

## ORIGINAL RESEARCH

# A Prospective Study on Perinatal Outcome in Meconium Stained Amniotic Fluid

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### ABSTRACT

**Background:** The presence of meconium-stained amniotic fluid is a sign of fetal compromise and is associated with increased perinatal morbidity. The objective of this study was to determine the perinatal outcome in pregnant women at term with meconium-stained amniotic fluid (MSAF) and compare it with the outcome associated with clear liquor. **Methods:** This prospective study was conducted to evaluate the perinatal outcome in meconium stained amniotic fluid. The study group consists of 300 patients in labor with meconium stained amniotic fluid. **Result:** Among these patients, 50.7% had thick meconium stained liquor, 35% of the patients had thin meconium stained liquor and 14.3% of the patients had moderate meconium stained liquor. In the study group, almost half of the patients were delivered by cesarean section (52.7% vs 37% in the control group)  $P = 0.001$ . Fetal distress is the commonest indication for cesarean section in the study group (70.2% vs 18.9% in control group)  $p = 0.001$ . In the study group, 31.7% of the babies were admitted for NICU care. The commonest reason for NICU admission was mild respiratory distress (34.7%). The perinatal mortality in the study group was 3.3% as compared to no neonatal death in the control group. (3.3% Vs 0);  $P = 0.17$ . **Conclusion:** The incidence of non-reassuring fetal heart rate pattern is significantly higher in women with meconium stained amniotic fluid in labor. The perinatal outcome is good in patients with meconium stained amniotic fluid and reactive NST. So, meconium in the amniotic fluid is associated with obstetric hazard and significantly increased risk of adverse neonatal outcomes, only when it is associated with fetal heart rate abnormalities. The main clinical value of meconium stained amniotic fluid is to alert the obstetrician to look for further signs of fetal compromise.

**Key words:** Amniotic fluid, fetal distress, Meconium, Perinatal outcome.

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### INTRODUCTION

The birth process is described as the most perilous journey an individual ever undertakes. Meconium staining of the amniotic fluid and abnormalities in the fetal heart rate pattern have long been recognized as danger signals in this journey. Incidence of meconium stained liquor increases steadily from 10% at 36 weeks to 30% at 40 weeks and 50% at 42 weeks. Fetal compromise of an acute or subacute nature also leads to passage of meconium. Whatever be the controversies regarding meconium, the following holds true: Clear amniotic fluid is reassuring. Thick fresh meconium in a situation of high risk is of great concern.

The presence of MSAF is a serious sign of fetal compromise and is associated with increased perinatal morbidity and mortality.<sup>1</sup> MSAF occurs in approximately 15 to 20% of term pregnancies. The incidence of MSAF increases with gestational age and is approximately 23-52% after 42 weeks of

gestation.<sup>2</sup>As most babies with MSAF are 37 weeks or older, it suggests physiological maturation of fetal autonomic nervous system. It may also indicate an acute or chronic hypoxic event, thereby suggesting fetal compromise.<sup>3</sup>Factors resulting in in-utero passage of meconium are placental insufficiency, maternal hypertension, pre-eclampsia, oligohydramnios or maternal drug abuse (tobacco, cocaine).<sup>4</sup>

Obstructed labor, induced labor and longer duration of labor were other independent factors associated with an increased likelihood of meconium-stained liquor at term.<sup>5</sup>There is increased risk of respiratory distress in neonates born through MSAF. Meconium passage can predispose to aspiration of meconium and resultant inflammatory pneumonitis, surfactant inactivation, and mechanical airway obstruction.<sup>6</sup> Meconium aspiration syndrome (MAS) results from meconium aspiration during intrauterine gasping

or during the first few breaths. About one-third of infants with MAS require intubation and mechanical ventilation. Improved antenatal care, intrapartum monitoring and amnioinfusion have resulted in reduced stillbirths and better neonatal outcome in recent years. However, in developing nations, MAS still accounts for about 10% of all cases of respiratory failure with 39% mortality rate.<sup>7</sup> Therefore, the present study was undertaken with the objective of determining the perinatal outcome in term deliveries associated with MSAF and comparing it with the perinatal outcome associated with clear liquor.

