

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20242501>

Original Research Article

Impact of meconium-stained amniotic fluid on mode of delivery and maternal and neonatal outcome in a tertiary care hospital: a cross-sectional study

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Received: 13 July 2024

Revised: 20 August 2024

Accepted: 21 August 2024

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ABSTRACT

Background: Meconium-stained amniotic fluid during labour has been long considered the predictor of adverse foetal outcomes such as meconium aspiration syndrome and perinatal asphyxia, which leads to perinatal and neonatal morbidity and mortality. Hence this study was done to compare the mode of delivery and neonatal complications among deliveries complicated by meconium-stained liquor with that of clear liquor.

Methods: The present study was a hospital based cross sectional study carried out in the department of obstetrics and gynaecology, Chettinad Hospital and Research Institute, Chennai, India. The study was carried out for a period between February 2022 and January 2023 among the pregnant women, who were admitted for delivery.

Results: A total of 110 deliveries with meconium-stained liquor was included and out of whom, 57% (63) were with thin meconium and 43% (47) had thick meconium. It was observed that 25.5% of the babies born out of thick MSL needed ICU admission for resuscitation efforts whereas 7.9% babies born out of thin MSL needed NICU admission.

Conclusions: The study observed that deliveries associated with thick meconium-stained liquor were at an increased risk of respiratory distress of the child, NICU admission in the child and were prone for more emergency LSCS when compared to thin MSL deliveries.

Keywords: Meconium-stained amniotic fluid, NICU admission, Respiratory distress, Thick MSL, Thin MSL

INTRODUCTION

Meconium is the material that the infant passes during its first bowel movement. Meconium may be yellow, brown, or green in colour. Meconium is passed by healthy term newborns 24 to 48 hours after birth. The passing of meconium in utero may suggest normal gastrointestinal maturation or, more concerning, acute or persistent fetal hypoxia. Preterm, oligohydramnios, peripartum infections, placental insufficiency, and some maternal medications like cocaine are among the factors linked to meconium passage in utero.¹ The passage of meconium by a fetus in utero during the prenatal period or during labour

is known as meconium-stained liquor, or MSL. The intrapartum care guidelines of the Royal College of Obstetricians and Gynecologists (RCOG) classify meconium-stained amniotic fluid as either non-significant MSL or significant MSL. Significant MSL is described as dark green or black amniotic fluid that is thick and tenacious and contains lumps of meconium, whereas non-significant MSL is described as a thin yellow or greenish tinged fluid that contains non-particulate meconium.² Meconium stained amniotic fluid significantly increase the rate of maternal complications such as meconium laden amniotic fluid embolism, intrapartum chorioamnionitis, Puerperal endometritis, wound infection, increased risk of

operative delivery, caesarean section and its complications.³ Compared to babies delivered with clear fluid, those born with meconium-stained amniotic fluid had a roughly 100 times higher risk of respiratory distress. The presence of meconium below the vocal cord is known as meconium aspiration, and it occurs in around 20-30% of all new-borns with meconium-stained amniotic fluid. Aspiration can happen during pregnancy when the foetus gasps or during the initial breaths of the newborn. Meconium aspiration syndrome (MAS) is characterized by meconium-stained amniotic fluid and radiographic indications of aspiration pneumonitis including hyperinflation and patchy opacities, whose symptoms cannot be explained otherwise, along with respiratory distress that appears soon after birth. Meconium-stained amniotic fluid from births accounts for around 5% of MAS cases and 12% of MAS infants die.⁴ On the other hand, meconium aspiration syndrome (MAS) accounts for about 5% of all MSAF cases. Up to 0.05% of newborn deaths (about 1 in 2000 pregnancies) are caused by MAS.⁵ The incidence increases with gestational age, with reported frequencies of 3%, 13%, and 18% at 37, 40, and >42 weeks, respectively.⁶ Meconium-stained amniotic fluid is predictor of adverse fetal outcomes. However, all fetuses with meconium passage do not have an adverse outcome and it is important to distinguish those who develop fetal distress promptly to prevent and intervene the sequelae accordingly. Parveen et al in their study has reported that thick meconium-stained amniotic fluid is associated with increased risk of perinatal depression, persistent pulmonary hypertension, sepsis, severe meconium aspiration syndrome and mortality.⁷

Hence this study was carried out with an objective to determine the pattern of various mode of deliveries among pregnancies complicated by meconium-stained liquor and to determine the neonatal outcomes in deliveries complicated by meconium-stained liquor.

