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Original Research Article

The study of maternal factors and perinatal outcome in meconium-stained liquor

Zalak V. Karena*, Geetha Bhat, Kavita Dudhrejiya, Deep Gorfad

Department of Obstetrics and Gynecology, Pandit Deendayal Upadhyay Medical College, Rajkot, Gujarat, India

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***Correspondence:**

Dr. Zalak V. Karena,

E-mail: zkarenawork@gmail.com

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ABSTRACT

Background: The presence of meconium-stained amniotic fluid (MSAF) is believed to be one of the surest signs of fetal distress in utero due to fetal hypoxia. The objective of the study is to determine the maternal factors, mode of delivery and perinatal outcome for meconium-stained liquor.

Methods: A prospective observational study of 500 women with term pregnancy having meconium-stained liquor during labour after spontaneous or artificial rupture of membranes from 01 October 2018 to 30 September 2019 were included in the study. Details regarding maternal risk factors and perinatal outcomes were studied.

Results: The women were classified into 2 groups according to the type of staining: thin group and thick group. 8.6% of the women had more than one risk factor. Prolonged labour (6.4%), oligohydramnios (4.8%) and hypertension (7%) prevailed more compared to other factors and had a significant association with meconium-stained liquor (p value <0.05). In our study, higher caesarean section rate (82.44%) due to fetal distress in meconium-stained liquor women was present. Incidence of birth asphyxia was significantly higher in thick meconium compared to thin meconium. 15 cases had birth asphyxia and 27 babies had meconium aspiration syndrome. Perinatal morbidity of 6.41% was seen in thin meconium-stained group and 20.74% with thick meconium-stained group. Out of 500 cases of meconium-stained liquor, 29 cases had neonatal death and 30 cases of thick meconium-stained group had still birth.

Conclusions: Meconium-stained liquor significantly increased the neonatal morbidity and mortality. The "thickness" of meconium had a direct bearing on the neonatal outcome.

Keywords: Meconium, Meconium aspiration syndrome, Perinatal morbidity, Perinatal mortality, Birth asphyxia, Still

INTRODUCTION

Nature has provided the fetus with many protective mechanisms against many intrauterine dangers. One such protection is amniotic fluid. Meconium is a waste product formed in fetal intestines, consisting water, desquamated cells from intestine and skin, gastrointestinal mucin, lanugo hair and intestinal secretions. Meconium staining of amniotic fluid has been considered a sign of fetal distress. Meconium appears as a result of an interference with the transport of oxygen through the placenta.¹ It is

postulated that hypoxia leads to reflex vagal stimulation leading to relaxation of anal sphincter and meconium passage.² Post term pregnancy, placental insufficiency secondary to a hypoxic stress, transient rise of partial pressure of carbon dioxide (PCO₂) or fall in partial pressure of oxygen (PO₂) in the umbilical arteries because of the pressure and repetitive compression in the umbilical cord, oligohydramnios, maternal hypertension, preeclampsia, fetal distress during labor, maternal drug abuse, especially of tobacco and cocaine, amnionitis, transient pressure on the scalp during labor, physiological spontaneous gastrointestinal motility and idiopathic causes

are the probable etiologies that promote the passage of meconium in utero.³⁻⁶ This meconium increase intra-natal fetal risk, morbidity and possibly mortality depending on the operative factors. The primary goal of obstetric care is to prevent maternal and fetal morbidity and mortality. To reduce fetal morbidity and mortality, early identification of markers of fetal distress is important.

The presence of meconium-stained amniotic fluid (MSAF) is believed to be one of the oldest and surest signs of fetal distress in utero due to fetal hypoxia. Meconium acts as a good culture medium, causing an inflammatory response when aspirated from the fetus and sometimes causing obstruction of the lungs. The presence of meconium in amniotic fluid (AF) with the detection of an abnormal fetal heart rate is said to indicate fetal distress which can lead to still birth or the birth of an asphyxiated baby resulting in brain damage, neurological problems and other manifestations. The incidence of MSAF varies widely with the maternal risk factors. This study is an attempt to determine whether the meconium staining of AF has a correlation with high risk factors predisposing to fetal stress at labour and to accurately evaluate the condition and outcome of fetus in all cases of MSAF with the help of data obtained in the present study.

METHODS

A prospective observational study of the women admitted in labour room with meconium-stained liquor at obstetrics and gynecology (OBGY) department, PDU Medical College was carried out from 01 October 2018 to 30 September 2019. Women with term pregnancy, cephalic presentation, compound presentation or transverse lie with meconium-stained liquor after spontaneous or artificial rupture of membranes during labour were included in the study. Women with preterm pregnancy or breech presentation were excluded. Patients with labour pain with MSAF, satisfying the inclusion and exclusion criteria were included in the study. Study cases were grouped into 2 categories as noted below according to clinical gradation of meconium. Group I (thin) – AF thin meconium stained at the time of rupture of membrane or later during the course of labour. Group II (thick) – AF thick meconium stained at the time of rupture of membrane or later during the course of labour. Obstetric management of the cases was done as the labour room protocols.

