

Perinatal Outcome of Meconium Stained Liquor in Pre-Term, Term and Post-Term Pregnancy

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Received: 30-09-2022 / Revised: 30-10-2022 / Accepted: 20-11-2022

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Conflict of interest: Nil

Abstract

Background: A newborn baby regularly passes meconium, a dark green liquid that contains bile, mucus, and epithelial cells. Obstetricians are very concerned about the possibility of meconium in the amniotic fluid. Although occasionally it may be natural and have no effect on the foetus, it is a potential sign of foetal hypoxia. To ascertain the prevalence of meconium-tainted labour, related risk factors, and perinatal outcomes in preterm, term, and post-term pregnancy.

Materials and Method: This prospective observational study was conducted on women visiting the OPD and labour rooms to give birth. The profiles of these women were reviewed, and records were kept about the appearance of meconium, the mode of delivery, the perinatal outcome, the Apgar score, and a comparison to the control group.

Results: In our study, the prevalence of MSL is 11.01%. (185 patients). In 93 cases (50.2%), the liquor had thin staining (light green), 49 had moderate staining (yellow), and 44 had thick staining (deep green). Meconium staining of liquor and maternal age did not significantly correlate, but women over 30 years of age had a higher incidence of 11.6%. The incidence of staining was higher i.e. 17.1% in higher gestational age of foetus 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. When compared to newborns with clear liquor, it was discovered that newborns with meconium-stained liquor had significantly lower APGAR ratings at 1 minute, 5 minutes, and 10 minutes ($P<0.05$). The densely stained group (3 patients) had more cases of meconium aspiration syndrome than the thinly stained group (zero patients). In comparison to cases complicated by thinly stained or clear liquor, mean Apgar Scores were significantly lower in cases complicated by thickly stained liquor. Pregnancies complicated with meconium stained liquid had a greater frequency of admission to the newborn critical care unit, meconium aspiration syndrome, neonatal fatalities, assisted vaginal delivery, and caesarean birth.

Conclusion: Meconium-stained liquor is linked to older mothers, earlier gestational ages, higher caesarean section rates, poorer apgar scores, higher NICU admission rates, and newborn outcomes.

Keywords: Meconium stained liquor, Amniotic fluid

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Introduction

Meconium, the gastrointestinal excretion of the foetus, is derived from the Greek "mekonion," which means "from poppies" or "like opium," and it was once thought that the substance caused the foetus to fall asleep while still inside the mother. To explain how meconium is passed through the foetus, some theories have been put forth. In response to hypoxia, the foetus passes meconium, signalling foetal compromise [1]. Meconium passing into the uterus could be a sign of the gastrointestinal tract developing normally and under neural control. Meconium passage may occur after vagal stimulation brought on by frequent but brief umbilical cord entrapment and the resulting rise in peristalsis. Meconium discharge may therefore also be a physiological process [2]. Meconium passing has complicated 7–22% of pregnancies [3]. In 5% of them, meconium aspiration syndrome manifests. Up to 0.05% of newborn deaths can be caused by or contributed to by meconium aspiration syndrome (i.e. 1 in 2000 of all pregnancies) [4].

Before 32 weeks, meconium passing is uncommon, and as gestational duration increases—especially in postdated pregnancy—its incidence rises [5]. Meconium can pass through the uterus as a result of placental insufficiency, maternal hypertension, pre-eclampsia, oligohydramnios, postdatism, diabetes, or drug usage by the mother (cocaine, cigarettes) [6].

Meconium-stained liquor is linked to an increased risk of caesarean section, instrumental delivery, NICU admission, foetal distress, low birth weight, and neonatal death [7]. A number of interventions, including amnioinfusion, oropharyngeal suctioning, postpartum endotracheal

intubation, etc., have been made to avert these problems [8].

The purpose of this clinical investigation was to determine its importance in relation to prenatal mortality and morbidity because there is controversy about its outcome and therapy. This study's goal was to identify the prevalence, risk factors, delivery method, and perinatal outcomes of meconium-stained amniotic fluid (MSAF) during labour and delivery.

Material and Methods

From May 2022 to October 2022, a study was conducted on women who presented to the labour room or OPD at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, with a singleton pregnancy, cephalic presentation without associated medical or surgical complications, and true labour pains at any gestational age. The study excluded patients with hypertension, diabetes, multiple pregnancies, abnormal presentation, and prior caesarean sections.

Following the selection of the cases, a thorough history and examination were conducted to measure the uterus' height, lying, presentation, position, and contents, as well as assess the pelvis. Use of any medication, such as oxytocin, analgesics, and sedatives, the timing of membrane rupture, and the appearance of meconium were documented. Liquor was classified as thick (deep green), thin (yellow), or lightly stained depending on its consistency and colour. Any anomalies in the foetal heart rate were observed during the monitoring.

When the baby was born, the paediatrician was present for oropharyngeal and/or nasopharyngeal suction, laryngoscopy and suction, endotracheal intubation, and APGAR measurements at 1 minute, 5 minutes, and 10 minutes following birth.

For 4 to 7 days, the research group's infants were monitored for perinatal morbidity and mortality. Babies born with meconium-stained liquor were more likely to be admitted to the NICU and more likely to experience meconium aspiration and meconium aspiration syndrome.

Results

Meconium stained liquid (MSL) was discovered in 185 of the 1680 women who

gave birth (11.01 percent prevalence of MSL). The clinical grading of meconium staining according to colour and consistency further classified these women into three groups: thin MSL-50.2% (n=93), moderate MSL-25.9% (n=48), and thick MSL-23.9% (n=44).