METHODS

The present study was a hospital based cross sectional study carried out in the department of obstetrics and gynecology, Chettinad Hospital and Research Institute, Chennai, India. The study was carried out for a period of 12 months between February 2022 and January 2023. The study included all the pregnant women with gestational week more than 36 weeks, who were admitted for delivery in the department of the OBG during the study period. The inclusion criteria were the patients with gestational age more than 36 weeks, cephalic presentation, without any known congenital anomalies in the scans. The exclusion criteria included antenatal mother malpresentations and all babies with congenital anomalies.

Institutional ethical committee approval was obtained before conducting the study. Informed and written consent was obtained from the patient who were included in the study.

A total of 1106 deliveries occurred in the institution during the study period. Out of it, 110 deliveries had meconium-stained liquor. The antenatal mothers with meconium-stained liquor were then classified into thin and thick MSL based on the characteristics of the meconium.

The data was collected using a semi structured proforma. Demographics information of the patients and other information such as gestational age, gender and birth weight of baby, medical and obstetric complications during pregnancy, mode of delivery, neonatal outcome meconium aspiration syndrome and need for admission in NICU was recorded on the proforma. Meconium-stained liquor was classified into thick MSL and thin MSL based on the colour and appearance of the liquor.

The data collected were made into master chart using Microsoft excel 2019 and imported into SPSS version 26 for statistical analysis. The qualitative variables were expressed using frequency and percentages. The quantitative variables using mean and standard deviation. To compare the distribution of qualitative variable between thick MSL and thin MSL, chi square test was employed and compare mean of quantitative variable between thick MSL and thin MSL, independent samples t-test was employed. A p value of less than 0.05 was considered to be statistical significance.

RESULTS

A total of 1106 deliveries that occurred in the institution during the study period were included in the study. A total of 110 deliveries with meconium-stained liquor was observed during the study period and out of whom, 57% (63) were with thin meconium and 43% (47) had thick meconium.

Table 1: Demographic variables of the study participants.

Variables	N	%
Age of the mother (in years)	<20	6 5.5
	21-25	21 19.1
	26-30	37 33.6
	31-35	39 35.5
	>35	7 6.4
Gravida status	Primigravida	51 46.4
	G2	36 32.7
	G3	18 16.4
	G4 and above	5 4.5
Gestational age* (completed)	36 w 1d-37 w	4 3.6
	37 w 1d-38 w	41 37.3
	38 w 1d-39 w	45 40.9
	39 w 1d-40 w	15 13.6
	>40 w	5 4.5
Sex of the baby	Male	69 62.7
	Female	41 37.3

*w-weeks; d-days

The Table 1 presents demographic data of pregnant women with meconium-stained liquor. It includes the distribution of age, gravida status, gestational age at delivery, and the sex of the baby. The majority of mothers were aged 26-35 years (69.1%), with a higher proportion being primigravida (46.4%). Most deliveries occurred between 37 and 39 weeks of gestation (78.2%), and the majority of babies were male (62.7%).

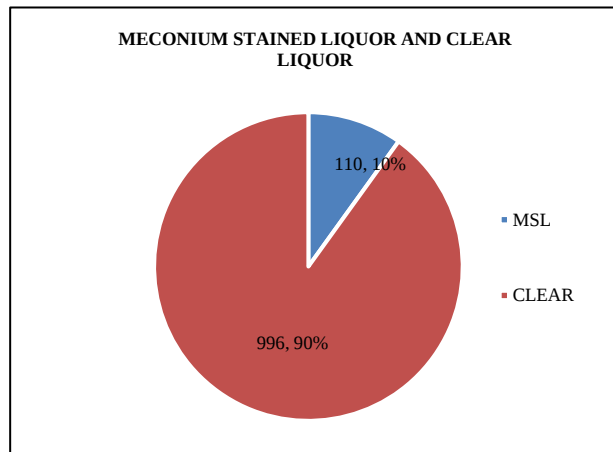


Figure 1: Distribution of meconium-stained liquor.

The parameters were compared between thick meconium-stained liquor and thin meconium-stained liquor. Among them, 63.8% of babies born out of thick MSL and 68.3% babies born out of thin MSL showed respiratory distress. Of these, 7 (15%) of the babies born with thick MSL showed low APGAR values whereas only 2 participants (3%) with thin MSL showed low APGAR values. The CTG was reactive in 18 (29%) women with thin meconium. There was a significantly higher incidence of pathological CTG's in 17 (36%) women with thick meconium. But this difference was not statistically

significant. 83% (39) of pregnant women with thick stained MSL were taken up for emergency LSCS in view of fetal distress whereas 55.6% (35) of the pregnant women with thin MSL were taken for emergency LSCS. This difference was statistically significant with a p value less than 0.05.

