Original article:

Evaluation of attributes to hyperbilirubinaemia in neonates in a tertiary care hospital in the Dhaka city

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Abstract

Objective: The study was aimed to evaluate the attributes related to hyperbilirubinaemia among neonates. ***Materials and methods:*** A total number of 120 neonates with hyperbilirubinemia included in the study. Data were collected using hospital records and by face-to-face interview of mother of those neonates using a predesigned questionnaire. Data were expressed as mean±SD and number (percent) as appropriate. Both descriptive and inferential statistics were considered in data analysis. Statistical analyses were performed using SPSS Software. ***Result:*** Of the total neonates, 57% were baby boys. In age group of 2nd to 7th days were 59.2% of neonates. According to the birth weight, neonates distribution was 38.3% in very low (<2000g), 42.5% low (2001-2500g) and 19.2% normal (>2500g) birth weight group. ABO incompatibility was found in 14.2% and Rh 8.3% cases of hyperbilirubinaemia. Birth trauma was found in 7.5% and congenital anomalies 3.3% neonates. Pre-maturity (gestational age <37 wks) was found in 73.3% cases. Normal vaginal delivery was performed in 59.2% of cases. Exclusive breast feeding was given by 43.33% mothers. Of the mothers 93.4% were housewives. Thirty percent (30%) of mothers were adolescents (<20 years) and 27.5% young adults (20 to 25 years). Of the 120 mothers 56.7% had primary level education. Low birth weight (<2000g to 2500g) neonates had significantly higher ($p<0.005$) serum bilirubin than the normal birth weight counterpart. Among the neonates of the mothers with GDM, 9.2% had serum bilirubin level above 20mg/dl and the distribution showed significant association ($p<0.005$). ***Conclusions:*** It is concluded that low birth weight and prematurity remained to the major causes of neonatal hyperbilirubinemia in neonates. Other common causes, particularly ABO and Rh incompatibility, are also present which could be avoided by meticulous clinical practice and burden of neonatal morbidity and mortality related to hyperbilirubinemia can be reduced.

Keywords: Neonates, Hyperbilirubinaemia, Prematurity, Low birth weight.

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Introduction

Neonatal hyperbilirubinaemia resulting in clinical jaundice is a common problem among neonates, particularly during the first weeks of life[1]. Cephalo-caudal progression of staining correlates with increasing level of serum bilirubin[1]. At birth and early days of life, serum bilirubin more that 7mg/dl becomes visible as jaundice; rise in bilirubin in newborn remains undetectable for some time until bilirubin rises[2]. Effect of hyperbilirubinaemia depends on its cause and the degree of elevation[3]. The situation of neonatal jaundice in developing countries is relatively same to that of developed countries4. In Bangladesh 60% neonates found to be admitted in hospitals due to neonatal jaundice[5]. Major factors related to neonatal jaundice found to be male gender, low birth weight, prematurity, ABO incompatibility, mode of delivery, birth trauma, neonatal infection,

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Gestational DM and breast feeding[6]. The mortality and morbidity picture of neonatal jaundice is markedly different in the developed and developing countries. Neonatal jaundice is a fairly common cause of morbidity in Bangladesh but little information is available on patterns of neonatal jaundice. Attitude and health care pattern of people and early detection of high risk groups are of paramount importance in preventing complications of neonatal jaundice[4]. Considering the realities of multiple risk factors of neonatal hyperbilirubinaemia, the study tried to determine the independent contribution of each risk factor. As a global problem, preventive and control strategies of hyperbilirubinaemia should be based on adequate knowledge and information regarding the incidence and risk factors, which are not available in the developing countries where the vast majority of births occur at home. Identifying infants at risk of severe hyperbilirubinaemia and early intervention may reduce the levels of morbidity and mortality associated with bilirubin encephalopathy[7]. This study was designed to access neonatal and maternal risk factors related to the hyperbilirubinaemia among the neonates. The study findings may contribute to formulation of guidelines and strategies for better management and prevention of hyperbilirubinaemia among the vulnerable neonates.

Materials and Methods

This descriptive cross-sectional study was conducted to evaluate the attributes of hyperbilirubinaemia among the neonates admitted in the Department of Neonatology, Dhaka Medical College and Hospital. A total number of 120 neonates with jaundice were purposively recruited. Data were collected by face-to-face interview and reviewing medical documents. Neonatal factors considered for study were prematurity, birth weight, ABO and Rh incompatibility, birth trauma, gender, congenital anomalies and septicaemia and, maternal factors gestational age, mode of delivery and breast-feeding. Maternal co-morbidities were gestational diabetes, hypothyroidism and hepatitis B considered. Data regarding socio-demographic profile of mothers were age, religion, educational status and occupation.

