

Perinatal outcome of meconium stained liquor in pre-term, term and post-term pregnancy

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Abstract

Introduction: Meconium is a dark green liquid passed normally by the newborn baby containing bile, mucus & epithelial cells. The presence of meconium in amniotic fluid is of great concern to the obstetricians. It is a potential warning of fetal asphyxia but sometimes it may be physiological with no effect on fetus.

Objectives: To determine the prevalence of meconium stained liquor during labour associated risk factors and perinatal outcome in preterm, term and post term pregnancy.

Materials and Method: This is an observational prospective study done on the women coming to labour room and OPD for delivery. These women were examined and records were maintained in terms of their profile, time of rupture of membrane, appearance of meconium, mode of delivery, perinatal outcome, Apgar score and compared with control group.

Results: The incidence of MSL in our study is 11.01% (185 patients). There were 93 (50.2%) cases with thin staining (light green), 49 (25.9%) with moderately staining (yellow) and 44 (23.92%) with thick staining (deep green) liquor. No significant correlation was noted between maternal age and meconium staining of liquor but higher incidence of 11.6% was noted in women age group of >30 years. The incidence of staining was higher i.e. 17.1% in higher gestational age of fetus i.e. 41-42 weeks. Our study also yielded results of rising incidence of low –birth weight babies (less than 2.5kg) in meconium stained liquor cases. Instrumental vaginal deliveries (3.3%) and caesarean sections (44.6%) were found to be more prevalent in these cases. It was found that newborn with meconium stained liquor had significantly reduced APGAR scores at 1 minute, 5 minutes and 10 minutes ($P < 0.05$) when compared to clear liquor cases. Meconium aspiration syndrome was more prevalent in the thickly stained group (3 patients) than in thinly stained group (zero patients). Mean Apgar Scores were significantly lower in cases complicated with thick stained liquor than in thin stained liquor or clear liquor. The incidence of admission to neonatal intensive care unit, meconium aspiration syndrome, neonatal deaths, instrumental vaginal and caesarean delivery were higher in pregnancies complicated by meconium stained liquor.

Conclusion: Meconium stained liquor is associated with advance maternal age, advance gestational age, increased caesarean section rate, lower apgar scoring, increased NICU admission rate and neonata.

Keywords: Meconium stained liquor, Amniotic fluid

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Introduction

Meconium, the gastrointestinal excreta of foetus is derived from Greek “mekonion” meaning “from poppy” or “like opium” and believed that the substance caused sleeping state of the foetus in the mother’s womb. Some theories have been proposed to explain foetal passage of meconium. Foetus passes meconium in response to hypoxia and signals foetal compromise.⁽¹⁾ In utero passage of meconium may represent normal gastrointestinal tract maturation under neural control. Meconium passage could follow vagal stimulation from common but transient umbilical cord entrapment and resultant increased peristalsis. Thus meconium release also could represent physiological process.⁽²⁾ 7-22% of pregnancy has been complicated due to meconium passage.⁽³⁾ 5% of these develop meconium aspiration syndrome. Meconium aspiration syndrome can cause or contribute to neonatal death in up to 0.05% (i.e. 1 in 2000 of all pregnancies).⁽⁴⁾

Meconium passage is rare before 32 weeks and its incidence increases as gestational age increases,

especially in postdated pregnancy.⁽⁵⁾ Factors such as placental insufficiency, maternal hypertension, pre-eclampsia, oligohydramnios, postdatism, diabetes or maternal drug abuse (tobacco, Cocaine) result in in-utero passage of meconium.⁽⁶⁾

Meconium stained liquor is associated with higher rate of caesarean delivery, instrumental delivery, NICU admission rate, fetal distress, low birth weight, neonatal death.⁽⁷⁾ Various measures have been done to prevent these complications like amnioinfusion, oropharyngeal suctioning, endotracheal intubation after birth etc.⁽⁸⁾

There is controversy regarding its outcome and management, so this present clinical study was done to find out its significance in respect of perinatal mortality and morbidity.

Objective

The purpose of this study was to determine the incidence, risk factors, mode of delivery and perinatal outcome in meconium stained amniotic fluid (MSAF) during delivery.

Materials and Method

The study was conducted in Obstetrics department of Index Medical College hospital and research centre, Indore, MP, over a period of one year (June 2015-June 2016) on the women coming to labour room or OPD with singleton pregnancy, cephalic presentation without associated medical and surgical complication with true labour pains at any gestational age. Patients with hypertension, diabetes, multiple gestations, mal presentation, and previous caesarean section were excluded from the study.

Following selection of the cases, detailed history and examination for height of uterus, lie, presentation, position, liquor including pelvis assessment was done. Use of any medication like oxytocin, analgesics and sedatives, time of rupture of membranes, appearance of meconium were noted and depending upon the consistency and colour, liquor was grouped as thick (deep green), thin (yellow) and moderately stained. Fetal heart rate was monitored and any abnormality was noted.

