

## Neonatal Outcome of 100 Cases of Term Pregnancy Having Meconium Stained Liquor in a Tertiary Level Hospital

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### Abstract

**Background :** Presence of meconium in amniotic fluid is potentially a serious sign of fetal compromise and associated with an increased perinatal mortality and morbidities. Meconium stained amniotic fluid is considered a harbinger of fetal compromise because of its direct correlation with fetal distress and increased likelihood of aspiration of meconium with resultant deleterious effects on the neonatal lung. The purpose of the study was to find the neonatal outcome of pregnancy associated with meconium staining amniotic fluid. Outcome variable were birth weight, Apgar score, admission in NICU, neonatal complications, neonatal mortality and morbidity.

**Materials and methods :** The present prospective observational study was conducted in the Department of Obstetrics and Gynaecology in Bangabandhu Sheikh Mujib Medical University, Dhaka and Dhaka Medical College Hospital. A total of 100 pregnant women admitted in the labour ward with meconium stained liquor were the study population.

**Results :** Nearly three-quarter (72%) of the patients were between 20 – 30 years followed by 17.2% more than 30 years and 10.8% below 20 years old. Over half (52.2%) of the neonates needed resuscitation and 58.7% had to be admitted in ICU. More than 90% of the neonates had normal birth weight and only 9.7% were of low birth weight. Over half (51.1%) of the neonates developed meconium aspirate syndrome and 10.5% respiratory distress syndrome. Neonatal jaundice and neonatal sepsis were observed in 5.4%, 4.3% neonates respectively. Ten neonates (10.5%) died early in the neonatal life, while 1(1.1%) was still-born. low APGAR score (< 7) at 1 and 5 minutes of birth was found in 63.6% and 53% of the cases respectively with thick meconium stained amniotic fluid as opposed to 26.3% and 17.7% of the cases respectively having thin meconium stained amniotic fluid (p = 0.002 and p = 0.014 respectively). Thick meconium tend to be

associated with meconium aspiration syndrome (p < 0.001). Neonates needing immediate resuscitation and admission in ICU was staggeringly higher in the former group than those in the latter group (p < 0.001). The incidence of perinatal death was significantly higher in patients with thick meconium stained fluid than that in patients with thin meconium (p = 0.029).

**Conclusion :** The study concluded that meconium stained amniotic fluid is associated with low APGAR score, higher incidence of MAS, ICU admission and perinatal death and their severity depends on the concentration of meconium.

**Key words :** APGAR score; Meconium Aspiration Syndrome (MAS); Meconium Stained Amniotic Fluid (MSAF).

### Introduction

Meconium stained amniotic fluid has been associated with poor perinatal outcome including low APGAR scores, increased rate of chorioamnionitis, increased incidence of neonatal intensive care admission and high rate of perinatal death.<sup>1</sup>

Passage of meconium in utero with staining of the amniotic fluid occurs in 12% to 16% of all deliveries. Presence of meconium below the vocal cord is known as meconium aspiration and this finding occurs in 20% to 30% of all infants with meconium stained amniotic fluid with around 12% mortality.<sup>2</sup>

Aspiration can occur in utero with fetal gasping or after birth with the first breaths of life.<sup>3</sup> As meconium staining amniotic fluid is associated with lots of adverse outcome of fetus and has long been considered to be a bad predictor of fetal outcome.<sup>4</sup>

The exact etiology of MSAF remains unclear.<sup>5</sup> Previous studies have demonstrated that the incidence of MSAF rises with gestational age. Matthews and Warshaw found 98.4% cases with meconium stained liquor and the neonates were admitted to the neonatal intensive care units.<sup>6</sup> These were delivered at 37 weeks of gestational age or later as it show maturation of autonomic nervous system.