As maternal age and gestational age rose in the current study, we observed an increased incidence of MSL, as shown 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%

No significant relationship between maternal age and gestational age and meconium staining of liquor was detected in our study when using the Chi square test, while there was an increase in the incidence of MSL among women under the age of 30 and with gestational ages of under 40 weeks. When compared to controls with clear liquor, it was discovered that cases with meconium-stained liquor had considerably lower vaginal deliveries ($P < 0.001$). In patients with meconium-stained wine, the likelihood of an instrumental vaginal birth was considerably higher ($P < 0.005$). Cases with meconium-stained liquor showed a considerably higher incidence of caesarean section than controls with clean liquor ($P < 0.001$). (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	

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 1 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 minutes 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 minutes			
Meconium stained liquor	40 (21.6%)	145 (78.4%)	185
Clear liquor	95 (6.3%)	1400 (93.7%)	1495
At 10 minutes			
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

Even the elderly midwives and obstetricians were very concerned about the meconium in the amniotic fluid with cephalic presentation. Meconium passing, formerly believed to be a clear marker of foetal death "in utero," was subsequently recognised as a sign of foetal hypoxia. Even contemporary obstetricians are unable to remain aloof when they observe meconium-stained liquid during labour, which necessitates close attention to the foetal well-being.

In a prior study, the incidence of meconium-tainted alcohol during labour ranged from 7% to 22%. The prevalence of meconium-stained amniotic stained fluid was determined to be 12.42 % by Mahapatro *et al.* in 2014, which is comparable to the 11.1% obtained in the current investigation [3].

Meconium-stained liquor was categorised by Barham (1969) [9] into three groups based on distinct colours: light (50.82%), yellow (19.3%), and dark green (29.85%). Meconium-stained liquor was divided into three grades for the current investigation. 50.2% of the population had thin staining, 25.9% had moderate staining, and 23.92% had thick staining. Thin MSL = 86 (34.4%), intermediate MSL = 102 (40.8%), and thick MSL = 62 (24.8%), according to Priyadarshini *et al* [7]. In their study, Nirmala *et al.* [10] found that there were 1267 deliveries, of which MSL was 100 (7.89%); thin MSL was 39%; intermediate MSL was 43%; and thick MSL was 18%. The results of our investigation agreed with those of Barham *et al.*

In the current study, there was no statistically significant correlation between maternal age and meconium-stained liquor, despite the fact

that the incidence was relatively higher in the 35+ maternal age group, which is comparable to Mahapatro *et al*(2014) finding that thick meconium was more common in the 30+ maternal age group [3]. Mundhara *et al.* (2013) also discovered that moms with advanced maternal age had a greater incidence of thick MSL [5]. Like our study, Osava RH *et al.* did not discover a connection between maternal age and liquor with meconium stains [6].

The prevalence of MSL rises with gestational age, and this was clearly demonstrated in the current study. Because of the small sample size and linked variable factors excluded from the current investigation, there was statistically no evidence of a meaningful association. Although Chakraborty *et al.* discovered a 34.1% incidence of thick MSL in postdated pregnancy, no meaningful relationship was discovered because of the small sample size [3]. In the current investigation, the incidence of assisted vaginal delivery was substantially higher in the meconium stained group (3.3%) compared to the control group (0.9%), which is consistent with Mahapatro *et al* study (1.42%) [3]. Compared to the control group's incidence of caesarean sections (27.7%), the stained group's (44.6%) rate was considerably higher in the current study.

Legal battles could be to blame for this. The caesarean rate in Espinheira MC *et al*'s study was 62.5% [11] Conflicting outcomes may be caused by rising caesarean section rates in early labour, improved neonatal resuscitation techniques, and legal disputes.

In our investigation, the difference between the birth weights of 10.1% of cases with birth weights greater than 2.5 kg and 13.27% of cases with birth weights less than 2.5 kg was statistically significant (p value <0.05). On the other hand, Rekha Kumari *et al.* found that 30 (or 40%) of the newborns with MSL had birth weights under 2.5 kg [12].

According to our research, meconium-stained amniotic fluid is linked to perinatal deaths, meconium aspiration syndrome (MAS), poorer Apgar scores, more newborn nursery admissions, and a higher incidence of caesarean sections. In the current study, the percentage of groups with meconium staining was higher (21.6%) than the percentage of groups with clear liquor (6.3%) at 1 minute and 5 minutes, which was statistically significant (p value < 0.05). In this study, even though the mean Apgar score was nearly the same in both groups, 6.5% of newborns with meconium still had an Apgar score below 7 at 10 minutes after birth, compared to 2.8% in the control group. Rokade *et al.* discovered that while 485 newborns improved their Apgar score after birth, 71% of newborns had an Apgar score of <7 at birth. (4) Rekha Kumar *et al.* reported similar outcomes [13].

When there is meconium in the alcohol, meconium aspiration syndrome (MAS) can be fatal. The newborn prognosis was directly influenced by the "thickness" of the meconium [14]. In contrast to thin meconium, all MAS cases were found in thick meconium. Although no statistically significant results were discovered, thick meconium was associated with a higher likelihood for meconium aspiration syndrome.

First week infant deaths in the current study were 0.5% in the meconium stained group and 1% in the control group, with no significant difference between the two groups. Supriya *et al.* investigation's discovered 20 newborn deaths in contrast to ours [15]. Early interventions and caesarean section liberalisation may be to blame for these discrepancies.

Conclusion

Meconium in amniotic fluid is a major indicator of intrauterine foetal impairment and is linked to an increase in perinatal morbidity, while clean amniotic fluid is

thought to indicate a successful pregnancy. While mode of delivery, birth weight, and APGAR score indicated significant associations for foetal outcome, some factors, such as rising maternal age and gestational age, may influence the presence of meconium in amniotic fluid. However, significant associations were not detected in our study.

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