OUTCOME IN RELATION TO APGAR SCORE IN TERM NEONATES

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ABSTRACT

Sixty four asphyxiated term babies (Apgar score of 6 or less at 5 minutes) and 90 non-asphyxiated term babies (controls) were studied. Of these, 40 cases and 48 controls could be followed up. Mortality and neurodeveloptnental outcome were studied in both the cases and controls. Mortality and poor neurodeveloptnental outcome correlated inversely with the Apgar scores at 5 and 10 minutes. The outcome of babies with low 5 minute Apgar scores was significantly better than those with the same scores at 10 minutes. Symptomatic neonates when compared to asymptomatic neonates with same Apgar score showed significantly poorer outcome. Babies with Apgar scores of 6 at 5 or 10 minutes behaved like the controls both in terms of mortality and neurodevelopmental outcome.

Key words: *Birth asphyxia, Apgar score, Neurodevelopmental outcome.*

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Asphyxia is one of the important causes of perinatal mortality, but whether the sub-lethal degrees of hypoxia result in brain damage of surviving infants or have long term effects, is less certain(l). Detrimental effects of perinatal asphyxia on subsequent development, have been observed for more than a century, but there is uncertainty about the sequence of events and prognostic value of the neurological signs exhibited by newborn babies having such a brain damage(2).

Material and methods

The present study was conducted prospectively on 64 term asphyxiated newborn and 90 term non-asphyxiated newborns delivered at Queen Mary's Hospital, Lucknow. Apgar scores of 6 or less at 5 minutes after birth were taken as criteria for the diagnosis of birth asphyxia. Apgar scoring of asphyxiated neonates was repeated at 10 minutes after delivery. Details of mother's pregnancy, labor and the delivery were noted in each case. All cases with history of maternal narcotic intake, respiratory distress, central cyanosis, jaundice, abdominal distention and congenital malformations were excluded from the study.

The follow up of 40 asphyxiated and 48 non-asphyxiated babies was successfully completed till the end of the study. The neurodevelopmental assessment at follow up was carried out using the Denver Developmental Screening Test (DDST). Statistical evaluation was done at 3 months, 7 months, and 11 months at the termination of the study. These results of neuro-developmental assessment were classified as normal, abnormal or questionable.

Results

Out of 1800 term babies delivered at Queen Mary's Hospital, Lucknow during

the study period, 64 (3.6%) had birth asphyxia, of which 24 babies (37.5%) expired.

Sixty four term neonates with Apgar score of 6 or less at 5 minutes were taken as cases. The mean gestational age and birth weights of the babies in the study group were 39.4 weeks (range 37-41 weeks) and 3.1 kg (range 2.6 to 3.5 kg), respectively. The 90 non-asphyxiated term neonates that were taken as controls had an almost similar mean birth weight, *i.e.,* 3.2 kg and gestational age, 39.2 weeks.

Tables I & II show neonatal mortality in relation to Apgar scores at 5 and 10 minutes. The neonatal mortality was 5.6% in the control group. The high mortality was because of a high percentage of cases with septicemia and respiratory infections in the unbooked and complicated deliveries conducted at this referral centre.

When comparisons were made between the asphyxiated group and the control group with the 5 minutes Apgar score reading, the mortality was similar when the score was 6, 4 times when the score was 5, 5 times when the score was 4 and as much as 12 times when the score was 3 or less, in the asphyxiated group.

When 10 minute Apgar scores were considered, mortality was 16.7% with Apgar score of 6. It was twice as much with Apgar scores of 4 and 5 and was 4 times when the Apgar score was 3 or less.

Mortality of babies who had low Apgar scores at 5 minutes was assessed in relation to the symptomatic presentation. All the cases with 5 minutes Apgar scores of 0 to 3 were symptomatic, while in the cases with scores of 4 to 6, only 33.3% were symptomatic. Mortality was 66.6% in babies with Apgar scores of 0 to 3 and 33.3% in those with Apgar scores of 4 to 6. None of the asymptomatic babies with 5 minutes scores of 4-6 died.

Table III shows neurodevelopmental outcome after 3, 7 and 11 months follow up in the asphyxiated and non-asphyxiated babies in relation to 5 minutes Apgar scores. It was found that babies with Apgar scores of 6 behaved very much like the control group babies while they had significantly better outcome from the babies with lower Apgar scores.

