



## Perinatal Outcome in Meconium Stained Amniotic Fluid

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### ABSTRACT

Meconium stained amniotic fluid (MSAF) is a sign of fetal distress and is associated with an increase in perinatal morbidity.

**Objectives:** To evaluate the perinatal outcome in meconium stained amniotic fluid in term pregnancy and to determine the mode of delivery in MSAF.

**Methodology:** This was a prospective Case- Control study conducted in Public Health Centre, Chennai, in Obstetrics and gynecology department from September 2011 to May 2013 among 100 pregnant women with MSAF in labour after rupture of membrane and 100 women with clear liquor, and the mode of delivery and the perinatal outcome was monitored in both groups.

**Results:** The incidence of non-reassuring Cardiotocography is significantly higher in women with MSL in labor ( $p = <0.001$ ). The cesarean sections rates were significantly higher among study group ( $p = 0.001$ ) mainly contributed by the thick meconium group and non-reassuring Cardiotocography.

**Conclusion:** Thus the presence of meconium in the amniotic fluid significantly affects the obstetric management, possibly reflecting a combination of more difficult labor and a low threshold for obstetric intervention.

**Key words:** Meconium, Cardiotocography, Perinatal morbidity.

### INTRODUCTION

The birth process is described as the most perilous journey an individual ever undertakes. The presence of Meconium Stained Amniotic Fluid (MSAF) is a serious sign of fetal compromise, which is associated with an increase in perinatal morbidity. [1] Approximately 13% of all live births are complicated by MSAF. [2] Thus, MSAF should be considered a possible warning sign of fetal distress and warrants careful monitoring of the fetal heart rate. MSAF rarely occurs before 34 weeks of gestation. [3] After 34 weeks, the incidence of meconium passage increases with

gestational age and reaches approximately 30% at 40 weeks and 50% in 42 weeks. [3-5]

The increased incidence of MSAF with advancing gestational age probably reflects the maturation of peristalsis in fetal intestine. When the fetus suffers from hypoxia or asphyxia, increased parasympathetic stimulation by vagus leads to passage of meconium.

Fenton & Steer suggested that passage of meconium was not significant if fetal heart rate was greater than 110 bpm. [6] However, in post-dated pregnancy or in pregnancy with growth restriction, even in the presence of normal reassuring heart rate;

it is a reasonable assumption that passage of meconium is a sign of fetal distress.

Aspiration of meconium with the first breath after birth is more likely, and the newborns are at higher risk for the obstetric interventions and local inflammatory effects of meconium. These infants are more likely to suffer from long term respiratory and neurological complication. [7]

Despite the controversies regarding MSAF, the following holds true: Clear amniotic fluid is reassuring and, thick fresh meconium is a high risk situation, and is of great concern. Presence of abnormal fetal heart rate (FHR) pattern in presence of MSAF is a definite indication of fetal compromise. [8]

The purpose of the this prospective study is to evaluate the effect of clear liquor and meconium stained liquor on mode of delivery and to find out neonatal morbidity and mortality associated with meconium stained amniotic fluid.

## MATERIALS AND METHODS

This study was conducted in Public Health Centre; west Mambalam, Chennai, Obstetrics and Gynaecology Department.

**Study Population:** Pregnant women admitted with labour pain in our Hospital.

**Sample Size:** 100 pregnant women with meconium stained amniotic fluid after rupture of membrane were taken as study population and 100 pregnant women with clear liquor after rupture of membrane were collected randomly as control group.

**Data collection:** Patient in labour was selected based on the inclusion and exclusion criteria's. These patients were clinically monitored during labour, after detailed history and examination. The color of the liquor was noted during

- a. The time of ARM
- b. Spontaneous rupture
- c. At the time of delivery.

FHR was recorded using CTG after detection of meconium. The time between the meconium and the time of delivery were

noted. Depending on the degree of meconium, FHR, stage of labour, risk factor, time and mode of delivery were noted. After delivery, fetal well-being was assessed by Apgar score at 1 minute and 5 minutes. Fetal cord blood CRP was analyzed for chorioamnionitis and neonatal sepsis. Evidence of IUGR, post maturity and anomalies were looked for. Babies were followed up to the hospital stay for any morbidity or mortality. *Morbidity criteria:* MAS, chest infection, fever, and seizures. The findings between clear liquor (control) and MSAF (test) are correlated to bring out the perinatal outcome in MSAF.