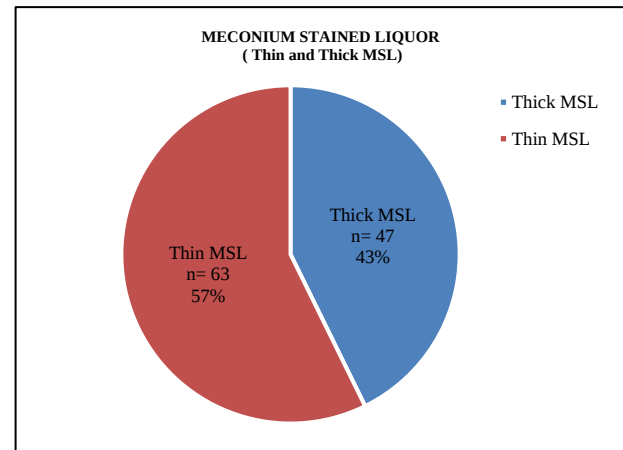


Figure 2: Pattern of meconium-stained labour.

It was observed that 2.1% of the babies born out of thick MSL and 4.8% babies born out of thin MSL showed low birth weight. 25.5% of the babies born out of thick MSL needed ICU admission for resuscitation efforts whereas 7.9% babies born out of thin MSL needed NICU admission. This difference is statistically significant. MAS was observed in only one baby born with thick MSL whereas no baby in thin MSL group showed features of MAS. Necrotizing enterocolitis was observed in single baby with thin MSL and no baby with thick MSL showed that. Regarding neonatal mortality, only one child born with thin MSL died whereas no child from thick MSL group died.

Table 2: Comparison of neonatal outcomes between thin and thick MSL.

Neonatal outcome	Thin MSL (63) (%)	Thick MSL (47) (%)	P value
Respiratory distress	43 (68.3)	30 (63.8)	0.686
Low apgar scores	2 (3)	7 (15)	0.036*
Low birth weight	3 (5)	1 (2)	0.634
Pathological CTG	18 (29)	17 (36)	0.416
NICU admission	5 (8)	12 (26)	0.016*
MAS (meconium aspiration syndrome)	-	1 (2)	0.427
Emergency C-section	39 (55.6)	35 (83)	0.02
NEC (necrotising enterocolitis)	-	1	1.00
Death	-	1	1.00

*Statistically significant.

DISCUSSION

The present study was conducted as a hospital based prospective study in the department of obstetrics and gynaecology, Chettinad Hospital and Research Institute,

Chennai, India. A total of 1106 deliveries that occurred in the institution during the study period were included in the study. A total of 110 deliveries with meconium stained liquor was observed during the study period which accounts for 9.9% incidence and out of whom, 57% (63)

were with thin meconium and 43% (47) had thick meconium. This observation was similar to Singh et al who observed a MSAF prevalence of 11.2% in India.⁸ The parameters were compared between thick meconium-stained liquor and thin meconium-stained liquor. They were classified into thin and thick meconium-stained liquor based on the colour and appearance of the liquor. Among them, 63.8% of babies born out of thick MSL and 68.3% babies born out of thin MSL showed respiratory distress. Majority of the children in both the groups showed normal APGAR scores at 1 minute and 5 minutes. There was a significant difference in the APGAR scores, in which 7 (15%) of the babies born with thick MSL showed low APGAR values whereas only 2 participants (3%) with thin MSL showed low APGAR values. This finding was similar to the observation made by Mohammed et al who observed low APGAR scores in 4.3% and 25.7% of babies with thin and thick MSL respectively whereas majority of the babies showed normal scores.⁵ Similar results were observed by Patil et al who showed that APGAR scores were low in 21.89% and 7.16% of thick and thin MSL babies respectively.⁹

83% (39) of pregnant women with thick stained MSL were taken up for emergency LSCS in view of fetal distress whereas 55.6% (35) of the pregnant women with thin MSL were taken for emergency LSCS. This difference is statistically significant. Mohammed et al reported a similar observation with 71.4% and 59.6% of pregnant women with thick MSL and thin MSL respectively required emergency LSCS in view of fetal distress.⁵ Verma et al also reported a similar observation where 96.4% of thick MSL and 46.2% of thin MSL required LSCS for delivery.¹⁰

In our study, 25.5% of the babies born out of thick MSL needed ICU admission for resuscitation efforts whereas 7.9% babies born out of thin MSL needed ICU admission. Ziadeh et al in his study noted 4% NICU admission with thin meconium and 13% with thick meconium which is consistent with the findings of our study.¹¹ Verma et al reported a higher incidence of ICU admission where 60.7% and 36.5% of babies born to thick MSL and thin MSL respectively required ICU admission.¹⁰ Vaghela et al in their study also reported a similar observation to our study where 4 out of 38 deliveries in thin MSL and 13 out of 28 in thick MSL deliveries required NICU admission.¹²

