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Original Article

Comparative Study of Serum Bilirubin Level between Term and Preterm Babies in Mymensingh Medical College Hospital.

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Abstract:

Neonatal jaundice is observed during 1st week of life in approximately 60% of term infants and 80% of preterm infants. All jaundiced newborns are at potential risk for developing severe hyperbilirubinemia if there is uncontrolled or managed inappropriately. The objective of this study is to compare serum bilirubin level of term and preterm babies. A cross-sectional study was conducted with total of 100 newborns babies who were admitted into neonatal unit, babies from obstetric department and who came for checkup and follow up in neonatal unit of Mymensingh Medical College Hospital, Mymensingh during the period August 2006 to January 2007. In this study, mean gestational age of term babies was 38.9±1.22 weeks and of preterm babies was 34.64±1.05 weeks. Mean bilirubin levels observed in term babies 6.68 and 5.72 mg/dl on day 3 and day 5 respectively. In preterm babies, the mean bilirubin levels were 7.16 and 9.09 mg/dl on day 3 and day 5 respectively. Statistically significant differences were observed in bilirubin level on day 5 in both term and preterm groups ($p<0.05$). Incidence of jaundice among term babies was 64.0% and among preterm babies was 84.0%. Jaundice developed significantly more among the preterm babies than the term babies ($p<0.05$). From this study, it can be concluded that in premature infants, the rate of rise in serum bilirubin tends to be the same or a little slower and mean serum bilirubin level was higher than that of term babies.

Key words: Serum Bilirubin, Term Babies, Preterm Babies.

Introduction:

Hyperbilirubinaemia is a common transitional finding in newborn babies. At least two third of all newborn develop jaundice during first month of life[1,2]. The plasma of human infant at birth contains a concentration of bilirubin that on the average considerably exceeds the figure for normal adult, the concentration increases rapidly after birth to reach peak at two or five days and thereafter slowly decreases[3,4]. Jaundice is one of the commonest physical sign in newborn, so much so that mild jaundice is described as physiological in a majority of the affected babies[5]. The overall incidence of neonatal jaundice is about 33% in our country[6,7]. About 60% of term and 80% of preterm baby develop clinical jaundice during first week of life[8]. Delivery of preterm as well as low birth weight babies in our country is more than that of developed countries. Hyperbilirubinaemia in these babies is relatively more than that of developed countries. In preterm infants, the rise in serum bilirubin tends to be same or little slower than that in term infant but it is of longer duration which generally results in higher levels[9]. In case of full term, bilirubin raises upto 10 mg/dl at 3-4 days of age and then fall and disappear at 5th-7th days. When jaundice develops in preterm infant, on or after 2nd or 3rd day of life, serum bilirubin usually rises up to 10-12 mg/dl on 5th day of life, possibly rising over 15 mg/dl and then fall to resolve by 14 days.

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Neonatal hyperbilirubinaemia is not a major cause of mortality in our country[10]. But it always demands special attention because of serious toxic effect of unconjugated bilirubin to brain. It can cause cerebral dysfunction leading to permanent crippling or even death[11]. Premature infants are at risk of brain damage at considerably lower level of serum bilirubin than in term babies[9]. Being a developing country with per capita income of US $ 480, most of the people in Bangladesh are below average economic condition[12]. The health statuses of our mothers are also below average. As a consequence preterm and low birth weights are more common. So serum bilirubin level between term and preterm babies are usually different. There is no comparative study of serum bilirubin with term and preterm babies in our country. This study was done to observe the difference of serum bilirubin level between term and preterm newborn in Mymensingh Medical College Hospital.

Materials and Methods:

This hospital based cross-sectional study was conducted in neonatal unit of Mymensingh Medical College Hospital, Mymensingh during a period of 6 months starting from August 2006 to January 2007. A total of 100 newborns were selected randomly as a study population, of which 50 were term and 50 were preterm. Inclusion criterias are babies who were admitted into neonatal unit and babies from obstetric department and who came in neonatal unit for check up; in case of term babies - gestational age- 37 completed weeks to <42 completed weeks and weight 2500 gm to 4000 gm. In case of preterm babies - gestational age- 32 weeks to <37 completed weeks and weight 1000 gm to <2500 gm. Exclusion criterias are Rh & ABO incompatibility, very sick babies, severe congenital anomalies, 1st day babies, weight- less than 2500 gm and more than 4000 gm for term babies, weight- less than 1000 gm and more than 2500 gm in case of preterm babies and gestational age- less than 32 weeks in case of preterm babies.

