OBSTETRIC FACTORS INFLUENCING NEONATAL JAUNDICE

by

S. C. Gupte,* M.Sc.

H. M. Bhatia,** M.Sc., Ph.D.

and

B. N. Purandare,*** M.D., F.R.C.S., F.I.C.S., F.R.C.O.G., F.A.M.S.

Though voluminous literature has been accumulated dealing with the aetiology of neonatal jaundice, still the differential diagnosis in the individual case continues to present considerable problems. Since the hyperbilirubinaemia of haemolytic and non-haemolytic origin have in common the increased concentration of indirect serum bilirubin responsible for the brain damage, any jaundice in the neonatal period is a matter of concern. Jaundice of prematurity or blood group incompatibility is well establishtd. (Barton *et al*, 1962 and Mollison, 1967). Baxi *et al*, (1964) have reported the cases of neonatal jaundice due to G-6-PD deficiency, in India. Various maternal diseased conditions, like syphilis, diabetes, hepatitis, etc., are also known to cause neonatal jaundice. (Rudolph *et al*, 1956 and Whitaker *et al*, 1965). It also appears from the literature that the various foetal factors, like cephalhaematoma, intracranial haemorrhage, asphyxia, acidosis, respiratory distress, hypothermia, dehydration, etc. increase the risk of jaundice (Crosse 1966). Many of these factors are usually associated with the maternal obstetric complications such as instrumental delivery, abnormal presentations, placental accidents, prolonged labour, etc. (Schaffer 1965). Besides this the risk of neonatal jaundice is also increased because of maternal and neonatal infections.

Thus, it appears that many factors, either singly or in combination, may cause neonatal jaundice of various severity. A survey of neonatal jaundice was carried out at the Nowrosjee Wadia Maternity Hospital. This report deals with various obstetric factors influencing neonatal jaundice.

Material and Methods

From February 1969 to November 1970, all the infants born at the Nowrosjee Wadia Maternity Hospital were screened for the presence of jaundice during first 48 hours of life. During this period, the cases of jaundice were detected by taking personal round in the wards and mothers of all jaundiced infants were personally interviewed to get complete obstetric history, complications of the present delivery and condition of the infant at the time of birth and during postnatal period. Remaining liveborn infants delivered during this period were included as control series and their obstetric history was collected from the labour ward register.

Our studies on the normal haematological values of the newborn infants

Blood Group Reference Centre and N. Wadic Maternity Hospital, Parel, Bombay-12.

**Research Assistant.*

***Asst. Director and Officer in Charge.*

****Dean Nowroji Wadia Maternity Hospital, Parel, Bombay.*

suggested that the serum bilirubin levels of more than 6 mg per cent at 48 hours of birth should be considered abnormal (Gupte *et al* 1972). Accordingly all the infants suspected of having clinical jaundice were investigated for complete haematology, serology and biochemistry and only those having serum bilirubin levels above 6 mg per cent were considered as jaundiced and included in the series.

The data of the jaundiced infants were analysed on the basis of birth weight, sex, parity maternal and neonatal complications. The analysis was compared with the incidence of such parameters in the control series. Statistical significance, whenever necessary, was calculated.

Results

Table I gives the number of deliveries in the obstetric section of the N. Wadia Maternity Hospital and also the incidence of abortions, stillbirths, twins deliveries and neonatal jaundice. It appears from this table that the incidence of jaundice among the liveborn infants is 6.56 per cent.

Correlation of the neonatal jaundice with sex, parity and birth weight is given in Table II. Findings suggest that the risk of jaundice is more in male infants, first born infants and premature infants weighing 2 Kg. or less at birth.

Data were further classified to see the inter-relationship between sex, parity and

TABLE I

Outcome of the Present Delivery During the Period of Study

Out come	Number	Incidence
Total No. of deliveries	17207	
Abortions	1484	8.6*
Stillbirths	672	3.9*
Liveborn infants	15235	87.5*
Liveborn twins	182	1.2**
Jaundiced infants	1000	6.56**

* Incidence on the basis of all deliveries.
** Incidence on the basis of live born infants.

TABLE II

Classification of Jaundiced Infants on the Basis of Sex, Parity and Birth Weight

	Sex		Para		Birth weight	
	Male	Female	Primi	Multi	upto 2 kg.	Over 2 kg.
Ob. No.	585	414	455	535	180	819
Exp. No.	509	490	237	753	127	872
P value<	0.001*	0.001*	0.001*	0.001*	0.001*	0.25

* Statistically significant.
Note: Expected numbers in table are calculated on the basis of incidence observed in control series.

