Original Article

Maternal Risk Factors and The Perinatal Outcome in Meconium-Stained Amniotic Fluid

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Abstract

Background: Meconium-stained amniotic fluid (MSAF) is a frequent intrapartum observation, and is an important sign of potential fetal compromise. While meconium passage could be a physiological process of gastrointestinal maturation in term pregnancy, it is also linked to hypoxia, higher rates of operative delivery and poor neonatal outcomes. The current study aimed to determine the maternal risk factors for MSAF and to examine the perinatal outcome of pregnancies associated with MSAF. **Material and Methods:** This is a prospective observational study done in the Department of Obstetrics and Gynecology, Ananta Institute of Medical Sciences, Rajsamand, Rajasthan over a period of 18 months. 100 singleton term pregnancies ≥37 weeks with MSAF were recruited. Meconium was clinically graded as "thin" or "thick" on the basis of its color and consistency. Maternal demographic characteristics, antenatal and intrapartum risk factors, fetal heart rate monitoring, mode of delivery, APGAR scores, neonatal morbidity, NICU admission, and perinatal mortality were recorded. Data were analyzed using IBM SPSS Statistics version 25.0 and Microsoft Excel 2018 and p-values of <0.05 were deemed statistically significant. **Results:** Of the 100 cases, 66% were thin MSAF and 34% thick MSAF. The majority of women were in the 21-25 years age group (50%), primigravidae (53%) and delivered within 37-39 weeks of gestation (68%). The most common maternal risk factors were pregnancy-induced hypertension (8%) and hypothyroidism (6%). Non-reactive non-stress test results were significantly associated with the use of thick MSAF (p=0.020), cesarean section (p=0.030), lower APGAR scores (p<0.05), higher neonatal morbidity (64.7% vs. 16.7%) and greater NICU admission, as well as two early neonatal deaths caused by meconium aspiration syndrome. **Conclusion:** Thick meconium stained amniotic fluid is correlated with much poorer perinatal outcomes than thin meconium. To minimize neonatal morbidity and mortality related to MSAF, prompt recognition of maternal risk factors, careful intrapartum fetal monitoring, timely obstetric intervention, and appropriate neonatal resuscitation are key.

Keywords: Meconium-stained amniotic fluid, maternal risk factors, perinatal outcome, Meconium aspiration syndrome, Neonatal morbidity.

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Introduction

Meconium-stained amniotic fluid (MSAF) is one of the most frequently encountered intrapartum findings and continues to pose significant challenges in obstetric practice because of its association with adverse fetal and neonatal outcomes.[1] Meconium is the first fecal excretion of the fetus, which contains intestinal epithelial cells, lanugo, mucous, bile pigments, amniotic fluid, and water.[2] Meconium starts to build up in the fetal intestine in the early second trimester but is rarely excreted into the amniotic cavity before term and it is more likely to be excreted as gestational age increases.[3] It has been reported that the incidence of MSAF is between 8–20% of all deliveries, with the highest incidence reported with post-term pregnancies.[4] Meconium passage can be a normal gastrointestinal maturation phenomenon in a term fetus but can also be a sign of fetal hypoxia or other pathological processes and should be carefully evaluated clinically.[5]

The exact mechanism of utero passage of meconium remains still not completely understood. Various hypotheses have been advanced, such as maturation of the gastrointestinal system under the control of the autonomic nervous system, vagal stimulation of intestinal peristalsis and anal sphincter relaxation after umbilical cord compression, and fetal hypoxia leading to vasoconstriction of the mesentery, intestinal ischemia, and passage of meconium.[1] In clinical practice it can be difficult to differentiate physiological meconium passage from pathological meconium, which may be associated with fetal compromise.[6] MSAF should therefore be interpreted in the context of fetal heart rate monitoring, gestational age and maternal/obstetric risk factors.[7] Abnormally thick meconium, especially when combined with

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abnormal fetal heart rate (FHR) patterns, has been correlated with a higher risk of fetal distress, operative delivery and neonatal morbidity.[8]

