

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20214318>

Original Research Article

## A comparative study on feto-maternal outcome in patients with meconium stained liquor versus clear liquor

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**Received:** 24 September 2021

**Accepted:** 13 October 2021

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### ABSTRACT

**Background:** Meconium is sterile, thick, black-green, odourless material, formed by accumulation of debris in the fetal intestine. This meconium, when leaks out intra-natally, due to hypoxia, can change the whole scenario, increasing intra-natal foetal risk, morbidity, and possibly causing mortality, depending upon the operative factors. Aims and objectives were to know the perinatal outcome in patients with meconium stained amniotic fluid. To study the complications of meconium stained amniotic fluid in the neonates.

**Methods:** Reverse-transcription polymerase chain reaction (RT-PCR) negative women, gestational age >37 weeks with cephalic presentation and singleton pregnancy with meconium stained liquor (grade I, II, and III) after spontaneous or artificial rupture of membranes during labour. Delivery was expedited, when fetal heart rate abnormalities were detected, by safest mode of delivery. The Apgar score of neonates, neonatal intensive care unit (NICU) admission, number of days of hospitalization and birth asphyxia were recorded.

**Results:** A Total 11 patients with pre-eclampsia which presented with meconium stained liquor (MSL). 6 patients with prolonged labour presented with MSL. 8 had thin, 15 had thick MSL and 3 patients of clear liquor. 2 children developed persistent pulmonary hypertension of the newborn (PPHN) in case of MSL group. 25 children required oxygen support and antibiotics after delivery. Mean hospital stay was 2.81 days in MSL and 1.33 days in clear liquor group.

**Conclusions:** Chronic hypoxia is more damaging and dangerous than acute hypoxia, due to longer time it has continued the damage. This can be very effectively achieved by improving the Antenatal care, and intra natal vigilance. Proper monitoring of patients in intrapartum period of following parameters like fetal heart sound, uterine contractions, fetal movements.

**Keywords:** Meconium stain, Chronic hypoxia, Asphyxia, Antenatal care

### INTRODUCTION

Nature has provided the foetus with many protective mechanisms against many intra uterine hazards. One such protection is amniotic fluid, the quantity varies, increasing with growing foetus, till term. In early pregnancy it is colourless and at term is become pale straw coloured. Abnormal colours of fluid during pregnancy indicates different pathologies.

Meconium is sterile, thick, black – green, odourless material, formed by accumulation of debris in the fetal

intestine. Passage of meconium into amniotic fluid prior to delivery or during stages of labour can be due to chronic or acute hypoxia, respectively.

This meconium, when leaks out intra-natally, due to hypoxia, can change the whole scenario, increasing intra-natal foetal risk, morbidity, and possibly causing mortality, depending upon the operative factors.

The amount of meconium passed out, depends on the underlying pathology, and the amount then, determines the severity of neonatal morbidity. A small amount that just

changes the colour of liquor to light green, or golden colour, warrants a timely delivery, if damage is to be minimized. Thick meconium suggests more severe hypoxia, of longer duration, that will definitely require neonatal resuscitation, and intensive care. Thick, dark green pea soup consistency forecasts an ominous outcome, as it is due to a long standing hypoxia.

Presence of meconium in liquor is definitely harmful, but the damage compounds many fold, if the foetus swallows it. If it remains in the stomach, it can be aspirated out, but meconium that the foetus aspirates into trachea, and regurgitates into pulmonary tissues, results in a meconium aspiration syndrome, acute respiratory distress syndrome (ARDS) and sometimes hyaline membrane disease, claiming a high neonatal mortality.

Meconium aspiration before or during birth can obstruct airways and can cause severe respiratory distress. Meconium aspiration into lungs can stimulate the release of cytokines and vasoactive substances that can invoke adverse cardiovascular and inflammatory responses in fetus and newborn.

Keeping all these facts and factors in mind, one can perceive that, meconium stained liquor is a matter of concern as it causes intra-natal asphyxia, mars neonatal outcome, and so, increases the rates of caesarean section, albeit as a salvation measure. Deliveries complicated with meconium stained liquor are associated with increased operative delivery and additional morbidity and mortality in pregnancy outcomes. Birth asphyxia due to meconium aspiration syndrome results in increase in neonatal intensive care unit (NICU) admission.