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Aspiration of meconium during intrauterine life may result in or contribute to Meconium Aspiration Syndrome (MAS), representing a leading cause of perinatal death.<sup>1</sup> MAS is more frequently seen in post term pregnancy or in growth restricted fetuses. Factors such as placental insufficiency, maternal hypertension, pre-eclampsia, oligohydroamnios or maternal drug abuse (Tobacco or cocaine) result in, in utero passage of meconium. Meconium stained liquor may be aspirated during delivery resulting in neonatal respiratory distress syndrome.<sup>7</sup>

The incidence of admission to newborn intensive care unit with, respiratory distress syndrome, meconium aspiration syndrome, neonatal asphyxia, chorioamnionitis, foetal distress or foetal acidosis, were higher in pregnancies complicated by meconium stained liquor.<sup>8-11</sup> MSAF occurs in 10% of pregnancies with most occurring at term or particularly post term. Mean APGAR scores were significantly lower and the proportion of neonates with poor APGAR scores were higher if thick meconium was present, but not for thin meconium. Prolonged labour was more common or was associated with worst outcome in meconium stained liquor. Caesarean sections were performed twice as frequently in women presenting with MSAF and failure to progress, which was the indication in more than half of the cases.<sup>6</sup>

The purpose of the present study was conducted to compare the perinatal outcome pregnancies complicated with meconium with particular reference to thick and thin meconium. The data generated from the study might be helpful for decision making in the management of pregnancies with MSAF, which in turn, will reduce the incidence of perinatal morbidity and mortality.

#### Materials and methods

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology in Bangabandhu Sheikh Mujib Medical University, Dhaka and Dhaka Medical College Hospital from March 2011 to August 2011. Term and post-term pregnant women admitted in the labour ward having meconium stained liquor were the study population. The following enrollment criteria were applied to select the study population:

#### Inclusion criteria:

- Patients with a singleton term (37 – 42 weeks) pregnancy with cephalic presentation with presence of meconium stained liquor during labour
- Post-term pregnancy (>42 weeks).
- Patients with term pregnancy with rupture membrane (spontaneous/artificial) having meconium stained liquor.
- Term pregnant woman have meconium stained liquor during caesarean section.

#### Exclusion criteria:

- Breech presentation
- Patients with clear amniotic fluid during labour.
- IUD or gestational age of less than 37 weeks.
- Congenital foetal abnormalities.

A total of 100 cases who met the defined enrolment criteria were purposively included in the study. Of them 7 were excluded because of inadequate information leaving 93 for final analysis.

The data was collected through interviews and clinical assessment of patients with a present data collection sheet.

Data were processed and analysed using software SPSS. The test statistics used to analyze the data were descriptive statistics and Chi-square ( $\chi^2$ ) tests. For all analytical tests, the level of significance was set at 0.05 and  $p < 0.05$  was considered significant. Before commencing the study, necessary permission was taken from proper authority.

#### Results

Regarding age distribution, nearly three-quarter (72%) of the patients was between 20-30 years followed by 17.2% more than 30 years and 10.8% below 20 years old. According to occupation majority (94.6%) of the patients were housewife. About 45% of the patients were belonged to poor class and another 45% to middle class. In terms of level of education, nearly one-quarter (23.6%) had no education, 39.8% were primary level and one-third (32.3%) secondary level educated.

In terms of gestational age, about 60% were found to lie in the range of 37-40 weeks of gestation, 34.4% from 41- 42 weeks and the rest (6.5%) crossed 42 weeks of gestation. Over 60% of the patients received antenatal care regularly, 34% received irregularly and the rest 4% never receive it. More of than half (57%) of the patients were primipara.

**Table I** Presence of associated risk factors among the patients (n = 93\*)

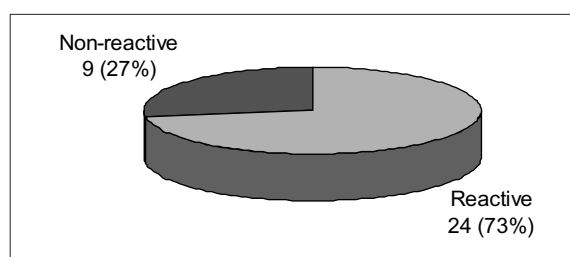
Associated risk factors	Frequency	Percentage (%)
Prolonged labour	34	36.6
Postdatism	33	35.5
Cord around the neck	18	19.4
PIH	08	8.6
Oligohydramnios	04	4.3
IUGR	01	1.1
Others	01	1.1

\* Total will not correspond to 100%, for multiple response.

