

Original Research Article

Association of gestational age, Apgar score and neonatal outcomes in newborns with meconium stained amniotic fluid

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ABSTRACT

Background: Infants born with meconium stained fluid are at increased risk of fetal hypoxia, evidenced by increased rates of abnormalities indicated by fetal monitoring in labor, low neonatal Apgar scores, and fetal deaths. The study is conducted to determine association of gestational age, Apgar score and neonatal outcomes in newborn born with meconium stained amniotic fluid in tertiary care centre of central India.

Methods: The study was conducted over a period of 2 years from January 2012 to January 2014 in Department of Pediatrics, Sri Aurobindo Medical College and Hospital, Indore, Madhya Pradesh, India. One hundred newborns with meconium stained amniotic fluid (study group) and one hundred newborns with clear amniotic fluids (control group) were studied in this period. Gestational age, Apgar score and neonatal outcomes were compared among two groups.

Results: The mean gestational age in study group was 38.89 ± 1.14 weeks and in control group was 38.59 ± 0.99 weeks. The mean Apgar score at 1 min was 5.80 ± 1.59 in study group and in the control group was 7.86 ± 0.35 . 32 babies in meconium stained liquor had hypoxia of which 11 had respiratory distress, 11 required mechanical ventilation (MAS 08, sepsis 03), 2 newborns had HIE stage 2 and 5 patients died. The above findings suggest higher gestational age, lower Apgar score and poor neonatal outcomes are associated with meconium stained liquor.

Conclusions: The study depicts significant co-relation with higher gestational age, lower Apgar at 1 and 5 minutes and poor neonatal outcome in babies with meconium stained amniotic fluid.

Keywords: Apgar score, Gestational age, Meconium stained amniotic fluid, Outcome

INTRODUCTION

Meconium staining of fetus takes 3 to 4 hours to develop. Meconium is a muco-viscidic odorless substance and is the first stool passed by the newborn. Infants born with meconium stained fluid are at increased risk of fetal hypoxia, evidenced by increased rates of abnormalities indicated by fetal monitoring in labor, low neonatal Apgar scores, and fetal deaths.¹⁻³ It is known to be present in the fetal ileum by as early as 10-16 weeks of gestation.⁴

Fetal hypoxia stimulates fetal evacuation of meconium. Infants born with meconium stained amniotic fluid are at increased risk of fetal hypoxia, evidenced by increased rates of abnormalities indicated by fetal monitoring in labor, low neonatal Apgar scores, and fetal deaths.¹⁻³ Incidence of MSAF varies from 8-20% of all deliveries approx 5% go on to develop MAS. The incidence of MSAF increases from 1.6% at 34-37 weeks to 30% at >42 weeks of infants born through MSAF.⁵

Decreasing amniotic fluid volume is a progressive feature of advancing gestational age.⁶ Mazar et al, meconium staining of the liquor occurs in 5% or less of preterm pregnancies, when it suggests chorio-amnionitis, but the prevalence increases to 10% or more after 38 weeks, reaching 22% in patients at a gestational age of 42 weeks and 44% in babies who delivered 1-2 weeks later.⁷

The aim of the study was conducted to determine association of gestational age, Apgar score and neonatal outcomes in newborn born with meconium stained amniotic fluid in tertiary care center of central India.

METHODS

The study was conducted over a period of 2 years from January 2012 to January 2014 in Department of Pediatrics, Sri Aurobindo Medical College and Hospital, Indore, Madhya Pradesh, India. All newborns delivered in our institution during the study period were included in the study. Babies born to mothers with risk factors (diabetes mellitus, pre-eclampsia, hypertension, chorio-amnionitis) were excluded from study. Also, babies with low birth weight, intra-uterine growth retardation and pre-natal or post-natally diagnosed congenital heart disease were excluded from the study. Total 200 newborn babies were included in the study. One hundred newborns with meconium stained amniotic fluid and one hundred newborns with clear amniotic fluids were studied in this period.

After taking necessary permission from ethical committee, parents of the newborn were explained verbally in detail about the aims of the study, procedures, risks/benefits involved, etc. A written informed consent was obtained from the parents and/or his/her legally acceptable representative. All report along with baseline data characteristics were filled in the self-made proforma. The newborn was followed till discharge/death/LAMA, etc. All the data required for the study was collected during this time period. Calculated descriptive statistics for all quantitative variables (student t-test) was used. Chi square test was used to compare qualitative data. Statistical Package for Social Sciences software Version 16.0.0 was used.

RESULTS

In the study, 100 newborns delivered with meconium stained amniotic fluid (study group) and 100 newborns born with clear amniotic fluid (control group) were assessed. In the present study, among controls 41 were females and 59 were males. Among the study group 35 were females and 65 were males. In the study a total of 157 newborn were delivered by normal vaginal delivery and 43 newborns by LSCS. In the control group, the maternal age was ranging between 17-29 years whereas in the study group it was ranging between 17-28 years.

Table 1: Association between gestational age in control and study group.

