



## Original Article

# PERINATAL OUTCOME ASSOCIATED WITH MECONIUM STAINED AMNIOTIC FLUID IN PREGNANCY

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### Abstract

**Objectives:** To evaluate perinatal outcome associated with meconium stained amniotic fluid in pregnant women.

**Methods:** It was a prospective cross sectional study, conducted in the Department of Obstetrics and Gynecology in Bangabandhu Sheikh Mujib Medical University, Dhaka, from January 2013 to December 2013. Total 50 pregnant women admitted in the labour ward for delivery with meconium stained amniotic fluid were the study population. Singleton pregnancy of more than 34 weeks duration was included and pregnancy with APH, breech presentation, congenital malformation of fetus, IUD were excluded from the study. Out of 50 patients two did not provide all the information needed to analyze the data and hence were excluded. Outcome Variables were gestational age, antenatal checkup, medical diseases of mother (HTN, Diabetes mellitus, Heart disease), obstetric complication (oligo-hydramnios, prolonged labour), mode of delivery, neonatal details (weight of the baby in kg, APGAR scoring at 1 min & 5 min), neonatal resuscitation, admission in neonatal ICU (NICU), neonatal complications (RDS, MAS, Neonatal death).

**Results:** Over half (52.1%) of the neonates needed resuscitation and 54.2% admitted in ICU. About 90% of the neonates had normal birth weight and only 10.4% were of low birth weight. 14.6% of the neonates developed meconium aspiration syndrome and 10.4% respiratory distress syndrome. Neonatal jaundice and neonatal sepsis were observed in 4.2% neonates each. Four neonates (8.3%) died early in the neonatal life, while 1 (2.1 %) was still-born. Low APGAR score (<7) at 1 and 5 minutes of birth was found in 64.7% and 52.9% of the cases respectively with thick meconium stained amniotic fluid as opposed to 25.8% and 16.1% of the cases respectively having thin meconium stained amniotic fluid ( $p = 0.008$  and  $p = 0.007$  respectively). Thick meconium was significantly associated with meconium aspiration syndrome ( $p = 0.003$ ). Neonates needing immediate resuscitation and admission in ICU was staggeringly higher in the former group than those in the later group ( $p = 0.002$ ). The incidence of perinatal death was significantly higher in patients with thick meconium stained amniotic fluid than that in patients with thin meconium ( $p = 0.021$ ).

**Conclusion:** Meconium stained amniotic fluid was associated with low APGAR score, higher incidence of MAS, ICU admission and perinatal death.

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### Introduction

The significance of intrauterine passage of meconium has generated considerable interest in the field of obstetrics. Approximately 8% to 15% of all infants are born with evidence of meconium-stained amniotic fluid (MSAF) and this prevalence increases with gestational age<sup>1</sup>. The most important concern with MSAF is its association with fetal distress and adverse perinatal outcome.

Meconium constitutes the first stool of a newborn infant. Meconium is a viscous green-black substance that

consists of denuded intestinal epithelial cells, ingested lanugo hair, swallowed amniotic fluid, mucus, digestive enzymes, bile acids, and water. Meconium passage in newborn infants is a developmentally programmed event normally occurring within the first 24 to 48 hours after birth. Intrauterine meconium passage in near-term or term fetuses has been associated with fetomaternal stress factors and/or infection, whereas meconium passage in post term pregnancies has been attributed to gastrointestinal maturation<sup>1</sup>. Factors that promote the passage of meconium in utero include placental insufficiency, maternal hypertension, pre-eclampsia, oligohydramnios and maternal drug abuse, especially of tobacco and cocaine<sup>2</sup>.

MSAF rarely occurs before 38 weeks' gestation. The incidence of this condition increases with longer gestations and approximately 30% of newborns have MSAF at 42 weeks<sup>3</sup>. The most severe condition associated with meconium passage in utero is the meconium aspiration syndrome (MAS), occurs in 2 to 5% of patients with MSAF<sup>3</sup>. Meconium aspiration syndrome (MAS) is a disease with complex pathophysiology and potential for perinatal mortality and considerable morbidity.

