Original Article

# A study of perinatal outcome in meconium stained amniotic fluid

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## Abstract

**Aims and Objectives:** To find out the incidence, study the mode of delivery, relation between meconium staining and fetal heart rate abnormality and clinical correlation of perinatal outcome with thin and thick meconium stained amniotic fluid. **Materials and Method:** Study was carried out in the department of Obstetrics and Gynaecology of MKCG Medical College Hospital, Berhampur from December 2014 to September 2016. Study included 912 patients with meconium stained amniotic fluid detected during labour and their perinatal outcome will be analysed keeping the type of meconium as the principal variable. **Results:** Out of 912 cases, thin meconium staining was seen in 63.82% and thick in 36.18%. 66.43% cases of MSAF were associated with high risk factors. Fetal heart rate abnormality was seen in 32.24% cases, more in cases of thick meconium. The mode of delivery in majority of 46.5% were spontaneous vaginal**,** 11.18% were assisted by forceps or ventouse and 42.77% needed LSCS. At 1 minute, 65.79% babies had Apgar score >7. At 5 minute, 80.92% babies had Apgar score >7. When heart rate abnormality was present along with meconium, 71.43% had Apgar score <7. 35.53% required NICU admission. 19.74% developed perinatal morbidity. MAS was the leading cause of death in 3.95%.**Conclusion:** There was significant association between heart rate abnormalities and mode of intervention. Low Apgar score was mainly observed when meconium was associated with abnormal heart rate pattern. Thick meconium stained amniotic fluid was associated with increased rate of intervention, neonatal morbidity and mortality compared with thin MSAF.

**Keywords:** Meconium stained amniotic fluid, Meconium aspiration syndrome, Thick meconium, Perinatal Outcome.

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## INTRODUCTION

Meconium is the name given to substances which have accumulated in the fetal bowel during intrauterine life. Although 69% of newborns pass meconium by 12 hours of age, many infants pass meconium prior to birth as well.[1] It has been suggested that the foetus passes meconium in response to hypoxia and that meconium therefore signals fetal compromise. Alternatively, in utero passage of meconium may represent normal gastrointestinal tract maturation under neuronal control. Meconium passage could also follow vagal stimulation from transient umbilical cord entrapment.[2] The significance of meconium in amniotic fluid is a widely debated subject. Traditionally meconium has been viewed as a harbinger of impending or ongoing fetal compromise; however some investigators believe that it is not associated with fetal hypoxia, acidosis or feta distress. The predictive value of meconium is better when it occurs in high risk patients and is thick, dark and tenacious. Lightly stained meconium has a poor correlation with feta hypoxia. [(3)] Meconium stained amniotic fluid occurrence during labour is associated with increased caesarean section rate.

## MATERIALS AND METHOD

The present study was carried out in the department of Obstetrics and Gynaecology of MKCG Medical College Hospital, Berhampur from December 2014 to September 2016. During the study, cases were selected from the patients attending Labour Room of our department. Total

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912 patients who fulfilled the inclusion criteria were studied.The protocol included detail history and thorough clinical examination of the patients, note the type of meconium stained amniotic fluid, FHS monitoring, note the mode of delivery, assess the newborn in terms of birth weight, apgar score at 1 min and 5 min and extent of resuscitation needed, detect the neonatal morbidity in terms of duration of NICU stay and outcome by following up the newborn for the first 7 days. Keeping the type of meconium as the principal variable, all the other criteria were analysed. The outcome variables used for analysis included parity, high risk factors, fetal heart rate abnormalities, mode of delivery, Apgar score, NICU stay, perinatal morbidity and mortality.

**Inclusion Criteria**

All pregnant women with a singleton pregnancy at term with cephalic presentation with or without predefined risk factors of different age groups, parity and stage of labour:

1. Presenting with meconium stained amniotic fluid after spontaneous or artificial rupture of membranes.
2. Gestational age 37 completed weeks.

**Exclusion Criteria**

1. Cases with unknown LMP.
2. Cases with preterm labour.
3. Cases with pregnancy 42 weeks.
4. Cases with abnormal presentation like breech, transverse lie.
5. Cases with multiple pregnancy.
6. Cases with antepartum haemorrhage.
7. Cases with previous LSCS.
8. Cases with diagnosed IUD.
9. Cases with fetal anomalies.
10. Cases with maternal medical illness like heart disease, diabetes, asthma.