**MATERIALS AND METHODS**

This prospective study was conducted at a tertiary care teaching hospital in department of Obstetrics and Gynecology for a period of one year the study group consist of 300 pregnant women selected on the basis of inclusion and exclusion criteria. All of them had meconium stained amniotic fluid of varying degrees. The fetal heart rate abnormalities were recorded with intrapartum cardiotocography (Non – stress test). The mode of delivery and neonatal outcome were analysed. The control group consist of 100 patients in labor with clear liquor.

Mothers on term gestation, Singleton pregnancy, Cephalic presentation, Primi or multigravida with meconium stained amniotic fluid at latent and active stages of labor with or without risk factors were included in the study. Whereas mothers with multiple gestation, Malpresentations, Congenital anomalies of the fetus, Polyhydramnios, Antepartum hemorrhage and Preterm pregnancy were excluded.

Patients in labor with meconium stained amniotic fluid were selected following the inclusion and exclusion criteria. Detailed history was taken and patients were carefully examined for any antepartum or intrapartum risk factors like preeclampsia, IUGR, APH, PROM etc. These patients were clinically monitored during labor. The color of amniotic fluid and degree of meconium was noted at the time of amniotomy or spontaneous rupture of membranes and at the time of delivery. The time interval between the detection of meconium and the time of delivery were noted. Fetal heart rate abnormalities were recorded using cardiotocograph, after the detection of meconium.

Depending upon the degree of meconium, fetal heart rate abnormalities, stage of labor and other risk factors, the time and mode of delivery was decided. After delivery, the immediate fetal well-being was assessed by Apgar score at 1 min and 5 minutes. Details such as cord around the neck, meconium staining of the cord, finger nails, vernix caseosa, meconium smearing of the body, caput, subgaleal bleed were noted. Weight of the baby taken into account. Evidence of IUGR, posmaturity and congenital anomalies were looked for. After the delivery of placenta, look for its weight, meconium staining, infarcts, calcification etc. Babies were followed up in the neonatal period upto 1 month using reply cards, for any morbidity and mortality. The morbidity criteria was taken as MAS, chest infections, fever and seizures.

**RESULT**

In our study population of 300 mothers majority of the patients were between 21 – 30 years of age in both the groups. In meconium group – 80% and in control group 79%. More than half of the patients were in the gestational age 37 – 40 wks both in study (62.6%) and control group (65%). In the study group, 61% were primigravida and 39% of the patients were multigravida. Only 5% of the patients were unbooked in the study group.

Next to the clinical presentation, nearly half of the patients (50.7%) had thick meconium stained liquor among which in 105 it was thin meconium stained, 43 moderate meconium stained. In 59% of the patients meconium was detected in the latent phase of labor and rest on active phase. Coming to time interval between detection of meconium and delivery, majority of the cases of meconium stained liquor were delivered within 1 hour of detection of meconium.

In study group, 158 patients (52.7%) were delivered by LSCS, of which 101 patients had thick meconium stained liquor. In thin meconium group, with reactive NST, 66% delivered vaginally. But in thick meconium group, irrespective of the NST, most of them were delivered by LSCS. In the control group, majority 59% of the patients delivered by labor natural and 37% delivered by LSCS. In non-meconium group, among 86 cases of reactive NST, 62.8% of cases delivered by labor natural. Among 14 cases of non-reactive NST, 64.3% of cases delivered by LSCS.

**Table 1. Indications for Cesarean Section**

Indications	Study Group	Control Group
Fetal distress	111 (70.2%)	7 (18.9%)
CPD	28	15
CPD with fetal distress	5	-
Persistent occipito posterior	1	2
Failed induction	3	7
Previous LSCS with PROM	6	1
Other Causes	4	5
Total No. of Patients	158	37

Among 158 patients, 31 patients had repeat LSCS in study group. In control group, 14 patients had repeat LSCS. The most common indication for LSCS in the study group is fetal distress, 70.2% vs 18.9% in the control group,  $Z = 33.4$ ;  $P = 0.001$ ; Odds Ratio = 10; 95% CI = 4 – 27.

