

Effect of Meconium Stained Liquor on Mode of Delivery and Fetomaternal Outcome in a Tertiary Level Hospital

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Abstract:

Background: The appearance of meconium-stained liquor during labour is generally considered to be a sign of hypoxia and a predictor of poor fetal outcome. It is one of the clinical events where normal pregnancy can turn into a high risk one for the mother as well as for the foetus.

Objective: To evaluate the obstetric outcome in meconium stained liquor during labour.

Study design: Prospective comparative study.

Study setting and period: Gynaecology and Obstetrics department of Sir Salimullah Medical College and Mitford Hospital (SSMC and MH), Dhaka, between January 2019 to June 2019.

Study population: The study patients in labour with meconium stained amniotic fluid and women in labour but having clear amniotic fluid who admitted for delivery during study period.

Result: A total of 75 cases were enrolled in the study as case and 75 cases were enrolled as control. The mean age was found 29.14±5.59 years in case group and 28.9±6.2 years in control group. Patients who received irregular ANC was 20(26.7%) and 25(33.3%) in case and control group respectively. Patients who did not receive ANC was 24(32.0%) in case group and 12(16.0%) in control group. Mean gestational age at delivery was found 38.87±1.4 weeks in case group and 38.75±1.6 weeks in control group. Primigravida was predominant in both groups. Caesarean deliveries were high (80.0%) in cases and it was much higher with thick meconium (74.7%) as compared to thin meconium (25.3%). APGAR scores in first minute and fifth minute were also low in cases. Birth asphyxia was found 20.0% in case group and 6.3% in control group. Meconium aspiration syndrome 25.0% and convulsion 3.8% developed only in cases. Neonatal ward admission was 22.0% in case group and 6.3% in control group. Neonatal mortality was higher 3.8% in cases than control 1.3%. Majority (6.65%) patients had post partum hemorrhage in case group and 3(4.0%) in control group.

Conclusion: Meconium stained amniotic fluid were associated with higher rate of caesarian delivery, increased need for neonatal resuscitation, increased rate of birth asphyxia with hypoxic ischemic encephalopathy, meconium aspiration syndrome, hospital admission, and mortality. Electronic foetal monitoring, timely obstetrical intervention and neonatal care can reduce associated complications and improve foetal outcome.

Key Words:

Meconium Stained Liquor,
Mode of Delivery, Antenatal care,
Fetomaternal outcome

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Introduction

The appearance of meconium-stained liquor during labour is generally considered to be a sign of hypoxia and a predictor of poor fetal outcome. It is one of the clinical

events where normal pregnancy can turn into a high risk one for the mother as well as for the foetus.¹

Meconium is a dark green liquid normally passed by the newborn baby within the first 24 to 48 hours after birth. It consist of gastrointestinal secretion, mucous, pancreatic juice, cellular debris, amniotic fluid, swallowed vernix caseosa, lanugo and blood. Meconium is found in the foetal gastrointestinal tract as early as tenth week of gestation and is not expelled into amniotic fluid due to relative lack of strong peristalsis and good anal sphincter tone. Meconium passage is rare before 34 weeks of gestations and after 37 weeks its incidence increases steadily with increasing gestational age.²

Passage of meconium in utero with staining of the amniotic fluid occurs in 12% to 16% of all deliveries.³⁻⁵ In healthy,

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well-oxygenated fetuses, meconium is cleared from the lungs by the normal physiological mechanism. It became detrimental to foetus if it is aspirated. Aspiration can occur in utero with foetal gasping or after birth with the first breaths of life.⁶ Most of them can develop an effective breathing movement to signs of aspiration and persistent hypoxia.⁷ Meconium stained amniotic fluid (MSAF) is known to be associated with several maternal and neonatal risk factors⁸. It is frequently seen in post term pregnancy or in growth restricted fetuses. Placental insufficiency, maternal hypertension, pre-eclampsia, oligohydroamnios or maternal drug abuse (tobacco or cocaine) also results in utero passage of meconium.⁹