## OBSERVATIONS AND RESULTS

Out of 15033 deliveries 1369 (9.11%) were meconium stained, out of which 912 (6.07%) cases met our inclusion and exclusion criteria and were selected for present study. Out of 912 cases of MSAF 576 cases (63.16%) were primigravidas, 252 cases (27.63%) were 2nd gravidas, 60 cases (6.58%) were 3rd gravidas and 24 cases (2.63%) were 4th or more gravidas. Present study shows maximum incidence of MSAF in primigravidas. This may be due to increased duration of labour in primigravidas as compared to multigravidas, incidence of preeclampsia and postdatism are also more common in primigravida as compared to multigravidas.

**Table 1:** Relationship of gestational age to msaf

| Gestational age | MSAF | |
|---|---|---|
| | No. | Percentage |
| 37-38 weeks | 312 | 34.21% |
| 39-40 weeks | 534 | 58.56% |
| 40-42 weeks | 66 | 7.23% |
| **Total** | **912** | **100%** |

In the present study, 534 cases (58.56%) were between 39-40 weeks and 66 cases (7.23%) were more than 40 weeks. Above study shows higher incidence of MSAF in term babies between 39-40 weeks due to maturation of neuronal mechanism.

**Table 2:** Type of MSAF

| Type | No. of cases | Percentage |
|---|---|---|
| Thin | 582 | 63.82% |
| Thick | 330 | 36.18% |

582 (63.82%) patients had thin meconium and 330 (36.18%) patients had thick meconium stained amniotic fluid. Thin and thick was divided as per the colour of meconium and presence or absence of flakes.

**Table 3:** Type of meconium in relation appearance in various stages of labour

| Type | No. of cases | Percentage |
|---|---|---|
| Early light | 504 | 55.27% |
| Early heavy | 216 | 23.68% |
| Late | 192 | 21.05% |

In this table light and heavy meconium was observed early in labour in 55.27% and 23.68% of cases respectively. But meconium was first observed late in 2nd stage of labour in 21.05% of cases.

**Table 4:** Associated risk factors

| Risk factors | No. of cases | Percentage |
|---|---|---|
| PIH | 168 | 18.42% |
| IUGR | 114 | 12.5% |
| Anemia | 102 | 11.18% |
| PROM | 84 | 9.21% |
| Prolonged pregnancy | 66 | 7.23% |
| Labour dystocia | 54 | 5.92% |
| Cord around fetal neck | 18 | 1.92% |
| **Total** | **606** | **66.43%** |

The present study notes that out of 912 cases 55.26% had antepartum or intrapartum complicatins. Of these168 cases PIH (18.42%) followed by IUGR 114 cases (12.5%), anemia 11.18%, PROM 9.21%, prolonged pregnancy 7.23%, labour dystocia 5.92% and cord around fetal neck in 1.92% of cases.

**Table 5:** fetal heart rate (fhr) abnormality in different types of msaf

| | Thin | | Thick | | Total | |
|---|---|---|---|---|---|---|
| FHR Abnormality | **No.** | **%** | **No.** | **%** | **No.** | **%** |
| Present | 90 | 14.43 | 204 | 61.82 | 294 | 32.24% |
| Absent | 492 | 85.57 | 126 | 38.18 | 618 | 67.76% |
| **Total** | **582** | **100** | **330** | **100** | **912** | **100%** |

$X^2$=205.029, P<.0001, Extremely significant

Incidences of fetal heart rate abnormalities were higher (61.82%) in thick meconium than thin (14.43%) and also accounting for increased incidence in operative interventions and low Apgar score. It was also proved to be statistically extremely significant.

**Table 6:** Mode of delivery in different types of MSAF

| Mode of delivery | Thin | | Thick | | Total | |
|---|---|---|---|---|---|---|
| | No of cases | % | No of cases | % | No of cases | % |
| Spontaneous vaginal delivery | 336 | 57.73 | 84 | 25.45 | 420 | 46.05 |
| Instrumental | 54 | 9.28 | 48 | 14.55 | 102 | 11.18 |
| LSCS | 192 | 32.99 | 198 | 60.00 | 390 | 42.77 |
| **Total** | **582** | **100** | **330** | **100** | **912** | **100** |

$X^2$=88.79, P<0.001, Highly significant.

