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A Treatment Profile of Neonatal Hyper-bilirubinemia in a Tertiary Health Care Hospital

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Neonatal hyperbilirubinemia, normally seen in 60% of term babies and 80% of preterm babies during the first week of life. Physiological jaundice appears between 30-72 hours after birth and eventually disappears on 10th day of life. Various reasons and risk factors are associated with jaundice. Eventhough, hyperbilirubinemia is not life threatening condition, the lack of timely treatment to newborns may lead to increased complications and death. The study was carried to identify the incidence, various aetiologies and treatment to hyperbilirubemic neonates. After obtaining, prior approval from ethical committee the study was initiated. The details of neonates admitted in neonatal wards during the year of 2017-2018 were collected from the Medical record department in a tertiary care hospital. The total number of live births in 2017-2018 was 1748 and 74 neonates were identified and treated for hyperbilirubinemia. The present study showed the incidence to be more in female babies than male babies. The female babies were about 55% and male babies were 44% . The preterm babies were 21% and term babies were 78%. The mode of delivery through LSCS was 56% and normal vaginal delivery was 43%. Hyperbilirubinemia seen in Multiparous was around 64% and in primiparous was around 35% . Majority of the newborns were in normal weights and physiological jaundice was the most common type of jaundice seen in newborns. Though, the recent techniques like Hour –Specific nanograms are available, the study indicates the necessity in educating mothers before delivery itself and introducing preventive steps, like pre-discharge assessment to reduce readmission and severity in newborns. The study finds a definite scope for further research and a need for easy techniques to early detection and treatment for the babies.

Keywords : Hyperbilirubinemia, Hour-specific nanogram, Physiological jaundice, Preterm.

Neonatal hyperbilirubinemia, the most common health problem in newborns and requires an essential medical attention. Normally, jaundice occurs in 60% of the term babies and 80% of the preterm babies within the first week of life [1,2]. Neonatal jaundice is prone to appear when the serum bilirubin level exceeds 5 mg/DL. In term babies, physiological jaundice appears between 30-72 hours of age and proceeds to a maximum intensity on fourth day which eventually disappears by 10thday of life[3]. The serum bilirubin level in above case does not exceed 15 mg/DL. Physiological jaundice in preterm babies is similar to term babies with maximum intensity reaching on 5-6 day and may persist up to 14 days. The serum bilirubin level in these babies may exceed 15 mg/DL. At normal concentration, bilirubin acts as an antioxidant, whereas when the concentration is increased they

become as severe neurotoxin and responsible to produce acute or chronic bilirubin encephalopathy which leads to irreversible brain damage[4]. A study carried in Australia exhibited the incidence level of neonatal jaundice between 7.1 and 45 per 10,000 birth and kernicterus of 0.4-2.7[5]. The other study conducted among Indian workers identified the overall incidence rate to be 54% to 77%. The various reasons and risk factors associated for the hyperbilirubinemia in neonates are ABO and other blood group incompatibility,glucose-6-phosphate dehydrogenase deficiency, infections, prematurity, low birth weight, lactation failure in excessive breastfeeding, cephalohematoma or bruises, babies of diabetic mother, hypothyroidisim, rare conditions such as Gilbert's syndrome, Crigler-Najjar syndrome and family history of neonatal jaundice in siblings[6]. A worldwide study conducted in low- income population identified around 14 million newborns with jaundice and required phototherapy[7]. The bilirubin level in the skin was measured with the help of hand-held device, transcutaneous bilirubinometer. In absence of this instrument, jaundice can be assessed visually. The relationship between serum bilirubin levels and the progression of skin discoloration can be described using kramer's rule. According to this rule, appearance of yellow colour in head and neck region indicates total serum bilirubin levels to be 4-8 mg /DL, in upper trunk (above umbilicus), to be 5-12 mg/DL, in lower trunk and thighs (below umbilicus), to be 8-16 mg/DL, in arms and lower legs to be 11-18 mg/DL and in palms and soles to be ≥ 18mg/dl.

Many developmental changes were introduced in the management of neonatal jaundice. Hour–Specific monogram for predicting neonatal hyperbilirubinemia was imported by Bhutani et al which was also supported by American Academy of Paediatrics. Hence the present study was carried to evaluate the occurrence, various aetiologies and treatment profile for neonatal jaundice in a tertiary care hospital[8].

