ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 06 | June - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

MATERNAL AND PERINATAL OUTCOMES IN MECONIUM STAINED AMNIOTIC FLUID

Obstetrics & Gynaecology

Dr. Smitee Priyam Junior Resident, Department Of Obstetrics And Gynecology, Santosh Medical College And Hospital, Santosh Deemed To Be University, Ghaziabad.

Dr Alpana Agrawal* Professor, Department of Obstetrics and Gynecology, Santosh medical college and hospital, Santosh deemed to be university, Ghaziabad. *Corresponding Author

Dr Manisha Gupta HOD, Professor, Department Of Obstetrics And Gynecology, Santosh Medical College And Hospital, Santosh Deemed To Be University, Ghaziabad.

ABSTRACT

Background: The presence of meconium-stained amniotic fluid (MSAF) during labor is a critical obstetric concern, often signaling potential fetal distress and posing significant risks to both maternal and perinatal outcomes. Understanding its implications is crucial for optimizing maternal and neonatal health, guiding timely interventions, and improving overall birth outcomes. **Aim:** To compare the fetomaternal outcome in patients with meconium stained amniotic fluid and in those with clear amniotic fluid in terms of maternal risk factors , mode of delivery and perinatal findings. **Methods:** It was a clinical observational study done over a period of one year. The study included consenting labouring patients who met the inclusion and exclusion criteria. Monitoring was done in the antepartum, intrapartum and postpartum period. **Results:** Among the 230 patients taken, most cases of MSAF were above 39wks of gestation and were associated with increased risk of abnormal CTG changes affecting the maternal outcomes by increasing the incidence of operative deliveries, and perinatal outcomes by affecting the APGAR score of the neonate. However cases of MSAF were also seen to have a good feto-maternal outcome with vigilant monitoring and active decision making. **Conclusion:** Vigilant monitoring and timely intervention in MSAF cases are crucial, but delivery decisions should be guided by NST findings and overall risk factors.

KEYWORDS

Meconium, Meconium Aspirations Syndrome, Fetal distress, APGAR score

INTRODUCTION

The birth process is described as the most perilous journey an individual ever undertakes. Meconium staining of the amniotic fluid and abnormalities in the fetal heart rate pattern have long been recognized as danger signals in this journey. [1]

Meconium is a green, viscous liquid that first appears in fetal ileum from 10 weeks gestation and incidence of intrauterine passage of meconium increases with the gestational age, maternal Risk Factors And comorbidities like pre-eclampsia, gestational diabetes, maternal infections including TORCH infections, elderly gravida, lifestyle stress factors, malnutrition etc[2,3,4] It can be either thin meconium or thick meconium stained liquor.

Newborns typically pass meconium within the first 24 to 48 hours after birth. However, certain factors like Obstructed labor, Advanced maternal age, Tobacco smoking, Oligohydramnios, Anemia and hypertensive disorders of pregnancy and Use of uterotonic agents can cause its passage while still in the womb. [5]

Meconium-stained liquor (MSL) is graded based on its appearance and consistency, indicating the severity of fetal stress. Grade 1 (Thin MSL), Grade 2 (Moderate MSL) and Grade 3 (Thick MSL)[6] Infants born with MSAF are considered 100 times more likely to develop MAS compared with infants born through clear amniotic fluid, and more than 4% of MAS infants died accounting for 2% of all perinatal deaths.[7]

MSL can cause Abnormal fetal heart rate tracing, Low Apgar score, Neonatal intensive care unit admission, Need for neonatal ventilation, Meconium aspiration syndrome, Hypoxic-ischemic encephalopathy of the neonate, Small for gestational age[8]

Therefore we conducted this study to evaluate and compare fetomaternal outcomes in patients with meconium-stained amniotic fluid versus those with clear amniotic fluid , focusing on maternal risk factors, mode of delivery, and perinatal outcomes.

MATERIAL AND METHODS

Study was hospital based observational study conducted in Dept of Obstetrics and Gynaecology, Santosh medical college and hospital for 1 year in 230 women. Approval was taken from the ethical committee of Santosh University. Informed consent was taken from all the subjects.

- **Inclusion Criteria:** All consenting pregnant females
- 37-41.6 weeks of gestation
- live singleton pregnancy
- cephalic presentation
- spontaneous or induced onset of labor
- adequate pelvis,
- presence of meconium in amniotic fluid on spontaneous rupture of membranes (SRM) or artificial rupture of membranes (ARM) were included in the study.

