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Original Research Paper

Pathology

STUDY OF LABORATORY PARAMETERS IN NEONATAL JAUNDICE

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ABSTRACT

Introduction: Neonatal hyperbilirubinemia with a total serum bilirubin level above 5mg/dL is one of the most vexing situations in neonates thereby becoming a concern for pediatricians. It is observed during the first week of life in full-term infants and preterm infants. It results from a predisposition to the production of bilirubin in new-borns infants and reflects the immature excretory pathway of bilirubin by the liver. Preterm infants have higher rates of bilirubin production. **Materials And Methods:** This retrospective study considered 150 cases of term and pre-term neonates with jaundice within one week of diagnosis of neonatal jaundice (NNJ). The blood group of the mother and baby, Serum bilirubin, Complete blood count with peripheral smear examination, Reticulocyte count, Direct coomb's test, and C-reactive protein of the baby were done. **Results:** The mean age of the neonates was 2 days. 76 (50.66 %) were male while 74 (49.33) were females. Percentage of Preterm babies was 30%. Neonates having low birth weight were 31 %. Physiological jaundice constitutes to 58 % of cases followed by ABO incompatibility Septicaemia, Rh incompatibility. Highest level of serum bilirubin was found in septicemia and Rh incompatibility. Direct Coomb's test and Indirect Coomb's test were found to be positive in all cases in Rh incompatibility while they were positive in 27 % of cases of ABO incompatibility. In cases of septicemia CRP was found to be positive in 100% of cases. **Conclusion:** Most of the cases were due to physiological jaundice. To rule out hemolysis, causes of hyperbilirubinemia should be enquired widely to avoid complications.

KEYWORDS : Neonatal hyperbilirubinemia, Physiological, Sepsis

INTRODUCTION

Neonatal hyperbilirubinemia or neonatal jaundice, is one of the most vexing situations in neonates thereby becoming concern for paediatricians and parents. Jaundice (Icterus) is a condition characterized by raised bilirubin levels in the blood (hyperbilirubinemia).

Neonatal hyperbilirubinemia is defined as a total serum bilirubin level above 5 mg per dL (86 μmol per L). The term jaundice derives from the French word "jaune," which means yellow. It is the most commonly encountered medical problem in the first two weeks of life and a common cause of readmission to the hospital after the first week of life. Preterm infants have higher rates of bilirubin production than adults because they have red cells with a higher turnover and a shorter life span.

Neonatal jaundice can be physiological and pathological. The most common cause of neonatal hyperbilirubinemia is physiological jaundice, followed by ABO incompatibility, septicaemia, Rh incompatibility, idiopathic, intracranial haemorrhage, biliary atresia, G6PD deficiency, congenital syphilis, and prematurity. Failure to identify and treat this entity may result in bilirubin encephalopathy and associated neurological sequelae.

Bilirubin is not merely a nuisance molecule, severe hyperbilirubinemia can cause bilirubin-induced neurological dysfunction (BIND) and, if not treated adequately, may lead to acute and chronic bilirubin encephalopathy.

Even though history and clinical presentation of the new born play a major role, laboratory parameters play an important role in diagnosing the cause of hemolysis, There are various modalities of investigations e.g. Direct and Indirect Coombs' test, Blood grouping, G6PD deficiency, complete blood count by which we can reach a diagnosis. Thus laboratory workup is very important for the diagnosis and prevention of neonatal hyperbilirubinemia. With this background present study was conducted to study the laboratory profile among infants with neonatal hyperbilirubinemia.

AIMS AND OBJECTIVES

In this study we aim to analyze different causes of Neonatal jaundice To study various laboratory parameters in Neonatal jaundice

MATERIALS AND METHODS

A retrospective study on neonatal hyperbilirubinemia admitted with significant neonatal jaundice in the first week of life was conducted at K VG Medical college and hospital. Criteria for defining baby as significant Jaundice was total serum bilirubin exceeding 15mg/dl or even between 5 mg/dl and 15 mg/dl within 24 hours of birth or the same persisting beyond one week of life. Total 150 such cases of newborns were admitted during the study period of 6 months (January 2022 -June 2022) . Written informed consent was taken from the guardian of neonates. Detailed history of baby and mother was taken and investigations were carried out. Following investigations were carried out for all cases:

Blood grouping of mother and baby(ABO &Rh typing) was done using antisera with slide and tube method, serum bilirubin estimation of baby was performed using auto analyzer by Diazo method of Pearlman and lee. Complete blood count with peripheral smear examination was performed which included hemoglobin estimation, total count, Differential count, band forms, peripheral smear

examination and reticulocyte count, direct and indirect coomb's test of both baby and mother and reticulocyte count stain using –Brilliant cresyl blue was also performed. Test for G-6-PD deficiency was carried out by using SPAN Diagnostic Reagent Kit from the red cell hemolysate, C-reactive protein of baby was carried out by using Latex agglutination method

Data was entered and analyzed by using appropriate statistical software. t-test was used as a test of significance to find out the probability value.

RESULTS

Our Study included 150 cases of neonatal hyperbilirubinemia of new-born admitted in our tertiary care institute. The mean age of neonates with jaundice was two days. Among these 76 (51%) were males and 74 (49%) were females. Neonates having low birth weight (<2.5 kg) were 48 in number (29.6%)and neonates having very low birth weight was 4 (2.66 %). Percentage of Preterm (<37 weeks) babies was 28.6 %.(Graph 1). Physiological jaundice constituted 58 % of cases followed by ABO incompatibility, Septicemia, and Rh incompatibility respectively(Table 1). Highest level of serum bilirubin was found in septicemia, Rh incompatibility, and ABO incompatibility (Table 2). The rise in serum bilirubin level was found to be more in pathological jaundice as compared to physiological jaundice.(Table 3). Direct Coomb's test and Indirect Coomb's test were found to be positive in all cases with Rh incompatibility while they were positive only in 27 % of cases with ABO incompatibility. CRP was raised in all cases of septicemia (100%). CRP is an acute phase reactant. It was also positive in a few cases of ABO incompatibility (6 cases) and physiological jaundice (3 cases).