Aspiration of meconium (Presence of meconium below the vocal cord) during intrauterine life may contribute to meconium aspiration syndrome (MAS), representing a leading cause of perinatal death. This finding occurs in 20% to 30% of all infants with meconium stained amniotic fluid² with around 12% mortality³. Of those neonates who develop MAS, thick MSAF has accounted for majority (73 to 87.6) of cases of MAS.¹⁰ The incidence of admission to newborn intensive care unit with respiratory distress syndrome, meconium aspiration syndrome¹¹, neonatal asphyxia¹², foetal distress or foetal acidosis¹³ were higher in pregnancies complicated by meconium stained liquor. Initial hypoxic events may cause the infant to have long-term neurological problems, including seizures, mental retardation and cerebral palsy.¹⁴

If meconium stained amniotic fluid (MSAF) is found, then continuous foetal heart rate monitoring is required for foetal well being.¹⁵ In our country, most maternity centers do not have facilities for continuous FHR monitoring and facilities for foetal scalp blood sampling are not available even in tertiary care hospitals. Thus, in the absence of these facilities unnecessary increase in instrumental vaginal deliveries (IVDs) and caesarian section (CS) rate with increased maternal morbidity and mortality.

The present study was undertaken to evaluate the effect of clear liquor and meconium stained liquor on time and mode of delivery and neonatal morbidity and mortality associated with meconium stained amniotic fluid.

Methodology:

This Prospective comparative study carried out among patients who were in labour with meconium stained amniotic fluid and women in labour but having clear amniotic fluid who was admitted for delivery in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, from Jan'2019 to Jun'2019.

With the ethical approval from the Institutional Ethical Committee (IEC), patients were selected after taking their written consent. All the patients who are in 1st& 2nd stage labour having single foetus with cephalic presentation with gestational age 37 completed weeks to 42 weeks age. Patients presenting with light yellow to thick dark green colour liquor after spontaneous or artificial rupture of membrane but CTG was reactive, no indication for urgent delivery (e.g., loss of FHR variability and late deceleration). Pregnancy less than 37 weeks of gestational age with hypertension, breech presentation, diabetes mellitus and any fetal malformations are excluded from the study. The gestational age was determined by ascertaining 1st day of last menstrual period and USG dating. The sample size is calculated and targeted sample size was 150. Therefore a total 75 pregnant women with meconium stained liquor and 75 pregnant women with clear liquor in labor was enrolled in this study.

Non-probability/Purposive sampling was done from the study population. Patients were selected through short interview applying inclusion and exclusion criteria. The total cases of women having meconium stained liquor in Labor and matched control group having clear liquor in labour admitted for delivery in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital was asked for proper history. Data was collected by face-to-face interview with the woman by using a pre-design questionnaire. The patients were carefully watched for progress of labour and were strictly monitored for FHR by intermittent auscultation and if necessary CTG. Where needed, augmentation with oxytocin was done. Delivery was expedited, when FHR abnormalities were detected by the safest possible method (IVD or CS). A neonatologist was present for all deliveries and attended to the babies. Those who needed observation were shifted to the intensive care unit as per the neonatologist's advice. Foetal outcomes like low Apgar score, low birth weight, birth asphyxia were evaluated and documented.

Statistical analyses were carried out by using the Statistical Package for Social Sciences version 16.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The mean value was calculated for continuous variables. The quantitative observations were indicated by frequencies and percentages. Chi-Square test with Yates correction was used to analyze the categorical variables, shown with cross tabulation. Student t-test was used for continuous variables. P values <0.05 was considered as statistically significant.

Results

A total of 75 patients in labour with meconium stained amniotic fluid and 75 labour case with clear liquor was studied in the Department of Obstetrics and Gynecology in Sir Salimullah Medical College & Mitford Hospital, Dhaka during January 2013 to June 2013. Pregnancy less than 37 weeks of gestational age, hypertension, diabetes mellitus, with any fetal malformations and non-cooperative patients who refused to give consent for the participation in the study were excluded from the study.