Procedure of the study:

A detail history and clinical examination were done. Gestational age of newborns were determined according to the first day of the mother's last menstrual period (by the mother's statement) and were additionally confirmed by the Ballad scoring system and antenatal ultrasonographic estimation or obstetric record, if present. Birth weight and other parameters were recorded. Examination findings were documented on a questionnaire. First Jaundice was assessed clinically, and then it was confirmed by estimation of serum bilirubin. When serum bilirubin was 5mg/dl or more, the patient was considered as jaundiced. Serum bilirubin (total) was estimated on day 3 and day 5 in all the cases. From each baby 2ml blood was drawn in each time. Blood sample was sent to the laboratory in a test tube wrapped in a carbon paper to avoid exposure to sunlight and breakdown of bilirubin. Bilirubin was estimated spectrophotometrically. Patients were followed up once a day in diffuse daylight in order to assess clinical improvement or deterioration.

A semi structured and open questionnaire was prepared for collection of information specific for the study. After taking written and verbal consent from mothers and guardians, all required information were obtained and documented on questionnaire and samples were collected. After obtaining investigation reports from the laboratory; the data were sorted, scrutinized and prepared for analysis. The data were analyzed by using SPSS programme.

Results:

A total of 100 newborns comprised the study group; of them 50 babies were preterm and rest 50 babies were term. Mean gestational age of term babies was 38.9±1.22 weeks and of preterm babies was 34.64±1.05 weeks. Mean (±SD) weight of the term babies was 2.96 (±0.23) kg and of the preterm babies was 1.89 (±0.28) kg (Table-I) Serum bilirubin level of term babies at D-3 were ranging from 03-10.2 within 37 completed wks to 39 wks and 2.9-8.7 within 40 wk to 42 completed wks. Serum bilirubin level of term babies at D-5 were ranging from 2-14 within 37 completed wks to 39 wks and 2-6.5 within 40 wk to 42 completed wks (Table-II) Serum bilirubin level of preterm babies at D-3 were ranging from 3-10.2 within 32 to 34 wks and 2-10 within 35 to 37 completed wks (Table-III) Serum bilirubin level of preterm babies at D-5 were ranging from 4.1-13 within 32 to 34 wks and 3-12 within 35 to 37 completed wks. Mean bilirubin levels observed in term babies were 6.68 and 5.72 mg/dL on day 3 and day 5 respectively (Table-IV) In preterm babies, the mean bilirubin levels were 7.16 and 9.09 mg/dL on day 3 and day 5 respectively. Statistically significant differences were observed in bilirubin level on day 5 in both term and preterm groups ($p<0.05$). Incidence rate of jaundice among term babies was 64.0% and among preterm babies was 84.0% (Table-V) Jaundice developed significantly more among the preterm babies than the term babies ($p<0.05$). Clinical jaundice developed in 62.5% term babies at day 2 and in 37.5% at day 3. On the other hand; 26.2% and 73.8% of preterm babies developed clinical jaundice on day 2 and day 3 respectively. Maximum number of term babies jaundice on day 2 and that of preterm babies on day 3 and the difference was statistically significant (Table-VI) Jaundice disappeared from 21.4% preterm babies within 5 to 7 days and 78.6% within 8 to 10 days. In term babies, jaundice had disappeared from 56.3% and 43.7% patients within 5-7 days and 8 to 10 days respectively. Statistically significant difference was observed in term of day of jaundice disappearance in both groups ($p<0.05$) (Table-VII).

Table-I: Distribution of study population by gestational age and birth weight

Groups	Gestational age (weeks)
Term babies	38.9±1.22
Preterm babies	34.64±1.05
Groups	**Birth weight in Kg**
Term babies (n=50)	2.96±0.23
Preterm babies (n=50)	1.89±0.28

Table-II: Serum bilirubin level of term babies at D-3 and D-5 by the gestational age.

Gestational Age	Serum bilirubin level (mg/dl) at D-3 Range	Mean	p value
37 completed wk to 39 wk	03-10.2	7.32	0.08
40 wk to 42 completed wk	2.9-8.7	5.86	
Gestational Age	**Serum bilirubin level (mg/dl) at D-5 Range**	**Mean**	**p value**
37 completed wk to 39 wk	2-14	6.88	0.07
40 wk to 42 completed wk	2-6.5	4.95	

Table- III: Level of Serum bilirubin of preterm babies at D-3 and D-5 by the gestational age.

