



Neonatal Outcome in Meconium Stained Amniotic Fluid

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Meconium stained amniotic fluid (MSAF) is a commonly studied topic in neonatal outcomes. Meconium was commonly thought a precursor to eventual or active fetal death, although, some scholars do not consider this to be connected with foetal hypoxia, fetal acidosis, or trauma. Purpose of the study was to identify various maternal risk factors leading to meconium staining of amniotic fluid. The study was conducted in KIMSDU, Karad for a duration of 18 months. In this study the neonates with meconium stained amniotic fluids were classified into two groups based on type of staining (thin-MSAF and thick-MSAF). Most of the babies with MSAF had birth weight between 2.6-3.5 kg (64.65%) followed by 1.6-2.6 kg (25.57%) and then ≥ 3.6 kg (9.78%). Number of babies requiring newborn intensive care unit (NICU) admission were 66 in case of thick meconium and 42 in case of thin meconium. In this study the overall neonatal mortality was 0.86% among MSAF cases. Among MAS cases, mortality was 25.87%. The study outcomes were statistically correlated using Chi-square test to validate the significance of the results.

Keywords: Neonatal outcome; meconium; amniotic fluid; meconium aspiration syndrome; birth asphyxia.

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1. INTRODUCTION

Meconium stained amniotic fluid has traditionally been used in the intra-partum and postpartum cycles as a component affecting fetal health. It was Aristotle, the renowned ancient Greek philosopher who, first explaining meconium stained amniotic fluid, gave the name meconium-arion, literally opium-like, on this state. Passing meconium in utero may result in acute or persistent hypoxia and/or infection. Gasping by the fetus or infant in this environment will induce aspiration of meconium infected amniotic fluid. Meconium aspiration can block airways, interfere with gas exchange and cause significant respiratory failure before or after birth [1]. The administration of babies raised into Meconium stained amniotic fluid (MSAF) has experienced substantial reform during the past two decades, and supports a "selective" strategy. In the case of late fetal heart rate (FHR) deceleration or low beat-to-beat FHR variation, the possibility of meconium accumulation can be minimized by fast detection of fetal trauma and initiation of on time delivery [2].

1.1 Objectives

To find out the incidence of meconium stained amniotic fluid among live births in KIMSDU. To study the mode of delivery in meconium stained amniotic fluid. To identify various associated maternal risk factors leading to meconium staining of amniotic fluid. To clinically correlate neonatal outcome with meconium stained amniotic fluid and comparison between thin and thick meconium group.

2. MATERIALS AND METHODS

The present study is a retrospective observational study. The present study was conducted between December 2015 and November 2017 (data collection-18 months, analyzing-6 months) at Krishna Institute of Medical Sciences Deemed University, Karad,

Maharashtra. This was a time-bound study. 363 samples were obtained over a period of 18 months. All meconium stained live births born to singleton pregnancy irrespective of maternal age, parity, maternal risk factors, presentation and stage of labour.

2.1 Study Design

A 18 months retrospective observational study was conducted in Paediatric department of Krishna institute of medical sciences, Deemed University Karad to find out fetal outcome in meconium stained liquor as well as maternal risk factors associated with MSAF. The following tables and graphs show the observation of the study. During the study period 5609 deliveries were conducted (4257 booked and 1352 unbooked cases). Overall incidence of MSAF during labour among booked cases was 363 (8.53%). Therefore, 363 cases of meconium stained amniotic fluid were included in the study.

As seen in Table 1, among the booked cases, 363 i.e., 8.53% were meconium stained out of which 348 cases were included in the present study as they satisfied the inclusion criteria. Fifteen cases were excluded from the study (2 multiple gestation and 13 still births).

2.2 Inclusion Criteria

The study included all MSAF live birth neonates born to singleton gestational pregnancies in the tertiary care hospital, regardless of mother's medical conditions, age, parity, portrayal and phase of labor.

2.3 Exclusion Criteria

- Mothers not booked in KIMSDU during antenatal period
- Still births
- Babies having congenital birth defects
- Multiple gestations
- Babies from other hospitals with MSAF

Table 1. Incidence of MSAF among booked cases

Amniotic fluid	No. of cases	Percentage (%)
Clear	3894	91.47%
Meconium	363	8.53%
Total	4257	100%

3. OBSERVATION AND RESULTS

As seen in Table 2 below, when maternal parity is considered, it is observed that 190 (54.6%) were primi-para, 139 (39.94%) were gravida-2 and 19 (5.46%) have conceived 3 or more times. In both the thin-MSAF and thick-MSAF groups, cases were more among primi mothers (p<0.05).

As seen in Table 3, when maternal risk factors were considered, out of 348 cases, 196 (56.31%) were complicated by diseases like Hypertensive disorders of Pregnancy (20.68%), followed by PROM (15.23%), Anemia (6.32%), Obstructed labour and Oligohydramnios (each 4.31%). 19

mothers (5.46%) had other pre-existing conditions like epilepsy, diabetes mellitus, heart disease, and hypothyroidism (p<0.05).

As seen in Table 4, of the 108 babies who were shifted to NICU, 48 (44.44%) did not develop any complications. 34 babies were diagnosed with birth asphyxia (15 thin-MSAF and 19 thick-MSAF). Of 348 MSAF babies, MAS developed in a total of 7 (7/348-2.01%) cases, of which, 3 babies progressed to PPHN as well.

It was observed that overall incidence of septicemia was 2.38% and the incidence was more among thick-MSAF babies (5.3%) as compared to thin-MSAF (0.5%).