Table TV shows neurodevelopmental outcome in relation to 10 minutes Apgar score after 3, 7 and 11 months of follow up. In the group with Apgar scores of 4-6, further divisions could not be made because of

TABLE I– *Apgar Score at 5 Minutes and Mortality*

Apgar score	No.	Mortality	(%)
≥7 Cases	90	5	(5.6)
6	16	1	(6.3)
5	10	2	(20.0)
4	8	2	(25.0)
0-3	30	19	(63.3)
Total cases	64	24	(37.5)

TABLE II– *Apgar Score at 10 Minutes and Mortality*

Apgar score	No.	Mortality	(%)
6	6	1	(16.7)
5	7	2	(33.3)
4	5	2	(40.0)
0-3	9	7	(77.8)

TABLE III-*Neurodevelopmenlal Outcome in Relation to* 5 *Minutes Apgar Score*

Group	5 min Apgar score	3 months				7 months				11 months			
		No.	N	Ab	Q	No.	N	Ab	Q	No.	N	Ab	Q
I	0-3	14	6 (42.8)	4 (28.6)	4 (28.6)	7	2 (28.6)	5 (71.4)	-	5	1 (20)	4 (80)	-
II	4	6	4 (66.6)	1	1	3	1 (33.3)	1	1	1	-	1 (100)	-
	5	8	7 (87.5)	1	-	3	2 (66.6)	1	-	2	1 (50)	-	1
	6	12	11 (91.7)	-	1	5	5 (100)	-		2	2 (100)		-
III	≥7	48	44 (91.7)	1 (2.1)	3 (6.2)	28	25 (89.2)	1 (3.6)	2 (7.2)	11	9 (81.9)	1 (9.1)	1 (9.1)
P value for													
I vs II		<0.05		>0.05	>0.05								
I *vs* III		<0.05		<0.05	<0.05								
II vs III		<0.05		>0.05	>0.05								

Legend: No. = Number, N = Normal, Ab = Abnormal, Q = Questionable.

Figures given in parentheses represent percentages.

TABLE IV-*Neurodevelopmental Outcome in Relation to 10 Minutes Apgar Score*

10 minutes Apgar score	3 months				7 months				11 months			
	No.	N	Ab	Q	No.	N	Ab	Q	No.	N	Ab	Q
0-3	3	-	2	-	2	-	2	-	1		1	-
4-6	13	9	2	2	6	4	3	-	3	2	1	-

Legend: No. = Number, N = Normal, Ab = Abnormal, Q = Questionable

small numbers of cases in this group. Tests for significance thus could not be performed.

Discussion

A salient feature brought out by this study, was that the mortality increased geometrically with decreasing 5 minute Apgar scores when it was 5 or less. But at the score of 6 it was almost similar to the control group. A similar relationship but with a higher degree of geometrical progression

was observed with the 10 minute Apgar scores. With similar Vow Apgar score readings at 5 and 10 minutes the mortality was significantly higher in the babies with low 10 minutes Apgar scores.

There was an inverse relationship of neurodevelopmental outcome and Apgar scores. Babies with low 5 minutes Apgar scores fared significantly better in terms of neurodevelopmental outcome than babies with the same low 10 minute Apgar scores. Apgar score of 6 showed almost similar neurodevelopmental outcome as that of controls.

Similar results have been reported by other authors also(3-8). Nelson and Ellenberg(3) showed that with 0 to 3 Apgar scores at 5 minutes, there was a mortality of 44% and disabling motor deficits in 50% of all survivors. Drage and Berendes(4) have shown similar results. The above authors showed that mortality and unfavorable neurodevelopmental outcome increased with Apgar score of 6 or less, but in our study, the outcome at Apgar score of 6 was nearly same as that of control group. Brown and Forfar(9) have shown similar relationship at the Apgar score of 6. They suggested that the use of Apgar scores of 5 or less was better predictor for mortality and unfavorable neurodevelopmental outcome.

Thus, the important fact brought out in the study is that Apgar score of 6 at 5 minutes should not be considered to denote significant asphyxia, and scores of 5 or less at 5 minutes should be taken as an indicator for asphyxia. Another observation highlights the fact that Apgar score should be repeated again at 10 minutes so that a better correlation to the neurodevelopmental outcome can be predicted.

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