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Early Neonatal Outcome in Meconium-Stained Amniotic Fluid in Uncomplicated Pregnancies

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ABSTRACT

Background: Meconium-stained amniotic fluid (MSAF), defined as the passage of fetal stool into the amniotic fluid, is frequently associated with adverse neonatal outcomes. Although it is more common in high-risk or post-term pregnancies, even in otherwise uncomplicated term pregnancies, MSAF may signal fetal compromise. The consistency of the meconium—thin or thick—has been linked to the severity of neonatal morbidity. However, limited data exist on its isolated impact in low-risk term pregnancies, especially in resource-limited settings.

Objectives: To evaluate early neonatal outcomes in term, uncomplicated pregnancies with MSAF, and to assess whether the thickness of meconium correlates with neonatal complications such as low Apgar scores, need for resuscitation, respiratory distress, NICU admission, Meconium Aspiration Syndrome (MAS), and early neonatal mortality.

Methods: A hospital-based prospective observational study was conducted at KVG Medical College and Hospital, Sullia, Karnataka, over a 12-month period in 2024. A total of 100 pregnant women at ≥37 weeks gestation with singleton, uncomplicated pregnancies and MSAF during labor were enrolled. Meconium was categorized as thin or thick. Neonatal outcomes were assessed, and statistical analyses were performed using SPSS version 22.0, with significance set at $p < 0.05$.

Results: Among the 100 cases, 62% had thin and 38% had thick meconium. Adverse neonatal outcomes were significantly higher in the thick MSAF group: Apgar score <7 at 1 minute (42.1% vs. 9.7%), NICU admissions (42.1% vs. 14.5%), and MAS (26.3% vs. 3.2%) ($p < 0.05$). Overall, 25% required NICU care, 18% needed resuscitation, and 2% died within 7 days.

Conclusion: Thick MSAF is strongly associated with early neonatal complications even in low-risk term pregnancies. Timely intrapartum monitoring and delivery room preparedness are crucial in managing MSAF to reduce neonatal morbidity and mortality.

Keywords*: Meconium-stained amniotic fluid, neonatal outcome, uncomplicated pregnancy, Apgar score, Meconium Aspiration Syndrome, NICU admission, term pregnancy.*

INTRODUCTION

Meconium-stained amniotic fluid (MSAF), the presence of fetal stool in the amniotic fluid before or during labour, has long been recognized as a warning sign of potential fetal compromise, even in pregnancies without other obstetric complications. Its incidence among term pregnancies is estimated at up to 20 %, varying by gestational age, obstetric management practices, and means of detection.[1] MSAF is associated with a spectrum of adverse neonatal outcomes, including low Apgar scores, respiratory distress, need for resuscitation, meconium aspiration syndrome, and increased neonatal unit admissions.[2] The severity of outcomes appears to correlate with the thickness of the meconium and whether labour is term or post-term.[3]

In pregnancies deemed uncomplicated—i.e., singleton, cephalic presentation, absence of known fetal anomaly or maternal disease—MSAF still imposes a measurable risk. Studies comparing neonates born through MSAF vs clear amniotic fluid have shown that even in low-risk settings, MSAF increases the odds of early neonatal morbidity. [4] For example, thin meconium has been associated with modest but significant increases in neonatal resuscitation and respiratory support, while thick meconium is more strongly linked to severe complications.[5]

Despite this, there remain gaps in the literature. Many studies include mixed populations (complicated pregnancies, multiple gestations, preterm deliveries), making it difficult to isolate the effect of MSAF alone. Further, there is limited data on early neonatal outcomes specifically in strictly uncomplicated pregnancies, particularly in certain geographical or healthcare settings where antenatal care and intrapartum monitoring may differ. Understanding the risk in this specific subgroup is important to inform obstetric decision-making, delivery room preparedness, and neonatal surveillance protocols.

Therefore, this study aims to evaluate early neonatal outcomes—such as respiratory distress, Apgar scores, need for resuscitation and NICU admission—in neonates born with meconium-stained amniotic fluid in pregnancies otherwise uncomplicated. The goal is to quantify risk and possibly stratify by factors such as meconium consistency, gestational age, or mode of delivery, thus contributing evidence for targeted clinical management.

MATERIALS AND METHODS

This hospital-based prospective observational study was conducted in the Department of Obstetrics and Gynecology at KVG Medical College and Hospital (KVGMC&H), Sullia, a tertiary care center located in Karnataka, India. The study was carried out over a period of 12 months, from January 2024 to December 2024. The study population included pregnant women admitted in labor with singleton pregnancies at term (≥37 weeks of gestation) who were found to have meconium-stained amniotic fluid (MSAF) during labor or at the time of delivery.

Women were enrolled based on specific inclusion criteria, which were: uncomplicated singleton term pregnancies (≥37 weeks), presence of meconium-stained amniotic fluid noted during the course of labor or delivery, and willingness to participate with informed written consent. Exclusion criteria included high-risk pregnancies such as those complicated by gestational diabetes, preeclampsia, or intrauterine growth restriction; preterm deliveries (<37 weeks); multiple gestations; known congenital fetal anomalies; systemic maternal illnesses like hypertension and diabetes mellitus; and elective cesarean deliveries that were not preceded by labor.

