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Perinatal Outcome in Meconium Stained Liquor Term Women Visiting To Shaikh Zaid Women Hospital Larkana

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Abstract

Background: Meconium-stained amniotic fluid (MSAF) is a frequent obstetric observation, which is related to a high rate of perinatal morbidity and mortality. Meconium presence and consistency are the vital signs that show fetal distress and may affect the outcomes of the newborn. This research aimed to assess the perinatal outcomes of term pregnancies with meconium-stained liquor.

Methods: Over the course of six months, 165 pregnant women with MSAF were sampled one after the other. The study was cross-sectional. Data on mother demographics, obstetric history, intrapartum features, and newborn outcomes were gathered using a structured proforma. Statistical analysis was conducted using SPSS version 26. Variables were summarized using descriptive statistics. The groups of results comprised thin and thick meconium, which were compared by chi-square and t-tests, and predictors of adverse perinatal outcomes were identified with the help of logistic regression.

Results:

In 41.8% of cases, thick meconium was found and showed a significant association

with Apgar scores < 7 (36.2%); meconium aspiration syndrome (24.6%); NICU admission (34.8%); and neonatal mortality (7.2%) ($p < 0.05$). Logistic regression identified thick meconium (AOR = 3.42, 95% CI = 1.62–7.21, p = 0.001), abnormal FHR (AOR = 2.87, 95% CI = 1.28–6.45, p = 0.010), and oligohydramnios (AOR = 2.76, 95% CI = 1.05–7.25, p = 0.038) as independent predictors of adverse outcomes.

Conclusion:

Thick meconium, fetal distress, and oligohydramnios are significant risk factors for poor perinatal outcomes. Early detection and timely intervention are crucial to decrease neonatal morbidity and mortality.

Introduction

A reasonably common observation during labor is meconium-stained amniotic fluid (MSAF), which can be found in up to 40% of post-term pregnancies and 10% to 20% of term pregnancies[1]. It has long been known that MSAF increases the likelihood of adverse perinatal outcomes, such as meconium aspiration syndrome (MAS) and neonatal intensive care unit (NICU) hospitalization, perinatal hypoxia and increased neonatal mortality[2-4]. While obstetric and neonatal care have advanced greatly, MSAF remains a significant clinical challenge related to its potential complications and unknown trajectory.

The exact pathophysiology of in utero meconium passage is not well defined; it is usually thought to be related to fetal distress, hypoxia, or intrauterine infection[5,6]. Some authors regard meconium passage as a negative phenomenon indicating fetal compromise while others hold this may be simply a normal maturational event related to fetal gastrointestinal development[7,8]. Similarly, practice patterns for the management of MSAF vary by institution or provider, ranging from aggressive approaches including amnioinfusion, early delivery, or continuous fetal monitoring, to more conservative care and management[9,10].

In low-income settings such as Pakistan, the existence of MSAF poses an even greater danger to maternal and neonatal health because of limited access to advanced obstetric and neonatal care[11]. Similar studies in low-resource areas have shown increased incidences of MAS, birth asphyxia, and neonatal deaths among cases with meconium-stained stained liquor[9,11,12]. In Shaikh Zaid Women Hospital, Larkana, which manages a lot of obstetric cases with high risk, it is important to efficiently review the perinatal outcomes associated with MSAF in the context of improving clinical practices and reducing neonatal morbidity and mortality.

Prior studies have emphasized differences in perinatal outcomes related to factors such as the density of meconium (thin vs. thick), gestational age, and aspects of fetal distress. In particular, meconium aspiration syndrome (MAS) and hypoxic-ischemic encephalopathy (HIE) are among the worst medical consequences linked to meconium. Besides, the cardiotocography (CTG) or fetal scalp pH should be considered as threshold monitoring tools of labor and would be useful to predict and manage adverse pregnancy outcomes in MSAF.[3, 13-15].