Meconium aspiration syndrome (MAS) occurs when meconium-stained amniotic fluid (MSAF) is aspirated into the lungs of an infant prior to, during, or immediately after birth, representing a continued leading cause of perinatal death. Even with modern neonatal intensive care, the mortality rate from MAS remains as high as 3-5 percent accounting for 2 percent of all perinatal deaths<sup>4</sup>.

The meconium aspiration syndrome is manifested as newborn respiratory compromise, tachypnea, cyanosis, and reduced pulmonary compliance. Persistent pulmonary hypertension due to increased pulmonary vascular resistance may accompany the meconium aspiration syndrome. There is an increased prevalence of asthmatic symptoms and abnormal bronchial reactivity among survivors of the syndrome<sup>5</sup>.

Meconium stained amniotic fluid is a frequent occurrence seen by health care providers in obstetrics and neonatal practice. Since it is a predictor of adverse perinatal outcome even in low risk pregnancies MSAF can be taken as an independent marker of fetal distress.

Babies born with MSAF are 100 fold likely to develop substantial respiratory distress than those born with clear amniotic fluid<sup>6</sup>. Initial hypoxic events may cause the infant to have long-term neurological problems,

including seizures, mental retardation and cerebral palsy<sup>7</sup>. Of those neonates who develop MAS, thick MSAF has accounted for majority (73 to 87.6) of cases of MAS<sup>8</sup>. Passage of thick meconium was significantly associated with severe asphyxia and carried a bad prognosis with increased risk of development of meconium aspiration syndrome<sup>9</sup>.

MSAF has a wide spectrum of research material, but very few studies have been carried out in our country. So, this study was designed to evaluate perinatal outcome associated with meconium stained amniotic fluid in pregnant women.

#### **Materials and Methods:**

This was a prospective cross-sectional study carried out in the department of Obstetrics and Gynecology, Bangabandhu Sheikh Mujib Medical University, from January to December 2013. Total 50 patients attending in the labour ward and in-patient department of Obstetrics and Gynaecology, was be enrolled in this study. Pregnant women admitted in the labour ward having meconium stained amniotic fluid were the study population. Inclusion criteria were singleton pregnancy of more than 34 weeks duration and meconium stained amniotic fluid diagnosed by spontaneous or artificial rupture of membranes. Patients having ante-partum haemorrhage, breech presentation, congenital malformation of fetus and IUD were excluded from this study. Outcome variables were gestational age, antenatal care, medical diseases of mother (HTN, Diabetes mellitus, Heart disease), Obstetric complications (oligohydramnios, prolonged labour), mode of delivery, Neonatal details (Weight in kg, APGAR score, neonatal resuscitation, NICU admission), and neonatal complications (RDS, MAS, neonatal death).

After discussing with patient and getting written consent from them a detailed history was taken, clinical examination was done. Gestational age by virtue of history, obstetrical examination and sonographic parameter was recorded. Partograph was be maintained in case of vaginal delivery. Further cervical dilatation, character of meconium stained amniotic fluid and fetal heart rate was monitored using stethoscope. Mode of delivery, neonatal details considering APGAR scoring, birth weight, resuscitation, and admission in neonatal ward was recorded. Neonatal complication considering respiratory distress syndrome, meconium aspiration syndrome, and neonatal death with cause was also recorded. Neonate was followed up during stay in the hospital.

All necessary information was recorded in preset data collection sheet. Statistical analysis of the results was obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-16). The results were presented in tables, figures and diagrams. Statistical significance is set at 0.05 level and confidence interval at 95% level.

## Results

In this study 50 pregnant women having meconium stained amniotic fluid were included. Among them 2 patients did not provide adequate information needed to analyze the data and were excluded from the study.

Table I shows the age distribution of the patients. More than three-fifth (68.7%) of the patients was between 20-30 years followed by 23 % more than 30 years and 8.3% below 20 years old. Majority (83.3%) of the patients were housewife, 41.7% of the patients were belonged to lower socio-economic status, 47.9% to lower middle class and 10.4% to upper middle class.