There are a number of maternal and obstetric conditions which predispose to meconium passage during labour. These include post-term pregnancy, hypertensive disorders of pregnancy, oligohydramnios, prolonged labor, premature rupture of membranes, intrauterine growth restriction, maternal anemia, diabetes mellitus and placental insufficiency.[9,10] High rates of cesarean delivery, low Apgar scores, neonatal intensive care unit (NICU) admission, birth asphyxia, meconium aspiration syndrome (MAS), respiratory distress, neonatal sepsis, and perinatal mortality have been linked to the presence of MSAF.[11] However, not every infant born as part of a meconium-stained liquor has a bad outcome, and maternal risk factors and intrapartum predictors that distinguish fetuses most likely to have complications are important to identify.[10]

Although there has been significant progress in intrapartum fetal monitoring and neonatal care, MSAF is a significant cause of perinatal morbidity, especially in resource-poor countries where prompt action may be difficult. Early identification of maternal risk factors for MSAF and early identification of fetuses at risk of adverse outcomes can help to provide appropriate obstetric management and a better prognosis for the neonate. In addition, recognizing the associations between maternal factors, MSAF and perinatal outcomes could help to design evidence-based approaches to risk stratification and intervention during labour. Hence, the aim of this study was to assess the risk factors among mothers for meconium stained amniotic fluid and to assess the perinatal outcomes in pregnancies complicated by MSAF.

Materials and Methods

The prospective observational study was done in the Department of Obstetrics and Gynecology, Ananta Institute of Medical Sciences, Rajsamand, Rajasthan for 18 months after obtaining approval from the Institutional Ethics Committee and the affiliated university. Pregnant women at term (after 37 completed weeks of gestation) presenting in labor with meconium stained amniotic fluid (MSAF) were included in the study.

The minimum calculated sample size was 90 based on a desired precision of 4%, an expected prevalence of 15% MSAF, a 95% confidence level (Z = 1.96) and a study power of 80%. The final sample size was determined at 100 participants, after a 10% non-response rate. Eligible women who consecutively met the selection criteria during the study period were recruited until the desired number were reached.

The study population comprised women with singleton term pregnancy (at or after 37 weeks), cephalic presentation, either primigravida or multigravida, who had meconium stained amniotic fluid (MSAF) after spontaneous rupture of membranes (SROM) or artificial rupture of membranes (ARM), including those with PROM. Women with fetuses who had congenital abnormalities, polyhydramnios or preterm pregnancy (<37 weeks) were excluded.

After enrolment a predesigned case record proforma for detailed maternal history was taken which included age, parity, gravidity, obstetric history, menstrual history, ante-natal complications, socio-economic status and medical/surgical illnesses. General examination was done which included pulse rate, blood pressure, temperature, pallor, edema, jaundice, dehydration and systemic examination. Obstetric assessment included abdominal examination, vaginal examination (fetal presentation, lie, uterine contractions, fetal heart rate, cervical dilatation, station of the presenting part, liquor characteristics, and medication used during labour).

Meconium stained amniotic fluid was aseptically collected after spontaneous or artificial rupture of membranes and classified clinically on the basis of its colour and consistency. Thin meconium was defined as liquor that was greenish-yellow with little staining, while thick meconium was defined as liquor that was dark green, muddy or tarry-black, with increased viscosity. Therefore, the subjects in the study were divided into two groups: Group I (Thin MSAF) and Group II (Thick MSAF). Fetal bradycardia was defined as a fetal heart rate below 100 beats per minute (bpm) and fetal tachycardia as a heart rate above 160 bpm, while the assessment of uterine contractions was done clinically by documenting the frequency and length of contractions, and the relaxation of the uterus between contractions. The delivery method (vaginal, instrumental or cesarean) and maternal risk factors for MSAF were documented.

Immediate postnatal and early neonatal outcomes were evaluated. Post delivery, the fetal head was delivered and routine airway clearance was done and nuchal cord was documented. APGAR scores were taken at 1 and 5 minutes; scores ≥7 were considered normal, 4-6 were defined as moderate birth asphyxia, and <4 as severe birth asphyxia. Birth weight, gender of the child born, resuscitation, admission to the neonatal intensive care unit (NICU), and complications including meconium aspiration syndrome and respiratory distress were recorded. All neonates were closely monitored for a minimum of 24 hours and until the 7th postnatal day for morbidity and mortality.

The data were entered into Microsoft Excel 2018 and analyzed with IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as frequencies and percentages, and continuous variables as mean ± standard deviation (SD). The Chi-square test or Mann-Whitney U test was used for non-parametric variables, while independent samples t-test was used for normally distributed continuous variables to compare between groups. A p-value <0.05 was considered statistically significant.