The required sample size was calculated using the formula for estimating a proportion with a specified absolute precision: $n=Z^2 \cdot p \cdot (1-p)/d2$, Where $Z = 1.96$ (for 95% confidence level), p = anticipated proportion of adverse neonatal outcomes (taken as 30% based on prior literature), and d = absolute precision (set at 9%). Using this formula, the minimum required sample size was determined to be 100 neonates born through MSAF in uncomplicated term pregnancies.

Amniotic fluid status was evaluated at the time of spontaneous or artificial rupture of membranes, and the meconium was categorized as either thin or thick by the attending obstetrician. Data collection included maternal characteristics such as age, parity, gestational age, mode of delivery, and relevant intrapartum events. Neonatal outcomes that were assessed included Apgar scores at 1 and 5 minutes, requirement for neonatal resuscitation, admission to the Neonatal Intensive Care Unit (NICU), presence of respiratory distress, development of Meconium Aspiration Syndrome (MAS), and early neonatal mortality (within 7 days postpartum). All neonates were followed for a minimum of 7 days after birth or until hospital discharge, whichever occurred later.

Collected data were entered and analyzed using Microsoft Excel and Statistical Package for Social Sciences (SPSS) version 22.0. Categorical variables were expressed as percentages, while continuous variables were presented as mean ± standard deviation (SD). Statistical comparisons between categorical variables were conducted using the Chi-square test or Fisher's exact test as appropriate. A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 100 term pregnant women with meconium-stained amniotic fluid (MSAF) were included in the study. The maternal age distribution showed that the majority of participants (78%) were between 21–30 years of age. In terms of parity, 56% were primigravida and 44% were multigravida. Most deliveries (82%) occurred at a gestational age of 38 to 40 weeks.

Regarding the grade of meconium, 62% of the cases had thin meconium, while 38% presented with thick meconium. The mode of delivery was vaginal in 58% of cases, while 42% required cesarean section. Cesarean sections were primarily indicated for fetal distress and failed induction of labor.

The observed neonatal outcomes are summarized in Table 1. Of the 100 neonates, 22% had an Apgar score <7 at 1 minute, and 8% had an Apgar score <7 at 5 minutes. Resuscitation was required in 18% of newborns. NICU admission was necessary in 25% of cases. Meconium Aspiration Syndrome (MAS) was diagnosed in 12 neonates, of which 10 cases (83%) were associated with thick meconium. Respiratory distress was observed in 20% of neonates, and there were 2 cases (2%) of early neonatal death within the first 7 days of life.

A statistically significant association ($p < 0.05$) was found between thick MSAF and the occurrence of low Apgar scores, NICU admissions, and Meconium Aspiration Syndrome, indicating that thick meconium is a predictor of adverse neonatal outcomes.

Table 1: Maternal Characteristics (n = 100)

Variable	Category	Frequency (%)
Age (years)	21–30	78
	>30	22
Parity	Primigravida	56
	Multigravida	44
Gestational Age	38–40 weeks	82
	>40 weeks	18
Grade of MSAF	Thin	62
	Thick	38
Mode of Delivery	Vaginal	58
	Cesarean Section	42

Table 2: Neonatal Outcomes (n = 100)

Outcome	Frequency (%)
Apgar score <7 at 1 minute	22
Apgar score <7 at 5 minutes	8
Need for resuscitation	18
NICU admission	25
Meconium Aspiration Syndrome (MAS)	12
Respiratory distress	20
Early neonatal death (<7 days)	2

Table 3: Table 3: Association Between MSAF Grade and Neonatal Complications

Outcome	Thin MSAF (n=62)	Thick MSAF (n=38)	p-value
Apgar <7 at 1 minute	6 (9.7%)	16 (42.1%)	< 0.05*
NICU admission	9 (14.5%)	16 (42.1%)	< 0.05*
Meconium Aspiration Syndrome (MAS)	2 (3.2%)	10 (26.3%)	< 0.05*

DISCUSSION

This study investigated the early neonatal outcomes in term pregnancies complicated by meconium-stained amniotic fluid (MSAF), with a particular focus on the impact of meconium thickness. The findings suggest that thick MSAF is significantly associated with adverse neonatal outcomes such as low Apgar scores, increased NICU admissions, and a higher incidence of Meconium Aspiration Syndrome (MAS).

In the present study, 22% of neonates had an Apgar score <7 at 1 minute, and 8% at 5 minutes. These findings are consistent with Singh et al., who reported 20% and 6% of neonates with low Apgar scores at 1 and 5 minutes, respectively, in MSAF cases6. Similarly, Desai et al. reported low Apgar scores in 18% of cases at 1 minute and 9% at 5 minutes7. The slightly higher incidence in our study may be attributed to delayed referral of cases or variation in resuscitation practices.