Exclusion Criteria: Included pregnancies

- < 37 weeks of gestational age />42 weeks pregnancy
- any fetal malformations
- malpresentation
- preterm labour
- multiple pregnancy
- intrauterine fetal death

Subjects were divided into two groups

Group A (Study Group) : Pregnant Females according to inclusion Criteria with meconium stained amniotic fluid

Group B (Control Group) : Pregnant Females according to inclusion Criteria with clear amniotic fluid

Proper antenatal history was taken and any pre-existing comorbidities were noted as all of these can be a cause for meconium stained liquor
Both groups of patients were monitored for

- Antepartum: Age, parity, socioeconomic position, past pregnancy result, antenatal care booked or unbooked, other medical conditions, BMI
- Intrapartum: Spontaneous or induced labor, usage of oxytocin, NST, delivery route, instrumental delivery, postpartum complications
- Perinatal: Birth weight, MAS, need for ventilation, NICU admission, and APGAR score

Statistical Analysis

The statistical analysis was done using SPSS Software Ver. 17. All the qualitative data was presented as frequency and percentages and was compared using Fisher"s test or Chi-square test. P- Value of < 0.05 was considered as significant.

OBSERVATION AND RESULTS

Meconium-stained Group A (n=128)
Clear Group B (n=102)

Table 1: Distribution Of Study Subjects According To Gestational Age

Gestational Age(weeks)	Group A(n=128)	Group B (n=102)	Total
36-37+6	10 (0.0%)	38 (42.33%)	48 (20.8%)
38-38+6	15 (11.7%)	33 (32.4%)	48 (20.9%)
39-39+6	49 (38.3%)	23 (22.5%)	72 (31.3%)
40-40+6	38 (29.7%)	8 (7.8%)	46 (20.0%)
41+	16 (12.5%)	0 (0.0%)	16 (6.0%)
Total	128 (100.0%)	102 (100.0%)	230 (100.0%)

Gestational age distribution differed significantly between the groups. In Group A (MSAF), most cases were at 39–39+6 weeks (38.3%), while Group B (clear AF) had the highest at 37–37+6 weeks (33.3%). Late-term cases (41+ weeks) appeared only in Group A (12.5%), and early-term cases (36–36+6 weeks) only in Group B (3.9%). Hence there is a significant association between gestational age and MSAF occurrence.

Table 2: Distribution Of Study Subjects According To NST & Mode Of Delivery

	Group A (n=128)	Group B (n=102)	Total
NST			
Distress	7 (5.5%)	7 (6.9%)	14 (6.1%)
Reactive	78 (60.2%)	66 (64.7%)	144 (62.1%)
Non-reassuring	44 (34.4%)	29 (28.4%)	73 (31.7%)
Mode of delivery			
LSCS	71 (55.5%)	40 (39.2%)	111 (48.3%)
NVD	39 (30.5%)	61 (59.8%)	100 (43.5%)
Ventous Assisted Vaginal delivery	6 (4.7%)	1 (1.0%)	7 (3.0%)
Forceps Assisted Vaginal delivery	12 (9.4%)	0 (0.0%)	12 (5.2%)

Table 2 compares NST results between the two groups. Reactive NSTs were most common (60.2% in Group A, 64.7% in Group B, 62.1% overall), followed by non-reassuring NSTs (34.4% in Group A, 28.4% in Group B). Fetal distress was observed in 5.5% of Group A and 6.9% of Group B. These findings suggest NST patterns were similar regardless of amniotic fluid status.

Table 2 also compares the mode of delivery between the two groups, revealing a higher rate of medical intervention in Group A (MSAF). Caesarean delivery was more common in Group A (55.5%) than in Group B (39.2%), comprising 48.3% overall. Assisted deliveries were less frequent overall but more frequent in Group A, with ventouse-assisted births at 4.7% in Group A and 1.0% in Group B, while forceps-assisted deliveries occurred only in Group A (9.4%). This confirms a significant association between MSAF and increased incidence of operative deliveries