Pediatrician was present during delivery oropharyngeal and/or nasopharyngeal suction,

laryngoscopy and suction, endotracheal intubation was done according to the condition of the newborn and APGAR was noted at 1 min, 5 min, and 10 min after birth.

All the babies of the study group were followed up for 4 to 7 days for perinatal morbidity and mortality. Incidence of NICU admission in the study group and the incidence of meconium aspiration & meconium aspiration syndrome were noted in babies born with meconium stained liquor.

Results and Observations

Out of total 1680 deliveries, 185 women were found to have meconium stained liquor (MSL) during labour and delivery (prevalence of MSL- 11.01%). These women were further divided on the basis of clinical gradation of meconium staining according to colour and consistency, thin MSL-50.2% (n=93), moderate MSL-25.9% (n=48) and thick MSL-23.9% (n=44).

In present study we found increased incidence of MSL as maternal age and gestational age advances as depicted in Table 1.

Table 1: Incidence of meconium stained liquor in different maternal age group and gestational age

Age in years	Cases with meconium stained liquor	Total No. of cases	Percentage of cases with meconium stained liquor
< 20	25	232	10.7%
21-25	46	427	10.7%
26-29	51	517	9.9%
30-34	37	320	11.6%
> 35	25	183	13.6%
Gestational age in weeks			
34-36	26	314	8.3%
37-39	51	501	10.2%
39-40	72	599	12.1%
40-41	30	231	12.9%
41-42	6	35	17.1%

On applying Chi square test to look for any significance of maternal age and gestational age over meconium staining of liquor {P value is >0.05 (from probability table)} no significant effect was found in our study though increase incidence of MSL was found in women of ≥ 30 years and with gestational age ≥ 40 weeks.

It was found that vaginal delivery was significantly less ($P < 0.001$) in cases with meconium stained liquor compared to controls with clear liquor. Instrumental vaginal delivery was significantly increased ($P < 0.005$) in cases with meconium stained liquor. When compared to controls with clear liquor, cases with meconium stained liquor had significantly increased incidence of caesarean section ($P < 0.001$). (Table 2)

Table 2: Comparison of mode of delivery in meconium stained liquor and control group

Mode of delivery	Meconium stained		Control group	
	No. of cases	Percentage	No. of cases	Percentage
Vaginal delivery	96	52.1%	1096	73.4%
Instrumental vaginal delivery	06	3.3%	14	0.9%
Caesarean section	83	44.6%	375	25.1%

Total	185		1495	
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Table 3 & 4 shows comparison of neonatal parameters such as birth weight, Apgar score respectively in women with MSL and clear liquor.

Table 3: Correlation of birth weight and meconium staining of liquor

Birth weight of new born (kg)	Total cases	Meconium stained cases	Percentage of cases with meconium stained liquor
<2	56	12	21.4%
2-2.4	426	52	12.2%
2.5-2.9	572	67	11.7%
3.0-3.4	372	36	9.7%
>3.5	254	18	7.1%

Statistical analysis (Table 3) was done by dividing the birth weight into two groups – less than 2.5 kg and more than or equal to 2.5 kg. Chi square test was applied with 1 degree of freedom and the χ^2 value was 4.66, p value was <0.05 which shows significant correlation between low birth weight and MSL.

Table 4: Comparison of APGAR score at 1, 5 and 10 minute between meconium stained liquor and control

Group	Apgar score <7	Apgar score >7	Total (n)
At 1 minute			
Meconium stained liquor	70 (37.8%)	115 (62.2%)	185
Clear liquor	312 (20.8%)	1183 (79.2%)	1495
At 5 minute			
Meconium stained liquor	40 (21.6%)	145 (78.4%)	185
Clear liquor	95 (6.3%)	1400 (93.7%)	1495
At 10 minute			
Meconium stained liquor	13 (7.1%)	172 (92.9%)	185
Clear liquor	42 (2.8%)	1453 (97.2%)	1495

After statistical analysis of Table 4, it was seen that newborn with meconium stained liquor had significantly reduced Apgar score at 1, 5 and 10 minute compared to control ($P < 0.05$).

Table 5: Correlation of different grades of meconium staining and meconium aspiration syndrome (MAS)

Group	Numbers of cases	Meconium aspiration syndrome
Thin staining	94 (50.54%)	0
Moderate staining	48 (25.81%)	1
Thick staining	44 (23.65%)	3
Total	185	4

Incidence of meconium aspiration syndrome in our study is 2.16%. Statistical analysis (Table 5) was done which shows that meconium aspiration syndrome was not significantly increased (P value > 0.05 but < 0.5) in cases with thick meconium stained liquor when

compared to moderately stained liquor but there was an increased tendency.

Table 6: Incidence of first week neonatal death in meconium stained liquor compared to control group

Group	Total Number of cases	1 st week neonatal death
Meconium stained liquor	185	1 (0.54%)
Control	1495	15 (1%)
Total	1680	16

Statistical analysis was done (table 6) to look for any effect of meconium stained liquor over first week neonatal death which shows no significant difference ($P > 0.05$) between both the groups.