Statistical Analysis

Data were expressed as mean±SD and number (percent) as appropriate. Proportion and chi-squared (Fisher's Exact) tests were performed as applicable. Data were analyzed using Statistical Package for Social Science (SPSS) Version 18. A two tailed p value less than 0.05 was considered statistical significant.

Ethical issue

The study was approved by the Ethical Committee of NIPSOM and all ethical considerations thoroughly followed.

Result

Of the total 120 neonates, 57% were baby boys. Age range of the 120 neonates was 1-21 days. Mean±SD age of the neonates was 5.36±4.43 days. Distribution of the neonates was 15.0%, 59.2% and 25.8% in 1, 2-7 and more than 7 days group respectively (Figure 1). Total serum bilirubin level varied from 12 – 23.8 mg/dl and 63.3% (76 out of 120) had the level between 17 to 20 mg/dl.

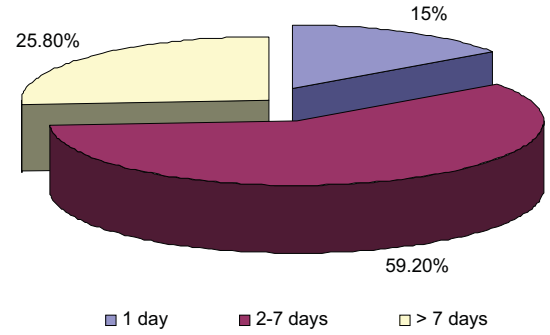

Figure 1: Distribution of subjects on the basis of duration of age (days).

Mean (±SD) birth weight (g) of the neonates was 2291± 461. Of the neonates 38.3% had very low (<2000g), 42.5% low (2001g to 2500g), and 19.2% normal birth weight (Figure 2). Among them, 17 (14.2%) had ABO incompatible, 10 (8.3%) Rh incompatible and 29 (24%) had septicemia as major causes of hyperbilirubinaemia. Birth trauma was found in 9 (7.5%) neonates while congenital anomalies were found only in 4 (3.3%) cases (Table 1).

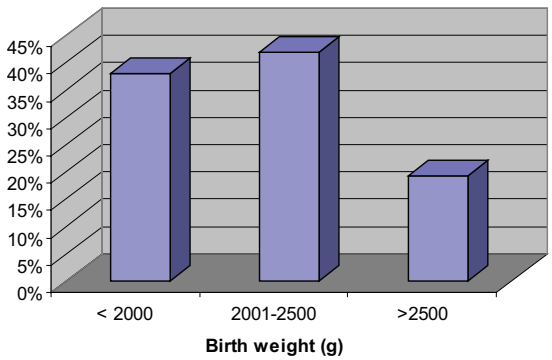

Figure 2: Distribution of neonates on the basis of birth weight.

Table 1: Neonatal factors related to hyperbilirubinaemia

Attributes	Findings
Gender [Male (Female)] (%)	57 (51)
Age [mean ±SD, days]	5.36±4.43
Birth weight [Mean ±SD, g]	2291±461
ABO incompatibility [N (%)]	17 (14.2%)
Rh incompatibility [N (%)]	10 (8.3%)
Septicaemia [N (%)]	29 (24%)
Birth trauma [N (%)]	9 (7.5%)
Congenital anomalies [N (%)]	4 (3.3%)

Maternal related risk factors

Of 73.3% of neonates with jaundice had gestational age was less than 37 weeks. Of the neonates under study mother of 59.2% cases had normal vaginal delivery. Exclusive breastfeeding was given to 43.3%, formula feeding 20.8% and mixed feeding 35.9% neonates (Figure 3).

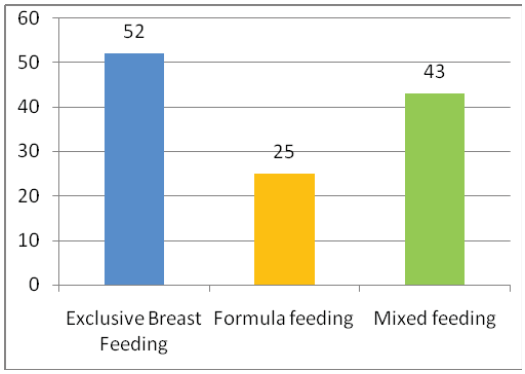

Figure 3: Distribution mothers provided their neonates exclusive breastfeeding.