Meconium staining of the amniotic fluid has long been regarded as a sign of fetal distress. Meconium is passed from the fetal gastro-intestinal tract as a response to hypoxia, mesenteric vasoconstriction induced gut hyperperistalsis, falling umbilical venous saturation, vagal stimulation, and normal physiological function of a mature fetus.<sup>1,2</sup>

Foetal distress is defined as alterations in the foetal heart rate (FHR), tachycardia, or bradycardia, with the passage of meconium in response to underlying foetal hypoxia. Variations in FHR, passage of the meconium in the amniotic fluid, increase in the intra uterine foetal movements, pathological or abnormal cardiotocography (CTG) and decreased foetal scalp blood pH are strong indicators of fetal distress.<sup>3</sup>

The risk factors for meconium stained amniotic fluid are both maternal and fetal. The maternal factors are hypertension, gestational diabetes mellitus, maternal chronic respiratory or cardiovascular diseases, post term pregnancy, pre-eclampsia, and eclampsia. The fetal factors include oligohydramnios, intrauterine growth restriction, with poor biophysical profile.<sup>4</sup>

The meconium aspiration syndrome can cause or contribute, to neonatal death, and in addition, upto one-third of all cases, in which aspiration occurs, develop long term respiratory compromise.<sup>5</sup> The meconium stained amniotic fluid is a clinical diagnosis with no practical confirmatory test.<sup>6</sup> The perinatal morbidity and mortality associated with meconium aspiration syndrome can be brought down if the high risks are identified in the antenatal period and careful decisions are made about the timing and mode of delivery, with vigilant clinical monitoring of the labour.<sup>7</sup>

### ***Aims and objectives***

Aims and objectives of the study were: to know the perinatal outcome in patients with meconium stained amniotic fluid; and to study the complications of meconium stained amniotic fluid in the neonates.

### **METHODS**

This prospective observational study was conducted in obstetrics and gynecology department of PDMC, RNT Medical College, Udaipur after obtaining proper clearance from institutional ethical committee. The study duration was 1 and half year, from January 2020 to June 2021. It comprises of patients, who had reported to hospital for regular antenatal check-ups. As this was a COVID-19 pandemic period, hence only RTPCR negative mothers were included in the study who fulfilled the inclusion criteria.

### ***Inclusion criteria***

Women with gestational age >37 weeks with cephalic presentation and singleton pregnancy in patients with meconium stained liquor (grade I, II, and III) after spontaneous or artificial rupture of membranes during labour.

### ***Exclusion criteria***

Women with RTPCR test positive, previous cesarean section and non-cephalic presentations (like breech transverse lie and compound presentation) were excluded from the study.

Patients detailed history, gestational age, per abdominal examination, per speculum and per vaginal examination, admission tests including intrapartum CTG were recorded in a pre-designed proforma. The patients were carefully monitored for the progress of the labour by plotting the parameters on a partogram. The fetal heart rate was strictly monitored by continuous electronic fetal monitoring.

The meconium staining of the amniotic fluids were classified as grade I, II, and III by visual examination, after spontaneous, or artificial rupture of membranes.

Grade I meconium stained liquor is translucent, light yellow green in colour, grade II MSL is opalescent with deep green and light yellow in colour, and grade III is opaque and deep green in color. Delivery was expedited, when fetal heart rate abnormalities were detected, by safest mode of delivery, either by instrumental vaginal delivery, or caesarean section. The Apgar score of neonates, birth weight, NICU admission, the neonates who had meconium aspiration syndrome, number of days of hospitalization and birth asphyxia were recorded.

### Statistical analysis

All the data so obtained was entered into Microsoft excel and evaluated using statistical package for the social sciences (SPSS) 20.0 software. Parametric and non-parametric data were analysed as required. A p value of <0.05 was considered statistically significant.

## RESULTS

Table 1 shows incidence of pre-eclampsia among MSL and clear liquor patients. There were 11 patients with pre-

eclampsia which presented with MSL and 5 patients presented with clear liquor.

There were 7 patients with oligohydramnios which presented with MSL. Table 1 shows incidence of prolonged labour among MSL and clear liquor patients. There were 6 patients with prolonged labour which presented with MSL. There were 23 children who had birth asphyxia presented in case of MSL group out of which 8 had thin, 15 had thick MSL. There were 3 patients of clear liquor group. Incidence of PPHN among MSL and clear liquor patients. There was 2 children who developed PPHN in case of MSL group.

Table 2 shows requirement of oxygen in case of MSL patients. There were 25 children who required oxygen support after delivery, which helped sustain life, as indicated by a highly significant p value. Table 2 shows requirement of antibiotics in case of MSL patients. There were 25 neonates who required antibiotics post-delivery. P value is highly significant. Mean duration of antibiotics was 3 days. As the neonates were born without any mishap, they ideally did not require any antibiotic.

