pathological and physiological origin. Pathological hyperbilirubinemia affects about 5-9% of newborn babies and the cause for this is ABO incompatibility, blood poisoning by bacteria, immature babies and spontaneous jaundice whereas physiological hyperbilirubinemia affects the neonates due to an increase in the number of RBCs in the blood with short span of life [7, 8].

Natural light is considered best for the detection of the disease wherein the skin of the baby or a bony region is pressed with a thumb until it turns pale and now the baby's skin is assessed for any yellow color [9]. For the diagnosis to be accurate, it is a must to gain knowledge about the etiology and risk factors of the disease. Multiple diagnostic procedures have been found to decrease the occurrence of hyperbilirubinemia like initiating mother's milk, phototherapy, exchange transfusion and injecting immunoglobulin intravenously [10]. Out of which phototherapy stands out to be an effective and convenient tool for the diagnosis of this disease and is useful in treating both hematolysis and non-hematolysis hyperbilirubinemia [11].

The main aim of this study is to analyze the etiology, risk factors and morbidity profile associated with neonatal hyperbilirubinemia in a tertiary care hospital.

Materials and Methods

Study Design: It was a prospective study which was conducted at a tertiary care centre in BMIMS Pawapuri (Nalanda) Bihar with newborn babies and also babies aged from 28 days to 1 year were included in this study.

Inclusion and Exclusion Criteria: The newborns selected for the study were full term, preterm development, healthy and ill individuals. A Total of 50 subjects affected with jaundice with bilirubin levels of more than 9-10 mg/dl from the tertiary care centre were included. The inclusion criteria were the newborn babies with jaundice admitted inside and outside the tertiary care centre, Neonates ageing between 0 to 28 days in duration of one year, both male and female babies and those who had no objection to be a part of this study. The exclusion criteria were the neonates in the OP department and the babies who refused to participate in the study.

Data Collection: After the selection, Hyperbilirubinemia was detected medically and examined biochemically. Every subject was analyzed in natural sunlight for the detection of any yellow discoloration in the skin in order to confirm jaundice and in medium to dark skinned babies providing digital pressure on the baby's forehead was used to detect the discoloration. Someway the neonates from nearby borders were investigated medically to detect the origin of jaundice. The levels of bilirubin were estimated using the Van den Bergh method. A detailed history of pre birth and post birth information of the newborns was recorded and the condition of hyperbilirubinemia in the newborns was examined clinically. The levels of bilirubin were recorded frequently, and the neonates were taken care of under standard regulations.

Results

Among the 50 subjects, 30 were males and 20 were females [Table 1]. Also 15 of the selected subjects were of less than 37 weeks gestation period and the remaining 35 were of more than 37 weeks gestation period.

Table 1: Distribution of the Neonates

Serial No.	Sex	Number	Percentage (%)
1	Male	30	60
2	Female	20	40
	Total	50	100

In the 15 subjects with less than 37 weeks gestation period, 7 were of 28-30 weeks gestational age, 6 were of 31-32 weeks gestational age and 2 were of 33-36 weeks gestational age [Table 2].

Table 2: Distribution of neonates according to gestational period

Sr. No	Gestational age	Number	Percentage (%)
1	< than 37 weeks		30
2	> than 37 weeks		70
		15	
3	28-30 weeks	35	14
4	31-32 weeks		12
5	33-36 weeks	7	4
		6	
		2	

Among the 50 neonates selected, 15 were of less than 37 weeks gestational period and 35 were of more than 37 weeks gestational period. Of the 15 subjects with less than 37 weeks development period, 7 (14%) were from 28-30 weeks development, 6 (12%) were from 31-32 weeks development and 2 (4%) were from 33-36 weeks development period.

From the studies of the 50 subjects it is known that the most common cause (Etiology) was idiopathic hyperbilirubinemia in about 20 newborns and then followed by physiological hyperbilirubinemia in about 13 newborns, ABO incompatibility in cases of hyperbilirubinemia in about 5 newborns, Rh factor incompatibility in about 4 newborns, blood poisoning by bacteria in about 5 newborns, cephalohematoma in about 1 newborn, G-6-PD in cases of hyperbilirubinemia in about 1 newborn and miscellaneous cause in 1 newborn [Table 3].