Out of 582 cases of thin meconium, 336 cases (57.73%) had spontaneous vaginal delivery, while in thick meconium out of 330 cases only 84 cases (25.45%) delivered normally. Incidence of LSCS was more in thick meconium i.e., 42.77% as compared to 32.99% with thin meconium. It was proved to be statistically highly significant.

**Table 7:** Mode of delivery in different types MSAF

| MODE OF DELIVERY | Early light | | Early Heavy | | Late | |
|---|---|---|---|---|---|---|
| | No of cases | % | No of cases | % | No of cases | % |
| Spontaneous vaginal delivery | 312 | 61.9 | 12 | 5.56 | 96 | 50 |
| Instrumental | 12 | 2.39 | 24 | 11.11 | 66 | 34.38 |
| LSCS | 180 | 35.71 | 180 | 83.33 | 30 | 15.62 |
| **Total** | **504** | **100** | **216** | **100** | **192** | **100** |

$X^2$= 354.383, P<. 0001, Extremely significant

The number of emergency LSCS was more when meconium was detected early in labour and was thick (83.33%) compared to thin (35.71%) and other stages of labour. Instrumental deliveries (34.38%) were preferred to LSCS (15.62%) when meconium was detected in the 2nd stage of labour. Spontaneous vaginal delivery (61.9%) was more in cases of thin meconium in early labour. LSCS was done in early light cases if it was associated with heart rate abnormality or any high risk factor. Results were proved to be statistically extremely significant.

**Table 8:** Apgar score at 1 minute and 5 minute in different types of msaf

| Apgar Score | Thin | | Thick | | Total | |
|---|---|---|---|---|---|---|
| | No | % | No | % | No | % |
| <7 at 1 minute | 156 | 26.8 | 156 | 42.27 | 312 | 34.21 |
| <7 at 5 minute | 66 | 11.34 | 132 | 40 | 198 | 21.71 |

P<0.0001, Extremely significant

The incidence of Apgar <7 for thin and thick meconium was 26.8% and 42.27% respectively. Low Apgar was observed in thick meconium than thin meconium. Apgar score at 5 minutes<7 for thin and thick meconium was 11.34% and 40% respectively is mostly in thin meconium 88.66% and thick meconium 60%. Thus 90 babies of thin meconium with low Apgar score at 1 minute improved at 5 minutes after resuscitation but only 24 babies of thick meconium with low Apgar score at 1 minute improved at 5 minutes. Thus at 5 minutes low Apgar were observed in thick meconium than thin meconium. Result was proved to be statistically extremely significant.

**Table 9:** Co-relation of msaf, heart rate pattern, mode of delivery and apgar score at 1 minute (normal heart rate)

| Meconium | Cases with normal FHR | MODE OF DELIVERY | | | APGAR SCORE | |
|---|---|---|---|---|---|---|
| | | Spontaneous vaginal delivery | Instrumental | LSCS | <7 | >7 |
| Thin | 492 (79.61%) | 330 (53.40%) | 42 (6.80%) | 120 (19.42%) | 78 (12.62%) | 414 (66.99%) |
| Thick | 126 (20.39%) | 72 (11.65%) | 12 (1.94%) | 42 (6.80%) | 24 (3.88%) | 102 (16.50%) |
| **Total** | **618 (100%)** | **402 (65.05%)** | **54 (8.74%)** | **162 (26.22%)** | **102 (16.5%)** | **516 (83.49%)** |

Out of 618 cases of MSAF with normal heart rate pattern, 492 cases (79.61%) were from thin meconium and 126 cases (20.39%) from thick meconium. In the thin meconium group, 330 (53.40%) cases had spontaneous vaginal delivery, 42 (6.80%) cases had instrumental delivery and 120 (19.42%) cases were subjected to LSCS with majority of them having associated risk factor. In the thick meconium group, 72 (11.65%) cases had spontaneous vaginal delivery, 12 (1.94%) cases had instrumental delivery and 42 (6.8%) cases had undergone LSCS. 102 cases (16.5%) had low Apgar score at 1 minute and 516 cases (83.49%) had good Apgar score.