**Table 1: Incidence of obstetrical parameters.**

Group	Present	%	Absent	%	P value
<b>Pre-eclampsia</b>					
MSL	11	11.00	89	89	0.118
Thin	4	8.16	45	45	
Thick	7	13.73	44	44	
Clear	5	5	95	95	
<b>Oligohydramnios</b>					
MSL	7	7	93	93.00	0.088
Thin	5	5	44	89.80	
Thick	2	2	49	96.08	
Clear	2	2	98	98.00	
<b>Prolonged labour</b>					
MSL	6	6.00	94	94.00	0.149
Thin	2	4.08	47	95.92	
Thick	4	7.84	47	92.16	
Clear	2	2	98	98	
<b>Birth asphyxia</b>					
MSL	23	23.00	77	77.00	0.000
Thin	8	16.33	41	83.67	
Thick	15	29.41	36	70.59	
Clear	3	3	97	97	
<b>MAS</b>					
MSL	9	9.00	91	91.00	0.002
Thin	3				
Thick	6				
Clear	0				
<b>PPHN</b>					
MSL	2	2	98	98	0.155
Thin	1				
Thick	1				
Clear	0				

**Table 2: Requirement of oxygen and antibiotic support.**

Required	%	Not required	%	P value
<b>25</b>				
<b>9</b>	25	75	75	<0.001
<b>16</b>				
<b>0</b>	0.0	100	100.00	
<b>25</b>	25.00	75	75.00	<0.001
<b>9</b>	18.37	40	81.63	
<b>16</b>	31.37	35	68.63	
<b>0</b>	0.00	100	100	

Table 3 shows mean duration of NICU-stay in case of MSL and clear liquor. Duration of hospital stay is more in case of MSL.

**Table 3: Duration of NICU stay.**

Group	Mean NICU stay	SD	P value
<b>Thin</b>	2.40	1.22	0.490
<b>Thick</b>	3.22	1.11	
<b>Clear liquor</b>	1.33	0.5	

## DISCUSSION

This study was done on 200 pregnant women at department of obstetrics and gynaecology, PDMC at RNT Medical College, Udaipur to find out the foeto-maternal outcome in case of meconium stained liquor, against clear liquor status.

The present study was carried out with an intention to assess the effect of presence of meconium in liquor, during labour, and the ultimate neonatal outcome, in form of morbidity and mortality, & maternal morbidity, against the babies born with clear liquor. The study was done comparing two groups of patients, one with meconium stained liquor versus a group with clear liquor.

In present study 200 patients were divided in two groups, each with 100 patients in MSL group and 100 patients in clear liquor group. The meconium stained group was further divided in 2 groups, depending on the amount of meconium leakage, staining the liquor with minimum quantity, giving a discolouration with a tinge of colour, or thick consistency meconium, as this factor is enough to alter the duration & result of treatment.

In present study among 100 patients of MSL group, 57 (57.00%) patients were delivered by lower segment caesarean section (LSCS), 29(29.00%) patients had normal delivery, 10 (10.00%) patients required vacuum delivery, and 4 (4.00%) patients required forceps delivery. Whereas in clear liquor group, 91 (91.00%) had normal delivery, 6 (6.00%) patients required LSCS, and 3(3.00%) patients required vacuum delivery.

Table 4 shows incidence of thin and thick meconium stained amniotic fluid. The present study showed 49.00% thin and 51.00% thick MSL group, whereas in another study by author Arun et al, it was 51.15% thin and 48.85% thick MSL group, an almost comparable incidence.<sup>8</sup>

The presence of meconium in amniotic fluid is suggestive of acute or chronic fetal hypoxia, leading to increased rate of neonatal morbidity and mortality. For better neonatal outcome, correct decisions taken at appropriate time are more fruitful.

**Table 4: Comparison of incidence of meconium stained amniotic fluid in present study with others authors.**

Authors	Arun et al <sup>8</sup> (%)	Present study (%)
<b>Thin</b>	51.15	49.00
<b>Thick</b>	48.85	51.00

**Table 6: Comparison of Apgar score at 5 minutes.**

Apgar score	Miller et al <sup>9</sup> (%)	Present study MSL group (%)	Clear liquor group (%)
<b>0-3</b>	0.9	0	0
<b>4-6</b>	10.4	24	1
<b>7-10</b>	88.7	76	99

In a similar study done by Miller et al, on the Apgar score at 5 min obtained was: 0.9 % had 0-3 score, 10.4 % had 4-6 score and 88.7% had 7-10 score.<sup>9</sup> Discussion 78 The above study finding co-relate with our study. There was improvement in Apgar score at 5 minutes. Low Apgar score (0-3) at 5 minutes indicated poor neonatal outcome, which were seen more in thick meconium stained cases.