Results

One hundred term pregnancies with meconium-stained amniotic fluid (MSAF) were included in the study. Of these, 66(66.0%) women had thin meconium-stained liquor and 34(34.0%) women had thick meconium-stained liquor, showing that thin meconium was almost double to that of thick meconium among the study group. [Table 1]

Table 1: Baseline maternal characteristics of pregnancies with meconium-stained amniotic fluid (N = 100)

Variable	Category	Value
Age (years)	≤20	11 (11.0)
	21–25	50 (50.0)
	26–30	29 (29.0)
	>30	10 (10.0)
	Mean age (years)	24.8
Gravidity	Primigravida	53 (53.0)
	Multigravida	47 (47.0)
Booking status	Booked	41 (41.0)
	Unbooked	59 (59.0)
Gestational age	37–39 weeks	68 (68.0)
	≥40 weeks	32 (32.0)

Most women belonged to the 21–25 years age group (50.0%), followed by 26–30 years (29.0%), ≤20 years (11.0%), and >30 years (10.0%). Overall, 53.0% were primigravidae, 59.0% unbooked cases and 68.0% delivered at 37-39 weeks of pregnancies with 32.0% having pregnancies of more than 40 weeks. [Table 2]

Table 2: Maternal and intrapartum characteristics according to meconium consistency

Variable	Thin MSAF (n=66)	Thick MSAF (n=34)	p value
Booked	28 (42.4)	13 (38.2)	0.564
Unbooked	38 (57.6)	21 (61.8)	
Primigravida	33 (50.0)	20 (58.8)	0.402
Multigravida	33 (50.0)	14 (41.2)	
Spontaneous labour	48 (72.7)	22 (64.7)	0.410
Induced labour	18 (27.3)	12 (35.3)	

Of the maternal risk factors assessed, none were identified in 81.0% of women. The most common associated maternal condition was pregnancy-induced hypertension (8.0%) followed by hypothyroidism (6.0%). One percent of cases had hypertension, 1.0% had combined PIH with hypothyroidism, 1.0% had a history of cesarean section, 1.0% had an Rh-negative pregnancy and 1.0% had thrombocytopenia. [Table 3]

Table 3: Maternal antenatal risk factors associated with meconium-stained amniotic fluid (N=100)

Risk factor	n (%)
No identifiable risk factor	81 (81.0)
Pregnancy-induced hypertension	8 (8.0)
Hypothyroidism	6 (6.0)
Hypertension	1 (1.0)
PIH + Hypothyroidism	1 (1.0)
Previous Caesarean section	1 (1.0)
Rh-negative pregnancy	1 (1.0)
Thrombocytopenia	1 (1.0)

The occurrence of thin meconium was more common among booked women (42.4%) and those with spontaneous onset of labour (72.7%) whilst that of thick meconium was relatively more frequent among unbooked women (61.8%) and induced labour (35.3%). Gravidity and onset of labor were not significantly associated with meconium consistency (p=0.402 and p=0.410, respectively) but non-reactive NST was significantly associated with meconium staining (84.8% in thin and 64.7% in thick MSAF; p=0.020). C-section was performed in all of the women with thick meconium and in 87.9% of the women with thin meconium, showing significant correlation between the consistency of the meconium and mode of delivery (p=0.030). [Table 4]

Table 4: Intrapartum fetal surveillance and mode of delivery according to meconium consistency

Variable	Category	Thin MSAF (n=66)	Thick MSAF (n=34)	p value
NST	Reactive	10 (15.2)	12 (35.3)	0.020
	Non-reactive	56 (84.8)	22 (64.7)	
Mode of delivery	Vaginal	8 (12.1)	0	0.030
	Caesarean section	58 (87.9)	34 (100.0)	

At one minute, the number of neonates with low (≤6) APGAR score was higher in the thick meconium group than in the thin meconium group. Most neonates in both groups had APGAR scores 7-10 by 5 minutes but thick meconium was still associated with poorer neonatal condition and the APGAR scores difference between the groups was statistically significant (p<0.05). [Table 5]

Table 5: Neonatal characteristics and APGAR score according to meconium consistency