**Table 10:** Co-relation of msaf, heart rate pattern, mode of delivery and apgar score at 1 minute (abnormal heart rate)

| Meconium | Cases with normal FHR | MODE OF DELIVERY | | | APGAR SCORE | |
|---|---|---|---|---|---|---|
| | | Spontaneous vaginal delivery | Instrumental | LSCS | <7 | >7 |
| Thin | 90 (30.61%) | 6 (2.04%) | 12 (4.08%) | 72 (24.49%) | 78 (26.53%) | 12(4.08%) |
| Thick | 204 (69.39%) | 12 (4.08%) | 36 (12.24%) | 156 (53.06%) | 132 (44.90%) | 72 (24.49%) |
| **Total** | **294 (100%)** | **18 (6.12%)** | **48 (16.32%)** | **228 (77.55%)** | **210 (71.43%)** | **84 (28.57%)** |

($X^2$=0.267, P=0.605) ($X^2$=13.7, P<. 001)

Out of 294 cases of MSAF with abnormal heart rate pattern, 90 cases (30.61%) were from thin meconium and 204 cases (69.39%) from thick meconium. Total 228 (77.55%) cases had undergone LSCS, 48 (16.32%) cases had instrumental delivery and only 18 (6.12%) cases had spontaneous vaginal delivery mainly those who were in 2nd stage. 102 cases (71.43%) had low Apgar score and 84 cases (28.57%) had good Apgar score at 1 minute. Out of 102 cases of low Apgar score, 132 cases were from thick and only 78 cases from thin meconium group. Comparing thin and thick meconium groups having abnormal heart rate with possibility of having LSCS, there was found no statistically significant between two groups ( $X^2$=0.267 and p=0.6053). It means that both thin or thick meconium groups with abnormal heart rate have equal chances of having LSCS. Comparing thin and thick meconium groups having abnormal heart rate with low Apgar score (<7), result was proved to be statistically extremely significant ($X^2$=13.701 and p=0.0002). It means that thick meconium with abnormal heart rate have poorer Apgar score than thin meconium with abnormal heart rate. Out of 912 cases oropharyngeal suctioning was done in 486 cases (53.29%). It was done in all cases (330) of thick meconium and only 156 cases of thin meconium who had low Apgar score at birth. Out of 330 babies of thick meconium, 174 had NICU admissions i.e., 52.72% whereas out of 582 babies of thin meconium, only 150 babies needed NICU admissions (25.77%). Result was also proved to be statistically extremely significant.

**Table 11:** Duration of stay in nicu

| Nicu Stay | Total No. Of Fetuses | | | | Total | |
|---|---|---|---|---|---|---|
| | Thin | | Thick | | | |
| | No. of cases | Percentage | No. of cases | Percentage | No. of cases | Percentage |
| 1-3 days | 120 | 80 | 42 | 24.14 | 162 | 50 |
| 4-6 days | 24 | 16 | 18 | 10.34 | 42 | 12.96 |
| >=7 days | 6 | 4 | 114 | 65.52 | 120 | 37.04 |
| **Total** | **150** | **100** | **174** | **100** | **324** | **100** |

Incidence of NICU admission for more than 7 days were much higher in thick meconium i.e., 65.52% as compared to thin meconium (4%).Number of NICU days between 1-3 days was more in thin meconium (80%) than thick meconium (24.14%). Many cases were discharged during these periods that were kept under observation.

**Table 12:** Perinatal outcomes in thin and thick group

| Perinatal outcome | Thin meconium | Thick meconium | Percentage |
|---|---|---|---|
| Perinatal morbidity | 42 | 138 | 19.74 |
| Perinatal death | 6 | 54 | 6.58 |

Out of 912 cases, 180 babies (19.74%) developed morbid conditions of which 4.61% (42 cases) in thin and 15.13% (138 cases) in thick meconium group. Perinatal mortality was 6.58%.