Table I shows that majority 30(40.0%) patients were age belonged to 26-30 years in case group and 33(44.0%) patients were belonged to 26-30 years in control group. The mean age was found 29.14±5.59 years in case group and 28.9±6.2 years in control group. The difference was not statistically significant ($p>0.05$) between two groups.

Table-I

<i>Distribution of the study patients by age (n=150)</i>					
Age (year)	Case (n=75)		Control (n=75)		P value
	n	%	N	%	
≤20	6	8.0	7	9.3	
21-25	27	36.0	20	26.7	
26-30	30	40.0	33	44.0	
31-35	9	12.0	13	17.3	
>35	3	4.0	2	2.7	
Mean±SD	29.14 ±5.59		28.9±6.2		0.803
Range (min-max)	(22 -40)		19-40		

P value reached from unpaired t-test

Table II

<i>Distribution of the antenatal check-up of the study patients (n=150)</i>					
Antenatal check up	Case (n=75)		Control (n=75)		P value
	n	%	n	%	
Regular	31	41.3	38	50.7	
Irregular	20	26.7	25	33.3	0.071 ^{ns}
No ANC	24	32.0	12	16.0	

P value reached from chi square test

Table 2: shows that patients received regular ANC was found 31(41.3%) in case group and 38(50.7%) in control group. Patients received irregular ANC was 20(26.7%) and 25(33.3%) in case and control group respectively. Patients received no ANC was 24(32.0%) in case group and

12(16.0%) in control group. The difference was not statistically significant ($p>0.05$) between two groups.

Table III

<i>Distribution of the study patients by gestational age at delivery (n=150)</i>			
	Case (n=75)	Control (n=75)	P value
	Mean ±SD	Mean ±SD	
Gestational age at delivery (weeks)	38.87 ±1.4	39.75 ±1.6	0.625

P value reached from unpaired t-test

Table III : shows gestational age at the time of delivery were 37-42 weeks in both groups and their mean gestational age at delivery was found 38.87±1.4 weeks in case group and 39.75±1.6 weeks in control group. The difference was not statistically significant ($p>0.05$) between two groups.

Table IV

<i>Distribution of the study patients by gravida (n=150)</i>					
Gravida	Case(n=75)		Control (n=75)		P value
	n	%	n	%	
Primi	41	54.7	44	58.7	0.621
Multi	34	45.3	31	41.3	

P value reached from chi square test

Table IV: shows that primigravid patients were found 41(54.7%) in case group and 44(58.7%) in control group. Multigravida patients were found 34(45.3%) in case group and 31(41.3%) in control group. The difference was not statistically significant ($p>0.05$) between two groups.

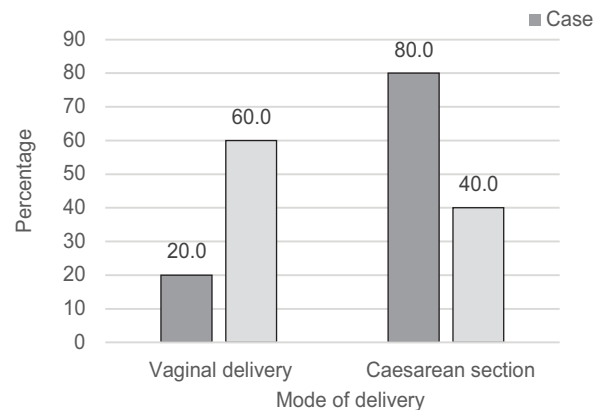


Figure 1 Bar diagram showing mode of delivery of the study patients

Figure 1: shows mode of delivery of the study patients, it was observed that 20.0% patients had vaginal delivery in case group and 60.0% in control group. 80.0% patients had caesarean section in case group and 40.0% in control group.