Comparisons were made between meconium stained group and clear amniotic fluid group to find out whether any difference exist between the two groups in relation to mode of delivery and fetal outcome.

**Data Analysis:** Data analysis was done using Statistical Package for Social Science/ Statistical Product & Service Solution (SPSS) computer software. Chi-square test was done to find out any significant statistical relation between the variables. A p value < 0.05 was deemed as a significant outcome, p<0.01 is taken as highly significant and p value >0.05 is considered as non- significant.

## RESULTS

This Prospective Case-Control study done in 100 patients with meconium stained liquor as study group and 100 patients with clear liquor as control group to evaluate the "Perinatal Outcome in meconium Stained Amniotic Fluid", yielded the following results.

	Study group	Control group
Number of patients	100	100
Mean Age of the Patients	25.20 years	24.05 years
Mean Gestational Age	39.3 weeks	38.98 weeks
Number of patients with Thick meconium	25	-
Required Amnioinfusion	49	3
Non-reactive CTG	34	10
Mean ROM-Delivery Time	2.98 hours	2.17 hours

Mode of Delivery:

Spontaneous Vaginal Delivery	57	73
Instrumental Delivery	16	20
LSCS	27	7

Fetal Outcome:

APGAR score<7 at 1min	13	3
APGAR score<7 at 5 min	10	1
Meconium below vocal cord	14	-
Needs NICU Admission	31	6
Respiratory Distress	4	2
MAS	2	-
Sepsis	2	1
Death	1	-
CRP Positive	21	11

DISCUSSION

The present study notes that the following are the risk factors that predisposed to MSAF -gestational hypertension, gestational diabetes mellitus, hypothyroid, Rh negative complicating pregnancy and anemia. 7% of patients in the study group presented with gestational hypertension which is comparable to the studies (Table 1) by Ghokroo K et al [9] and Laxmi et al and Desai et al, [10] concluded that the incidence of meconium passage was notably higher in patients with gestational hypertension.

Table 1: Risk Factors

	Present study	Ghokroo K et al	Laxmi et al	Desai et al
Gestational Hypertension	7%	8.66%	16.5%	20%

58% of the patients in present study group had moderate to thick meconium, out of which 25% had thick meconium. This finding was comparable with the studies (Fig 1) done by Debdas et al [11] Arun et al [12] and Sheiner et al.

labour (34% vs. 10%). Similar observation was made by Starks et al [13] that reported a significant increase in incidence of fetal heart rate abnormalities in meconium group (32.7%) and 6.1% in control group. Surekha et al stated that FHR pattern variations were more often seen in cases with thick meconium than those with thin meconium.

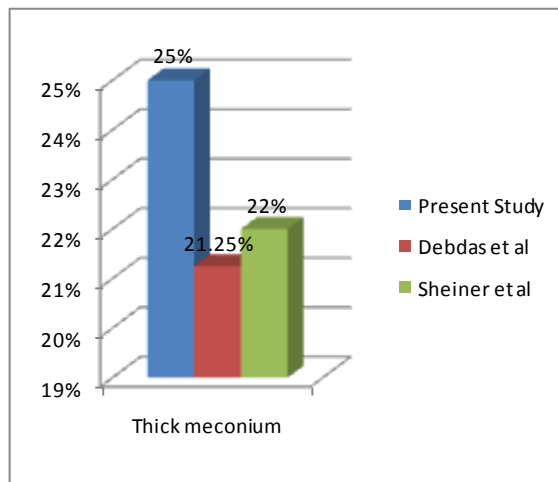


Figure 1: Incidence of Thick Meconium in amniotic fluid

The criteria for FHR abnormalities in the present study such as persistent tachycardia/bradycardia, absence of variability, repetitive late deceleration accounted for higher fetal heart rate abnormalities reported in the present study.