Table 1. Male and Female Ratio with Gestational Age in Percentage

Characteristics related with Neonatal Hyperbilirubinemia in percentage		
Gender	Male	44.59 %
	Female	55.40 %
Gestational Age	Term	78.37 %
	Preterm	21.62 %

MATERIALS AND METHOD

The present retrospective study was carried in a tertiary care teaching hospital for 2017-2018. All the live births in the hospital during the study

Table 2. Birth weight,Treatment profile and Aetiology of Jaundice

Birth weight (in grams) and Treatment	Percentage	Etiology	Prcentage
Normal(>2500 g)	79.72 %	Cephalohematoma	1.35 %
Low birth weight (1500 – 2500 g)	16.21 %	Physiological jaundice	66.21 %
Very low birth weight (1000-1500 g)	2.70 %	Prematurity	16.21 %
Extremely low birth weight (<1000 g)	1.35 %	Sepsis	6.75 %
Single surface phototherapy	81.08 %	ABO incompatibility	2.70 %
Double surface phototherapy	2.70 %	Rh incompatibility	1.35 %
Both(single and double surface phototherapy)	14.86 %	Breast milk jaundice	5.40 %
Triple and single surface Phototherapy	1.35 %	-	-

Table 3. Correlation of Birth Weight with Peak bilirubin levels

Groups	Mean± SD	Correlation of Coefficient	SIG.
Birth weight(in grams)	2.884 ± 0.68	r = +0.267	0.021
Peak bilirubin (in gm/DL)	14.90 ± 3.51		

Correlation is significant at 0.05 level(2-tailed)

period were taken from Medical record department. Neonates admitted in neonatal ward with a visible jaundice during the study period were included. The most common treatment for non-severe hyperbilirubinemia was phototherapy and sunbath. The data collected for the study includes gestational age, gender, birth weight, birth order, mode of delivery, peak serum bilirubin level and the treatment profile. Aetiologies identified by thorough examinations in neonates were noted. An automated analyzer with calorimetric method was used to measure the serum bilirubin levels in the blood sample (venous) collected from the neonates. The clinical picture of neonatal jaundice was confirmed by carrying required test. The severity was categorized depending on bilirubin levels and it was grouped above 18 mg/DL in preterm babies and above 20 mg/DL in term babies.

RESULTS AND DISCUSSION

The total number of live births in 2017-2018 was 1748 and 74 neonates were identified and treated for hyperbilirubinemia. The present study showed the incidence to be more in female babies than male babies. The female babies were about 55% and male babies were 44% (Table 1). The preterm babies were 21% and term babies were 78% (Table 1). The mode of delivery through LSCS was 56% and normal vaginal delivery was 43% (Fig 1). Hyperbilirubinemia seen in Multiparous was around 64% and in primiparous was around 35% (Fig 2). Majority of the newborns were in normal weights and physiological jaundice was the most common type of jaundice seen in newborns. Single surface phototherapy was the common treatment given to the newborns which was similar to other studies (Table 2). The next cause of jaundice was due to prematurity. There were various causes to jaundice which was shown in Table 2. A positive correlation was seen with birth weight and the peak bilirubin values in neonates (Table 3).

DISCUSSION

Mild increase in bilirubin level often disappears within two-three weeks in newborns whereas in-case of moderate to severe raised levels, an appropriate treatment is required[9]. Phototherapy, using conventional or fiber optic lights and exchange transfusion was the common and frequently used treatment to reduce the serum bilirubin levels. During phototherapy, exposure of skin to light source converts unconjugated bilirubin to water-soluble form and can be easily excreted by the normal mechanism. The blue-green light source was used in phototherapy for a better penetration into the skin and removes the unconjugated bilirubin by undergoing photochemical reaction[10]. Single, double and triple surface photo-therapies are available to decrease the bilirubin levels. Single surface phototherapy was found to be effective when compared to double surface which was used only to avoid the exchange transfusion[11]. In present study, only single surface phototherapy was used in major cases which was similar to previous studies. Exchange transfusion can be used in case if there is a risk of kernicterus, blood incompatibility or