GRAPH 1: GESTATIONAL AGE DISTRIBUTION OF THE STUDY POPULATION

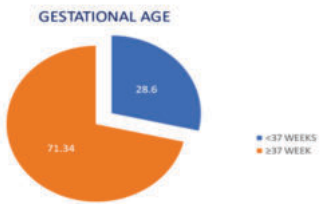

TABLE 1- DISTRIBUTION OF PATIENTS ACCORDING TO ETIOLOGY

Etiology	Number of cases	Percentage (%)
Physiological jaundice	87	58%
Suspected ABO incompatibility	22	14%
Septicaemia	12	8%
Rh incompatibility	11	7.3%
Prematurity	16	12%
G6PD deficiency	2	1.3%
Total	150	100.

TABLE2: Mean level of Hemoglobin, Serum bilirubin and Reticulocyte count in Neonata hyperbilirubinemia

Etiology	Mean hemoglobin	Serum bilirubin	Retic count
Physiological jaundice	16	12.7	1.6
Abo incompatibility	10.36	23.11	8
Rh incompatibility	10.4	21.66	11
Septicaemia	12	23.68	3
Prematurity	12.1	14.28	3
G6PD deficiency	7.7	14.25	3

DISCUSSION

Study included 150 cases of Neonatal hyperbilirubinemia cases. The mean age of the neonates was 2 days. Study subjects represented predominantly males 76(50.66.%) as compared to females which were 74 (49.33 %) . This was coinciding with studies done by Mantani et al [1](62% vs. 38%) and Sharma et al 2(1.3:1) [2] showing neonatal hyper bilirubinemia was more common in male babies as compared to female babies.

TABLE 3.Mean Serum bilirubin value: physiological Vs Pathological Neonatal Jaundice

Neonatal Jaundice	Mean level of S. Bilirubin total (mg/dl)	t-value	p-value
Physiological jaundice	12.72±1.85	14.28	<0.0001 Statistically significant
Pathological jaundice	20.28±4.29		

In our study percentage of Pre-term (<37 weeks) babies was 28.6 % .Neonates

having low birth weight (<2.5 kg) were 29.6% and neonates having very low birth weight were 2.66 %. In the study of Choudhury Habibur Rasul et al[3] 42% of patients with neonatal jaundice had low birth weight and 37% were preterm. In the study by Vikram et al [4] the percentage of Pre-term (<37 weeks) babies was 39.32%, neonates having low birth weight (<2.5 kg) were 30 (33.70%)and neonates having very low birth weight was 10 (11.23%).

Physiological jaundice constituted 58 % of cases followed by ABO incompatibility, Septicaemia, and Rh incompatibility respectively in our study .

Highest level of serum bilirubin was found in septicemia, Rh incompatibility, and ABO incompatibility. The rise in serum bilirubin level was found to be more in pathological jaundice as compared to physiological jaundice. The difference was significant statistically with a p-value of <0.0001 This result coincided with a study by Dr. Amar shah etal[5] which showed serum bilirubin was highest in ABO incompatibility, Rh Incompatibility, and septicemia and was statistically significant.

In newborns, jaundice within 24 hours is considered pathologic and requires detailed evaluation including serum bilirubin and hemolytic disease workup.

Direct coomb's test and Indirect coomb's test were found to be positive in all cases with Rh incompatibility while they were positive only in 27 % of cases with ABO incompatibility. A similar finding was observed in a study by Krutika Sagathia etal[6] which showed DCT and ICT were positive in 100% of cases of Rh incompatibility while in ABO incompatibility they were found to be positive in 63% of cases. Vikram et al study 4 showed Direct Coomb's test found to be positive in all cases in Rh incompatibility while they were negative in ABO incompatibility

CRP was raised in all cases of septicemia (100%).CRP is an acute phase reactant. Increase in CRP indicates ongoing infection .It was also positive in a few cases of ABO incompatibility (6 cases) and physiological jaundice (3 cases). This shows similarity to a study done by Kritika Sagar et al 6 which showed CRP positivity for 100 % cases of septicemia and a few cases of ABO incompatibility (2 cases) and physiological jaundice (4 cases).

This study also included a peripheral smear study of the neonates. Physiological and pathological jaundice showed macrocytic hyperchromic picture, but nucleated RBC'S and spherocytes were common among Rh-ABO incompatibility cases; which were less significant among neonates with physiological jaundice. Similar smear findings were seen in a

study of Vikram R et al [4]. In addition, polychromasia, anisopoikilocytosis, fragmented RBCs, hypochromia, etc. were also seen on smear in hemolytic causes of jaundice

CONCLUSION

In our study, most of the cases were physiological jaundice although peak serum bilirubin levels were found to be more among pathological jaundice .Among pathological jaundice, highest level of serum bilirubin was found in septicemia, Rh incompatibility, and ABO incompatibility. ABO, RH typing and G6PD screening should be routinely done along with Direct Coombs test, peripheral smear examination and retic count to aid in determining the causes of neonatal hyperbilirubinemia A Simple Rh typing can save the life of babies or future siblings. Detailed neurological examination should be carried out thoroughly in all cases to avoid further neurological complications.

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