Similar observations were also made by Wong SF et al who reported that the incidence of non-reassuring Cardiotocography in women presenting with meconium stained amniotic fluid was significantly higher (9.8% vs. 6.4%). In the present study, depending upon the density of meconium, in patients with thick meconium stained liquor, 7% had non-reactive CTG and 1% had reactive CTG. This corroborates with study reported by Halvax et al [14] that there is a significant linear association between the thickness of meconium and abnormal FHR pattern during labour.

In present study, 34% of cases had non-reactive CTG in study group and 10% cases had non-reactive CTG in control group with (p<0.001) (Table 2). This shows that the incidence of non-reassuring fetal heart rate pattern was significantly higher in women with meconium stained amniotic fluid in

**Table 2: CTG**

CTG	Study group(n=100)		Control(n=100)	
	No. of patients	Percentage	No. of patients	Percentage
Reactive	66	66%	90	90%
Non-reactive	34	34%	10	10%
p value	<0.001 (Significant)			

More cases of Non-reactive CTG were found in study group 34% compared to control group with only 10%.

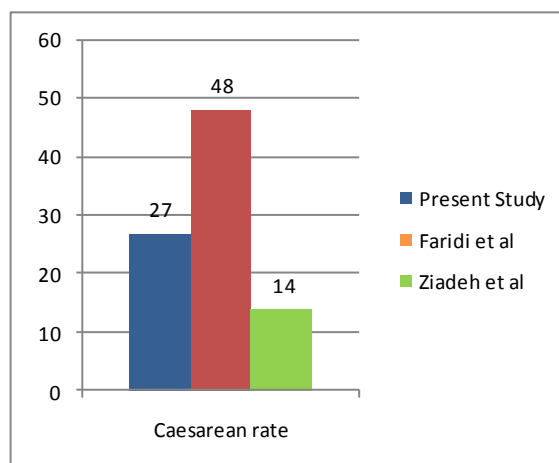
With regard to the mode of delivery, in the present study 27% of the patients in the meconium group underwent caesarean section and 16% instrumental delivery (p=0.001)(Table 3). In the control group only 7% had caesarean section and 73% of the patients underwent normal vaginal delivery which indicates a higher incidence of caesarean sections in MSAF patients. The

most common indication for caesarean section in meconium group was fetal distress. Ziadeh et al stated that delivery by caesarean section increased by 7-14% in patients with meconium stained liquor. Hiremath P B et al [15] stated MSAF is associated with increased incidence of caesarean section (Fig 2).

**Table 3: Mode of delivery**

Mode	Study group(n=100)		Control(n=100)	
	No. of patients	Percentage	No. of patients	Percentage
Normal	57	57%	73	73%
Vacuum	14	14%	20	20%
Forceps	2	2%	-	-
LSCS	27	27%	7	7%
p value	0.001( Significant)			

### Caesarean section rate

**Figure 2: Rate of cesarean section**

In present study, 13% of the patients in the meconium group had low APGAR <7 in 1 minute and 3% had low APGAR in control group. In 5 minutes APGAR 10% had low APGAR<7 in meconium group and 1% in control group. 3% of the patients presented with below score of 3 in meconium group in I minute APGAR, and 3% in 5 minutes APGAR. These findings are comparable with the study (Table 4,5) reported by Clifford J et al [16] and Gautham et al. [17]

**Table 4: APGAR SCORE in 1 minute**

	Present Study		Clifford J et al		Gautham et al	
	Study group	Control group	Study group	Control group	Study group	Control group
Low APGAR <7 in 1 minute	13%	3%	40.3%	3.9%	13%	3.6%

P value: 0.039 (significant)

**Table 5: APGAR SCORE in 5 minutes**

	Present Study		Gautham et al	
	Study group	Control group	Study group	Control group
Low APGAR <7 in 5 minutes	10%	1%	6%	1.8%

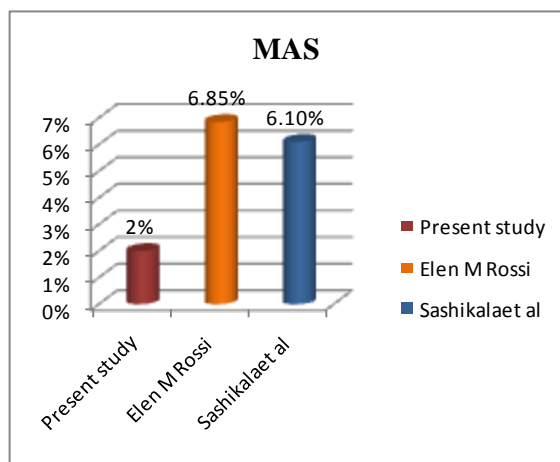
P value: 0.047 (significant)