Variable	Category	Thin MSAF (n=66)	Thick MSAF (n=34)	p-value
Birth weight (kg)	Mean	2.87	2.87	0.878
APGAR at 1 minute	1–3	3 (4.5)	2 (5.9)	0.745
	4–6	25 (37.9)	24 (70.6)	
	7–10	38 (57.6)	8 (23.5)	
APGAR at 5 minutes	1–3	0	1 (2.9)	0.553
	4–6	21 (31.8)	9 (26.5)	
	7–10	45 (68.2)	24 (70.6)	

The overall neonatal morbidity was noted in 33.0% neonates. The most common complications were meconium aspiration syndrome (18.0%) and birth asphyxia (15.0%). Neonatal morbidity was significantly higher in neonates born through thick meconium versus thin meconium (64.7% vs. 16.7%, respectively) and there was a statistically significant association between the consistency of meconium and the adverse neonatal outcomes ($p<0.05$). [Table 6]

Table 6: Neonatal morbidity according to meconium consistency

Outcome	Thin MSAF (n=66)	Thick MSAF (n=34)	Total
Birth asphyxia	8 (12.1)	7 (20.6)	15
Meconium aspiration syndrome	3 (4.5)	15 (44.1)	18
Pneumonia	0	0	0
Hypoxic ischemic encephalopathy	0	0	0
Any neonatal morbidity	11 (16.7)	22 (64.7)	33 (33.0)

Thirty-three (33) neonates needed NICU admission, with 21 (63.6%) from the thick meconium group and 12 (36.4%) from the thin meconium group. Of those who were admitted, 39.4% of neonates admitted for 4–6 days, 30.3% for 1–3 days and >7 days respectively, suggesting that there were more neonates with thick meconium stained liquor with neonatal morbidity. [Table 7]

Table 7: NICU admission and duration of stay

NICU stay	Thin MSAF (n=12)	Thick MSAF (n=21)	Total
1–3 days	5 (41.7)	5 (23.8)	10
4–6 days	4 (33.3)	9 (42.9)	13
>7 days	3 (25.0)	7 (33.3)	10
Total NICU admissions	12 (36.4)	21 (63.6)	33

The study population did not have any stillbirths. There were two early neonatal deaths (2.0%), both in neonates born via thick meconium stained amniotic fluid (5.9% of the thick meconium group). Both neonatal deaths were due to the meconium aspiration syndrome. [Table 8]

Table 8: Perinatal mortality

Outcome	Thin MSAF (n=66)	Thick MSAF (n=34)	Total
Stillbirth	0	0	0
Early neonatal death	0	2 (5.9)	2 (2.0)
Cause of death (MAS)	0	2	2

Discussion

Meconium-stained amniotic fluid (MSAF) is an important intrapartum finding due to its association with fetal compromise and adverse neonatal outcomes. In this current prospective study of 100 term pregnancies complicated by MSAF, thin meconium was seen in 66% and thick meconium in 34% of cases. This distribution was similar to that of Padmapriya et al who reported 62% thin and 38% thick meconium and Debdas et al who reported 78.75% thin and 21.25% thick meconium in term pregnancies.[13,14] The age group of 21–25 years contributed the majority of women (50%), and almost four-fifth (79%) of the women were in the age range 21–30 years, which is similar to the findings of Padmapriya et al. and Ramji Lal et al. who also reported the highest incidence of MSAF in women of this reproductive age group.[13,15] Also, there was a high percentage of primigravidae (53%) which is comparable with the findings of Kamala Ghokroo et al (54%) and Ramji Lal et al (61%), suggesting that first pregnancies may be marginally associated with higher prevalence of MSAF.[15,16] One-third of the women had pregnancy beyond 40 weeks but previous studies by Hiremath et al. and Ramji Lal et al. have shown a consistent rise in the incidence of MSAF with advancing pregnancy and especially after 40 weeks because of gastrointestinal maturation of fetus and its susceptibility to intrauterine hypoxia.[15,17]