Next we started analyzing perinatal outcome, Using 1 min Apgar score, only 51.3% of babies had a good Apgar  $> 7/10$  at 1 min. In thick meconium, only 39.5% of babies had Apgar  $> 7/10$  at 1 min, and 23% of babies had a poor Apgar of  $< 4/10$  at 1 min. Using 5 min Apgar score, 89% of the babies had a good Apgar of  $> 7/10$  at 5 mins. Even in patients with thick meconium, 84.9% of babies had a good Apgar of  $> 7/10$  at 5 mins. With reactive NST, Apgar score is good in all three groups. The incidence of low Apgar is higher in those with non – reactive NST. This is statistically significant in thin and thick meconium groups. All patients with reactive NST had a good Apgar of  $> 7/10$  at 5 mins. About 79% of patients had a good Apgar of  $> 7/10$  at 1 min.

Majority of the babies are in the birth weight range 2.5 to 3.5kg in both study and control group. Many IUGR babies were noticed with, thick meconium stained liquor.

**Table 2. Birth Weight of Babies in Meconium Group**

Birth weight	Thin MSAF	Moderate MSAF	Thick MSAF	Total
1.5 – 1.9 kg	1	-	8	9
2 – 2.4 kg	7	5	24	36
2.5 – 2.9 kg	36	17	47	100
3 – 3.4 kg	41	16	45	102
$>3.5$	20	5	28	53

Coming to NICU admission total number of babies admitted = 95 (31.7%). Among 157 reactive NST only 21 (13.4%) babies were admitted. Among 143 non reactive NST, 74 babies (51.8%) were admitted. Majority of the admission is constituted by babies from thick meconium group with non – reactive NST (60.9%). Percentage of MAS in this study = 10.3%, among 6 babies which were admitted to TOR/O sepsis, sepsis was present in 3 babies. Among 86 reactive NST. Only 4.7% babies were admitted. Among 14 non-reactive NST, 7.1% of babies were admitted in control group.

**Table 3: Reason for NICU Admission in Meconium Group**

Reason for Admission	Number of babies admitted
MAS	25
IUGR with MAS	6
LGA	5
Respiratory distress	33
IUGR	12
HIE I and II	3
Intraventricular hemorrhage	1
Subgaleal bleed	1
To R/O Sepsis	6
IDM	3
Total	95

Perinatal mortality was nil with Control Group, Total number of neonatal deaths – 10 (3.3%). All neonatal deaths occurred in those patients with non – reactive NST. In patients with thin meconium stained liquor. 3 babies died – 2 babies died due to severe birth asphyxia and hypoxic ischemic encephalopathy stage II and 1 baby died due to meconium aspiration syndrome (IUGR). In patients with moderate meconium stained liquor, 1 baby died due to hypoxic ischemic encephalopathy II (IUGR). In patients with thick meconium stained liquor, 6 babies died. 4 babies died due to meconium aspiration syndrome, 1 baby died due to severe birth asphyxia and another one baby died due to bilateral pneumothorax, which developed as a sequelae of MAS. The perinatal mortality becomes significant ( $P = 0.003$ ) in meconium stained liquor, with non – reactive NST.

**Table 4: Comparison of Perinatal Mortality**

	Study Group	Control Group
Total number of patient	300	100
Neonatal deaths	10	0
Percentage	3.3%	0

## DISCUSSION

This prospective study consists of 300 patients with meconium stained amniotic fluid in labor as study group. The control group consists of 100 patients in labor with clear liquor. There were 30 cases of PIH, 7 cases of GDM and 112 cases of post dated pregnancy in study group. In control group there were 10 cases of PIH, 3 cases of GDM, and 35 cases of post dated pregnancy.

In the study group, 50.7% of patients had thick meconium stained liquor, 14.3% had moderate meconium and 35% of patients had thin meconium stained liquor. In the study group, 47.6% of the patients had non-reactive NST vs 14% in the control group, ( $P = 0.001$ ). This shows that the incidence of non – reassuring fetal heart rate pattern was significantly higher in women with meconium stained amniotic fluid in labor (47.6% vs 14%). Similar observation was made by Starks et al.,<sup>8</sup>. They found significantly increased incidence of fetal heart rate abnormalities in the meconium group (32.7%) than control (6.1%).

The reason for higher fetal heart rate abnormalities in the present study may be explained as follows: The criteria for FHR abnormalities in the present study are persistent tachycardia / bradycardia, absence of variability, repetitive late decelerations, whereas in Starks study, the criteria for FHR abnormalities was only late decelerations. Similar observations were also made by Wong SF, Chow<sup>9</sup>. They remarked that the incidence of non – reassuring cardiotocography in women presenting with meconium stained amniotic fluid was significantly higher (9.8% vs 6.4%).