Table 3: Distribution Of Study Subjects According To Postpartum Complications

Postpartum Complications	Group A (n=128)	Group B (n=102)	Total
None	82 (64.1%)	86 (84.3%)	168 (73.0%)
PPH	6 (4.7%)	8 (7.8%)	14 (6.1%)
Perineal tear	3 (2.3%)	1 (1.0%)	4 (1.7%)
Puerperal Endometritis	7 (5.5%)	0 (0.0%)	7 (3.0%)
Puerperal sepsis	3 (2.3%)	1 (1.0%)	4 (1.7%)
Stitch line infections	2 (1.6%)	0 (0.0%)	2 (0.9%)
Episiotomy site infection	4 (3.1%)	0 (0.0%)	4 (1.7%)
Postpartum eclampsia	3 (2.3%)	1 (1.0%)	4 (1.7%)
Lateral vaginal wall tear	8 (6.3%)	1 (1.0%)	9 (3.9%)
Total	128 (100.0%)	102 (100.0%)	230 (100.0%)

Table 3 compares postpartum complications, showing a higher risk in Group A (MSAF). While most cases had no complications (64.1% in Group A, 84.3% in Group B), issues were more frequent in Group A. PPH affected 4.7% in Group A and 7.8% in Group B. Puerperal endometritis (5.5%), episiotomy infections (3.1%), postpartum eclampsia (2.3%), and stitch line infections (1.6%) were exclusive to Group A. Lateral vaginal wall tears were also more common in Group A (6.3% vs. 1.0%). This proves the need for closer postpartum monitoring in MSAF cases.

Table 4: Distribution Of Study Subjects According To 1 And 5 Min APGAR

1 Min APGAR	Group Â(n=128)	Group B (n=102)	Total
4	1 (0.8%)	0 (0.0%)	1 (0.4%)
5	2 (1.6%)	0 (0.0%)	2 (0.9%)
6	14 (10.9%)	3 (2.9%)	17 (7.4%)
7	29 (22.7%)	11 (10.8%)	40 (17.4%)
8	58 (45.3%)	45 (44.1%)	103 (44.8%)
9	21 (16.4%)	42 (41.2%)	63 (27.4%)
10	3 (2.3%)	1 (1.0%)	4 (1.7%)
Total	128 (100.0%)	102 (100.0%)	230 (100.0%)
5 Min APGAR			
7	3 (2.3%)	0 (0.0%)	3 (1.3%)
8	10 (7.8%)	2 (2.0%)	12 (5.2%)
9	18 (14.1%)	2 (2.0%)	20 (8.7%)
10	97 (75.8%)	98 (96.1%)	195 (84.8%)
Total	128 (100.0%)	102 (100.0%)	230 (100.0%)

Table 5 compares the 1-minute and 5-minute APGAR scores, revealing significantly lower scores in Group A (MSAF). At 1 minute, scores of 8 and 9 were most common in both groups, but lower scores (4, 5, and 6) were exclusive to Group A, indicating weaker initial responses. A score of 6 was more frequent in Group A (10.9% vs. 2.9%), as was 7 (22.7% vs. 10.8%). At 5 minutes, most newborns scored 10 (75.8% in Group A, 96.1% in Group B), while lower scores (7, 8, and 9) were more frequent in Group A. Therefore this study highlights an increased risk of neonatal distress in MSAF cases.

DISCUSSION

Gestational age was closely linked to MSAF, with most cases occurring between 39 and 40 weeks. This emphasizes the importance of close foetal monitoring in late-term pregnancies, as the risk of foetal distress and associated complications increases near term. Regular assessments, including NST and ultrasound, can aid in early detection, allowing timely interventions such as labour induction or caesarean delivery when necessary. Proactive management can help minimize the risk of adverse maternal and neonatal outcomes.

Our study found higher rates of non-reassuring NST (34.4%) and foetal distress (5.5%) in MSAF cases, consistent with previous research by Attali et al. (2023), Chhetri & Aryal (2020), and Tolu et al. (2020). These findings highlight the link between MSAF and increased fetal compromise, underscoring the need for vigilant monitoring.[9,10,11, 12]

Our study found a higher LSCS rate in MSAF cases (55.5% vs. 39.2%, $p < 0.001$), consistent with previous studies confirming increased caesarean deliveries due to fetal distress. Vaginal delivery was less common (30.5% vs. 59.8%), aligning with research by Suresh et al. (2022) and Attali et al. (2023). Assisted deliveries, including ventouse (4.7%) and forceps (9.4%), were also more frequent in MSAF cases. These findings reinforce that MSAF significantly increases the need for operative and assisted deliveries. [13]

Postpartum complications were more frequent in MSAF cases (35.9% vs. 15.7% in CAF), with higher rates of infections like puerperal endometritis, sepsis and postpartum haemorrhage. Consistent with previous studies, these findings suggest increased maternal morbidity due to prolonged labor, interventions, and meconium contamination, emphasizing the need for enhanced postpartum care.