**Table 13:** Causes of perinatal morbidity in different types of MSAF

| Perinatal morbidity | Total no. Of foetuses | | | | Total | |
|---|---|---|---|---|---|---|
| | Thin | | Thick | | | |
| | No. of cases | Percentage | No. of cases | Percentage | No. of cases | Percentage |
| Birth asphyxia | 29 | 69.05 | 66 | 47.83 | 95 | 10.42 |
| Sepsis | 2 | 4.76 | 6 | 4.35 | 8 | 0.88 |
| Jaundice | 6 | 14.29 | 12 | 8.69 | 18 | 1.97 |
| Aspiration pneumonia | 5 | 11.90 | 6 | 4.35 | 11 | 1.21 |
| MAS | - | - | 48 | 34.78 | 48 | 5.26 |
| **Total** | **42** | **100** | **138** | **100** | **180** | **19.74** |

$X^2$=156.99 P<0.0001 Extremely significant

Compared to thin meconium morbidity was more in thick meconium,42 (4.61%) cases in thin and 138 (15.13%) cases in thick meconium. It was proved to be statistically extremely significant.

**Table 14:** Causes of death in babies born with MSAF

| Causes of death | No. of cases | Percentage |
|---|---|---|
| MAS | 36 | 3.95 |
| Pneumonia | 9 | 0.98 |
| Sepsis | 4 | 0.44 |
| Birth asphyxia | 11 | 1.21 |
| **Total** | **60** | **6.58** |

Meconium aspiration syndrome was the leading cause of perinatal mortality in 36 cases, followed by birth asphyxia 11 cases, pneumonia 9 cases and sepsis 4 cases.

## DISCUSSION

Various studies have reported an incidence of meconium stained amniotic fluid ranging from 1.5 to 18%.[4] In the present study incidence was 6.07%. The differences in the incidence among various authors is due to the different constituent of high risk cases, gestational age and different criteria of inclusion and exclusion. Parity and maternal age were independent factors for type of meconium stained amniotic fluid. The present study shows higher (58.56%) incidence of MSAF in term babies between 39-40 weeks with mean gestational age of 39.32 weeks which was comparable to study Miller (1981)[5] having mean gestational age of 39.82 weeks and Laxmi Itagi *et al* (2010)[6] with mean gestational age of 39.12 weeks. In the present study 582 (63.82%) patients had thin meconium and 330 (36.18%) patients had thick meconium stained amniotic fluid. Cases of thin meconium were more than thick meconium like that of Arun Nayak (1991)[7] with 51.15% thin meconium and 48.85% thick meconium and Urvashi S (2015)[8] with 58.5% thin meconium and 41.5% thick meconium. Light and heavy meconium was observed early in labour in 55.27% (early light) and 23.68% (early heavy) of cases respectively. Late meconium (first observed late in 2nd stage of labour) in 21.05% of cases. 66.43% cases of MSAF were associated with high risk factors with PIH i.e., 18.42%, IUGR 12.5%, anemia 11.18%, followed by PROM 9.21%. We had a large number of high risk cases mainly because our institution is a tertiary centre where many high risk cases are referred. The present study was comparable to Mundhara *et al*(2013)[9] who found 57.58% cases of MSAF associated with high risk factors. In the study done by Mundhara following were the risk factors like PIH 16.97%, anaemia 7.27%, PROM 11.51%. PIH was the major risk factor as also seen by our study. Heart rate abnormalities were seen in 32.24% of cases and rest 67.76% had normal heart rate. Incidence of fetal heart rate abnormalities were higher (61.82%) in thick meconium accounting for increased incidence in operative interventions and low Apgar Score. Thus we can conclude that meconium stained amniotic fluid alone (mainly thin meconium) is not a definite sign of fetal distress as 67.76% had normal heart rate although there was meconium staining during labour. The present study was comparable to the study done by Qadir s *et al* (2016)[10] stating heart rate abnormalities in 29.6% (15.8% in thin and 62.5% in thick meconium group. Our study had caesarean section rate of 42.77% which was comparable to Unnisa S *et al* (2016)[11] 45.7%. But it was lower than K Supriya *et al* (2014)[12] 51.4% and higher than Urvashi S *et a l*(2015)[8] 33%. The present study has higher rates of LSCS because obstetricians were more aggressive in labours with meconium stained amniotic fluid as our center does not have facilities for continuous FHR monitoring and facilities for foetal scalp blood sampling. Thus, in the absence of these facilities there is an increase in instrumental vaginal deliveries and caesarean section rate. Type of MSAF certainly influences the mode of delivery. There was higher rates of LSCS and instrumental vaginal deliveries in thick meconium group as compared to thin meconium group as also seen by other studies K Supriya *et al* (2014)[12] and Qadir s *et al* (2016)[10]. The time of appearance of MSAF influences the mode of delivery. There was statistically significant higher rates of LSCS in early heavy group as compared to early light and late group. This may be due to fetal anoxia necessitating LSCS. There was higher rates of instrumental vaginal deliveries in late group as compared to early light and early heavy group. In this group, patients were well observed in labour and if