Only 19% of the women had maternal risk factors, most commonly pregnancy-induced hypertension (8%) and hypothyroidism (6%). However, most women (81%) were not found to have a risk factor during their pregnancy, indicating that MSAF can happen in normal pregnancies. The same has been observed in previous studies with the emphasis being

placed on physiological maturation being a factor as well as pathological fetal hypoxia for meconium passage.[13,14] Intrapartum assessment showed that there was a significant relationship between the consistency of meconium and the result of fetal surveillance. Thick meconium was found to be significantly associated with non-reactive non-stress tests (NSTs) as was also reported by Rao et al and Ramji Lal et al where they reported higher incidence of abnormal NST patterns in pregnancies complicated by thick meconium.[15,18] Spontaneous labour was more prevalent than induced labour in both, but the rate of CS was significantly more in women with thick meconium, with all women with thick MSAF being delivered by CS. Patel et al and Rao et al have documented similar trends and suggested that this increased operative delivery rate was due to abnormal fetal heart rate patterns and an appreciation of fetal compromise with thick meconium.[18,19]

The present study neonatal outcomes also highlight the clinical significance of thick meconium. APGAR scores at 1 and 5 minutes were significantly lower in neonates delivered through thick MSAF than for neonates delivered through thin meconium ($p<0.05$); however, improvement in APGAR scores at 5 minutes was observed in most neonates. The results are similar to those of Padmapriya et al. and Rao et al. who found a significant reduction in APGAR score and increased birth asphyxia in neonates born in meconium stained liquor.[13,18] The mean birth weight of the present study was 2.87 kg which is similar to that reported by Rathoria et al. and Padmapriya et al.[13,20] A total of 33% of neonates were found to have neonatal morbidity with most frequently occurring complications being meconium aspiration syndrome (18%) and birth asphyxia (15%).

Nearly one third of neonates had to be admitted to NICU and the incidence of admission was almost twice as high for infants born with thick meconium as for infants born with thin meconium. The results are in line with those of Rahman MM et al. who showed that MSAF cases used NICU more and had longer neonatal hospital stays, especially in the presence of thick meconium.[21] The perinatal mortality rate in the present study was 2%, both neonatal deaths being attributed to meconium aspiration syndrome (MAS) and both of them were in the thick meconium group. Debdas et al. and Padmapriya et al. also found that thin meconium is generally associated with good neonatal outcomes while thick meconium is associated with a significantly increased risk of respiratory complications, neonatal morbidity and mortality.[13,14] All these findings highlight that meconium-stained amniotic fluid (MSAF) should be considered as a significant indicator of fetal distress and therefore careful monitoring during labor, prompt obstetric intervention and early newborn resuscitation should be carried out to improve perinatal outcomes in this group.

Strengths and Limitations

There are several strengths to this study, namely the prospective observational design, the uniform clinical evaluation of all the participants, and the extensive evaluation of both maternal risk factors and short-term neonatal outcome in pregnancies complicated by meconium-stained amniotic fluid. The division of meconium into thin and thick grades allowed for meaningful comparison of maternal characteristics, intrapartum findings, mode of delivery and neonatal outcomes, and gave clinically relevant information for obstetric decision making. The study also has some limitations, however. It was performed at a single tertiary care center, with a relatively small number of patients (100 subjects), and thus the results may not be widely applicable. A comparison group of pregnancies with clear amniotic fluid would not have been included which would have precluded an estimation of the relative risk associated with MSAF. Also, no long term neonatal follow-up was conducted beyond the first week of life; so, delayed neurodevelopmental outcomes and other long-term sequelae could not be evaluated.

Conclusion

Meconium-stained amniotic fluid is a significant intrapartum finding, is linked to an increased rate of maternal intervention, and is associated with poor neonatal outcomes, especially if thick. Most women did not have identifiable maternal risk factors but the most common associated factors were pregnancy-induced hypertension and hypothyroidism. Thick meconium had a significant relationship with non-reactive fetal heart rate patterns, cesarean section rates, APGAR scores, neonatal morbidity, NICU admissions and neonatal mortality due to meconium aspiration syndrome. To reduce perinatal morbidity and mortality, careful intrapartum fetal monitoring, early identification of maternal risk factors, timely obstetric intervention, and prompt neonatal resuscitation are all important.