In our study out of 4 patients with MSL, 2 patients had thick MSL, and their neonates required prolonged NICU management. Both babies with vigilant care were saved, and well at time of discharge. A single baby in second group, did not require any further management. Once more the effect of meconium passage in liquor being the reason of asphyxia, becomes apparent. Of 23 cases of asphyxia, as mentioned under previous table, 15 babies required

careful and vigilant NICU management., with thick MSL, and in case of thin MSL, out of 8 cases, only 4 required oxygen for 2-3 days, without antibiotics. 3 cases of second group, required no such additional care. Shaikh et al showed similar results with lesser number of asphyxia in study group patients.<sup>10</sup>

It becomes apparent, that degree of hypoxia determines the amount of meconium leakage, & thereby the post-natal outcome. Second group, none of 3 babies, with score of 1 to 3, or 4 to 6, required any support, simple immediate post natal resuscitation was enough to establish normalcy. Hypoxic ischaemic encephalopathy—a dreadful condition that develops due to severe intra-natal asphyxia, is diagnosed, when, the heart rate of new born is, <60/min, baby fails to cry, and these babies require very vigilant neonatal management, with a ventilator support, antibiotics. In this case, the HIE was Grade I, which signifies that complete recovery is possible with prompt and vigilant management, which was offered in NICU. The newborn was declared neurologically normal, on 7th day, and was taking breast feeding adequately, which, according to a neonatologist, is a good sign, & does point to the possibility of normal neurological development.

Pulmonary hypertension in a new born can cause perfusion problems, due to resistance to blood flow from heart to lungs. Control of this in the initial stage is all the more essential, for good immediate neonatal outcome, as the pulmonary blood pressure at normal level at the time of discharge from hospital, forecasts a normal future health for the new born.

**Table 7: Comparison with other study to the present study requiring NICU care.**

MSL group	Debdas et al <sup>11</sup> (%)	Present study MSL group (%)
<b>Thin</b>	23.68	22.45
<b>Thick</b>	76.32	35.29
<b>Clear liquor group</b>	-	3.00

Meconium aspiration can pose a serious problem with post natal oxygenation, particularly, if the meconium aspirated is thick, as it is quite tenacious, and difficult to aspirate completely. This is evident in this group, wherein 4/6 neonates required ventilator support for 3-4 days. Fortunately all of them recovered completely, none had developed a dreadful aftermath, hyaline membrane disease, as the babies delivered at full term.

The result of our study is comparable from percentage point of view, with study of Debdas et al, as we do not have the data regarding degree of meconium loss, affecting number of babies.<sup>11</sup>

This study showed that 29 babies of MSL group needed NICU care, out of which in thin MSL group 11 (22.45%) babies and in thick MSL group there were 18 (35.29%) babies. Other study by Debdas et al 340 cases was

observed in which 76 babies of MSL group needed NICU care, out of them 18 (23.68%) were thin MSL group, and 58 (76.32%) were thick MSL, babies required NICU care.<sup>11</sup>

From the study, and data above, one thing is very clear, that foetus should not suffer hypoxia, due to any reason, at any time during pregnancy, as this cause chronic hypoxia, spells a guarded outcome of pregnancy. This chronic hypoxia, when is aggravated during labour by acute hypoxia intranatally, again can seriously jeopardise the foetal health, and outcome. Of course, with a good, efficient NICU in the institute can salvage these neonates, it is a late effort.

‘Prophylaxis is always better than treatment to cure’ can never be exemplified better than in case of a pregnant woman. Co-operation from patient, in the form of regularly attending antenatal clinics, taking the offered treatment regularly, and coming to hospital with any problem, when it is in early stage, can go a long way for such prophylaxis.

Similarly, careful evaluation of patient at every visit, giving due importance and attend every complaint immediately, can aver many obstetric complications in infancy. Particularly, all those conditions, which result in intra uterine chronic hypoxia, viz. pre-eclampsia, intrauterine growth restriction (IUGR), diabetes mellitus, anaemia, can be easily diagnosed and well managed.

## CONCLUSION

Meconium staining can be prevented, if the very root cause of the problem is addressed at its core, all the ensuing problems, that increase neonatal morbidity can be averted. Do not allow any condition, either to develop in a pregnant woman, or if it does develop, effective control and all the measure to revert it, should be vigorously tried, that chronic intrauterine hypoxic status never prevails. Intra-natal vigilance to avert any situation causing acute hypoxia, as well should be immediately attended to. Chronic hypoxia is more damaging and dangerous than acute hypoxia, due to longer time it has continued the damage. This can be very effectively achieved by improving the antenatal care, and intra natal vigilance.

In intrapartum period – proper monitoring of patients by following parameters like fetal heart sound, uterine contractions, fetal movements. We can reduce the incidence of fetal hypoxia. If fetal hypoxia occurs, it can be prevented in initial stage by giving left lateral position, adequate oxygen supply, injection soda bicarbonate in ringer lactate. This can prevent acidotic medium. A healthy mother indicates health of the family, society and nation.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Patel K, Rastogi R. A comparative study on fetomaternal outcome in patients with meconium stained liquor versus clear liquor. *Int J Reprod Contracept Obstet Gynecol* 2021;10:4119-24.