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SHORT COMMUNICATION

MATERNAL AND NEONATAL FACTORS AFFECTING PHYSIOLOGICAL JAUNDICE IN WESTERN U.P.

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Abstract : Several maternal and fetal factors are responsible for neonatal jaundice, which is a common observation in large number of newborns. However, role of these factors in causation of this condition is not well established. Fifty pregnant mothers and their fifty two newborns were studied in the present study. Mothers with complicated pregnancy or septicemia at the time of delivery were excluded. In addition newborns with congenital or chromosomal abnormalities were excluded. Serum concentrations of bilirubin of all neonates were measured on days 1, 3 and 5. It was found to be lower on day 1, with a peak at day 3. The area under serum bilirubin level-time curve (AUC) for each neonate was also calculated. Fetal sex and birth weight were not found to significantly affect the neonatal hyperbilirubinemia. Newborn of bipara mothers were found to have significantly lower ($P<0.05$) serum bilirubin level on day 1 as compared to primipara mothers only but higher ($P<0.05$) on day 3 as compared to either primi or multipara mothers. Yet, AUC of serum bilirubin curve was significantly higher ($P<0.05$) in newborns of bipara mothers than others. Significantly ($P<0.05$) higher serum bilirubin on day 1 was also observed in preterm neonates than full term ones. However, maternal haemoglobin and mode of delivery were not shown to affect the neonatal bilirubin levels in these newborns.

Key words : serum bilirubin maternal anemia neonatal jaundice

INTRODUCTION

Neonatal hyperbilirubinemia is a known physiological phenomenon observed in about 60% full term and 80% pre mature newborns. Any process that presents greater serum

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bilirubin load results in this hyperbilirubinemia such as absence of placenta, immaturity of liver, shunting of hepatic venous blood via ductus venosus, reduced RBC life span, delayed breast-feeding and abnormalities in liver enzymes (1) and that may occur due to various physiological or pathological reasons in fetus, mother or both. However, most of the studies in this field were conducted abroad, that too confined mainly to pathological jaundice (2–5). Hence, in the present study, an attempt has been made to examine the effect of maternal & neonatal factors on neonatal jaundice and the study was performed in a hospital at Meerut in Western UP.

MATERIAL AND METHODS

Fifty pregnant mothers and their fifty-two neonates (including two twin deliveries) were selected from the obstetric ward of Sardar Vallabh Bhai Patel Hospital, Meerut. Written informed consent was taken from all the mothers after obtaining approval from the Institutional Ethical Committee. Only mothers with uncomplicated pregnancy and having no history of 1st trimester bleeding or septicemia at the time of delivery were selected. Similarly babies with non-physiological hyperbilirubinemia, cephalhaematoma, meconium aspiration, Rh incompatibility, and with major malformation or chromosomal abnormalities were also excluded. Information about age, parity, and mode of delivery and gestation period were recorded from each mother. Estimation of blood haemoglobin by Sahli's method and blood group assessment were done for every mother. Body weights at birth of all the neonates were taken immediately (within half an hour) after birth. Cord blood was taken for the estimation of serum bilirubin on day 1, subsequently venous blood was drawn for its estimation on days 3 and 5 (6). The area under serum bilirubin level-time curve (AUC) for the serum bilirubin data of each neonate was calculated by trapezoid integration between days 1 and 5. Statistical significance was calculated by using ANOVA for within group and unpaired Student t-test for between group comparisons.

RESULTS AND DISCUSSION

As shown in Table I, there was no significant alteration in serum bilirubin due to fetal sex and variation in body weight at birth on days 1, 3 and 5. However, the serum bilirubin levels were lowest on day 1,

TABLE I: Neonatal serum bilirubin levels (mean±SD) in relation to their birth weight & sex.

Parameter		*n*	*Serum bilirubin mg/dl*			*AUC*
			Day 1	*Day 3*	*Day 5*	
Birth weight (kg)	<2.5	22	1.51±0.56	7.09±1.94	6.61±1.73	22.32±5.06
	≤2.5	30	1.48±0.54	7.66±1.89	6.53±2.08	23.66±5.13
	F		0.06	1.05	0.02	0.75
Sex	M	33	1.40±0.52	7.69±1.82	6.65±1.03	23.56±5.05
	F	19	1.64±0.57	6.92±2.03	6.43±1.96	22.13±5.16
	F		2.43	1.84	0.15	2.74

Table value of F(2, 49) at 5% = 3.19

TABLE II: Neonatal serum bilirubin levels (mean±SD) in relation to their birth weight & sex.