Depending upon the density of meconium, in patients with thick meconium stained liquor, majority (60.5%) had non – reactive NST and 39.5% had reactive NST. Similar observation was made by Halvax et al.,<sup>10</sup> that there is a significant linear association between the thickness of meconium and abnormal fetal heart rate pattern during labor.

In the study group, almost half of the patients (52.7%) were delivered by cesarean section as compared to 37% in the control group. (52.7% vs 37%). This correlate closely with the study conducted by Faridi Aggarwal<sup>11</sup> where the incidence of Cesarean section in patients with meconium stained liquor is 48%. In this present study, 42% of the patients delivered vaginally, 52.7% of patients were delivered by cesarean section and 5% had instrumental delivery ( $X^2 = 42.3$ ,  $P = 0.001$ ). The most common indication for cesarean section in the meconium group was fetal distress (70.2% vs 18.9% in control group);  $P = 0.001$ .

In study group, with reactive NST, 94.9% of babies had good mean Apgar score of  $\square$  7/10. But with non reactive NST only 61.5% had a good mean Apgar score of  $\square$  7/10. This shows that the incidence of low Apgar score at 1 and 5 minutes in meconium stained amniotic fluid was significantly higher when associated with fetal heart rate abnormalities. Meis

and associates<sup>12</sup> found that heavy meconium increased the risk of low Apgar score, MAS and death compared with light meconium. But later on, Bochner and Coauthors<sup>13</sup> reported that even with thick meconium, perinatal morbidity was increased only when non reassuring FHR pattern were present.

In the study group, 31.7% of the babies were admitted for NICU care. In patients with reactive NST only 13.4% of the babies were admitted, but in those with non – reactive NST 51.8% of babies were admitted ( $P = .0001$ ). Similarly, many early reports have related meconium passage to increased risk of perinatal morbidity and mortality, especially when associated with abnormal fetal heart rate patterns. There were reports by Nathan et al,<sup>14</sup>.

Ash AK, Cambridge<sup>15</sup> have suggested that meconium stained amniotic fluids might signify underlying acute or chronic fetal hypoxia with adverse perinatal outcome, especially when associated with cardiotocographic abnormalities. The incidence of meconium aspiration syndrome in the study was 9.66%. This corresponds closely to the studies conducted by Rossi et al.,<sup>16</sup> where they reported the percentage of MAS developing in infants delivered through meconium stained amniotic fluid is 8 – 10%.

In this present study, when MAS incidence is further classified depending upon the density of meconium, the MAS incidence in thick meconium stained liquor in 16.4%, in moderate meconium stained liquor 2.3% and in thin meconium stained liquor it is 3.8%. This correlates closely with the study done by Rossi and colleagues,<sup>16</sup> where they reported MAS incidence of 19% in patients with thick meconium stained liquor, 5% in patients with moderate meconium stained liquor and 3% in patients with thin meconium stained liquor.

The perinatal mortality in the study group was 3.3%. There was a total of 10 neonatal deaths. According to Ziadeh and Sunna<sup>17</sup> Jordan University, the perinatal mortality increased from 2 per 1000 births with clear amniotic fluids to 10 per 1000 with meconium stained amniotic fluids  $P (< 0.001)$ . According to Fraser, Hofmeyr and Alexander<sup>18</sup>, the perinatal mortality was 0.5%.

## CONCLUSION

The incidence of non-reassuring fetal heart rate pattern is significantly higher in women with meconium stained amniotic fluid in labor. There is a significant linear association between the thickness of meconium and abnormal fetal heart rate pattern during labor. The perinatal outcome is good in patients with meconium stained amniotic fluid and reactive NST. The cesarean section rate, low Apgar score, neonatal admissions and perinatal mortality were significantly higher with meconium stained amniotic fluid and non-reactive NST. So, meconium in the amniotic fluid is associated with obstetric hazard and significantly increased risk of adverse neonatal outcomes, only when it is associated with fetal heart rate

abnormalities. The main clinical value of meconium stained amniotic fluid is to alert the obstetrician to look for further signs of fetal compromise.

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