Maternal co-morbidity GDM was found in 19 (15.8%), hypothyroidism 8 (6.7%) and hepatitis B positive 11 (9.2%) cases (Table 2).

Table-2: Maternal related factors in cases of neonatal jaundice

Attributes	Findings
Gestational age (mean ±SD, wks)	35.4±2.3
Mode of delivery [NVD (CS)] (%)	59.2 (40.8)
Feeding pattern (%)	
Exclusive breast feeding	52 (43.33)
Formula feeding	25 (20.84)
Mixed feeding	43 (35.83)
History of Jaundice of previous baby	33 (27.5%)
GDM	19 (15.8%)
Hypothyroidism	8 (6.7%)
Hepatitis B	11 (9.2%)

NVD, Normal vaginal delivery; CS, Caesarian section; GDM, Gestational diabetes mellitus Mean (±SD) age (yrs) of the mothers was 23.73±5.44 (Table 3). Frequency distribution regarding maternal age was shown in figure 4. Of the 120 mothers 30% were adolescents (<20 yrs) and 27.5% young adult (20 to 25 years). Of the total mothers 93.4% were housewives. Mother's formal education status was as follows: 20.8% illiterate, 56.7% primary level and 22.5% secondary level (Table 3).

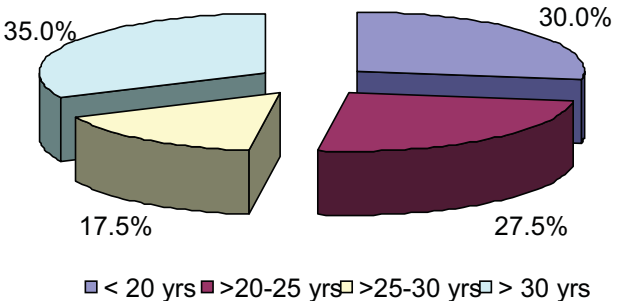

Figure 4: Distribution of mother with neonatal jaundice on the basis of their age.

Table 3: Socio-demographic profile of mothers of neonates

Attributes	Findings
Age of mother (mean±SD, yrs)	23.73±5.44
Religion [Islam (Hinduism)] (%)	90 (10)
Education [N (%)]	
Illiterate	25 (20.8)
Primary	68 (56.7)
Secondary	27 (22.5)
Occupation of mother	
Job (%)	8 (6.6)
Housewife (%)	112 (93.4)

Different level of bilirubin in neonates was explored with their birth weight. Distribution of number of neonates in three levels of total bilirubin showed significant association (p<0.005) (Table 4).

Table 4: Distribution of neonates with different level of total bilirubin on the basis of birth weight Birth weight group Total bilirubin level (mg/dl)

Birth weight group	**Total bilirubin level** (mg/dl)		
	12-16.9	17-20	>20
	N (%)	N (%)	N (%)
<2000 (g)	0 (0)	35 (29.1)	11 (9.2)
2000-2500 (g)	10 (8.3)	41 (34.2)	0 (0)
>2500(g)	23 (19.2)	0 (0)	0 (0)

Of the 120 neonates 9.2% had bilirubin level more than 20 mg/dl and 5% between 17-20 mg/dl. None of the neonate was in group of bilirubin level 12-16.9 mg/dl. Of the 103 neonates of ABO compatible had bilirubin

level up to 16.9 mg/dl. The distribution showed statistical significant associated (p<0.001) (Table 5).

Table-5: Distribution of neonates with ABO incompatibility in relation to total bilirubin level

ABO incompatibility	**Total bilirubin level** (mg/dl)		
	12- 16.9	17-20	> 20
	N (%)	N (%)	N (%)
ABO incompatible	0 (0)	6 (5)	11 (9.2)
ABO compatible	33 (27.5)	70 (58.3)	0 (0)

Gestational diabetes mellitus was present in 19 mothers. Baby of the 19 mother 11 (9.2% of total) had bilirubin more than 20 mg/dl and none of those with normal glucose. In 56.5% of neonates bilirubin levels was between 17-20 mg/dl. At same bilirubin level 6.7% cases of neonate mothers had GDM. This distribution showed statistical significant association (p<0.005) (Table 6).