Gestational age (weeks)	Min (weeks)	Max (weeks)	Mean	SD	p value
Control group	37	42	38.59	0.99	p <0.05
Study group	37	42	38.89	1.14	

Table 1 shows gestational age newborn among study group and control group. The mean gestational age in study group was 38.89±1.14 weeks and in control group was 38.59±0.99 weeks. The association was statistically significant showing that fetus with higher gestational age are more likely to have meconium stained liquor than those born at term. There was a significant difference between the two groups with respect to gestational age of babies at birth with a slightly higher gestational age in study group.

Meconium stained liquor is indirect indicator of fetal hypoxia. Prolonged fetal hypoxia is associated with low Apgar score. Table 2 shows Apgar score of babies of study and control group at 1 min. The mean Apgar score of babies in study group at 1 min was 5.80±1.59 and babies in control group at 1 min was 7.86±0.35. This table shows us that the first minute Apgar scores in the study group was significantly lower than that in the

control group suggesting babies with meconium stained liquor are more likely to have low Apgar and need for resuscitation. Table 3 shows Apgar score of babies in study group at 5 min was 7.60±1.14 and in control group was 8.86±0.35. Both at 1- and 5-min Apgar score was lower among babies born with meconium stained liquor (study group) as compared to those with clear amniotic fluid (control group). This table shows us that the fifth minute Apgar score between the two groups was statistically significant with lower value in study group as compared to the control group.

Table 4 shows list of complications among babies with meconium stained liquor. 32 babies in meconium stained liquor had hypoxia of which 11 had respiratory distress, 11 required mechanical ventilation (MAS 08, sepsis 03), 2 newborn had HIE stage 2 and 5 patients died (3 due to PPHN and 2 with sepsis). The morbidities were significant in study group compared to control group only

2 had hypoxia (due to Transient tachypnea of newborn). Babies born with meconium stained liquor had significantly more requirement of oxygen, ventilation and birth asphyxia compared to those born with clear amniotic fluid.

Table 2: Association between Apgar scores in control and study groups (1 min).

Apgar score (1 min)	Min	Max	Mean	SD	P value
Control group	7	8	7.86	0.35	p
Study group	0	8	5.80	1.59	<0.05

Table 3: Association between Apgar scores in control and study groups (5th min).

Apgar score (5 min)	Min	Max	Mean	SD	p value
Control group	8	9	8.86	0.35	p
Study group	3	9	7.60	1.14	<0.05

Table 4: Comparison of morbidities in the study group and control group.

Morbidities	Study group		Control group	
	No. of cases	%	No. of cases	%
Hypoxia (oxygen requirement)	32	32.0	02	2.00
Respiratory distress	11	11.0	02	2.00
Ventilation	11	11.0	00	00
Hypoxic ischemic encephalopathy (seizures)	02	2.0	00	00
Death	05	5.0	00	00

DISCUSSION

Even with improved perinatal care, the incidence of common entities like MSAF (8-20%) and MAS (5-10% of MSAF) continue to occur with the same frequency over the years.

There was no significant variation among both the groups (study and control) when the birth order was considered as a risk factor. In the present study, in control group the babies were weighing between 2.50 to 3.38 kg whereas in the study group it was ranging between 2.50 to 3.80 kg. There was no statistically significant difference in the birth weight of control and study group (p >0.05)

Kariniemi et al, based that the determinants of meconium in the amniotic fluid were gestational age, base deficit, calcified placenta, late decelerations and placental weight.⁸ Decreasing amniotic fluid volume is a progressive feature of advancing gestational age.⁶ The association was statistically significant in the present

study showing that fetus with higher gestational age are more likely to have meconium stained liquor than those born at term.

Darkhaneh et al, and Dollberg et al, showed that the Apgar scores at 1 and 5 minutes in babies with meconium stained amniotic fluid was significantly lower when compared with controls which very well matches with this study.^{9,10} In this study, in the study group the mean Apgar score at 1 min was 5.80±1.59. In the control group it was 7.86±0.35. This was found to be statistically significant (P <0.05). Similarly, the Apgar score at 5 min was 8.86±0.35 in control group and 7.60±1.14 in study group. This was found to be statistically significant (P <0.05). Lower Apgar score was seen in study group both at 1 min and at 5 min.

Wiswell et al, believed that meconium staining may be an independent marker of fetal distress.¹¹ Shivanna concluded that meconium staining may represent previous hypoxia or a state of compensated fetal distress.¹² It was found that half of term infants with HIE to have been stained with meconium.^{6,13} Mahmoud et al, concluded that in utero meconium passage has been attributed to a fetal response to intrauterine stress and is often associated with fetal hypoxia, asphyxia and acidosis. In this study, above findings are reinforced as babies with meconium stained amniotic fluid had more NICU stay due to hypoxia, meconium aspiration syndrome, birth asphyxia. Out of 100 babies in study group, 5 babies died due to complication of MAS. Whereas 98% babies with clear amniotic fluid had no such uneventful transition. Only 2 babies had hypoxia at birth due to transient tachypnea of newborn with a mean stay of 4.5 hours in NICU followed by discharge. The study depicted significant co-relation with higher gestational age, lower Apgar at 1 and 5 minutes and poor neonatal outcome in babies with meconium stained amniotic fluid.

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