Discussion

The presence of meconium in amniotic fluid in cephalic presentation was of great concern even to the midwives and obstetrician of old age. Passage of meconium, once thought to be a sure sign of fetal death 'in utero', was later understood to be an evidence of fetal hypoxia. Even the modern obstetricians cannot be

indifferent at the sight of meconium stained liquor during labour which calls for close vigilance of the fetal well-being.

The incidence of meconium stained liquor during labour in previous study varied between 7% and 22%. Mahapatro et al 2014 found the prevalence of meconium stained amniotic fluid is 12.42% which is comparable to present study that is 11.1%.⁽³⁾

Barham (1969)⁽⁹⁾ classified meconium stained liquor into three groups according to different colours – light (50.82%), yellow (19.3%) and dark green (29.85%). In the present study, meconium stained liquor was classified into three grades. There were 50.2% in thin staining group, 25.9% were moderately stained and 23.92% were thickly stained. Priyadarshini et al found thin MSL = 86(34.4%), moderate MSL = 102(40.8%), thick MSL = 62 (24.8%).⁽⁷⁾ Nirmala et al,⁽¹⁰⁾ in her study, showed that there were 1267 deliveries among which MSL = 100(7.89%); thin MSL = 39%, moderate MSL = 43%, thick MSL = 18%. Our study was consistent with the study of Barham et al.

In present study, there was no statistically significant correlation between maternal age and meconium stained liquor, although incidence was relatively higher in maternal age group of 35 years and more which is comparable to Mahapatro et al (2014) found increased incidence of thick meconium, 11-43%, when maternal age group was above 30 years.⁽³⁾ Mundhara et al 2013 also found higher incidence of thick MSL in mothers with advance maternal age.⁽⁵⁾ Similarly to our study Osava RH et al. does not found correlation between maternal age and meconium stained liquor.⁽⁶⁾

Incidence of MSL increases with gestational age and this was very evident in present study. Statistically no significant association was found, due to sample size and associated variable factors which were not included in present study. Chakraborty et al found 34.1% incidence of thick MSL in postdated pregnancy but due to small sample size no significant relation was found.⁽³⁾

Incidence of instrumental vaginal delivery in the meconium stained group (3.3%) was significantly increased when compared to control group (0.9%) in the present study, which matches with the study of Mahapatro et al (1.42%).⁽³⁾ In the present study incidence of cesarean section was significantly increased in stained group (44.6%) when compared to control (27.7%).

This may be due to legal litigations. Espinheira MC et al in his study, showed the caesarean rate as 62.5%.⁽¹¹⁾ Conflicting results may be due to increased incidence of caesarean section in early labour or better resuscitation of newborn at birth and due to litigations.

In our study, 13.27% of cases with meconium stained liquor had birth weight less than 2.5 kg and 10.1% of cases had birth weight >2.5 kg which was statistically significant (p value < 0.05). On the other

hand, Rekha Kumari et al in her study, observed birth weight <2.5kg in 30(40%) of the neonates who had MSL.⁽¹²⁾

Based on our study we can conclude that meconium stained amniotic fluid is associated with increased incidence of caesarean section, lower Apgar score, more neonatal nursery admissions, meconium aspiration syndrome (MAS) and perinatal death. In the present study Apgar score less than 7 at 1 minute and 5 minutes were more in meconium stained group (21.6%) as compared to clear liquor group (6.3%) which was statistically significant (p value <0.05). In this study at 10 minutes after birth, 6.5% of newborn with meconium still had Apgar score less than 7 compared to 2.8% in the control group though mean Apgar score was almost same in both group. Rokade et al found that 71% of newborn had Apgar <7 at birth but later 485 of newborn improved their Apgar score.⁽⁴⁾ Similar results were observed by Rekha Kumar et al.⁽¹³⁾

Meconium aspiration syndrome (MAS) is a life-threatening complication in cases with meconium stained liquor. The “thickness” of meconium had a direct bearing on the neonatal outcome.⁽¹⁴⁾ All cases of MAS were seen in thick meconium compared to thin meconium. No statistical significant were found but there was increased tendency of meconium aspiration syndrome in thick meconium.

In present study, first week neonatal death was 0.5% in meconium stained group and 1% in the control group with no significant difference. In contrast to our study Supriya et al. found 20 neonatal deaths.⁽¹⁵⁾ These differences may be due to early interventions and liberalisation in caesarean section.

Conclusion

The presence of meconium in amniotic fluid is a serious sign of intra-uterine fetal compromise associated with an increase in perinatal morbidity, while clear amniotic fluid is referred as a good perinatal outcome. Some factors may influence the presence of meconium in amniotic fluid like advancing maternal age and gestational age, but significant association not found in our study, while mode of delivery, birth weight and APGAR score showed significant association for fetal outcome.

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