**Table-I**  
*Socio-demographic characteristics*

Variables	Frequency	Percentage
Age (years)		
<20	4	8.3
20-30	33	68.7
>30	11	23.0
Occupation		
Housewife	40	83.3
Service	4	8.3
Student	3	6.3
Others	1	2.1
Socioeconomic status		
Lower (<15000 Tk/ month)	20	41.7
Lower middle class (15000-25000 Tk/month)	23	47.9
Upper middle class (>25000 Tk/month)	5	10.4
Education		
Illiterate	11	23
Primary	18	37.5
Secondary	15	31.2
Above secondary	4	8.3

Regarding gestational age, 4.2 % were found between 34-<37 weeks of gestation, 56.2 % were of 37-40 weeks, 33.3 % between >40-42 weeks and the rest (6.3 %) were above 42 weeks of gestation (Table II).

Table II shows risk factor distribution of study population, more than one-third (35.4%) of the patients were in prolonged labour, 33.3 % had postdated pregnancy, 18.7 % cord around the neck, 8.3 % pregnancy induced hypertension, 4.2 % oligohydramnios, and in 2.1 % there were IUGR.

**Table-II**  
*Antenatal events*

Variables	Frequency	Percentage
Gestational age (weeks)		
34-<37	02	4.2
37-40	27	56.2
>40-42	16	33.3
>42	03	6.3
Associated risk factors		
Prolonged labour	17	35.4
Postdated pregnancy	16	33.3
Cord around the neck	9	18.7
PIH	4	8.3
Oligohydramnios	2	4.2
IUGR	1	2.1
Others	1	2.1

Table III shows that about one third (31.2%) of the fetus exhibited normal heart rate, 45.9% had bradycardia and 22.9% tachycardia.

**Table-III**  
*Intrapartum events*

Variables	Frequency	Percentage
(n=48)		
Fetal heart rate		
Normal	15	31.2
Bradycardia	22	45.9
Tachycardia	11	22.9
Degree of meconium		
Thin	31	64.6
Thick	17	35.4
Mode of delivery		
Spontaneous vaginal delivery	3	6.2
Ventose	2	4.2
LUCS	43	89.6

Table III shows the degree of meconium staining liquor, mode of delivery and pattern FHR. About two- third (64.6 %) of the patients had thin meconium stained liquor and 35.4 % thick liquor; 89.6 % of the patients were delivered by lower uterine caesarean section, 6.2 % experienced spontaneous vaginal delivery and 4.2 % of the fetuses were delivered by ventose extraction.

**Table-IV**  
*Neonatal events*

Variables	Frequency	Percentage
(n=48)		
<b>APGAR score</b>		
<b>At 1 minute</b>		
0-3	1	2.1
4-6	17	35.4
7-10	30	62.5
<b>At 5 minutes</b>		
0-3	1	2.1
4-6	15	31.2
7-10	32	66.7
<b>Outcome parameters</b>		
<b>Resuscitation</b>		
Needed	25	52.1
Not needed	23	47.9
<b>Admission in NICU</b>		
Needed	26	54.2
Not needed	22	45.8
<b>Birth weight (kg)</b>		
<2.5	5	10.4
2.5-3.5	34	70.8
3.6-4	8	16.7
>4	1	2.1
<b>Complications</b>		
Meconium aspiration syndrome	7	14.6
Respiratory distress syndrome	5	10.4
Neonatal jaundice	2	4.2
Neonatal sepsis	2	4.2

Table V shows perinatal out-come of the study cases, 4 neonates (8.3 %) died early in the neonatal life, while 1 (2.1%) was Still-born.

**Table-V**  
*Perinatal mortality*

Perinatal mortality	Frequency	Percentage
Still birth	1	2.1
Early neonatal death	4	8.3

Table VI demonstrates that the low APGAR score (<7) at 1 and 5 minutes of birth was found in 64.7 % and 52.9 cases respectively with thick meconium stained amniotic fluid as compared to 25.8 % and 16.1 % of the cases respectively having thin meconium stained amniotic fluid ( p = 0.008 and p = 0.007 respectively). Thick meconium was significantly associated with meconium aspiration syndrome ( p = 0.003). Neonates needing immediate resuscitation and admission in neonatal ICU was staggeringly higher in the former group than those in the later group ( p = 0.001 and p = 0.002 respectively). The rate of perinatal death (still-born and early neonatal death) was significantly higher in patients with thick meconium stained fluid than that in patients with thin meconium ( p = 0.021).