Neonatal outcomes were notably worse in the MSAF group, with higher rates of delayed cry at birth, indicating initial respiratory distress. These infants also had lower 1-minute and 5-minute APGAR scores, reflecting compromised early adaptation. Additionally, there was an increased need for neonatal resuscitation, including interventions such as positive pressure ventilation and supplemental oxygen, suggesting a greater risk of birth asphyxia and respiratory complications. These findings highlight the critical need for prompt neonatal care and close monitoring in cases of meconium-stained amniotic fluid.

CONCLUSIONS

This study highlights the importance of vigilant fetal surveillance, timely delivery decisions, and prompt neonatal resuscitation in cases of meconium-stained amniotic fluid to reduce adverse perinatal

outcomes. However, MSAF alone should not dictate the mode of delivery; factors such as NST findings and other risk factors must be considered. If NST remains favorable, a carefully monitored trial of labor can be safely attempted, ensuring the best possible outcomes for both mother and baby.

Acknowledgement : I sincerely express my deepest gratitude to my guide, seniors, colleagues, juniors, and parents for their unwavering support, guidance, and encouragement throughout this research journey.

REFERENCES

1. Kapote DS, Mohite AM, Syed A. Comparative analysis of maternal and fetal outcome in meconium stained amniotic fluid and clear liquor in primigravida. Int J Reprod Contracept Obstet Gynecol 2020;9:482-7.
2. Dr. Gunvant Vaishnav,M.D., Associate Professor,Department of O&G, GMERS Medical College, & General Hospital Gotri, Vadodara (Gujarat-India)
3. Bacsik RD. Meconium aspiration syndrome.Pediatric Clin N Am. 1997;24(3):463-77.
4. Smith CA, Nelson NM. The physiology of the Newborn Infant, 4th ed. Springfield, IL: Charles C Thomas; 1976:69-72.
5. Gallo DM, Romero R, Bosco M, Gotsch F, Jaiman S, Jung E, Suksai M, y Cajal CL, Yoon BH, Chaiworapongsa T. Meconium-stained amniotic fluid. American journal of obstetrics and gynecology. 2023 May 1;228(5):S1158-78.
6. Kitsommart R, Thammawong N, Sommai K, Yangnoy J, Bowornkitiwong W, Paes B. Impact of meconium consistency on infant resuscitation and respiratory outcomes: a retrospective-cohort study and systematic review. J Matern Fetal Neonatal Med 2021;34: 4141–7.
7. Ashwal E, Hiersch L, Melamed N, Aviram A, Wiznitzer A, Yogev Y. The association between isolated oligohydramnios at term and pregnancy outcome. Arch Gynecol Obstet 2014;290:875–81.
8. Tran SH, Caughey AB, Musci TJ. Meconium-stained amniotic fluid is associated with puerperal infections. Am J Obstet Gynecol 2003;189:746–50.
9. Marahatta, S., Poudel, L., Panthee, K., Aryal, S., Rimal, S. and Thakur, N. Maternal Risk Factors And Neonatal Outcome In Meconium Stained Amniotic Fluid.
10. Attali I, Korb D, Azria E, et al. Meconium-stained amniotic fluid and neonatal morbidity in nulliparous patients with prolonged pregnancy. *Acta Obstet Gynecol Scand.* 2023;102:1092-1099. doi:10.1111/aogs.14619.
11. Chhetri UD, Aryal S. Risk factors and perinatal outcome of meconium-stained amniotic fluid. *J Lumbini Med Coll.* 2020;8(1):77-82.
12. Tolu LB, Birara M, Teshome T, Feyissa GT. Perinatal outcome of meconium stained amniotic fluid among labouring mothers at teaching referral hospital in urban Ethiopia. PloS one. 2020 Nov 13;15(11):e0242025.
13. Anupama Suresh Y, Yeddula D, Suresh YV. A clinical study of meconium-stained amniotic fluid and its maternal and perinatal outcome in a tertiary centre. *J Pharm Negat Results.* 2022;13(S10):552. doi:10.47750/pnr.2022.13.S10.552.