Table I showing risk factor distribution study revealed that more than one-third (36.6%) of the patients were in prolonged labour, 35.5% had postdated pregnancy, 19.4% had cord around the neck, 8.6% pregnancy induced hypertension, 4.3% oligohydramnios. Preeclampsia, IUGR and other risk factors each was 1.1%.

Majority (87.6%) of the patients had adequate liquor amni (AFI 8-25), 5.6% inadequate (AFI 5 – 8) and 6.8% had scanty liquor (AFI < 5). One-third (31.2%) of the foetus exhibited normal heart rate, 45.2% had bradycardia and 22.6% tachycardia.

According to the degree of meconium staining, Amniotic fluid was graded into grade-I (Thin yellow), grade-II (Light green), grade-III (Thick). Over one-third (35.5%) of the patients had thin yellow staining liquor (Grade-I), 26.9% light green liquor (Grade-II) and 37.6% thick liquor (Grade-III). More than 85% of the patients were delivered by lower uterine caesarean section, 7.5% experienced spontaneous vaginal delivery and 5.4% of the foetuses were extracted with the help of ventouse. Sixty percent of the neonates at 1 minute of their birth exhibited normal APGAR score (7-10) which at 5 minutes of birth was found in 64.7% of cases. The rest of the neonates at 1 and 5 minutes had APGAR < 7.

**Figure 1** CTG findings of the foeti during labour (n = 33)

Out of 33 cases who underwent non-stress test (CTG) over one-quarter (27%) of the foetus was non-reactive (Fig 1).

**Table II** Distribution of neonates by their outcome

Outcome parameters	Frequency	Percentage (%)
Resuscitation (n = 92)		
Needed	48	52.2
Not needed	44	47.8
Admission in ICU (n = 92)		
Needed	54	58.7
Not needed	38	41.3
Birth weight (kg) (n = 93)		
< 2.5	09	9.7
2.5 – 3.5	66	71.0
3.6 – 4	16	17.2
> 4	02	2.2

Table II shows over half (52.2%) of the neonates needed resuscitation and 58.7% had to be admitted in ICU. More than 90% of the neonates had normal birth weight and only 9.7% were low birth weight.

**Table III** Complications encountered by the neonates (n = 93\*)

Complications	Frequency	Percentage (%)
Meconium aspiration syndrome	14	15.1
Respiratory distress syndrome	10	10.5
Neonatal jaundice	05	5.4
Neonatal sepsis	04	4.3

\* Total may not correspond to 100%, for multiple response.

**Table IV** Perinatal mortality observed in the study (n = 93\*)

Perinatal mortality	Frequency	Percentage (%)
Still birth	01	1.1
Early neonatal death	10	10.5

Table III & IV shows half (51.1%) of the neonates developed meconium aspirate syndrome and 10.5% respiratory distress syndrome. Neonatal jaundice and neonatal sepsis were observed in 5.4%, 4.3% neonates respectively. Ten neonates (10.5%) died early in the neonatal life, while 1 (1.1%) was still-born.

**Table V** Neonatal outcome associated with Grading (Thick & Thin) of meconium staining

Neonatal outcome	Status of meconium		p-value(s) <sup>#</sup>
	Thick (%) (n = 33)	Thin (%) (n = 57)	
APGAR < 7 at 1 minute	63.6	26.3	0.002
APGAR < 7 at 5 minute	53.0	17.7	0.014
Resuscitation needed	85.3	32.8	<0.001
ICU admission needed	88.2	41.4	<0.001
Meconium aspiration syndrome	34.3	3.4	<0.001
Respiratory distress syndrome	17.1	6.9	0.230
Neonatal jaundice	5.7	5.2	0.626
Neonatal sepsis	5.7	3.4	0.485
Neonatal jaundice	5.7	5.2	0.626
Perinatal death	24.2	5.7	0.029

<sup>#</sup> Data were analysed using Chi-square ( $\chi^2$ ) Test. S means significant.

