Overview of neonatal hyperbilirubinemia at Nepal Medical College Teaching Hospital

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ABSTRACT

This study was done to assess the prevalence of neonatal jaundice, underlying risk factors and efficacy of phototherapy, which would be of value in identifying and implementing strategies to prevent morbidity and mortality from this condition. A retrospective study was carried out in 86 neonates admitted to neonatal intensive care unit at Nepal Medical College Teaching Hospital, Attarkhel, Kathmandu from May, 2005 to April 2008. All of the newborns who developed hyperbilirubinemia and required phototherapy and/or exchange blood transfusion (EBT) were included in this study. Case records were evaluated for details of maternal and babies birth history and clinical examinations. The initiation of phototherapy and/or EBT were done by using standard guidelines. Out of total of 820 NICU admissions, 86 (10.5%) had significant hyperbilirubinemia. Amongst them 59.3% were male and 40.7% female. Septicemia, prematurity and ABO incompatibility were observed in 33.7%, 23.2% and 13.9% cases respectively. Phototherapy was required in 95.5% and EBT in 4.6% cases. In our study, septicemia, prematurity and ABO incompatibility were found to be the most common risk factors of neonatal jaundice. The data showed, phototherapy as an effective procedure in management of neonatal hyperbilirubinemia.

Keywords: Hyperbilirubinemia, neonates, phototherapy, septicemia.

INTRODUCTION

Neonatal jaundice is a very common condition worldwide occurring in up to 60% of term and 80% of preterm newborns in the first week of life.[1] Although most cases of neonatal hyperbilirubinemia are physiological and don't have serious consequences, toxic levels of unconjugated bilirubin can lead to neurotoxicity resulting in neurodevelopmental abnormalities such as hearing loss, athetosis, intellectual deficits and can cause death.

The main causes of pathological jaundice are prenatal factors such as birth trauma or infection, maternal factors such as Rh incompatibility or ABO incompatibility and neonatal factors such as prematurity, sepsis, birth asphyxia, genetic syndrome such as Crigler-Najjar's and Gilbert's syndrome, breast milk jaundice, hemolytic disease like glucose 6 phosphate dehydrogenase deficiency.[2] Prolong jaundice and jaundice occurring in the first 24 hours of life requires detail investigation as they increase the likelihood of an underlying pathological cause. If untreated, severe unconjugated hyperbilirubinemia is neurotoxic and can cause kernicterus.[3] Management of the condition therefore includes, preventing serum bilirubin from reaching toxic levels. Identifying severe hyperbilirubinemia and early intervention can reduce the level of morbidity and mortality associated with bilirubin encephalopathy.[4]

The exact data of neonatal jaundice is not available from developing countries where the majority of births occur at home. A recent study in 2005 from a neonatal unit in Karachi reported that neonatal jaundice account for 13.5% of all admission, placing it third on the list of causes requiring admission for neonates.[5] The incidence of neonatal hyperbilirubinemia was 3.5% in nursery and NICU at B.P Koirala Institute of Health Sciences, Nepal.[6]

MATERIALS AND METHODS

A retrospective study was carried out in 86 neonates admitted to neonatal intensive care unit at Nepal Medical College Teaching Hospital, Attarkhel, Kathmandu from May, 2005 to April 2008. All of the newborns who developed hyperbilirubinemia and required phototherapy and/or exchange blood transfusion (EBT) were included in this study. These neonates were either admitted with jaundice or developed it after they were hospitalized for other reasons. Patients with physiological jaundice and not requiring phototherapy and/or EBT were excluded from this study. Case records were evaluated for details of maternal, antenatal, natal and postnatal history, mode of presentation and therapeutic intervention. Laboratory parameters including total and direct serum bilirubin, complete blood count, hemoglobin, peripheral smear, direct coomb's test reticulocyte count, blood grouping of the mothers and babies, septic screening of the

Table-1: Risk factors of neonatal hyperbilirubinemia requiring phototherapy and exchange blood transfusion (EBT)

Risk factorsQuantitative	Phototherapy		Total	ETB		Total
	male	female		male	female	
Sepsis	16(18.6%)	11(12.8%)	27 (31.4%)	1(1.7%)	1 (1.7%)	1(1.7%)
Prematurity	12(13.9%)	7(8.1%)	19 (22.1%)	1(1.7%)		1(1.7%)
ABO- Incompatibility	5(5.8%)	7(8.1%)	12 (13.9%)		-	1(1.7%)
IUGR	5(5.8%)	4(4.6%)	9 (10.5%)	-	-	-
Idiopathic	3(3.5%)	2(2.3%)	5 (5.8%)	-	-	-
Cephalhemato-ma	2(2.3%)	2(2.3%)	4 (4.6%)	-	-	-
Birth Asphyxia	3(3.5%)	1(1.7%)	4 (4.6%)	-	-	-
IDM	2(2.3%)	-	2 (2.3%)	-	-	-
Rh-Incompatibility	-	-	-	1(1.7%)	-	1(1.7%)
Grand total= 86	48(55.8%)	34(39.5%)	82 (95.5%)	3(3.5%)	1(1.7%)	4(4.6%)

newborns were assessed. Details regarding effectiveness of phototherapy were evaluated. The neonates (preterm and term) with significant total serum bilirubin (TSB) and requiring phototherapy and/or EBI were assess by standard guidelines.[7] Septicemia was defined as clinical suspicion with positive blood cultures and/or features (reluctance on feeding or poor feeding, abdominal distension, less activity, respiratory distress, apnea, hypo or hyperthermia etc.) of infection necessitating antibiotics for e" 7 days, in the absence of other attributable causes. Newborn infants < 37 weeks gestational age with significant hyperbilirubinemia who could not be categorized into any other major etiological category were considered to have 'prematurity' associated jaundice. Jaundiced newborns who could not be categorized into any of the aforementioned criteria were placed in an "unknown" category.

