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Original Research Article

To correlate the cord blood bilirubin level with subsequent Neonatal Hyperbilirubinemia.

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Abstract:
Background & Method: The aim of the study is to correlate the cord blood bilirubin level with subsequent Neonatal Hyperbilirubinemia. The demographic profile and relevant information of individual patient was collected by using structured proforma by interviewing the mother. Gestational age was assessed by New Ballard Score. Cord Blood bilirubin was estimated. Serum bilirubin estimation will be done at 72 hrs of age. All babies were followed up daily for the first five postnatal days. Those suspected to have jaundice as per Kramer dermal chart were tested for serum bilirubin level by calorimetric assay by diazonium method.
Result: Prevalence of caesarean section was 34% in present study with fetal distress being the most common indication. At cut-off of 2 mg%, the sensitivity and specificity of cord bilirubin levels for development of significant hyperbilirubinemia was 76.2% and 89.9% while PPV and NPV was 55.2% and 95.5% with overall accuracy of 88%.
Conclusion: Out of the total 150 cases studied, 44% were females while 56% were males. A total of 32.7% females were primi-para while 67.3% were multi-para. At cut-off of 2 mg%, the sensitivity and specificity of cord bilirubin levels for development of significant hyperbilirubinemia was 76.2% and 89.9% while PPV and NPV was 55.2% and 95.5% with overall accuracy of 88%. These newborns (CSB ≤1.5 mg/dl) can be discharged with assurance to parents. Babies with CSB level ≥2 mg/dl should be followed more frequently.

Keywords: cord blood, bilirubin, Neonatal & Hyperbilirubinemia.

Study Designed: Observational Study.

1. Introduction

Jaundice is the most common condition that requires medical attention in newborns as 84% of the new-borns are affected by neonatal hyperbilirubinemia and it is considered as the most common cause for readmission to the hospital during this period [1].
The yellow coloration of the skin and sclera in newborns with jaundice is the result of accumulation of unconjugated bilirubin. In most infants, unconjugated hyperbilirubinemia reflects a normal transitional phenomenon. However, severe hyperbilirubinemia (total serum

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bilirubin >20 mg/ dL) occurs in some infants, is a cause for concern because unconjugated bilirubin is neurotoxic and can cause death in newborns and lifelong neurologic sequelae in infants who survive (kernicterus). For these reasons, the presence of neonatal jaundice frequently results in diagnostic evaluation [2].

Risk factors for the hyperbilirubinemia include early gestational age, cephalhematoma or significant bruising, exclusive unsuccessful breastfeeding, isoimmune or other haemolytic anemia and a sibling with a history of neonatal jaundice [3]. In addition to hyperbilirubinemia, earlier gestational age, hemolysis, sepsis, and low birth weight are associated with the development of bilirubin encephalopathy.

Physiological hyperbilirubinemia is a result of immature liver cell which have low uridine diphosphoglucuronosyl transferase activity when compared to mature hepatocyte, low concentration of albumin which is a bilirubin binding ligand and increased number of erythrocytes which have a shorter life span. Physiological jaundice is a normal response on the part of the baby due limitations in the ability to excrete bilirubin. Neonates develop an unconjugated hyperbilirubinemia due to increased level of unconjugated Bilirubin above 1.0 mg/dl [4].

Hyperbilirubinemia has deleterious effects on neonates such as kernicterus, Choreoathetoid type of cerebral palsy, hearing impairment, and cognitive impairment if not treated at the time. Hence, meticulous screening of newborns is required to detect hyperbilirubinemia[5].

2. Material & Method

Department of Paediatrics, DSP Main Hospital, a 600 bedded multi-disciplinary hospital located in Durgapur. Hospital records for children who were admitted during the year from Sep 2018-March 2020 were obtained, those whosoever fulfils the inclusion criteria were included in the study. All the necessary information regarding the study was explained to the parents of infants. Informed written consent was taken from the parents who were willing to participate in the study.

The demographic profile and relevant information of individual patient was collected by using structured proforma by interviewing the mother. Gestational age was assessed by New Ballard Score. Cord Blood bilirubin was estimated. Serum bilirubin estimation will be done at 72 hrs of age. All babies were followed up daily for the first five postnatal days. Those suspected to have jaundice as per Kramer dermal chart were tested for serum bilirubin level by calorimetric assay by diazonium method.

Inclusion Criteria

1) Term healthy neonates (>37weeks of GA)
2) Both genders

Exclusion Criteria:

1. Rhesus blood factor incompatibility.
2. ABO incompatibility.
3. Significant illness requiring NICU admission.
4. Major congenital malformation

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3. Results

Table 1: Distribution of study cases as per Gender of the baby

Gender	N	%
Female	66	44.0%
Male	84	56.0%
Total	150	100.0%

Out of the total 150 cases studied, 44% were females while 56% were males.