Table V demonstrates that low APGAR score (< 7) at 1 and 5 minutes of birth was found in 63.6% and 53% of the cases respectively with thick meconium stained amniotic fluid as opposed to 26.3% and 17.7% of the cases respectively having thin meconium stained amniotic fluid ( $p = 0.002$  and  $p = 0.014$  respectively). Thick meconium tends to be associated with meconium aspiration syndrome ( $p < 0.001$ ). Neonates needing immediate resuscitation and admission in ICU were staggeringly higher in the former group than those in the latter group ( $p < 0.001$ ). The incidence 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 ( $p = 0.029$ ).

### Discussion

Meconium passage in newborn infants is a developmentally programmed event normally occurring within the first 24 – 48 hours after birth. Intrauterine meconium passage in near-term or term fetuses has been associated with foetomaternal stress and/or infection, whereas meconium passage in postterm pregnancies has been attributed to gastrointestinal maturation.<sup>1</sup> Meconium amniotic fluid is commonly observed phenomenon and studies have shown that presence of meconium stained amniotic fluid is a serious sign of foetal compromise which is associated with an increase in perinatal morbidity. Clear amniotic fluid, on the other hand, is considered reassuring.

The present study was intended to observe the neonatal outcome, based on the degree of meconium staining amniotic fluid. Out of 93 patients over one-third (35.5%) had thin yellow staining liquor (Grade-I), 26.9% light green liquor (Grade-II) and 37.6% thick liquor (Grade-III). Over half (52.2%) of the neonates needed resuscitation and 58.7% had to be admitted in ICU. Over half (51.1%) of the neonates developed meconium aspirate syndrome and 10.5% respiratory distress syndrome, 5.4% neonatal jaundice and 4.3% neonatal sepsis. Ten neonates (10.5%) died early in the neonatal life, while 1 (1.1%) was still-born. APGAR score < 7 at 1 and 5 minutes of birth was fairly common in cases with thick meconium (63.6% and 53% of the cases respectively) than that in cases with thin

meconium (26.3% and 17.7% 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 observed to be almost 10 times higher in the former group than that in the latter group. As meconium is always considered a marker for foetal distress, there is always a significant effect on the APGAR score of neonates.

Neonates needing immediate resuscitation and admission in ICU were staggeringly 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 liquor.<sup>8,12</sup>

The incidence of perinatal death (Still-born and early neonatal death) was significantly higher in patients with thick meconium than that in patients with thin meconium which is consistent with the findings of Shaikh et al.<sup>13</sup> Early studies also observed that meconium in conjunction with an abnormal heart tracing increased perinatal morbidity and mortality rates with an increased incidence of low 1-minute and 5-minute APGAR score.<sup>14,15</sup> Thus in the absence of foetal heart rate abnormalities, the presence of meconium does not indicate foetal compromise and no intervention is necessary other than close monitoring.

Similarly, among postterm patients with normal antepartum testing women with heavy meconium in early labour have no greater risk for foetal 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>16</sup>

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 foetal hypoxia and increased intestinal peristalsis has been considered for many years. In earlier human studies Walker found that meconium was released more frequently when foetal umbilical vein oxygen saturation was below 30%.<sup>17</sup> Furthermore, thick meconium was associated with lower oxygen saturation more often than light meconium. 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>18,19</sup>

#### Limitation

In this study there was no control group having clear amniotic fluid to compare the neonatal outcome with the meconium stained group. Here comparison was made between thin and thick meconium group. The result could be more conclusive if a normal control group was present.

#### Conclusion

In the light of the findings of the present study and discussion thereof, it can be concluded that meconium stained amniotic fluid is associated with low APGAR score, higher incidence of MAS, ICU admission and perinatal death. The thickness of meconium is directly proportional to the severity of complication with higher the concentration of meconium worse is the prognosis.

#### Recommendation

All of the above complications could be possible to reduce by application of following suggestion:

- More steps should be taken to spread the knowledge about the advantage of antenatal check up.
- Expansion of EOC project to village level by including family planning visitors and family welfare visitors under this project and improvement of their training facilities in tertiary hospital.
- It should be need to increase in number of post graduate specialist in obstetrics in all thana health complexes.
- Improvement of communications facilities.
- There should be improvement of sophisticated instruments in all teaching hospitals and thana health complexes for assessment of fetal profile both antenataly and intranataly.

- Proper improvement of trained man power with increasing the operation theatre, NICU facilities up to all thana health complex.
- Neonatal resuscitation training programe should be organized for the health personels.