Meconium-stained amniotic fluid (MSAF) continues to pose a serious risk for unfavorable perinatal outcomes in low-resource settings like Larkana, where access to sophisticated neonatal and obstetric care is frequently restricted. Meconium aspiration syndrome, birth asphyxia, and neonatal mortality are among the major unfavorable prenatal outcomes that are still common but completely avoidable with prompt detection and treatment. Determining the incidence and characterization of perinatal outcomes associated with MSAF at Shaikh Zaid Women Hospital, an important tertiary care institution, will help to identify local risks associated with perinatal outcomes and gaps in service provision. The study offers an important opportunity to provide evidence that supports medical decision-making, intrapartum monitoring and neonatal survival in local low-resource healthcare settings. This study, therefore, aims to comprehensively assess the perinatal outcomes among term women presenting with

meconium-stained liquor at Shaikh Zaid Women Hospital Larkana. The data collection from this study will also generate evidence to inform neonatal care, protocols as well as evidence-based obstetric recommendations.

METHODS

This prospective cohort study took place over the span of 6 months from at the Obstetrics and Gynecology Unit-I of Shaikh Zaid Women Hospital, Larkana, following the approval of the synopsis. The study's objective was to assess perinatal outcomes for term pregnancies with meconium-stained amniotic fluid (MSAF).

The sample size of 165 participants was calculated using $n = Z^2PqN/ [e^2(N-1) + Z^2Pq]$ formula, using a 95% confidence interval (Z=1.96), and a prevalence rate of 7.41% as well as a margin of error of 4% and a population size of 20,000[16]. The sampling technique used was non-probability consecutive sampling.

Women at or beyond 37 weeks of gestation admitted for delivery with confirmed meconium-stained amniotic fluid were included in the study. Confirmation of MSAF was made visually during spontaneous or artificial rupture of membranes or at delivery. The study only included singleton term deliveries in the active phase of labor, defined as cervical dilation ≥4 cm with regular uterine contractions. Gestational age was validated by early first-trimester ultrasound, with last menstrual period and early scan medically congruent, or if not available, clinical gestational age from fundal height or Ballard scoring was used if clinically appropriate. Participants also needed to have neonatal outcomes confirmed during the first 72 hours of life and to provide written informed consent for participation. Pregnancies complicated by congenital anomalies (e.g., hydrocephalus, anencephaly), multiple gestation, pregnancy-induced hypertension (BP >160/110 mmHg), gestational diabetes (GTT >4.8 mmol/L), and/or severe antepartum hemorrhage (>500 ml) were excluded from the study.

Before beginning data collection, staff received training in standardized classification and documentation of MSAF. Data collection occurred over six months, after a one-week pilot study to inform refinements. Data were collected for each subject at three separate times: maternal baseline data (age, parity, and medical history), intrapartum data (method of delivery, fetal monitoring, and MSAF description, thin or thick), and neonatal outcomes (Apgar scores, need for resuscitation, NICU admission, diagnosis of MAS, and death within 28 days of life). Neonatal assessments occurred at 24 hours of life, 72 hours of life, and 28 days postpartum. Data were collected in real time by a trained research nurse using a standardized case report, and 10% of records were randomly audited for accuracy. Illiterate participants provided informed consent in either Sindhi or Urdu in the presence of a witness. Ethical safeguards ensured participant confidentiality, voluntary participation, and priority for patient care. Monthly safety and progress reports were submitted to the IRB to ensure compliance with ethical and procedural standards.

When meconium-stained amniotic fluid (MSAF) was detected with the naked eye, it was categorized as either thick (dark green and viscous or granular) or thin (lightly stained and watery). Term pregnancy was established as having a gestational age of not less than 37 0/7 weeks and not more than 41 6/7 weeks, which was established by either the application of early ultrasound or a repeat of the last menstrual period. Meconium aspiration syndrome (MAS), neonatal mortality at 28 days of life, and more than 24 hours in the neonatal intensive care unit (NICU) were the primary perinatal outcomes. Apgar scores at 1 and 5 minutes, birth asphyxia, and the need for artificial breathing were secondary outcomes.

The indicators of fetal distress were identified as the deviation of the normal pattern of fetal heart rate on the cardiotocography, such as frequent cases of late or irregular decelerations, and bradycardia. Motherly features were also recorded, and they included prolonged labor, oligohydramnios, and intrapartum fever. They were also

evaluated by the performance of the neonatal resuscitation measures application, like endotracheal suctioning and positive pressure ventilation, using standardized definitions.