References

1. Gallo DM, Romero R, Bosco M, Gotsch F, Jaiman S, Jung E, Suksai M, Ramón Y Cajal CL, Yoon BH, Chaiworapongsa T. Meconium-stained amniotic fluid. Am J Obstet Gynecol. 2023 May;228(5S):S1158-S1178.
2. Lee J, Romero R, Lee KA, Kim EN, Korzeniewski SJ, Chaemsaithong P, Yoon BH. Meconium aspiration syndrome: a role for fetal systemic inflammation. Am J Obstet Gynecol. 2016 Mar;214(3):366.e1-9.
3. Schreiber H, Shilony A, Amrami RB, Cohen G, Markovitch O, Biron-Shental T, Bauer-Rusek S, Arnon S, Kovo M. Impact of Thin Meconium on Delivery and Early Neonatal Outcomes. Children (Basel). 2023 Jan 26;10(2):215.
4. Abu Shqara R, Hoffman N, Lowenstein L, Frank Wolf M. Preterm meconium-stained amniotic fluid: A red flag for infection and adverse perinatal outcomes. Int J Gynaecol Obstet. 2026 Jan;172(1):420-427.
5. Mundhra R, Agarwal M. Fetal outcome in meconium stained deliveries. J Clin Diagn Res. 2013 Dec;7(12):2874-6.
6. Dini G, Ceccarelli S, Celi F, Semeraro CM, Gorello P, Verrotti A. Meconium aspiration syndrome: from pathophysiology to treatment. Ann Med Surg (Lond). 2024 Feb 15;86(4):2023-2031.
7. Adnan M, Mydam J, Hageman JR, Cohen L. Fetal Heart Tracing Patterns and the Outcomes of Newborns With Meconium-Stained Amniotic Fluid. Cureus. 2022 Apr 28;14(4):e24545.
8. Singh D, Verma K, Lakshmi VS. Study on various risk factors leading to meconiumstained amniotic fluid in pregnancy and its effects on labor. Int J Reprod Contracept Obstet Gynecol 2026;15:2003-8.
9. Tefera M, Birhanu D, Mihretie A, Belete E, Demis A, Alemaw L.

Magnitude of meconium stained amniotic fluid and associated factors among women who gave birth in North Shoa Zone hospitals, Amhara Region, Ethiopia 2022. Plos One. 2024;19(2):e0297654.
10. Sundaram R, Murugesan A. Risk factors for meconium stained amniotic fluid and its implications. Int J Reprod Contracept Obstet Gynecol. 2016;5(8):2503-7.
11. Richards AM. Pediatric Respiratory Emergencies. Emerg Med Clin North Am. 2016;34(1):77-96
12. Mohammad N, Jamal T, Sohaila A, Ali SR. Meconium stained liquor and its neonatal outcome. Pak J Med Sci. 2018 Nov-Dec;34(6):1392-1396.
13. Padmapriya R, Shanmugapriya N, Shanmugapriya K, Sukanya E. Study On Maternal Risk Factors And Fetal Outcome In Deliveries With Meconium Stained Amniotic Fluid. Int J Acad Med Pharm. 2023;5(4):696-8.
14. Debdas AK, Kaur T. Meconium stained liquor - Reappraisal. Journal of Obstetrics and Gynaecology of India. 1981; 31:924-929.
15. Ramji Lal, Chauhan M. Maternal risk factors and the perinatal outcome in meconium stained amniotic fluid. IJOGR 2016; 4: 32-36.
16. Gokhroo K, Sharma U, et al. Various maternal factors responsible for meconium stained amniotic fluid. J Obstet Gynecol India. 2001;51(6):1-5.
17. Hiremath PB, Bahubali Gane, Meenal C, Nidhi Bansal, Ragaramya. The Management Practices and outcome of meconium stained amniotic fluid. Int J Biol Med Res. 2012; 3(3): 2204-2207.
18. Rao KS, Pathapati S, Vansipriya C. Risk factors for meconium stained liquor and outcome of neonate in meconium stained amniotic fluid. Indian J Obstet Gynecol Res. 2021;4(1):1-5.
19. Patel S, Patel B, Shah A, Jani S, Jani C. Maternal and fetal characteristics associated with meconium-stained amniotic fluid. Indian J Obstet Gynecol Res. 2020 Dec 15;4:476-81.
20. Rathoria R, Rathoria E, Bansal U, Mishra M, Jalote I, Shukla NK, Agarwal D. Study of risk factors and perinatal outcome in meconium stained deliveries from a district of Uttar Pradesh, India. Int J Reprod Contracept Obstet Gynecol. 2018 Sep 1;7(9):3605-9.
21. Rahman MM, Al Amin A, Quader MA. Meconium-Stained Amniotic Fluid and Its Perinatal Feto-maternal Outcome. Community Based Medical Journal. 2022 Aug 17;11(2):114-9.