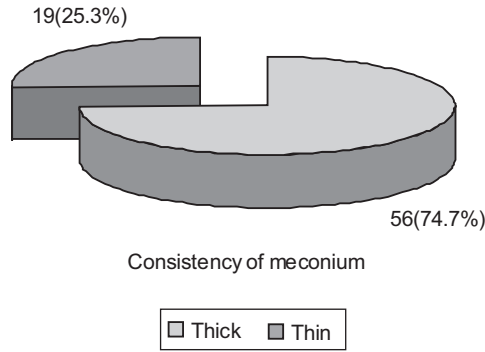


Figure 2: Pie chart showing consistency of meconium in case group

Figure 2: shows that more than one fourth (25.3%) patients had thin consistency of meconium and almost three fourth (74.7%) had thick consistency of meconium.

Table V

<i>Distribution of the study patients by APGAR score (n=150)</i>					
APGAR score	Case(n=75)		Control (n=75)		P
	n	%	N	%	value
APGAR at 1 min					
≤7	40	53.3	15	20.0	0.001 ^s
>7	35	46.7	60	80.0	
APGAR at 5 min					
≤7	17	22.7	6	8.0	0.012 ^s
>7	58	77.3	69	92.0	

s=significant

P value reached from chi square test

Table V : shows APGAR score of the study patients, it was observed that at 1 minute APGAR score found d”7 was 40(53.3%) in case group and 15(20.0%) in control group. After 5 minutes APGAR score d”7 was 17(22.7%) in case group and 6(8.0%) in control group. The difference was statistically significant (p<0.05) between two groups.

Table VI

<i>Distribution of the study patients by neonatal outcome (n=150)</i>					
Neonatal outcome	Case(n=75)		Control (n=75)		P
	n	%	n	%	value
Neonatal complications					
Present	40	53.3	6	8.0	^a 0.001 ^s
Absent	35	46.7	69	92.0	
<i>Nature of complications</i>					
Birth asphyxia					
Present	15	20.0	5	6.3	^a 0.016 ^s
Absence	60	80.0	70	93.7	
Meconium Aspiration Syndrome					
Present	19	25.0	0	0	^b 0.001 ^s
Absence	56	75.0	75	100.0	
Convulsion					
Present	3	3.8	0	0.0	^b 0.122 ^{ns}
Absence	72	92.2	75	100.0	
Mortality					
	3	3.8	1	1.3	
<i>Neonatal management</i>					
Oropharyngeal suction required					
Required	51	68.0	16	21.0	^a 0.001 ^s
Non Required	24	32.0	59	79.0	
Neonatal ward admission					
Required	17	22.0	5	6.3	^a 0.005 ^s
Non Required	58	78.0	70	93.7	
Intubation needed					
Required	4	5.0	0	0.0	^b 0.059 ^{ns}
Non Required	71	95.0	75	100.0	

s=significant; ns=not significant

^aP value reached from chi square test

^bP value reached from fisher’s exact test

Table VI shows neonatal outcome, it was observed that neonatal complications was found 40(53.3%) in case group and 6(8.0%) in control group. Birth asphyxia was present 15(20.0%) in case group and 5(6.3%) in control group. Meconium Aspiration Syndrome was present 19(25.0%) in case group and not present in control group. Convulsion was present 3(3.8%) in case group and not present in control group. Mortality had 3(3.8%) in case group and 1(1.3%) in control group. Oropharyngeal suction required was 51(68.0%) in case group and 16(21.0%) in control

group. Neonatal ward admission was 17(22.0%) in case group and 5(6.3%) in control group. Intubation needed 4(5.0%) patients in case group and not need in control group. The difference was statistically significant ($p < 0.05$) between two groups and not significant for convulsion and Intubation.

