

# MATERNAL AND OBSTETRICAL RISK FACTORS IN ASPHYXIA NEONATORUM

By

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## SUMMARY

A prospective study was conducted on 1274 consecutive live births to identify the maternal and obstetrical risk factors in relation to birth asphyxia. 9.1% babies had asphyxia at birth (Apgar < 7 at 1 minute). The incidence of 8.5% in singleton births was significantly less than that of 19.7% observed in multiple births ( $p < 0.01$ ). Maternal and obstetrical causes were responsible for asphyxia in 51.4%, the foremost among them being prolonged or obstructed labour. Antepartum haemorrhage, tight loop of cord round the neck and general anaesthesia given to the mother carried a risk of 47.0%, 16.6% and 13.7% respectively. Asphyxia was three times more common in babies born to toxæmic and anaemic mothers, this difference was statistically significant in both conditions ( $p < 0.001$ ). Increased incidence of asphyxia in babies of anaemic mothers has not been reported before and needs further study. Babies born to Grand-multiparous mothers had the highest incidence of asphyxia (15.0%) followed by primiparous mothers (9.31%). The incidence in Grand-multiparous mothers was significantly more when compared to 2nd, 3rd and 4th gravida mothers collectively ( $p < 0.001$ ). Most maternal and obstetrical factors can be controlled by good antenatal care and efficient peripheral referral services.

## Introduction

Asphyxia neonatorum is the foremost cause of first week mortality in India (Ghosh *et al* 1969, Bhakoo *et al* 1975, Santhakrishnan *et al* 1986). Hence prevention of neonatal asphyxia is vital for reducing perinatal mortality. By identifying the associated easily definable maternal and obstetrical risk factors and thus anticipating asphyxia neonatorum in high risk

cases an optimal perinatal care approach can attempt to reduce the incidence of perinatal mortality and morbidity of mental and physical handicap. Keeping this in mind the present study was undertaken.

## Material and Methods

One thousand two hundred and seventy four consecutive live births born at Mahatma Gandhi Institute of Medical Sciences, Sevagram were studied prospectively. Detailed history and data were recorded in a predesigned proforma. Mothers were examined and investigated

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for toxæmia of pregnancy (blood pressure > 90 mm Hg diastolic with hyperreflexia and/or significant proteinuria (Macdonald and Mulligan 1980), anaemia (Hb < 10 gm% by Sahli's method). Maternal post-delivery weight and height were recorded. All deliveries were attended to by a neonatal resident who gave timely resuscitation when required, and recorded apgar scores at 1 mt, 5 mts, and 10 mts. Apgar score of 7 or less, 4 to 6 and 0-3 at 1 mt were indicative of mild, moderate and severe asphyxia respectively.

Here we present the analysis of certain maternal and obstetrical factors of 1208 singleton livebirths, the rest 66 live births were multiple births hence were excluded from this analysis. Statistical significance was calculated using  $X^2$  test.

### Results

The overall incidence of asphyxia neonatorum was 9.10% (116/1274). In singleton births it was 8.52% (103/1208) as against 19.70% (13/66) in multiple births. This difference was statistically significant ( $p < 0.01$ ). Further analysis was done on 1208 singleton live births only. The asphyxia was mild in 2.3% moderate in 3.8% and severe in 2.4% cases. On studying the antenatal and natal events carefully the most important factors responsible for asphyxia at birth were maternal and/or obstetrical in 53 (51.45%) and fetal in 47 (45.63%). Among these 8 babies had both factors. No obvious cause could be determined in 11 (9.9%) babies. Among the maternal and/or obstetrical factors the foremost cause was prolonged or obstructed labour whereas prematurity was the most frequent cause among the fetal factors (Table I). Presence of antepartum haemorrhage, tight loop of cord round the neck and general anaesthesia

given to the mother for obstetric intervention in cases of prolonged labour carried a risk of 47.05%, 16.67% and 17.70% respectively for neonatal asphyxia. A nearly threefold rise of asphyxia was observed in babies born to toxæmic and anaemic mothers (Table II). These differences were statistically significant in both groups ( $p < 0.001$ ). Maternal weight (< 45 kg) and maternal height (< 145 cms) were not found to be significantly associated with neonatal asphyxia. The incidence of asphyxia was highest in offsprings of grand multiparous mothers (15.0%) followed by primigravida mothers (9.31%). However in grand multiparous mothers mild asphyxia occurred with a higher frequency (85.0%) with virtually no severe asphyxia, whereas in primigravidas severe asphyxia was recorded in 24.5% of birth asphyxiat-

TABLE I  
Prominent Contributory Factors in Asphyxiated Newborns

	No.	%
<b>I. Maternal and Obstetrical factors</b>		
Prolonged or obstructed labour	25	22.52
Toxaemia of pregnancy	9	8.10
Antepartum haemorrhage	8	7.20
Use of general anaesthesia	7	6.30
Use of sedatives in the mother within 24 hours before delivery	3	2.70
Abdominal pregnancy	1	0.90
<b>II. Fetal factors</b>		
Prematurity	21	18.91
Foetal distress without any obvious cause	11	9.90
Meconium aspiration	6	5.40
Congenital anomaly	5	4.50
Tight loop of cord round the neck	3	2.70
Post maturity	1	0.90
<b>III. No obvious cause</b>		
	11	9.90