RESULTS

Out of total of 820 NICU admissions 86 (10.5%) had significant hyperbilirubinemia. These newborns were treated with phototherapy and exchange blood transfusion. There were 51 (59.3%) male and 35 (40.7%) female. The risk factors of neonatal hyperbilirubinemia are shown in Table-1. Septicemia, prematurity and ABO incompatibility were observed in 29 (33.7%), 20 (23.2%) and 12 (13.9%) cases respectively. The gestational age varied from 30+3 weeks to 42+2 weeks with (mean 38.2 ± 1 weeks). Caesarean section was done in 32(37.2%) and normal vaginal delivery in 54 (62.8%) cases. The birth weight of the babies varied from 1400 gram to 4500 grams (2809 +/- 200 grams).The mean duration of onset of jaundice was 4.12 day (day1-15th day).The peak level of total serum bilirubin varied from 6.2mg/dl to 26.5 mg/dl (15.8 ± 4.28 mg/dl). The maximum total serum bilirubin level more than 20 mg/dl were noticed in 14 (16.3%) cases. The Hb level varied from 6.8 gm/dl to 18.6 gm/dl (11.2 ± 2.56 gm/dl) and white blood cell count varied from 2950 – 25400/ cubic mm of blood. (10, 792 ± 1820 / cubic mm of blood) shown in Table-2. Two babies died who developed septicemia. Exchange blood transfusion was done in 4(4.6%) babies, two with septicemia, one each with prematurity and Rh incompatibility respectively. Eightyfour (95.3%) babies received phototherapy exclusively. The phototherapy duration varied from 24 hours to 120 hours.

DISCUSSION

The occurrence of neonatal hyperbilirubinemia of 10.5% of the NICU admissions, who required phototherapy and EBT were observed in this study. Previous studies showed incidence of hyperbilirubinemia 3.7% and 38.0% respectively.[8,9] Our study showed that 59.3% male and 40.6% female had significant hyperbilirubinemia giving a male/female ratio of 1.4:1. This agrees with the incidence of 60.4% of male babies with hyperbilirubinemia reported by Manning *et al*.[10] Total serum bilirubin (TSB) of more than 20mg/dl occurred in 14 (16.3%) cases. This high level of TSB level was reported as 3.5/ 1000 live birth in Pakistan.[11] Septicemia was the most common risk factor for neonatal hyperbilirubinemia observed in 33.7% cases. Similar

Table-2: Characteristics of the investigated newborns (n =86)

Quantitative Variables	Mean	SD
Gestational age(weeks)	38.2	1
Birth weight(gm)	2809	200
Hemoglobin(gm/dl)	11.2	2.56
WBC(per cubic mm)	10,792	1820
Total serum Bilirubin(mg/dl)	15.8	4.28

SD – Standard deviation

studies reported the incidence of hyperbilirubinemia in 32.5% and 26.6% cases in Nigeria and Bangladesh.[12,13] Second, leading cause was prematurity in 22.1% of babies which was less as compared to the data of Owa and Dawodu.[14] ABO incompatibility and Rh incompatibility were found in 13.9% and 1.7% respectively. A study conducted in Iran noted 49.3% incidence of hyperbilirubinemia due to ABO incompatibility, which was also very high.[15] In 2.3% neonates risk factor was infant of diabetic mother (IDM). Birth Asphyxia was found to be concomitant factor in 4.6% babies with neonatal jaundice. Here, 5.8% had no obvious cause and may be considered as idiopathic. A report from India by Singhal showed 34.6% of idiopathic neonatal hyperbilirubinemia.[16] Only four (4.6%) patients required exchange blood transfusion which is comparable with a study done by Owa and Ogunlesi.[17] This might be due to early initiation of effective phototherapy and admission of less number of referral cases in our hospital. Eighty two (95.3%) babies received phototherapy. The range of duration of phototherapy was 24 hrs to 120 hrs. Phototherapy has been made more powerful to reduce the EBT in the developed world.[18-21] In this study, none of the babies develop kernicterus and two babies died because of septicemia.

In our study, septicemia, prematurity and ABO incompatibility were found to be most common risk factors of neonatal hperbilirubinemia. Rh incompatibility, IDM, cephalhematoma was found insignificant. In our part of South Asia, infections play a major role in morbidity and mortality associated with jaundice. So there should be early detection followed by aggressive treatment of infections and associated jaundice. This study also shows phototherapy as an effective tool for management of neonatal hyperbilirubinemia.

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