The requirement of neonatal resuscitation (18%) and NICU admission (25%) in our study also aligns with prior findings. Porwal et al. documented NICU admissions in 28% of neonates born through MSAF8, and Dani et al. reported a 24.5% NICU admission rate in term neonates with MSAF 9. These outcomes underscore the clinical significance of MSAF as a predictor for potential neonatal compromise requiring specialized care.

The incidence of Meconium Aspiration Syndrome (MAS) in our cohort was 12%, with a notable concentration (83%) among neonates exposed to thick meconium. This observation is supported by Parween et al., who also found a significantly higher rate of MAS (14.8%) among thick MSAF cases 10. Dani et al. further reported a MAS rate of 10.9%, emphasizing the increased risk with thick meconium 9. However, Bhasin et al. reported a slightly lower incidence (8.6%) of MAS11, which could be due to proactive intrapartum management, including early decision for cesarean section and prompt neonatal intervention.

The rate of early neonatal mortality in our study was 2%, which is similar to findings by Bhasin et al., who reported a mortality rate of 1.9%11, and Desai et al., who found a rate of 2.5%7. The mortality in these cases is likely influenced by the severity of MAS and associated respiratory failure.

Variations across studies may be explained by differences in institutional protocols, availability of trained personnel, response time to fetal distress, and sample characteristics such as inclusion of only term, uncomplicated pregnancies in our study. For example, Akhila et al. included both high-risk and low-risk pregnancies, possibly contributing to higher morbidity figures12. Additionally, tertiary centers with established neonatal intensive care infrastructure may report lower complication rates due to timely and effective intervention.

Our findings strongly reinforce that thick meconium is an independent risk factor for poor neonatal outcomes. Careful intrapartum monitoring, early detection of fetal distress, and preparedness for immediate neonatal resuscitation are essential components of managing such cases.

CONCLUSION

This study demonstrates that meconium-stained amniotic fluid, particularly when thick, is significantly associated with adverse early neonatal outcomes even in otherwise uncomplicated term pregnancies. Neonates exposed to thick MSAF were more likely to have low Apgar scores, require resuscitation, be admitted to the NICU, and develop Meconium Aspiration Syndrome. These findings underscore the importance of diligent intrapartum monitoring and preparedness for neonatal resuscitation in all cases of MSAF, regardless of overall pregnancy risk status. Stratifying risk based on meconium consistency may help optimize clinical decision-making and neonatal outcomes. Further multicentric studies with larger sample sizes are recommended to validate these observations and support protocol development for labor management in the presence of MSAF.

REFERENCES

1. Gallo DM, Romero R, Bosco M, Gotsch F, Jaiman S, Jung E, et al. Meconium-stained amniotic fluid. *Am J Obstet Gynecol*. 2023;228(5S):S1158-S1178.
2. Attali I, Korb D, Azria E, Lepercq J, Goffinet F. Meconium-stained amniotic fluid and neonatal morbidity in nulliparous patients with prolonged pregnancy. *Acta Obstet Gynecol Scand*. 2023;102(8):1092-1099.
3. Hofmeyr GJ. What (not) to do before delivery? Prevention of fetal risk in the presence of thick meconium. *Best Pract Res Clin Obstet Gynaecol*. 2009;23(1):23-30.
4. 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.
5. Schreiber H, Shilony A, Amrami RB, Bar J, Daykan Y, Cohen G, et al. Impact of Thin Meconium on Delivery and Early Neonatal Outcomes. *Front Med (Lausanne)*. 2023;10:9955471.
6. Singh G, Singh O, Thapar K. Neonatal outcome in meconium stained amniotic fluid: a hospital based study. Int J Contemp Pediatr. 2017;4(2):356-360.
7. Desai D, Chauhan K, Chaudhary S. A study of meconium stained amniotic fluid, its significance and early maternal and neonatal outcome. Int J Reprod Contracept Obstet Gynecol. 2013;2(2):190-193.
8. Porwal NP, Potdar DB, Kanvikar R, Ingle SY. Neonatal outcome in meconium stained amniotic fluid. J Pharm Res Int. 2020;32(29):111-115.
9. Dani C, Ciarcià M, Barone V, Di Tommaso M, Mecacci F, Pasquini L, et al. Neonatal outcomes of term infants born with meconium-stained amniotic fluid. Children. 2023;10(5):780.
10. Parween S, Prasad D, Poonam P, Ahmar R, Sinha A, Ranjana R. Impact of meconium-stained amniotic fluid on neonatal outcome in a tertiary hospital. Cureus. 2022;14(4):e24464.
11. Bhasin D, Vishal AK, Babu B, Bhasin A. Maternal and neonatal outcome in meconium stained amniotic fluid at term in labour - a retrospective study. J Evid Based Med Healthc. 2021;8(4):190-194.
12. Akhila S, Koppad AM, Aundhakar CD. Study of neonatal outcome in meconium stained amniotic fluid. Int J Med Health Res. 2018;4(3):134-138.