With taking the above measure we can reduce the perinatal mortality and morbidity.

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#### Contribution of authors

NSA: Conception, design, data collection, interpretation of data, drafting, critical revision of contents, manuscript writing and final approval.  
BN : Analysis, critical revision, interpretation of data and final approval.

#### Disclosure

Both the authors declare no conflict of interest.

#### References

1. Ahanya et al. Meconium passage in utero: mechanisms, consequences, and management. *Obstet Gynecol Surv.* 2005; 60(1):45-56.
2. Clary GM, Wiswell TE. Meconium-stained amniotic fluid and the meconium aspiration syndrome. An update. *Pediatr Clin North Am.* 1998;45(3): 511-529.
3. Klinger MC , Kruse J. Meconium aspiration syndrome: pathophysiology and prevention. *J am Board Fam Pract.* 1999; 12(6): 450-466.
4. Gupta V, Bhatia BD, Mishra OP. 'Meconium stained amniotic fluid : Antenatal, Intrapartum and neonatal attributes', *Ind Ped.* 1996; 33:293-295.
5. Guiding A , Spong CY. Severe meconium aspiration syndrome is not caused by aspiration of meconium. *American journal of Obstetrics Gynaecology.* 2001; 185(4): 931-938.
6. Matthews TG, Warshaw JB. Relevance of the gestational age distribution of meconium passage in Utero. *Pediatrics.* 1979; 64(1): 1-30.
7. Steer PJ, Danielian P. Fetal distress in Labour . *Ocstretics.* 2002; 12(1): 15-21.
8. Rao S, Lang C, Levitan ES, Deitcher DL. Visualization of neuropeptide expression, transport, and exocytosis in *Drosophila melanogaster.* *J N eurobiol.* 2001; 49(3): 159-172.

9. Paola M, Diego B, Pablo EM, Tanya NP, Manuel A, Gutierrez H et al. Pathophysiology of perinatal asphyxia: can we predict and improve individual outcome ? EPMA J. 2011; 2(2) 211-230.
10. Alan TN, William WA. Diagnosis and management of clinical chorioamnionitis. Clin Perinatol. 2010; 37(2): 339-354.
11. Scott H, Walker M, Gruslin A. Significance of meconium-stained amniotic fluid in the preterm population. Journal of Perinatology. 2001; 21(3): 174-178.
12. Hosna AK, Jahanara A, Emdadul H, Kamal MA, Abdullah AM, Mohammad FHK et al. Fetal Outcome in Deliveries with Meconium Stained Liquor. BANGLADESH J CHILD HEALTH. 2009; 33(2):41-45.
13. Shaikh EM, Sadaf M, Majid AS. Neonatal outcome in meconium stained amniotic fluid-one year experience. J Pak Med Assoc. 2010; 60(9): 711-714.
14. Krebs HB, Peters RE, Dunn LJ, Segreti A. Association of meconium with abnormal fetal heart rate patterns. Am J Obstet Gynecol. 1980; 137(2): 936-943.
15. Zaideh SM, Sunna E, Badria LF. The effect of mode of delivery on neonatal outcome of twins with birth under 1500 grams. J Obstet Gynaecol. 2000; 20(4): 389-391.
16. Bochner CJ, Medearis AL, Davis J, Oakes GK, Hobel CJ, Wade ME. Antepartum predictors of fetal distress in post term pregnancy. Am J Obstet Gynecol. 1987; 157(2): 353-358.
17. Walker J. Fetal hypoxia. J Obs Gyn Brit Emp. 1954; 61: 162-180.
18. Richy SD, Ramin SM, Bawdon RE, Robert SW, Jody RNP, Roberts J et al. Markers of acute and chronic asphyxia in infants with meconium-stained amniotic fluid. American Journal of Obstetrics and Gynecology. 1995; 172(4) : 1212-1215.
19. Jazayeri A, Politz L, John CMT, Tina QRN, William NS. Fetal erythropoietin level in pregnancies complicated by meconium passage : Does meconium suggest fetal hypoxia? American Journal of Obstetrics and Gynecology. 2000 ; 183(1) : 188-190.