SPSS version 26 was used in analyzing the data collected (IBM Corp., Armonk, NY). Apgar scores, maternal age, and gestational age are quantitative variables that were evaluated with the Shapiro-Wilk test to determine their normality. The mean ±SD was used to represent data with a normal distribution, and the median with the interquartile range was used to represent data that did not. Neonatal outcomes, mode of birth, and meconium consistency all had frequency and percentage of categorical variables. The data distribution was examined using the Chi-square and independent t-test or Mann-Whitney U tests to show the relationship between continuous and categorical variables between groups, respectively. Depending on whether the variables were distributed, the independent t-test or the Mann-Whitney U test was used to compare the variables.

The multivariable logistic regression analysis was required to be carried out, taking into consideration the risk factors (maternal age, parity, and mode of delivery) as significant, to find study variables that have risk factors of bad outcomes (e.g., MAS, NICU hospitalization, and mortality). Neonatal mortality within 28 days was compared using Kaplan-Meier survival curves and the log-rank test. A p-value of less than 0.05 was considered statistically significant. The results were presented in tables or graphs so that they might be better understood.

RESULTS

Out of the 165 women who participated in the investigation of pregnant women, the highest number were aged between 26-30 years (38.8%). This was followed by the age group of 20-25 years (35.2%), as well as those aged 30 or above (17.0%), and, finally, those aged below 20 years (9.1%). Primiparous women made up a small majority of the participants in this study (53.9%), with an average gestational age at delivery of 39.3 ± 1.1 weeks. As for the maternal medical aspects, a large percentage of these women were not affected by any positive medical conditions (59.4%). The highest percentage of complications were of maternal hypertension (13.3%) and oligohydramnios (10.3%), followed by maternal fever (7.9%) and diabetes (6.7%). The majority of pregnancies were spontaneous labors (70.9%), with the remaining 29.1% requiring induction. (Table 1)

Table 1. Maternal Demographic and Obstetric Characteristics (n = 165)

Variable	**n (%)**
Age (years)	
< 20	15 (9.1)
20–25	58 (35.2)
26–30	64 (38.8)
>30	28 (17.0)
Parity	
Primiparous	89 (53.9)
Multiparous	76 (46.1)
Gestational age (weeks) (Mean ± SD)	39.3 ± 1.1
Maternal medical conditions	
None	98 (59.4)
Hypertension	22 (13.3)
Diabetes (GDM/Pre-existing)	11 (6.7)
Oligohydramnios	17 (10.3)
Maternal fever (≥38°C)	13 (7.9)
Other	4 (2.4)

Onset of labor	
Spontaneous	117 (70.9)
Induced	48 (29.1)

There was a greater incidence of spontaneous rupture of membranes during labor (61.8%) compared with artificially ruptured membranes (38.2%). Thin meconium-stained amniotic fluid was observed in (58.2%), while thick meconium was noted in (41.8%). The majority of fetuses had normal fetal heart traces (68.5%) while (31.5%) indicated potential fetal distress. Approximately half of all labors were spontaneous vaginal delivery (57.0%), with 32.7% of labors requiring cesarean section and 10.3% requiring instrumental deliveries. (See Table 2)

Table 2. Intrapartum and Delivery Characteristics (n = 165)

Variable	**n (%)**
Type of membrane rupture	
Spontaneous (SROM)	102 (61.8)
Artificial (AROM)	63 (38.2)
Consistency of meconium	
Thin	96 (58.2)
Thick	69 (41.8)
Fetal heart rate pattern	
Normal	113 (68.5)
Abnormal	52 (31.5)
Mode of delivery	
Spontaneous vaginal delivery	94 (57.0)
Instrumental (Forceps/Vacuum)	17 (10.3)
Cesarean section	54 (32.7)

Of the 165 neonates delivered, 52.7% were male and 47.3% female, with an average birth weight of 3065 ± 425 g. About one-fourth of the infants (23.6%) had a 5-minute Apgar score less than 7, and 27.9% needed some kind of neonatal resuscitation. Meconium aspiration syndrome occurred in 13.3% of cases, and 21.2% of the infants needed to be admitted to the neonatal intensive care unit (NICU) related to complications such as respiratory distress or asphyxia. Birth asphyxia was observed in 10.3%, mechanical ventilation was needed in 7.3%, and neonatal mortality within 28 days was recorded in 3.6% of cases. (Table 3)

Table 3. Neonatal Outcomes (n = 165)