TABLE III

Interrelationship Between Sex, Parity and Birth Weight of the Jaundiced Series

		Sex		Primi
		Male	Female	
Primi (455)	Ob. No.	280	175	
	Exp. No.	235	220	
	P Value<	0.01*	0.01*	
Premature (2 kg or less) (180)	Ob. No.	88	92	69
	Exp. No.	88	92	88
	P Value<	—	—	0.1

* Statistically significant.

birth weight. Table II shows that first born male infant is more at risk of getting neonatal jaundice. There was no sex difference in the premature jaundiced infants' series.

Table IV gives the data regarding the present delivery in the jaundiced series compared with the normal control series. Findings suggest that incidence of complications like forceps, vacuum extractions, caesarean sections, abnormal presentations, etc., is significantly higher in the jaundiced series than in the control. Besides the complications incorporated in Table iv, the data were also analysed on the basis of other complications, like accidental haemorrhage, eclampsia, hydraminos, cord around the neck, etc. and in all these conditions there was an increased risk joundice though the numbers in each category were not sufficient enough for statistical evaluation.

Table V gives the analysis of jaundiced infants on the basis of sex and birth weight in relation to forceps caesarean sections and breech presentations. The findings suggested that there was no sex difference. Analysis on the basis of birth weight indicated that jaundice in the infants delivered by caesarean section or breech presentation was not influenced by birth weight. However, there was higher incidence of jaundiced infants with more than 3 kg. birth weight in the forceps group.

In the series of jaundiced infants with forceps or caesarean sections, there was significant increase in primiparae, than in the normal control series. However, since primiparae have shown significant risk in the whole series of jaundice, the data of forceps and caesarean sections were analysed on the basis of incidence of these complications in primiparae, and this analysis did not suggest the increased risk of jaundice in primiparae undergoing forceps or caesarean sections (Table VI).

The data were also analysed on the basis of seasonal variations and findings are given in Table VII.

Discussion

The normal bilirubin values among Indian newborns at birth are upto 2.8 mg per cent. The levels rise upto 6 mg per cent during the first 48 hours after birth (Gupte *et al* 1972). These levels appear similar in the studies reported by Mollison and Cutbush (1949), Claireaux

TABLE IV

Effect of Obstetric and Paediatric Complications on Neonatal Jaundice

	Complications										
	Forceps or V.A.	Caesarean sections	Abnormal presentation	Twins delivery	Home delivery	Premature delivery	A.P.H.	P.P.H.	Episiotomy	Toxaemia	Asphyxia
Normal series	210 (1.4)	357 (2.7)	428 (2.88)	182 (1.2)	65 (0.45)	1872 (13)	141 (0.94)	122 (0.8)	2361 (15.7)	165 (1.1)	175 (1.16)
Jaundice series	74 (7.4)	56 (5.6)	74 (7.4)	10(1)	12(1.2)	180 (18)	22 (2.2)	22 (2.2)	377 (37.0)	20 (2)	30(3)
P value<	0.001*	0.001*	0.001*	—	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*

Figures in parenthesis indicate percentage. * Statistically significant.

TABLE V

Analysis of Jaundiced Infants Undergoing Forceps, Caesarean Sections and Breech Presentations on the Basis of Sex and Birth Weight

	Male Infants			Forceps Birth-wt.		Caesarean sections Birth wt.		Breech Presentations	
	Forceps	Caesareans	Breech presentation	Upto 3 Kg.	3 kg.	Upto 3 kg.	3 kg.	Upto 3 kg.	3 kg.
Normal series	96(56)	197(53)	133(52)	151(89)	19(11.0)	310(84)	61(16.0)	217(84)	41(61)
Jaundice series	35(56)	23(41)	29(53.7)	49(78)	14(22)	51(91)	5(9)	46(86)	8(14)
P value<	0.9	0.2	0.95	0.05*	0.01*	0.8	0.1	0.3	0.5

* Statistically significant.

Note: Figures in parenthesis indicate percentage.

TABLE VI

Incidence of Forceps, Caesarean Sections and Breech Presentations in Jaundiced Infants of Primiparae

	Forceps	Caesarean sections	Breech presentations
Normal series	114(67)	103(27)	56(25)
Jaundiced series	47(75)	18(33)	20(37)
P value	0.3	0.5	0.05*

* Statistically significant.
Note: Figures in Parenthesis indicate percentage.

TABLE VII

Seasonal Variation in Neonatal Jaundice

	Quarters of the year			
	Jan.-March	April-June	July-Sept.	Oct.-Dec.
No. of deliveries	2765	4156	5081	3233
No. of jaundiced infants	164	243	400	193
Incidence of Jaundice	5.9	5.82	7.87	5.97
P value	0.15	0.15	0.001*	0.15

* Statistically significant.