Table 3: Distribution of neonates according to the etiology of hyperbilirubinemia

Sr.No	Etiology	Number	Percentage (%)
1	Idiopathic	20	40%
2	Physiological	13	26%
3	ABO incompatibility	5	10%
4	Rh factor incompatibility	4	8%
5	Blood poisoning by bacteria	5	10%
6	Cephalohematoma	1	2%
7	G-6-PD	1	2%
8	Miscellaneous	1	2%

Among the 50 newborns, vaginal delivery was the mode of birth in 36 newborns, C-section was the mode of birth in 12 newborns and breech delivery was the mode of birth in 2 newborns [Table 4].

Table 4: Distribution of neonates according to the type of delivery

Sr. No	Type of delivery	Number	Percentage (%)
1	Vaginal birth	36	72%
2	C-section	12	24%
3	Breech delivery	2	4%

Discussion

Of the total subjects affected with neonatal hyperbilirubinemia 30 were males which are about 60% and so male babies are more prone to the disease which is also similar with the studies conducted by Narang et al [12]. Among the 15 neonates with less than 37 weeks gestation mostly the occurrence was between 28-32 weeks of gestation which is about 7 newborns (14%) and so prematurity is also an important etiology of neonatal hyperbilirubinemia which is in similar with the findings of Singhal et al [13].

In most of the neonates included in this study the cause of the disease was unknown in a number of 20 newborns and so they were categorized under idiopathic hyperbilirubinemia which is also similar to the study of Merchant et al [14] in his study he observed about 65% of the subjects was affected with idiopathic hyperbilirubinemia.

Physiological hyperbilirubinemia occurred in 13 newborns in a span of 48 to 96 hours and then faded away after like 7-12 days, High levels of bilirubin were noted on 4th and 7th day. Blood poisoning by bacteria was the cause in 5 neonates in which 1 were full term babies and 4 were preterm babies. Various other complications like toxemia of pregnancy, delayed labor and prematurity were observed one neonate. Rh factor incompatibility was observed as a cause in one neonate. It was confirmed by Direct coomb's test and the findings of this study is in similar to the study of Merchant et al [14]. Bilirubin encephalopathy was seen in 2 neonates among them one was a preterm baby associated with ABO incompatibility and the other was full term baby associated with Rh isoimmunisation. The signs of bilirubin encephalopathy were developed in the preterm baby in 72 hours after birth and in both cases exchange transfusion was done. Miscellaneous causes were seen in only one newborn because the newborn had many inherited abnormalities like knee contractures, cryptic genitals, and craniosynostosis and also the mother underwent a record of two intrauterine deaths. This baby did not survive after the 7th day of his birth.

About the therapeutic interpretation, exchange transfusion was given for 8 newborns, mostly the neonates with ABO incompatibility and idiopathic hyperbilirubinemia required exchange transfusion.

It was required when the levels of bilirubin were about 19 to 20 mg/dl in newborns with less than 37 weeks gestation and for newborns with more than 37 weeks gestation exchange transfusion was given when the level of bilirubin was low. Other neonates were given phototherapy along with phenobarbitone if required. Phototherapy was initiated when the level of bilirubin was about 10 mg/dl and given in an interval of 24, 48 and 72 hours. The level of bilirubin was decreased by 2-3 mg/dl in 24 hours after phototherapy. Although exchange transfusion was given in some cases of ABO incompatibility and idiopathic hyperbilirubinemia the rest of the subjects were cured with phototherapy in combination with phenobarbitone and thus phototherapy is a reliable and effective diagnostic tool in cases of hyperbilirubinemia [15]. In this study, association of phenobarbitone did not show any additive effects when compared to phototherapy.

As for side effects in phototherapy, about 2 neonates had diarrhea during the treatment and 1 neonate had rashes over his body. And for exchange transfusion one neonate had cardiac arrest and 2 neonates had reduced glucose levels in blood. The main risk factors considered for hyperbilirubinemia are delayed labor, toxemia of pregnancy, prematurity and oxytocin induced labour.

Conclusion

The most frequent etiology of hyperbilirubinemia was ABO incompatibility and idiopathic hyperbilirubinemia continued by Rh factor incompatibility, blood poisoning by bacteria and G-6-PD deficiency. Meanwhile, phototherapy is an excellent and effective diagnostic tool to decrease the level of bilirubin in neonatal hyperbilirubinemia. There are no risky side effects associated with phototherapy when compared with exchange transfusion.

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