Table 2. Relationship of MSAF with parity of the mother

Parity	No of MSAF cases					
	Thin	%	Thick	%	Total	%
Primi	101	51.27%	89	58.94%	190	54.60%
Gravida-2	80	40.61%	59	39.07%	139	39.94%
Gravida-3 and above	16	8.12%	3	1.99%	19	5.46%
Total	197	56.61%	151	43.39%	348	100%

Table 3. Maternal risk factors related with MSAF

Maternal risk factors	No of MSAF cases					
	Thin	%	Thick	%	Total	%
Anaemia	12	6.09%	10	6.62%	22	6.32%
HDP	52	26.39%	20	13.24%	72	20.68%
PROM	37	18.78%	16	10.60%	53	15.23%
Obstructed labour	5	2.53%	10	6.62%	15	4.31%
Oligohydramnios	9	4.57%	6	3.97%	15	4.31%
Emergency C/S	10	5.08%	9	5.96%	19	5.46%
No risk	72	36.55%	80	52.98%	152	43.68%
Total	197	56.61	151	43.39	348	100

Value of $\chi^2 = 19.729$, $p=0.0031$, significant. By applying Chi-Square test there is a significant association between maternal risk factors with MSAF cases.

Abbreviations: HDP: Hypertensive disorders of pregnancy; PROM: Premature Rupture of Membranes

Table 4. Relationship of MSAF with NICU outcome

Outcome	Thin MSAF	%	Thick MSAF	%	No of cases	%
Uncomplicated	25	59.52%	23	34.85%	48	44.44%
Birth asphyxia	15	35.71%	19	28.79%	34	31.48%
HIE	1	2.38%	9	13.64%	10	9.26%
MAS only	0	0%	4	6.06%	4	3.70%
MAS + pPHN	0	0%	3	4.55%	3	2.78%
Sepsis	1	2.38%	8	12.12%	9	8.33%
Total	42	100%	66	100%	108	100%

Value of $\chi^2 = 14.796$, $p=0.0113$, significant. By applying Chi-Square test there is a significant association between NICU outcome with MSAF cases.

PNH: Paroxysmal nocturnal hemoglobinuria
HIE: Hypoxic-Ischemic Encephalopathy

4. DISCUSSION

The original description of meconium and MAS in utero aspiration was published in 1918. An estimated reason for its function was focused on the theory that the anal sphincter in utero anoxia may relax and result in a passage of meconium [3]. Many scholars like Dhillon et al. established that asphyxia contributed to the movement of meconium owing to decreased peristalsis of the intestine [4]. Hamed reported a mortality rate of approximately 6% and a morbidity rate of approximately 60% among infants born via MSAF in a research study which endorsed the need for resuscitation in these cases and focused his views on the complications observed in neonates [5,6]. There are also hypotheses indicating the possible function of intrauterine infection contributing to meconium movement, as the risk of intra-amniotic infection is seen to be substantially higher in women with MSAF [7,8]. In certain instances, the presence of meconium is typically a physiological maturation phenomenon. Passage of meconium is uncommon before the 37th week of pregnancy, however may occur in more than 35% of pregnancies during the 42nd week of conception [9].

The incidence of meconium in the liquor increases with advancing gestational age [7]. The overall reported incidence is 12%, with an incidence of less than 10% at 38 weeks to virtually 100% of pregnancies at 42 weeks complicated by meconium staining of the liquor [10].

At the cycles intrapartum and postpartum, MSAF was active as a factor affecting fetal well-being. Even for older midwives and obstetricians, the appearance of meconium in amniotic fluid in cephalic presentation was of considerable concern. It was in significant in breech presentation as it was thought to be expressed by mechanical compression of soft abdomen of the fetus. The modern obstetricians are fully aware of this fact and they cannot be indifferent at the sight of meconium in AF during labour which calls for close vigilance of the fetal well-being and to alert the Pediatrician. Its importance is judged by the Neonatal Resuscitation Program (NRP) guidelines which stresses on colour of liquor (clear or meconium stained) as one of the parameters in initial assessment of newborn. Incidence of MSAF in labour widely varies as reported from time to time by different studies. In our study, there were 363 out of 5609 deliveries which had meconium stained liquor, making the

overall incidence 7.13%. Similar observations were made by Puria and Dutta [11] who reported a higher incidence of 22% due to more number of no-care mothers attending their hospital.

HIE developed in a total of 2.87% cases (0.5% thin-MSAF and 5.9% thick-MSAF). This is comparable with the study conducted by Hofer et al. [12] who noted an incidence of 3.8%. Among these, 1 baby belonging to thick-MSAF group developed late onset septicemia.

5. CONCLUSION

The presence of Meconium stained amniotic fluid (MSAF) at delivery is a potential sign of fetal compromise. Our study shows that MSAF is a neonatal problem causing morbidity and mortality among neonates, and those babies at highest risk of meconium aspiration syndrome. MAS, Birth asphyxia and HIE was more common when amniotic fluid was associated with thick meconium. Moreover, thick MSAF is associated with increased rate of intervention, neonatal morbidity and mortality compared with thin MSAF. Continuous intra-partum FHR monitoring, gradation of meconium, availability of NST and progress of labour should be considered in the management of meconium stained group. Admission to delivery interval is important as well as stage of labour in deciding the mode of delivery and prevention of perinatal morbidity. Alerting the paediatrician about the meconium staining of amniotic fluid and proper resuscitation of babies born through MSAF reduces the overall morbidity and mortality.

CONSENT AND ETHICAL APPROVAL

Before participants were enrolled in the research, an informed written consent was received. Thorough assessment of mother, health conditions, MSAF, pregnancy as well as labour progression were recorded. The evaluation of breathing, the blood pressure, heart beat rate, the colour as well as the newborn's tone referred to analysis and resuscitation activities were noted.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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