meconium passed in such a phase and there was delay in spontaneous delivery then immediate assisted delivery with the help of instruments was done. LSCS was done in early light group when there was fetal heart rate abnormality or any associated high risk factor. In late group LSCS was done when there was any obstetric indication or fetal heart rate abnormality and immediate delivery was not possible even by the help of instruments. At 1 minute, 600 (65.79%) babies were delivered with Apgar score >7 and 312 (34.21%) babies had Apgar score <7. Apgar score were good in thin meconium compared to thick meconium. Out of 582 cases of thin meconium 426 (73.2%) had good Apgar score compared to thick meconium where out of 330 cases, only 174 (52.73%) cases had good Apgar score. The present study was almost equal to Rekha *et al* (2012)[13] who observed that at 1 minute, 82.7% babies had Apgar score >7 and 17.3% babies had Apgar score <7 suggesting that most of the cases of MSAF are born with Apgar score 7-10. So MSAF after rupture of membrane is not always a sign of fetal distress or asphyxia. Other associated factors also play a role in the fetal outcome. At 1 minute Apgar score were good in thin meconium compared to thick meconium and required prompt intervention. Majority of the babies (80.92%) had Apgar score 7-10 at 5 minute. Statistically significant low Apgar score seen in thick meconium indicating adverse fetal outcome even after prompt intervention. There was improvement in Apgar score at 5 minute mainly in the thin group as compared to thick meconium group. At 5 minute 88.66% babies of thin meconium group had good Apgar score and 60% babies of thick meconium group had good Apgar score. 294 (32.24%) cases had abnormal heart rate and 618 (67.76%) cases had normal heart rate. Out of those with normal heart rate, 126 cases (20.39%) had thick meconium. In this group of normal heart rate, 402 (65.05%) cases had spontaneous vaginal delivery, 54 (8.74%) cases had instrumental delivery and 162 (26.22%) cases had undergone LSCS who had associated high risk factor or any obstetric indication. Out of 294 (32.24%) cases of abnormal heart rate, 204 cases (69.39%) had thick meconium. In the group of abnormal heart rate, only 18 (6.12%) cases had spontaneous vaginal delivery and 48 (16.32%) cases had instrumental delivery. Comparing groups having normal heart rate with abnormal heart rate, majority of the cases 228 (77.55%) in the abnormal heart rate group had undergone LSCS with the indication of fetal distress. This shows significant association between heart rate abnormalities and mode of intervention. This has been proved to be highly statistically significant in our study ($X^2$=212.43, P<.0001).Thin meconium associated with heart rate abnormalities increases the risk. This study had 90 cases with thin meconium and heart rate abnormalities and 84 cases of them had intervention either by instrument or LSCS. It was seen that both thin and thick meconium groups with abnormal heart rate had equal chances of having LSCS. Thick meconium was more often associated with heart rate abnormalities. Out of 330 cases of thick meconium, 204 cases had heart rate abnormalities and 192 cases of them had intervention either by instrument or LSCS. Out 912 cases, 312 (34.21%) cases had low Apgar score at 1 minute among which 102 cases had normal heart rate. Among 210 cases who had heart rate abnormalities with low Apgar score, majority of them (132 cases) were from thick meconium group showing significant association between thick meconium with heart rate abnormalities and low Apgar score. These cases needed NICU admission and had more perinatal morbidity. Comparing groups having normal heart rate with abnormal heart rate, majority of the cases 210 (71.43%) in the abnormal heart rate group had low Apgar score at 1 minute. This shows significant association between heart rate abnormalities and low Apgar score. This has been proved to be highly statistically significant in our study ($X^2$=264.59, P<0.0001).ACV Swamy, N Sundari and HS Sheela (2002)[14] observed MSAF perse does not imply foetal distress during labour until other parameters like fetal heart abnormalities and scalp PH values support this contention. They stated that irrespective of the type of meconium, patients with abnormal CTG needed more interventional delivery. Abnormal CTG with thick meconium had more neonates with low Apgar at birth and prolonged NICU stay. In their study of 100 cases, patients with thick meconium and normal CTG went through labour uneventfully or delivered vaginally. 57% of parturients with MSAF had normal CTG and all of them delivered normally. 13 patients had thick meconium and normal CTG and all of them delivered normally.43% of labouring women had associated CTG abnormalities and 72% of these women had interventional delivery. About 50% of these 43 women had fetal distress as an indication for intervention; showing significant association that abnormal CTG increases the risk. In their study 18 patients with thin meconium and CTG abnormalities and 10% of these 18 patients (50%) has to have intervention. This indicates the significant association between abnormal CTG and type of meconium, mode of delivery and neonatal outcome. In their study 18% of neonates had low 1 min Apgar, all of them improved at 5 min. 10% of them needed slightly prolonged NICU stay for respiratory distress. Out of these 10 neonates who needed 5-6 days NICU stay, 8 had abnormal CTG pattern during labour and most of them were of thick meconium group. Incidence of NICU admission was higher (52.72%) in cases of thick