Parameter		*n*	*Serum bilirubin mg/dl*			*AUC*
			Day 1	*Day 3*	*Day 5*	
Parity	P1	21	1.66±0.51	7.2±1.77	6.38±1.89	22.61±5.05
	P2	17	1.26±0.64$^{\square}$	8.51±1.44*	7.28±1.80	25.56±4.21*
	P3 & more	14	1.52±0.39	6.41±2.07	5.98±1.97	20.62±5.06
	F		3.52	5.66	1.98	4.22
Mode of delivery	Vaginal	21	1.56±0.47	7.69±1.80	6.15±2.11	23.49±5.24
	Ceasarian section	31	1.44±0.60	7.23±1.99	6.85±1.77	22.93±5.25
	F		0.56	0.73	1.71	0.20
Term	Preterm	13	2±0.48*	6.61±2.08	6.05±1.83	21.87±5.45
	Full term	39	1.32±0.46	7.68±1.80	6.74±1.95	23.43±4.98
	F		21.22	3.19	1.25	0.92
Haemoglobin (g%)	<10	7	1.30±0.57	8.23±1.64	7.16±2.02	24.93±4.83
	10-12	39	1.49±0.52	7.37±2.01	6.56±1.94	21.95±6.13
	>12	6	1.72±0.70	6.77±1.49	5.95±1.85	21.15±4.77
	F		0.93	0.99	0.63	0.89

Table value of $F(2, 49)$ at 5% = 3.19; *$P<0.05$ in comparison to respective group/groups; whereas $^{\square}P<0.05$ in comparison to group P1 only (unpaired students t-test)

reaching to peak on day 3 and exhibiting declining tendency on 5th day. Similarly no significant change was observed in area under serum bilirubin 7 level-time curve (AUC). When the neonatal serum concentration of bilirubin was analyzed on the basis of maternal factors (Table II), it was observed that neonates of Bi-para mothers exhibited significantly ($P<0.05$) lower serum biliribin on day one in comparison to new born of primipara mothers only whereas the rise in serum bilirubin level in these neonates on day 3 was significantly ($P<0.05$) higher than those of other groups. However, subsequent value on day 5 was not significantly different from newborn of primi or multipara mothers. The AUC of such neonates was significantly higher ($P<0.05$) than those of primi or multipara mothers.

Significantly high serum bilirubin levels have been reported in neonates born to high gravida and high parity (7). On contrary high bilirubin levels were found in newborns with lower birth order (8) but no relationship between serum bilirubin level and parity was observed in another study (9). Therefore the literature is equivocal about this relationship. Our findings of significantly higher AUC ($P<0.05$) in newborns to bipara mothers do not match to either of these observations. Though it is not possible to ascribe any specific reason, it may be due to racial, climatic or dietary influences which are different in Indian and Western countries.

Babies born to full term mothers have a significantly ($P<0.05$) lower serum bilirubin levels on day 1 as compared to babies born

to preterm mothers. However subsequent rise or fall on day 3 and 5 respectively as well as values of AUC did not reveal any significant change between two groups.

Newborns of mothers with short gestation period were found to have high serum bilirubin levels (1). It was also reported that the total serum bilirubin binding capacity and molar binding ratio of bilirubin to albumin are low in preterm babies, thereby greater possibility of developing kernicterus (10). The findings of the present study also match with others workers having significantly higher serum bilirubin level on day 1 in premature than full term neonates. It may be due to greater immaturity of liver and less active hepatic enzymes but subsequent insignificant ($P>0.05$) difference in values in days 3 and 5 is difficult to explain.

Serum bilirubin on days 1 and 3 were found to be higher in newborns delivered vaginally than caesarian section but the levels show a reverse pattern on day 5 in this study. As has been suggested neonates are stressed prior to birth and induce conjugative enzymes prior to vaginal delivery. Further newborns delivered by cesarian section are breast-fed relatively infrequently during 1st 48 hours of life than those born by vaginal delivery (11).

The study also revealed that the newborns of anemic mothers (Hb<10 g%) have lower serum bilirubin levels on, day 1 but higher on days 3 and 5 as compared with those born to mothers with Hb more than 10 g%. It also points that greater the maternal haemoglobin levels, lesser will be the rise and fall on days 3 and 5, respectively, thereby, exhibiting a relationship between haemoglobin levels and liver maturity. No relationship is documented between haemoglobin levels and neonatal hyperbilirubinemia. However, presence of infection/infestation or dietic factors might be responsible for it.

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