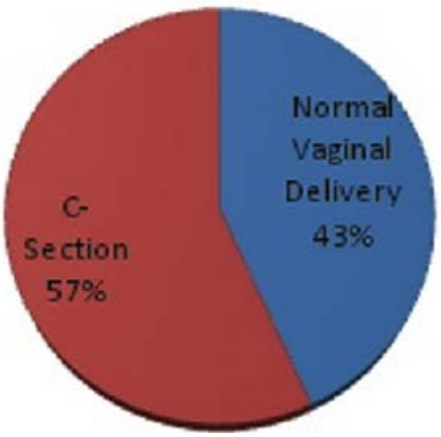

Fig. 1. Mode of Delivery in Percentage

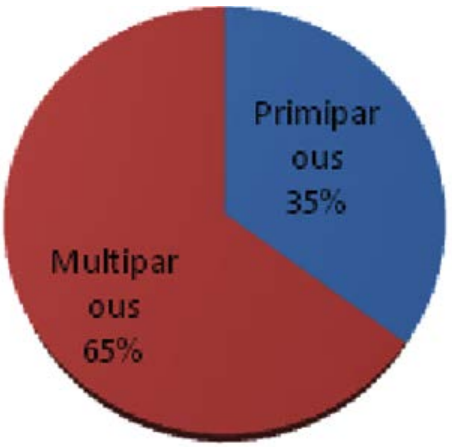

Fig. 2. Status of Parity in Percentage

after intense phototherapy was unsuccessful[12]. Double volume phototherapy replaces 86% of blood and 63% in single volume phototherapy. Exchange transfusion may produce many adverse effects like thrombocytopenia, portal vein thrombosis, necrotizing enterocolitis, arrhythmia, cardiac, arrest, hypocalcemia, hypomagnesemia, hypoglycemia, respiratory and metabolic acidosis and other complications due to blood transfusion [13]. The practice of using the high dose intravenous immunoglobulin (iv IG) has reduced the need for exchange transfusion with Rh, ABO[14]. In present study, the absence of exchange transfusion indicates the lack of occurrence in the critical bilirubin levels in newborns. Krishna veni et al conducted a study to know the effect of gender on bilirubin levels and the study showed female babies to be more affected than male babies which was similar to our study[15]. Mostly term babies were affected with physiological jaundice which requires phototherapy for a short period as a treatment and this study also stipulates similar result[16].

Phenobarbitone, an antiepileptic drug has been used as a prophylactic treatment in the pre-term babies where there is a higher risk of jaundice. These drugs act by inducing the activity of uridine-di-phosphate glucuronosyl transferase enzyme and enhance the excretion of bilirubin and thereby reduce the concentration in newborn babies. Phenobarbitone can be used prophylactically in order to avoid exchange transfusion in babies which result in many complications[17]. Alternate to conventional treatment, there are other pharmacological treatments to reduce neonatal jaundice. These include metalloporphyrins, clofibrate, bile salts, laxative, indole-3- carbinol and bilirubin oxidase which are under clinical trial. Metalloporphyrins, synthetic heme analogs can reduce the production of unconjugated bilirubin by competitively inhibiting heme oxygenase[18].

A study conducted in India for a period of 7 years in a tertiary care hospital identified around 65% morbidity among extremely low birth weight babies[19]. Even,the chance of occurrence in kernicterus were more common in the very low birth weight than normal weight babies[20]. In present study,it is observed that the correlation of birth weight and peak bilirubin levels were statistically significant and this was supported by the data which indicated the presence of only 20% with a low birth weight and rest all have normal birth weight[21]. The study data also showed the absence of severe neonatal hyperbilirubinemia and a conventional treatment of phototherapy was only used. Mode of delivery also had influence to induce jaundice in newborns and there were higher chances of the jaundice in babies who were born by cesarean section than through normal vaginal delivery. In our study, around 56% of babies were delivered through cesarean section who were affected with jaundice when compared with normal delivery (43%)[22]. Mikael et al conducted a study to analyze various risk factors for non-hemolytic jaundice in neonates and identified primiparous to be one of the reason, and this was in contrary with the result of the present study[23].

CONCLUSION

Hyperbilirubinemia in neonates are more dangerous when they are not provided with appropriate treatment. Therefore in order to reduce the severity of jaundice in newborns, preventive steps should be taken in co-operation with physician and parents for early diagnosis and treatment of babies. Mothers can be educated about various factors which induce neonatal jaundice before delivery itself. A practice of routine bilirubin level assessment in the neonates before discharge will help in reducing re-admission of babies. Even with the availability of recent techniques like hour specific nomograms in identifying jaundice still, more research is required by research scientist to help the doctors by introducing easy techniques for early treatment for the babies.

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