Variable	**n (%)**
Neonatal sex	
Male	87 (52.7)
Female	78 (47.3)
Birth weight (grams)	Mean ± SD = 3065 ± 425
Apgar score <7 at 5 min	39 (23.6)
Neonatal resuscitation required	46 (27.9)
Meconium aspiration syndrome (MAS)	22 (13.3)
NICU admission	35 (21.2)
Birth asphyxia	17 (10.3)
Mechanical ventilation required	12 (7.3)
Neonatal mortality (within 28 days)	6 (3.6)

When comparing perinatal outcomes between thin and thick meconium-stained amniotic fluid, adverse outcomes were significantly higher among women with thick

meconium. Low Apgar scores at 5 minutes were observed in 36.2% of neonates with thick MSAF compared to 14.6% with thin MSAF (p = 0.002). Similarly, the incidence of meconium aspiration syndrome was markedly higher in the thick group (24.6% vs. 5.2%, p < 0.001), and NICU admissions were also more frequent (34.8% vs. 11.5%, p = 0.001). Birth asphyxia (15.9% vs. 6.3%, p = 0.048) and neonatal mortality (7.2% vs. 1.0%, p = 0.032) were significantly associated with thick meconium. Moreover, cesarean delivery was more common in thick meconium cases (46.4%) compared to thin (22.9%) with a significant difference (p = 0.004).(Table 4

Table 4. Comparison of Perinatal Outcomes between Thin and Thick Meconium

Outcome	Thin MSAF (n=96)	Thick MSAF (n=69)	p-value
Low Apgar (<7 at 5 min)	14 (14.6%)	25 (36.2%)	0.002*
MAS	5 (5.2%)	17 (24.6%)	<0.001*
NICU Admission	11 (11.5%)	24 (34.8%)	0.001*
Birth Asphyxia	6 (6.3%)	11 (15.9%)	0.048*
Neonatal Mortality	1 (1.0%)	5 (7.2%)	0.032*
Cesarean Delivery	22 (22.9%)	32 (46.4%)	0.004*
**Significant at p < 0.05 (Chi-square test)*			

Multivariable logistic regression analysis identified thick meconium, abnormal fetal heart rate patterns, and oligohydramnios as significant predictors of adverse perinatal outcomes. Thick meconium increased the likelihood of any complications by more than 3 times (p = 0.001), and abnormal FHR also showed a significant association (p = 0.010). Another risk factor that was not dependent on the other variables was oligohydramnios (p = 0.038). Mother's fever as well as cesarean delivery were also linked to high odds of an adverse outcome, although this was not found to be statistically significant (p > 0.05). This paper presents how intrapartum monitoring and immediate intervention for thick meconium and fetal distress are important. Multivariable logistic regression analysis found that such independent predictors of adverse perinatal outcomes as thick meconium, abnormal fetal heart rate (FHR) patterns, and oligohydramnios were significant. Thick meconium increased the risk by more than threefold (p = 0.001), while abnormal FHR nearly tripled the odds (p = 0.010). Oligohydramnios also showed a significant association (p = 0.038). (Table 5)

Table 5. Logistic Regression Analysis for Predictors of Adverse Perinatal Outcomes

Predictor Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Thick Meconium	3.42	1.62–7.21	0.001*
Abnormal FHR	2.87	1.28–6.45	0.010*
Cesarean Section	1.94	0.92–4.10	0.079
Maternal Fever	2.15	0.87–5.31	0.095
Oligohydramnios	2.76	1.05–7.25	0.038*
**Significant at p < 0.05 (Multivariable logistic regression)*			

DISCUSSION

Our cohort of 165 term women with MSAF showed a MAS incidence of 13.3%, NICU admission of 21.2%, and neonatal mortality of 3.6%; thick meconium was strongly associated with adverse outcomes (AOR 3.42), and abnormal fetal heart tracing and oligohydramnios were additional independent predictors. These results are broadly consistent with recent literature showing that MSAF, especially when thick, is linked to increased neonatal morbidity and need for intensive care. Several studies reported higher rates of operative delivery, birth asphyxia, and NICU admission among infants born through MSAF compared with clear fluid, supporting our finding of increased intervention and morbidity in the presence of meconium[17-19].