Table VII
Distribution of the study patients by maternal outcome (n=150)

Maternal outcome	Case(n=75)		Control (n=75)		P value
	n	%	N	%	
Postpartum haemorrhage	5	6.65	3	4.0	0.973
intrapartum/ postpartum/ Pyrexia	3	4.0	2	2.65	
Wound infection	4	5.3	2	2.65	

P value reached from chi square test

Table VII shows that 5 (6.65%) patients had postpartum haemorrhage in case group and 3(4.0%) in control group. Intrapartum/ postpartum/ Pyrexia was found 3 (4.0%) in case group and 2(2.65%) in control group. Wound infection was 4 (5.3%) in case group and 2(2.65%) in control group. The difference was not statistically significant ($p > 0.05$) between two groups.

Discussion:

Meconium stained amniotic fluid (MSAF), is a commonly observed phenomenon and one of the major obstetric hazards. A fetal condition during labor is usually assessed by fetal heart rate and checking the presence of meconium in the amniotic fluid.^{16,17} The detection of MSAF during labor often causes apprehension and anxiety for the patient as well as for the health provider as it is often considered an indication of fetal distress. The presence of thick meconium is associated with increased incidence of perinatal morbidity and mortality. This case control study was carried out with an aim to evaluate the maternal and immediate neonatal outcomes in meconium stained liquor during labour.

In this current study it was observed that most of the patients in case & control groups were 26 to 36 years. The mean age was found 29.14 ± 5.59 years in case and 28.9 ± 6.2 years in control group, which was almost similar between two groups. Similar mean age 29.92 ± 3.41 years found in Kumari et al.¹⁸ but Khatun¹⁹ showed the mean age of the mother was 24.5 ± 4.9 years in cases and 23.6 ± 4.2 years in

controls which is lower than present study. In this current study it was observed that primigravid patients were found 54.7% in case group and 58.7% in control group. Multigravida patients were found 45.3% in case group and 41.3% in control group, which were almost consistent between two groups. Kumari et al.¹⁸ showed 20% grand multiparous (parity > 5) patients having meconium stained amniotic fluid. It was observed in the study that patients had gestational age at delivery 37-42 weeks in both groups and their mean gestational age at delivery was found 38.87 ± 1.4 weeks in case group and 39.75 ± 1.6 weeks in control group. The difference was not statistically significant ($p > 0.05$) between two groups. In this study it was also found that rate of meconium staining in amniotic fluid increased with gestational age. Sunoo et al.²⁰ also found significant increased rate of meconium in amniotic fluid at 39 weeks. This can be explained by the presence of hormone motilin responsible for bowel peristalsis and defecation. It is secreted in increasing quantities by the fetus as gestational age advances and levels are highest in postdated gestations.²¹ In this study it was observed that patients received irregular ANC was 26.7% and no ANC was 32% in case group and irregular ANC was 33.3% and no ANC was 32% in control group which shows No ANC was lower in case group. As all ANC receiving rate in our country still not reached the SDG goal so the difference was not statistically significant ($p > 0.05$) between two groups in our study. Khatun¹⁹ and Kumari (68%)¹⁸ found very high association between antenatal checkup and amniotic stained liquor. Obstetricians is known to be more aggressive in labours with meconium stained amniotic fluid leading to higher caesarean section rate, which was 80% in our study. In contrast the caesarean section rate in the clear liquor group was 40%. Kumari¹⁸ mentioned in their study that vaginal deliveries were successful 60% cases but Saunders et al.²² reported that caesarean sections were performed twice as frequently in subjects with meconium stained amniotic fluid, In spite of debate, most obstetricians feel unsafe about the state of fetus, if the amniotic fluid is meconium stained during labour. This has influenced the mode of delivery a lot. Even in places where other facilities of intrapartum monitoring like fetal blood sampling and cardiotocography are available, the rate of caesarian delivery are found to be increased. The "thickness" of meconium had a direct bearing on the neonatal outcome. Among the cases it was observed that rate of caesarean delivery was more in thick meconium (74.7%) compared to thin meconium which was highly significant. Similar observation were also made by Patil et al.²³ and Khatun et al.¹⁹ and Mundhra (49.09%).²⁴