Table 6: Distribution of neonates with their mother's diabetes status in relation to total bilirubin level

GDM	**Total bilirubin level (mg/dl)**		
	12- 16.9	*17-20*	*> 20*
	N (%)	N (%)	N (%)
Yes	0 (0)	8 (6.7)	11 (9.2)
No	33 (27.5)	68 (56.6)	0 (0)
	Fisher's Exact Test = 47.833, p value <0.005, CI = 95%)		

Discussion:

Proportion of male neonates with hyperbilirubinemia in the present study was 57.0% which found to be almost similar to that of earlier reported by Zabeen et al[7]. They have demonstrated that 11.6% of their neonates had serum total bilirubin ³20 mg/dl where as in the present study the proportion was 9.2%. In the present study 17 (14.2%) neonates had ABO and 10 (8.3%) Rh incompatibility. Proportion of neonates with ABO incompatibility in these study subjects found to be consistent with the other studies. The study carried out on Iranian population showed the ABO incompatibility to be 12%[8] and earlier study in Bangladesh 11.3%[5]. ABO incompatibility was reported to be the commonest cause of neonatal hyperbilirubinemia according to the study conducted in UAE[7]. However, Rh incompatibility relatively higher the present study than the previous study (5.4%)[5]. This feature may be attributed to the relatively small number of samples. Prematurity is one of the major causes of neonatal jaundice. In this study 77.3% (88 out of 120) neonates were premature which is almost similar to the findings of Dawodu and his group[7]. The study reconfirmed the prematurity as prominent cause of hyperbilirubinemia in neonates. It is usually seen that in most of the cases hyperbilirubinemia present within the first week of life. The present study the scenario was also similar where in 74.2% of the neonates had 7 days or less.

Birth weight is regarded as the indicator of fetal well being and used to assess risk of neonatal morbidity and mortality. Low birth weight babies are found to be susceptible to develop hyperbilirubinemia. In the present study 38.3% of the neonates were of low birth weight (<2500g) which is consistent with other studies[5,7]. These low birth weight babies had significantly higher level of bilirubin compared to the other groups (Table 4). This finding highlighted fact of low birth increase the risk of development of hyperbilirubinemia and its level.

In the present study 15.8% of mothers of hyperbilirubinemic neonates had GDM which is lower than the earlier report that showed very high proportion (35%) of mothers with GDM, this variation, however, might be explained by the fact of recruiting the cases from BIRDEM Hospital[5] for the later study. On the other hand 15.8% of GDM mothers in the present study appeared to be markedly high to that of 3.3% in another study[9] where, however, number of study samples was much higher. Study involving large number of subjects and adaptation of more stringent inclusion criteria may explain the issue clearly. It is important to note that significantly more neonates of GDM (9.2%) than non-GDM mothers had higher bilirubin level (p<0.005) which strengthened the notion that neonates of GDM mothers are more likely to suffer from neonatal hyperbilirubinemia.

The present study demonstrated that normal vaginal delivery was done in 59.2% cases and rest had Caesarian section which is almost similar (63.6% vs 36.4% respectively) to other report[8]. Relatively high proportion of delivery done caesarian section might have been compounded by the fact that in case of normal vaginal delivery mother and the newborn left the hospital much earlier than their counterpart and in case need sought clinical advice elsewhere but those with caesarian section stayed in the hospital till 6th or 7th postoperative day and the neonates represented relatively higher number.

Exclusive breast feeding argued to be beneficial to neonates in many ways. However, breast fed babies often shows early onset of jaundice may be due to ineffective lactation in first few days after birth resulting in dehydration or in some instances use of water or glucose in water finally cause aggravation of jaundice. The condition is also seen in successful feeding as well. It is suggested that glucuronidase containing breast milk may have a role in this respect. In neonates intestinal absorption of bilirubin appears to be enhanced by breast-feeding and by decrease or delay in the passage of muconium. In the present study 43.33% of the respondents had history of exclusive breast feeding. Higher proportion of neonates with hyperbilirubinemia was also shown by in another study[8]. Neonatal sepsis was found to be present in 24% of hyperbilirubinemic cases which was consistent with other study where it was demonstrated 26.6%[7]. This finding excluded sepsis as a major cause of jaundice in the neonates. It is concluded that low birth weight and prematurity remained to the major causes of neonatal hyperbilirubinemia in neonates. Other common causes, particularly ABO and Rh incompatibility, are also present which could be avoided by meticulous clinical practice and burden of neonatal morbidity and mortality related to hyperbilirubinemia can be reduced.

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