Table 2: Distribution of study cases as per Obstetric history

Parity	N	%
Primi	49	32.7%
Multi	101	67.3%
Total	150	100.0%

A total of 32.7% females were primi-para while 67.3% were multi-para.

Table 3: Distribution of study cases as per Mode of delivery

Mode of Delivery	N	%
LSCS	51	34.0%
Vaginal	99	66.0%
Total	150	100.0%

Prevalence of caesarean section was 34% in present study with fetal distress being the most common indication.

Table 4: Screening efficacy of cord bilirubin levels for prediction of significant hyperbilirubinemia

Cord Bilirubin (optimum cut-off)	Significant Hyperbilirubinemia		
	No	Yes	Total
</= 2 mg%	116	5	121
> 2 mg%	13	16	29
Total	129	21	150

Parameters	%
Sensitivity	76.2%
Specificity	89.9%
PPV	55.2%
NPV	95.9%
Accuracy	88.0%

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At cut-off of 2 mg%, the sensitivity and specificity of cord bilirubin levels for development of significant hyperbilirubinemia was 76.2% and 89.9% while PPV and NPV was 55.2% and 95.5% with overall accuracy of 88%.

4. Discussion

Neonatal hyperbilirubinemia (NH) is a common problem in newborns. During the 1st week of life jaundice is seen in approximately 60% of term infants and 80% of preterm infants[6]. Under normal circumstances, the umbilical cord serum indirect bilirubin is 1-3 mg/dl and rises at a rate of <5 mg/ dl/ day; thus jaundice becomes visible on the 2nd or 3rd day, usually peaking between the 2nd and 4th days at 5-6 mg/dl and decreasing to < 2mg/dl between the 5^{th} and 7^{th} day of life[7].

The increased cases of bilirubin related neurological damage occurred as a result of early hospital discharge of newborns. Therefore, it is must to have an easy and safe test to identify babies who are at risk for significant jaundice and will help in avoiding the fatal outcome.

To address this issue AAP recommends that all newborns that were discharged within 48 hours of birth should be followed up within 2 to 3 days of discharge to hospital, health worker or at home. It will be very difficult to document the benefits of this policy, given the rare incidence of kernicterus and less chances of adapting the advice especially in lower socioeconomic and rural areas[7].

Experience suggests that asking mothers to look for yellowish discoloration (jaundice) in newborns is not reliable. Despite such instructions, it is difficult to recognize significant jaundice for many parents.

Unfortunately, the presence of severe jaundice for age is often missed clinically, which means that the trigger for measuring the first serum bilirubin level and deciding subsequent recommendation is not set. This is a potentially a serious problem. Jaundice appears at various intervals in new-borns after birth and ability to notice its severity, approximate range with cephalocaudal progression has been a topic of study in the last 60 years[8]. Additionally, in most of the recently reported healthy term new-borns that developed kernicterus, significant jaundice was almost certainly present before the first hospital discharge, judging from the height of Total Serum Bilirubin for age in hours at readmission. Either the early icterus had not been noted or its pathologic intensity for postnatal age was not appreciated. Currently we do not have a reliable method of anticipating such levels of hyperbilirubinemia. Unfavourable outcomes can be prevented by regular, close and frequent follow up after birth and discharge from hospital, but to prevent rare cases of kernicterus to approach to surveillance of the new-born that is substantially more rigorous than has been practiced. The benefits, costs, feasibility and risks of such an approach need to be determined[9].

Collection of umbilical cord blood is simple, easy and not associated with any pain. Most important is that the results of tests are available within hours of birth. Thus, the babies who are discharged within few days postnatally can be assessed for risk of hyperbilirubinemia in a non-invasive way at birth. Using Cord Blood Bilirubin (CBB) values may help to predict babies with low risk for hyperbilirubinemia and minimize an unnecessary stay in hospital. Keeping these factors in mind our study was conducted on healthy full-term neonates with non-haemolytic jaundice. We aimed to quantify the relationship between Cord blood bilirubin with development of significant hyperbilirubinemia i.e. requiring intervention i.e. phototherapy or exchange transfusion[10].

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Study included 150 full term and healthy neonates delivered in our hospital during the study period and satisfying eligibility criteria. Mean gestation age was 38.16 weeks while mean birth weight was 2.97 Kg. Out of the total 150 cases studied, 44% were females while 56% were males[11].

5. Conclusion

Out of the total 150 cases studied, 44% were females while 56% were males. A total of 32.7% females were primi-para while 67.3% were multi-para. At cut-off of 2 mg%, the sensitivity and specificity of cord bilirubin levels for development of significant hyperbilirubinemia was 76.2% and 89.9% while PPV and NPV was 55.2% and 95.5% with overall accuracy of 88%. These newborns (CSB ≤1.5 mg/dl) can be discharged with assurance to parents. Babies with CSB level ≥2 mg/dl should be followed more frequently.

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