APGAR scores have low predictive value of birth asphyxia and it is affected by other factors. But in places where facilities of acid base assessment of the newborn are not available, we might rely on the findings of APGAR scores and or WHO criteria for the diagnosis of birth asphyxia. In this series it was observed that at 1 minute APGAR score found ≤ 7 was 53.3% in case group and 20.0% in control group. After 5 minutes APGAR score ≤ 7 was 22.7% in case group and 8.0% in control group. APGAR score found ≤ 7 was significantly ($p < 0.05$) higher in cases group at 1 minute and at 5 minutes. Khatunet al.¹⁹ showed APGAR scores in first minute and fifth minutes were also low in cases (6.8 ± 1.2 and 8.3 ± 1.1 respectively) in comparison to control. APGAR scores in fifth minute were significantly lower in cases. In another study Kumari et al.¹⁸ and Sedaghatian et al.⁸ found similar result in their study. Wiswell et al.³ found significantly lower one minute APGAR scores in meconium stained neonate but not in five minutes. From this study it could not exclude some hypoxic insult increased with gestational age being responsible for the increased incidence of meconium stained amniotic fluid as it could not perform fetal blood sampling for blood gas analysis and suggesting that the condition was indicative of fetal compromise.

In this current study it was observed that neonatal complication was found 53.3% in case group and 68.0% in control group. Birth asphyxia was found 20.0% in cases group and 6.3% in control group, which is consistent with Khatun (12-9%)¹⁹ and Gupta et al.²⁵

Meconium aspiration syndrome (MAS) 25.0% and convulsion 3.8% in case group but not found in control group. Meconium aspiration syndrome was significantly ($p < 0.05$) higher in cases group. Bhide et al.²⁶ reported 22%, but Patilet al.²³ had reported 12.8% meconium aspiration syndrome. The incidence of MAS was very high in babies with low 1 minute Apgar scores in spite of repeated intratracheal suctioning to remove meconium which gives credence to the theory that meconium aspiration is predominantly an intrauterine event which occurs in response to continued fetal gasping in a hypoxic environment and tracheal suctioning at birth cannot completely eliminate development of MAS.³

In this current study it was observed that oropharyngeal suction required was 68.0% in case group and 21.0% in control group, which was significantly ($p < 0.05$) higher in cases group. Requirement of oropharyngeal suction was significantly more in cases obtained by Khatunet al.¹⁹

In this current series it was observed that neonatal ward admission was 22.0% in cases and 6.3% in control group. Mortality was found 3.8% in cases and 1.3% in control

group. Neonatal ward admission was significantly ($p < 0.05$) higher in cases group. Admission in neonatal ward was more in cases and neonatal mortality was also high in cases than control obtained by Khatunet al.¹⁹. In their study mortality rate was 3.75% in cases with thick meconium compared to 1.25% mortality in control. Gupta et al.²⁵ found 4.9% mortality in meconium stained amniotic fluid group compared to 2.8% in control. It was also observed that meconium in conjunction with an abnormal heart tracing was associated with increased perinatal morbidities and mortality.²⁷

In this present study it was observed that, 6.65% patients had post-partum haemorrhage in case group and 4.0% in control group. Wound infection was 5.3% in case group and 2.65% in control group. There were no maternal deaths or any serious complication like uterine hypertonicity, maternal sepsis, DIC, amniotic fluid embolism or uterine rupture.

Limitations of the study: The study population was small and selected from referral hospital in Dhaka city, so that the results of the study may not reflect the exact picture of the country

Conclusion

Based on our study we concluded that meconium stained amniotic fluid is associated with higher rate of cesarean delivery, neonatal resuscitation, birth asphyxia, meconium aspiration syndrome, neonatal hospital admission and mortality. It is also associated with adverse maternal outcome such as postpartum haemorrhage and intra or postpartum pyrexia. As it is a small study and we hope our study encourage others to undertake large multicenter study and give us actual picture of meconium stained liquor. But electronic foetal monitoring, timely obstetrical intervention and neonatal care can reduce associated complications and improve foetal outcome.

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