**Table-VI**  
*Neonatal outcome associated with degree of meconium staining*

Neonatal outcome	Status of meconium		p-value
	Thick (%) (n=13)	Thin (%) (n=31)	
APGAR <7 at 1 minute	64.7	25.8	0.008 <sup>s</sup>
APGAR <7 at 5 minute	52.9	16.1	0.007 <sup>s</sup>
Resuscitation needed	82.4	32.3	0.001 <sup>s</sup>
NICU admission needed	88.2	41.9	0.002 <sup>s</sup>
Meconium aspiration syndrome	35.3	3.2	0.003 <sup>s</sup>
Respiratory distress syndrome	17.6	6.5	0.225 <sup>s</sup>
Neonatal jaundice	5.9	6.5	0.938 <sup>s</sup>
Neonatal sepsis	5.9	3.2	0.660 <sup>s</sup>
Perinatal death	23.5	3.5	0.021 <sup>s</sup>

Data was analyzed using chi-square ( $\chi^2$ ) test. S means significant.

## Discussion

Meconium stained amniotic fluid is a commonly observed phenomenon and studies have shown that presence of meconium stained amniotic fluid is a

serious sign of fetal compromise which is associated with an increase in perinatal morbidity. Clear amniotic fluid, on the other hand, is considered reassuring<sup>10</sup>.

In this study APGAR score <7 at 1 and 5 minutes of birth was fairly common in cases with thick meconium (64.7 % and 52.9 % of the cases respectively) than that in case with thin meconium ( 25.8 % and 16.1 % respectively). The thickness of meconium has a direct bearing on the neonatal outcome as is evidenced by higher incidence of birth asphyxia in the thick meconium group compared to thin meconium group. Incidence of meconium aspiration syndrome ( MAS) was almost 10 times higher in the former group than that in the later group as has been observed by other studies<sup>11</sup>. As meconium is always considered a marker for fetal distress, there is always a significant effect on the APGAR score of neonates.

Neonates needing immediate resuscitation and admission in ICU were significantly higher in the thick meconium group than those in the thin meconium group. Similar findings were reported by other investigators , where incidence of admission to newborn intensive care unit with respiratory distress syndrome, meconium aspiration syndrome, neonatal hypoxia were higher in pregnancies complicated by meconium stained amniotic fluid<sup>12</sup>.

The incidence of perinatal death (still-born and early neonatal death) was significantly higher in patients with thick meconium than those in patients with thin meconium which was consistent with the findings of early studies where it was also observed that meconium in conjunction with an abnormal heart tracing was associated with increased perinatal morbidities and mortality<sup>13</sup>. In other studies it was reported that in the absence of fetal heart rate abnormalities , the presence of meconium does not indicate fetal compromise and no intervention is necessary other than close monitoring<sup>14</sup>.

Similarly, among postterm patients with normal antepartum testing women with heavy meconium in early labour have no greater risk for fetal distress or perinatal morbidity than women with clear amniotic fluid. These findings suggest that postterm patients with heavy meconium in early labour and normal antepartum testing can be managed in labour in the same manner as low risk patients without meconium<sup>15</sup>.

The report of this study does not correspond with the result of our study. Amniotic fluid meconium may act

both directly and indirectly on the exposed tissue, with effects dependant on concentration of meconium, duration of exposure and the presence of associated stress factors (e.g. hypoxia and infection).

The relationship between fetal hypoxia and increased intestinal peristalsis has been considered for many years. Parlman JM found that meconium was released more frequently when fetal umbilical vein oxygen saturation was below 30 %; furthermore, thick meconium was associated with lower oxygen saturation more often than thin meconium<sup>16</sup>. Elevated cord blood erythropoietin levels have been noted in fetuses with advanced gestation and in fetuses with meconium passage at any gestational age, possibly indicating that an element of hypoxia contributes to the passage of meconium in utero<sup>17</sup>.

### Conclusion

Based on the present study, it can be concluded that meconium stained amniotic fluid is associated with low APGAR score , higher incidence of MAS, NICU admission and perinatal death. The thickness of meconium; is directly proportional to the severity of complication; higher the concentration of meconium worse is the prognosis.

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