Several studies have reported MAS rates and NICU admissions similar to ours when focusing on term populations with a substantial proportion of thick meconium. A study found MAS prevalence around the mid-teens in cohorts where thick meconium predominated, and a 2024 single-center analysis also reported significantly worse outcomes with thick versus thin staining; both findings mirror our observed MAS rate (13.3%) and higher NICU use in the thick group. These parallel results strengthen the association between meconium consistency and neonatal respiratory compromise[20-22].
Other contemporary reports place MAS incidence somewhat lower in mixed maternity populations, particularly where immediate intrapartum practices and postnatal management are highly protocolized. Systematic and narrative reviews emphasize that MAS incidence varies widely (approx. 1–12% in some series) depending on gestational age distribution, local resuscitation practices, and definitions used for MAS, explaining why our MAS rate is higher than some reports but comparable to studies from similar resource settings[4, 23].
Our demonstration that thick meconium, abnormal CTG patterns, and oligohydramnios predict adverse outcomes is corroborated by several recent analyses. Several studies specifically identified thick meconium and non-reassuring fetal heart tracings as key risk markers for severe neonatal morbidity and for interventions such as cesarean delivery and NICU admission, findings that align with our multivariable results (AORs >2 for abnormal FHR and oligohydramnios). These consistent associations underscore the utility of combining clinical signs (meconium consistency) with intrapartum monitoring to triage risk[20, 24].
When comparing neonatal mortality, our 3.6% 28-day rate is higher than the figures reported in many high-resource settings but comparable to reports from tertiary centers in low- and middle-income countries where delays in access or limited NICU capacity increase case fatality. A recent regional study and a 2025 case series reported neonatal mortality in MSAF cohorts ranging from ~1% up to higher single digits, where severe MAS and sepsis were common patterns that match the resource-sensitive context of our facility and may explain the observed mortality[18, 25].
The findings of this study highlight the value of more intrapartum care in the case of a complicated pregnancy with meconium-stained amniotic fluid, especially in thick meconium. Continuous monitoring of the heart rate of the fetus and early obstetric management can help identify high-risk pregnancies may decrease neonatal morbidity. Also, it is essential to make sure that the laboratory rooms have skilled personnel, modern resuscitation tools, and easy access to the NICU to enhance the neonatal outcomes. The necessity of unifying management of MSAF in clinical practice is also pointed out in this study as a means of avoiding avoidable complications like meconium aspiration syndrome and birth asphyxia.
In this study, the sample size is very small and only one tertiary care center was studied; hence, it may not be applicable in other centers. Since observational study design cannot allow the development of definite causal relationships, the present study cannot claim a possible causal relationship between MSAF thickness and neonatal outcomes. In addition, the potential difference in intrapartum control or referral bias, neither of which has long-term neurodevelopmental follow-up, can have influenced the results. Larger samples and extended follow-up would be suitable to test and investigate these results and extended neonatal outcomes in the future, in multicenter studies.

CONCLUSION

One of the most effective indicators of poor perinatal outcomes, including low Apgar scores, meconium aspiration syndrome, newborn death, and admission to the critical care unit, is still thick meconium-stained amniotic fluid. Our results highlight the importance of promptly detecting and treating thick meconium and irregular fetal heart rate patterns, which can significantly enhance a newborn's prognosis. A crucial

step that can help lessen the burden of meconium-related issues and guarantee safe births for both mothers and newborns is the implementation of evidence-based approaches to intrapartum management, staff training, and improved neonatal care facilities.

LIST OF ABBREVIATIONS

MSAF – Meconium-Stained Amniotic Fluid
MAS – Meconium Aspiration Syndrome
FHR – Fetal Heart Rate
NICU – Neonatal Intensive Care Unit

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AUTHOR'S CONTRIBUTIONS:

Author 1-2: Study concept, design, drafting of manuscript, result analysis
Author 3-4: Data collection
Author 5-6: Reviewing the initial manuscript draft and critical analysis

REFERENCES

Gashaw A, Adamu Y, Sime Y, Destaw B. Determinants of meconium-stained amniotic fluid among laboring mother in Ethiopia, systematic review and meta-analysis. Frontiers in Global Women's Health. 2024;5:1393145.