(1960), and Smith (1966), for the British population. Assuming 6 mg per cent bilirubin as the highest levels, the incidence of neonatal jaundice in our series appears to be 6.56 per cent of the live born infants. Incidence of neonatal jaundice changes from country to country. Brown and Wong (1965), recorded clinical jaundice in 90 per cent of the Chinese infants and 30 per cent of the European infants. Incidence of jaundice observed by Shnier and Levin (1959) in Bantu infants was 4.2 per cent, whereas Lee *et al* (1970) reported 12 per cent of Chinese infants with serum bilirubin levels more than 15 mg per cent. In the present series 76 per cent of the jaundiced infants had serum bilirubin levels upto 12.5 mg per cent, while 22.1 per cent had serum bilirubin between 12.5 to 20 mg per cent. Only 1.9 per cent of the jaundiced infants had very severe disease with more than 20 mg per cent serum bilirubin.

A seasonal increase in the incidence of neonatal jaundice has been observed by Mitchell *et al* (1969) in a small community from California, in the fourth quarter of each year reviewed. Lee *et al* (1970) observed significant increase in the incidence in summer. Our findings (Table VII), suggests significant increase in the third quarter of the year. Since July to September is the rainy season in Bombay, this may be attributed to the unhygienic conditions.

Analysis on the basis of sex showed that the males were predominantly affected by jaundice. This has been observed by several workers (Barton *et al* 1962; Lee *et al* 1970). Lee *et al* (1970) considered this to be due to the predominance of the G-6-PD deficiency in the males. But, in the present series only eight infants were G-6-PD deficient and obviously this was not the cause. It is likely that normally for the same birth

weight males are slightly less mature than females (Crosse 1966).

The present analysis indicated that the first born infants are more susceptible to get jaundice. Lee *et al* (1970), also reported similar observations. The present work also showed that breech delivery in primipara increases the risk of jaundice in the newborn infant, while the other complicated deliveries like forceps and caesarean sections did not show any relationship with parity. As stated earlier that males are at greater risk of getting jaundice, but the data suggested that the risk is much higher for the first born male infants.

Premature infants are more susceptible to get jaundice has been shown by all workers (Lucey 1960; Barton *et al* 1962). This has been considered to be due to the immaturity of newborn infants' liver and several complications associated with prematurity. All these workers have, however, taken 2.5 kg. as the level of prematurity. Birth weight is influenced by various factors like geographical, racial and socioeconomic and nutritional status. Since the patients coming at the Nowrosjee Wadia Maternity Hospital have low socioeconomic and nutritional status, the analysis of the control group during this period showed that 50 per cent of the infants have less than 2.5 kg. birth weight. Therefore, in this series infants weighing 2 kg. or less at birth were considered premature as suggested by several Indian workers (Kalra *et al* 1967 and Ghosh and Daga 1967). The risk of neonatal jaundice appears to be higher in the premature infants from the present series. As indicated earlier, even though male infant is at greater risk of getting jaundice, sex had no effect in the group of premature infants. This observation has also been made by Barton *et al* (1962). Since the birth weight of male infants for any gestational period is always higher than female infants this may influence the number of male infants in the lower birth weight group.

The risk of neonatal jaundice is increased due to the complications during prenatal, natal and postnatal periods. The prenatal factors which increase the risk are antepartum haemorrhage (A.P.H.), toxaemia, eclampsia, various drugs taken by the mother, etc., which may influence jaundice either by haemolysis or by inhibiting bilirubin conjugation. Crosse (1966) suggested that the increased risk of jaundice could be due to asphyxia, acidosis, respiratory distress, intracranial haemorrhage, hypothermia, etc.

The influence of various postnatal factors increasing the risk of neonatal jaundice have been considered by several workers (Crosse *et al* 1955; Lucey 1960), but the prenatal factors are considered by very few. Barton *et al* (1962) observed that the prenatal complications like toxaemia, eclampsia, A.P.H., etc. did not increase the risk of neonatal jaundice. In the present series the number of eclamptic mothers was too small to draw any conclusion. However, the risk of jaundice appears more in the cases of toxaemia, antepartum haemorrhage, etc. Association between A.P.H. and neonatal jaundice was also noted by Dunden (1960) and Sacrez *et al* (1960). Gessener (1969), attributed this to be due to maternal blood swallowed by the infant. The present series also suggested that complicated deliveries like forceps, caesarean sections, etc., increased the risk of neonatal jaundice. Lee *et al* (1970), observed increasd incidence of jaundice in the infants undergoing vacuum extractions. It appears from our study that breech presentations also influence the jaundice in the neonatal period.

Summary

One thousand newborn jaundiced infants were investigated at N. Wadia Maternity Hospital and were analysed to observe obstetric influence.

Analysis suggested that:

1. First born infants, male infants and premature infants (weighing less than 2 kg. at birth) were more susceptible to get jaundice.

2. There was no sex difference in the series of premature jaundiced infants.

3. All obstetric complications increased the risk of neonatal jaundice, particularly forceps, caesarean sections and breech presentations.

4. Incidence of jaundice was significantly increased in the rainy season.

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