Our study observed that there is no statistically significant difference was seen between thick and thin liquor in terms of respiratory distress, low birth weight and CTG abnormalities. However, there are few studies that report significant differences with these factors among thin and thick MSL. Verma et al reported that 57.2% and 46.1% of deliveries with thick and thin MSL showed birthweight less than 2.5 kg.¹⁰ Parveen et al also observed an incidence of 26.4% and 31.6% of low birth weight babies in thin and thick MSL respectively.⁷ Patil et al reported that respiratory distress was seen in 24.16% and 86.7% of thin and thick MSL deliveries respectively.⁹ Kashekar et al

observed that pathological CTG values were found in 36.3% of thick MSL and 0.1% of thin MSL deliveries respectively.¹³ These contrasting differences between our study and the respective studies can be due to the difference in the sample characteristics and the nature of the study.

The study has its limitations. Long term effects of meconium stained liquor cannot be assessed as the study does not include the follow-up components.

CONCLUSION

The study observed that deliveries associated with thick Meconium stained liquor were at an increased risk of respiratory distress of the child, NICU admission in the child, and are prone for more emergency LSCS when compared to thin MSL deliveries.

ACKNOWLEDGEMENTS

The authors acknowledge the help rendered by Professor Dr Ranoji V. Shinde, department of obstetrics and gynecology for guiding the study and improving the methodology.

Funding: No funding sources

Conflict of interest: None declared

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

REFERENCES

- Skelly CL, Zulfiqar H, Sankararaman S. Meconium. [Updated 2023 Jul 24]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024
- Addisu D, Asres A, Gedefaw G, Asmer S. Prevalence of meconium stained amniotic fluid and its associated factors among women who gave birth at term in Felege Hiwot comprehensive specialized referral hospital, North West Ethiopia: a facility based cross-sectional study. *BMC Pregnancy Childbirth.* 2018;18(1):429.
- Khatun MHA, Arzu J, Haque E, Kamal MA, Al Mamun MA, Khan MFH, et al. Fetal outcome in deliveries with meconium stained liquor. *Bangladesh J Child Health.* 2010;33(2):41-5.
- Mundhra R, Agarwal M. Fetal outcome in meconium stained deliveries. *J Clin Diagnostic Res.* 2013;7(12):2874-6.
- Mohammad N, Jamal T, Sohaila A, Ali SR. Meconium stained liquor and its neonatal outcome. *Pak J Med Sci.* 2018;34(6):1392-6.
- Poggi SH, Ghidini A. Pathophysiology of meconium passage into the amniotic fluid. *Early Hum Dev.* 2009;85(10):607-10.
- Parveen A, Udayakumar S, Pushpalatha K, Karthik RN. Clinical outcome of babies born through meconium stained liquor. *Int J Contemp Pediatr.* 2023;10(11):1699-704.

8. Singh G, Singh O, Thapar K. Neonatal outcome in meconium stained amniotic fluid: a hospital based study. *Int J Contemp Pediatr.* 2017;4:356-60.
9. Patil VB, Sonwane VB. A prospective clinical study of babies born with meconium stained liquor delivered by caesarean and pervaginal delivery. *Int J Heal Sci Res.* 2017;7(August).
10. Verma M, Vikram A. Meconium stained liquor and its incidence at different periods of gestation and the fetal outcome address for correspondence: instrumental delivery. *MedPulse Int J Gynaecol.* 2018;5(January):4-7.
11. Ziadeh SM, Sunna E. Obstetric and perinatal outcome of pregnancies with term labour and meconium-stained amniotic fluid. *Arch Gynecol Obstet.* 2000;264(2):84-7.
12. Vaghela HP, Deliwala K, Shah P. Fetal outcome in deliveries with meconium stained liquor. *Int J Reprod Contracept Obstet Gynecol.* 2014;3(4):909-12.
13. Kashikar S, Kotpalliwar M, Uttarwar P. Meconium-stained liquor and its impact on maternal and neonatal outcome. *Int J Reprod Contracept Obstet Gynecol.* 2021;10:1629.

Cite this article as: Jananni VA, Chhatwal JG, Kandasamy V, Shinde RV. Impact of meconium-stained amniotic fluid on mode of delivery and maternal and neonatal outcome in a tertiary care hospital: a cross-sectional study. *Int J Reprod Contracept Obstet Gynecol* 2024;13:2472-6.