There is no significant statistical correlation between APGAR and grade of meconium in the present study because of the administration of amnioinfusion which improves the APGAR score. Marci et al [18] reported a significant reduction in fetal distress, significant reduction in caesarean section for fetal distress and decreased incidence of meconium aspiration and meconium aspiration syndrome associated with the use of amnioinfusion. Wenstrom et al reported that amnioinfusion decreases meconium below vocal cords and low one minute APGAR scores. Amnioinfusion can be used to relieve umbilical cord compression during labour, hence useful in improving FHR pattern and reduces fetal acidemia.

In the babies born to MSAF group, 31% required admission in NICU as compared to 6% in control group (Table 6). Among those admitted, 17% of the patients in the study group presented with thick meconium of which 4% of the infants delivered had respiratory distress, 2% had MAS, 2% had sepsis and 1% had perinatal mortality. Of the infants delivered in the control group 2% had respiratory distress, no incidence of MAS, and 1% sepsis. MAS babies had non-reactive CTG and occurred in 1% in moderate MSAF and 1% in thick MSAF. Elen M Rossi [19] reported that, 6.85% of the babies born with MSAF developed MAS. Sashikala et al [20] reported that of the MSAF born babies, 39.7% developed transient tachypnea, 6.1% MAS and 3.8% septicemia (Fig 3).

**Table 6: NICU Admission**

NICU	Study group(n=100)		Control(n=100)	
	No. of patients	Percentage	No. of patients	Percentage
Not admitted	69	69%	94	94%
Required admission	31	31%	6	6%
p value	<0.001 (Significant)			



**Figure 3: Incidence of Meconium aspiration Syndrome**

Fleischer et al reported that the risk of neonatal respiratory complications in presence of meconium was 2% when FHR pattern were normal and 12% when they were abnormal. Rossi et al [19] reported a MAS incidence of 19% in patients with

thick meconium stained liquor and 3% in patients with thin meconium stained liquor.

Perinatal mortality was 1% in present study; baby was born to a multiparous lady at 38 weeks 5 days with Pre-eclampsia, after ARM it was moderate MSL. Amnioinfusion was given for variable deceleration, baby had a non-reactive CTG. Baby was delivered by normal vaginal delivery after 2 hours and 10 minutes. Weight was 2.7 kg and APGAR was 8/10, 9/10. There was no meconium staining of vocal cord. Baby was admitted in NICU for 2 days for severe respiratory distress. CRP was 76. Baby was treated with oxygen and Intravenous antibiotics, but baby died on 3<sup>rd</sup> day. The reason for perinatal mortality may be due to MAS, Neonatal sepsis or Pneumonitis.

Cochrane Collaboration [21] concluded that prophylactic antibiotic appeared to have

no significant reduction in the incidence of neonatal sepsis. However, significant reduction in the risk of chorioamnionitis was observed with the use of prophylactic antibiotics. According to Ziadehet al <sup>[22]</sup> the perinatal mortality increased from 2 per 1000 births with clear amniotic fluids to 10 per 1000 births in cases of meconium stained amniotic fluids P (< 0.001). According to Fraser, <sup>[23]</sup> Hofmeyr and Alexander, the perinatal mortality was 0.5%.

Majority of the babies had CRP negative both in control and study group. More positives were found in MSAF group (21%) but not statically significant. Elizabeth et al <sup>[24]</sup> concluded that there was no significant correlation between APGAR and CRP levels. Silvia Bravo et al <sup>[25]</sup> found significant association between MSAF and increase in IL-6 with normal CRP value.

## CONCLUSION

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 with reactive CTG. Detection of thick meconium should be monitored more closely and needs additional monitoring facilities. Thus meconium in the amniotic fluid significantly affects the obstetric management, possibly reflecting a combination of more difficult labor and a low threshold for obstetric intervention.

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