Gestational Age	Serum bilirubin level (mg/dl) at D-3 Range	Mean	p value
32-34 weeks	03-10.2	7.32	0.02
35-37 weeks	2-10	9.88	
Gestational Age	**Serum bilirubin level (mg/dl) at D-5 Range**	**Mean**	**p value**
32-34 wks	4.1-13	9.88	0.04
35-37 wks	3-12	7.8	

Table-IV: Comparison between mean bilirubin level of term and preterm babies at different days of observation:

	Group Term(n=50)	Preterm(n=50)	p value
Day 3	6.68±2.19	7.16±1.98	0.251
Day 5	5.72±2.44	9.09±2.50	0.001

Table- V: Presence of Jaundice in term and preterm babies (n=100):

Jaundice	Group Term babies	Preterm babies	p value*
Present	32 (64.0)	42 (84.0)	
Absent	18 (36.0)	8 (16.0)	**0.023**
Total	50 (100.0)	50 (100.0)	

Table-VI: Time of onset of Jaundice in term and preterm babies:

Onset in day	Group Term (n=32)	Preterm (n=42)	p value
Day 2	20 (62.5)	11 (26.2)	
Day 3	12 (37.5)	31 (73.8)	**0.002**
Total	32 (100.0)	42 (100.0)	

Table-VII: Time of disappearance of clinical jaundice in neonates in days:

	Preterm babies	Term babies	p value
5-7 days	9 (21.4)#	18 (56.3)	
8-10 days	33 (78.6)	14 (43.7)	0.002
Total	42 (100.0)	32 (100.0)	

Discussion:

One hundred cases were studied during a period from August 2006 to January 2007. Among them 50 were preterm and 50 were term neonates. The study was designed to estimate and compare serum bilirubin level of term and preterm babies. In this study, mean gestational age of the term babies was 38.9 weeks and of the preterm babies was 34.64 weeks. Mean weight of the term babies was 2.96 kg and that of preterm babies was 1.89 kg. The average birth weight of Bangladeshi neonate was found to be 2.48-2.53 kg[13]. During the period of this study, the incidence of neonatal jaundice was found to be 74% of total cases. The incidence of neonatal hyperbilirubinaemia as reported by various Indian workers varies from 54.6-77% which is comparable to the present study[6].

In this study, 42 (84.0%) of preterm babies and 32(64.0%) of term babies were found to be jaundiced. This pattern is consistent with the finding of other observations[6].

In this study, difference of serum bilirubin level between 37-39 wks and 40-42 wks of gestation was found statistically insignificant in both D-3 and D-5 of age. But difference between serum bilirubin level on D-3 and D-5 between 32-34 wks and 35-37 wks of gestation was found significant. In preterm babies in both groups it is seen that serum bilirubin level is more marked in more preterm babies on D-5. This finding is similar to study done in Turkey by SarieiSU et al[14].

In this study, mean serum bilirubin level observed in term babies were 6.68 mg/dl and 5.72 mg/dl on day 3 and day 5 respectively. In preterm babies, mean serum bilirubin level were observed 7.16 mg/dl and 9.09 mg/dl on day 3 and day 5 respectively. Study in UCSF Medical Center[15] and Gilmore et al[16] showed that in term newborns, serum bilirubin progressively rises to mean peak of 5-6 mg/dl at 3-4 days and in preterm newborns, peak concentration of 8-12 mg/dl is reached by 5th day of life which is comparable to the present study. These findings are also comparable with other observations[17-19]. In the present study, the time of onset of jaundice was also analyzed. Among the preterm babies, 11 (26.2%) neonates manifested jaundice on the 2nd day and 31 (73.8%) on the 3rd day of life. On the other hand, in case of term babies, 20 (62.5%) neonates manifested jaundice at the age of 2nd day and 12 (37.5%) cases on the 3rd day of age. Gilmore et al showed that in almost every newborn particularly premature infants, elevated serum bilirubin level developed usually in the 2nd or 3rd day and Suckling et al showed that term newborn developed elevated serum bilirubin by 3rd day which is similar to the present study[16,20]. This pattern is also consistent with the finding of other observations[17,18].

Out of 42 preterm jaundiced babies, 33 (78.6%) babies jaundice disappeared between 8-10 days. Among the 32 term jaundiced babies, 18 (56.3%) jaundice disappeared between 5-7 days. In this study it is observed that disappearance of jaundice occured early in term babies than in preterm babies. As reported by Wikimedia Foundation, USA jaundice lasts for about 7 days in preterm newborns and about 5 days in term newborns which is comparable to the present study[21]. These findings are also consistent with other observations[17, 18, 22].

Conclusion:

Hyperbilirubinaemia is a common and, in most cases, benign problem in neonates. In premature infants, the rate of rise in serum bilirubin tends to be the same or a little slower and mean serum bilirubin level was higher than that of term babies. Hyperbilirubinaemia in preterm infants is more prevalent, and its course is more protracted than in term neonates.

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