TABLE II  
Birth Asphyxia in Relation to Maternal Toxaemia, Anaemia and Gravidity

Maternal Factor	Total	Neonatal Asphyxia	p value of
<i>Toxaemia</i>			
Present ..	47 ( 3.9)	11 (23.4)	<0.001
Absent	1161 (96.1)	92 ( 7.92)	
<i>Anaemia</i>			
Hb <10 gm%	545 (45.1)	77 (14.2)	<0.001
Hb >10 gm%	663	26 ( 3.9)	
<i>Gravidity</i>			
A. Primigravida	537 (44.4)	50 ( 9.3)	Only E Vs. B+C+D = <0.01 Rest not significant
B. Second gravida	315 (26.0)	22 ( 6.9)	
C. Third gravida	209 (17.3)	18 ( 8.8)	
D. Fourth gravida	102 ( 8.4)	6 ( 5.0)	
E. Fifth or more Gravida multipara	45 ( 3.7)	7 (15.0)	

Figures in parentheses indicate percentage.

ed babies and mild in 50.0%. The incidence of asphyxia in babies of grandmultiparous mothers was significantly more ( $p < 0.001$ ) when compared to babies of 2nd, 3rd and 4th gravida mothers collectively.

#### Discussion

The incidence of asphyxia neonatorum (9.16%) in the present study is not different from that reported in other Indian studies as Bhakoo *et al* (1975) reported it as 9.8% and Batra *et al* (1968) as 9.6%. Macdonald and Malligan (1980) recorded an incidence of 1.16% when he defined neonatal asphyxia as infants who require > 1 mt of IPPR before sustained respiration. Our finding of a significantly increased incidence of asphyxia neonatorum in multiple births is well acknowledged (Batra, 1988; Sing, 1978). Severe asphyxia in our study occurred only in 2.40% of cases as opposed to 4.9% (Macdonald and Mulligan, 1980), 3.2% (Singh and

Kalra, 1978) and 3.00% (Batra *et al*, 1988) reported earlier. Fall in severity can be attributed to the fact that we excluded multiple births in this analysis and in our institute all deliveries irrespective of risk factors are attended to by neonatal residents.

Maternal and Obstetrical factors were responsible for about half the cases of neonatal asphyxia. The same trend can be seen in the data of Batra *et al* (1988). Prolonged labour, the end result of various obstetrical factors as an important contributory factor in our study could possibly be due to delay in referral and transport of cases, ours being a rural institute catering to mainly the rural population around. In recent times the liberal use of caesarean sections should be able to bring down prolonged labour and malpresentation as causes of neonatal asphyxia with a good and timely referral system and transport. Friedman and Sachtleben (1976) reported the incidence of neonatal depression (Apgar < 6) to be higher (7.1%) in nulliparous women

with prolonged labour as compared to expected (6.1%). Cry *et al* (1984) showed high risk of asphyxia after antepartum haemorrhage, cord prolapse and shoulder dystocia, whereas Batra *et al* (1988) observed cord prolapse, malpresentation and fetal distress to be the minor risk factors, however we identified antepartum haemorrhage, tight loop of cord round the neck and maternal general anaesthesia in cases with prolonged labour as important risk factors.

Babies born to toxemic mothers have an increased risk of neonatal asphyxia due to multiple factors. There being placental insufficiency as a result of maternal hypertension, maternal convulsion and placental pathology (Zeak and Assali, 1950) fetal depression due to heavy maternal sedation and high incidence of premature termination of pregnancy in toxemic mothers. Our finding of increased incidence of asphyxia neonatorum in babies of toxemic mothers compares well with that of Macdonald and Mulligan (1980) who reported this finding in term infants of toxemic mothers. We have however not come across studies relating maternal anaemia to neonatal asphyxia. We found a significant increase in neonatal asphyxia in babies of anaemia mothers. Maternal anaemia is known to cause intrauterine growth retardation (Bhargava *et al*, 1973; Singla, 1980) and low cord haemoglobin (Nohanli and Kharna, 1975) hence we postulate that both these factors may be responsible indirectly for asphyxia in babies of anaemic mothers. A higher incidence of asphyxia neonatorum in primigravida and multigravida mothers is consistent with earlier reports (Bell *et al*, 1986; Batra *et al*, 1988). These mothers are known to have difficult labour with associated fetal and neonatal complications.

Hence the present study concludes that

maternal and obstetrical factors are responsible for fifty per cent of cases of asphyxia neonatorum. Barring a few most are preventable by timely referral and adequate management of high risk cases such as maternal toxemia, maternal anaemia and antepartum haemorrhage. Early identification, quick transport and appropriate management of cases of obstructed labour will also help immensely in decreasing the incidence of neonatal asphyxia. All this therefore points to improvement in quantity and quality of obstetrical care in the rural peripheries.

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DISCUSSION

Asphyxia neonatorum is a clinical entity which is defined as a state of hypoxia and acidosis in the newborn infant. It is a common cause of perinatal mortality and morbidity. The incidence of asphyxia neonatorum is reported to be 10-15% in modern cities. The incidence is higher in the developing countries. The incidence of asphyxia neonatorum is reported to be 10-15% in modern cities. The incidence is higher in the developing countries. The incidence of asphyxia neonatorum is reported to be 10-15% in modern cities. The incidence is higher in the developing countries.

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