Davis JD, Sanchez-Ramos L, McKinney JA, Lin L, Kaunitz AM. Intrapartum amnioinfusion reduces meconium aspiration syndrome and improves neonatal outcomes in patients with meconium-stained fluid: a systematic review and meta-analysis. American Journal of Obstetrics and Gynecology. 2023;228(5):S1179-S91. e19.

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.

Osman A, Halling C, Crume M, Al Tabosh H, Odackal N, Ball MK. Meconium aspiration syndrome: a comprehensive review. Journal of Perinatology. 2023;43(10):1211-21.

Tara NaC. The Neonatal and Maternal Outcomes of Intrauterine Meconium Release at Term Pregnancy: a Case-cohort Study: University of Nairobi; 2024.

Monfredini C, Cavallin F, Villani PE, Paterlini G, Allais B, Trevisanuto D. Meconium aspiration syndrome: a narrative review. Children. 2021;8(3):230.

Avagliano L, Massa V, Bulfamante G. Meconium-stained amniotic fluid and histologic signs of fetal distress in stillbirths. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2021;266:55-62.

Ng'wenda DE. Factors Associated with Unfavorable Obstetric Outcomes Among Women with Meconium Stained Amniotic Fluid Presenting for Delivery at Dodoma Regional Referral Hospital: University of Dodoma (Tanzania); 2022.

Kashikar S, Kotpalliwar MK, Uttawar PR. Meconium-stained liquor and its impact on maternal and neonatal outcome. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2021;10(4):1629-37.

Ghosh S. Study of Magnitude of Meconium Stained Amniotic Fluid in Term Pregnancy and Perinatal Outcome: Rajiv Gandhi University of Health Sciences (India); 2020.

NV D, Lakshmi GV. Perinatal outcome in meconium stained liquor in labour. IP International Journal of Medical Paediatrics and Oncology. 2023;4(1):41-6.

Choudry A, Habib M, Shamim Z, Batool SZ, Haroon M, Kallu UR. Frequency of meconium stained liquor in low risk laboring women and its effect on perinatal outcome in a tertiary care hospital. The Professional Medical Journal. 2021;28(07):936-43.

Fan H-C, Chang F-W, Pan Y-R, Yu S-I, Chang K-H, Chen C-M, et al. Approach to the connection between meconium consistency and adverse neonatal outcomes: a retrospective clinical review and prospective in vitro study. Children. 2021;8(12):1082..

Addisu D, Mekie M. Adverse maternal and perinatal outcomes of meconium-stained amniotic fluid in term labor at hospitals in south gondar zone, northwest Ethiopia: A prospective cohort study. BioMed Research International. 2023;2023(1):8725161.

Ali M, Maruf A, Naher N, Islam S. Neonatal outcome in meconium stained amniotic fluid (MSAF): a study in a neonatal high dependency unit (NHDU) of a medical college hospital. Mediscope. 2019;6(2):65-71.

Tantu T, Zewdu D, Degemu F, Yehualeshet T. The incidence and determinants of the meconium-aspiration syndrome among mothers with meconium-stained amniotic fluid after emergency cesarean section: a prospective cross-sectional study in a specialized hospital, south Ethiopia. Frontiers in Pediatrics. 2023;11:1149398.

Abu Shqara R, Lowenstein L, Frank Wolf M. Impact of meconium-stained amniotic fluid thickness on maternal infectious morbidity: a comprehensive clinical and microbiological analysis. Archives of Gynecology and Obstetrics. 2025;312(1):59-67.

NIMBARK N, PARMAR R, SHAPARIA S, JOSHI M. A Comparative Study on Fetomaternal Outcome in Patients with Meconium-stained Amniotic Fluid vs Clear Amniotic Fluid. Medicina Moderna-Modern Medicine. 2023;30(3).

Fan H-C, Chen C-M. Meconium aspiration syndrome: An overview of the literature. Tungs' Medical Journal. 2024;18(1):4-11.

Attali I, Korb D, Azria E, Lepercq J, Goffinet F, Schmitz T, et al. Meconium-stained amniotic fluid and neonatal morbidity in nulliparous patients with prolonged pregnancy. Acta Obstetricia et Gynecologica Scandinavica. 2023;102(8):1092-9.

Rahman MM, Al Amin A, Quader MA. Meconium-Stained amniotic fluid and its perinatal feto-maternal outcome. Community Based Medical Journal. 2022;11(2):114-9.