meconium and they required admission for more than 7 days. Many babies required NICU admission for observation of respiratory distress and were observed for 24 hours and discharged from the NICU. Remaining 180 babies (19.74%) developed perinatal morbidity, 42 (4.61%) in thin and 138 (15.13%) in thick meconium. Birth asphyxia in 10.42%, sepsis in 0.88%, jaundice in 1.97%, aspiration pneumonia in 1.21%, and aspiration syndrome in 5.26%. MAS was the leading cause of death in 3.95% followed by birth asphyxia 1.21%, pneumonia 0.98% and sepsis 0.44%. Overall perinatal mortality was 6.58%. All cases of MAS was seen in thick meconium group. Birth asphyxia was seen in 29 cases of thin and 66 cases of thick meconium, 2 cases of sepsis in thin and 6 cases in thick meconium.6 cases of jaundice in thin meconium and 12 cases in thick meconium. 5 cases of aspiration pneumonia were seen in thin meconium and 6 cases in thick meconium. Statistically significant association was proved between thick meconium and morbidity. Out of total 912 cases, there were 60 cases (6.58%) of perinatal death, 6 cases of thin meconium and 54 cases of thick meconium. Significantly higher death was seen in thick meconium group. In the present study, perinatal mortality was 6.58%, leading cause of death being meconium aspiration syndrome 3.95% followed by birth asphyxia 1.21%, pneumonia 0.98% and sepsis 0.44%. Our study had similarity with the study done by Laxmi Itagi *et al* (2010)[6]. In their study perinatal morbidity was 20.5% with 4.5% in thin meconium and 16% in thick meconium. Birth asphyxia as the major cause of morbidity in 10.5% followed by MAS in 5.5% cases, sepsis in 2.5% cases and aspiration pneumonia in 2% cases. Perinatal mortality was 5.5%.

## CONCLUSION

The study confirmed our clinical impression that meconium stained amniotic fluid adversely affect fetal outcome especially when it is thick or associated with fetal heart rate abnormality. Meconium stained amniotic fluid is not an indicator for fetal distress especially thin MSAF but its correlation with fetal heart rate abnormalities should be taken as potential danger sign for the baby. Continuous intrapartum FHR monitoring, gradation of meconium, and progress of labour should be considered in the management of meconium stained group. Oropharyngeal suctioning is not needed in all babies mainly when meconium is thin and baby is vigorous and various neonates of thick meconium need only careful observation after thorough orophayngeal suction. Most of the centre of our country lack facilities of electronic FHR monitoring and fetal scalp blood studies same as our institute. In such conditions, clinical evaluation of cases is necessary. It is important to re-examine the importance of clinical method and apply them to judge fetal hypoxia and prevent long term sequelae. The present study shows that by good intrapartum monitoring, timely interventions, oropharyngeal suctioning and endotracheal intubation of selective babies complications of MSAF can be reduced to a great extent.

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