All the babies delivered were kept in observation for 24 hours. Babies which were normal and did not develop any complications within 24 hours after birth were placed with the mother. Babies who developed any sign of complications within 24 hours were kept in neonatal intensive care unit (NICU). Babies who placed with the mother if developed any complication also were transferred to NICU. Babies were followed-up up to 14th day and their clinical condition was assessed and any abnormalities were recorded. Death and its cause during hospital stay within second week of neonatal life were also

recorded. Statistical package for the social sciences (SPSS) software version 21 was used for data analysis.

RESULTS

Total 500 women, with MSAF during labour were studied. Maternal factors and perinatal outcome in regards to thin and thick MSAF were analyzed. 62 % i.e. 312 cases in the study group had thin MSAF (Table 1). 58% cases belonged to 21-25 age groups (Table 2). Maternal age was an independent factor for the type of MSAF. 80% cases belonged to 37 to 39 weeks of gestation. 67.4% women in study group were primi gravida and there was no statistically significant association between gravidity and MSAF.

Table 3 shows distribution of maternal risk factors in the study group. Antepartum and the intrapartum risk factors which were associated with MSAF were 6.4% cases of prolonged labour, oligohydramnios in 4.8% of the cases, hypertension in 7% of the cases and 3.4% of the cases with anaemia. Prolonged labour, oligohydramnios and hypertension prevailed more compared to other factors and had a significant association with meconium-stained liquor, $p < 0.05$. Postdatism was the common maternal factor associated with MSAF. More than one risk factor was seen in 43 cases. 80.12% cases had spontaneous labour in thin meconium group, whereas in thick meconium group it was 69.14%. Among the induced cases, 24% cases had MSAF. Increased association of meconium staining was seen in mothers with spontaneous onset of labour probably because of other associated risk factors. In the present study, there was a significant association with the consistency of meconium and the mode of delivery. Incidence of cesarean section was highest in thick group 82.44% compared to 17.56% in thin group (Table 4).

Table 1: Frequency of the types of MSAF.

Meconium-stained AF	Number of cases (n=500)	Percentage
Thin	312	62.4
Thick	188	37.6

Table 2: Incidence of meconium-stained AF in different age group.

Age group (years)	Number of cases (n=500)	Percentage
20 and below	54	10.8
21-25	289	57.8
26-30	126	25.2
Above 30	31	6.2

Sexes of 63 % of the babies delivered in study group with MSAF were male. Mean birth weight was 2.8 kgs. The present study shows that MSAF was significantly associated with low APGAR score at both one minute and

five minutes. Low APGAR scores were observed in thick meconium than in thin meconium (Table 5). NICU care requirement of thick meconium group was about twice than that of thin meconium group. 22.5% cases of thick meconium group required more than 7 days of NICU admission compared to 2.25% in thin meconium group.

Table 6 shows the causes of neonatal morbidity and mortality in the study group. The most common cause of still birth was meconium aspiration syndrome.

Thick meconium-stained group had poorer perinatal outcome than that of the thin meconium-stained group with less than 0.01 % still birth (Table 7).

Table 3: Antenatal and intrapartum risk factors associated with MSAF.

Risk factors	No. of cases	Percentage
Hypertension	35	7
IUGR	8	1.6
Oligohydramnios	24	4.8
Prolonged labour	32	6.4
Postdatism	102	20.4
PROM	89	17.8
Anemia	17	3.4
More than one risk factor	43	8.6
No risk factor	150	30

Chi square test – 14.18, p value <0.05

Table 4: Correlation and the mode of delivery in MSAF.

Meconium consistency	Total no. of cases	Normal deliveries		Caesarean section	
		No. of cases	%	No. of cases	%
Thin	312	286	81.25	26	17.56
Thick	188	66	18.75	122	82.44
Total	500	352	100	148	100

Chi square test – 25.88, p value <0.05 – significant

Table 5: Correlation of 1 minute and 5-minute APGAR score in different groups of meconium-stained cases.

Group of cases	Apgar score at 1 minute				Apgar score at 5 minutes			
	1 to 3	4 to 6	7 to 10	Total	1 to 3	4 to 6	7 to 10	Total
Thin meconium	10	42	236	288	6	36	256	298
Thick meconium	23	99	60	182	21	77	74	172
Total	33	141	296	470	27	113	330	470

Chi square test – 12.06, p<0.05

Table 6: Cause and incidence of neonatal morbidity and mortality.

Causes	No. of cases	Neonatal morbidity	No. of deaths	% of deaths
Asphyxia	15	10	5	17.24
MAS	27	9	18	62.06
Pneumonia	13	11	2	6.89
Septicemia	2	0	2	6.89
HIE	4	2	2	6.89
Total	61	32	29	100

Table 7: Perinatal outcome in meconium-stained liquor.

Fetal outcome	Thin group (%)	Thick group (%)	Total	%
Neonatal death	5 (0.01)	24 (0.12)	29	5.8
Still birth	2 (<0.01)	28 (14.8)	30	6
Cured	305 (97.7)	136 (72)	441	88.2
Total	312	188	500	100

DISCUSSION

In our study, 62.4% subjects were in thin meconium group which is similar to the study of Majid et al and Sandu et al noted that 80% of cases with MSAF were in the age group of 21-30 years.^{7,8} In our study 83% of cases with MSAF

belong to the same age group. 67.4% cases were primi gravida which is similar to the study results by Kamala et al.⁹ In present study, more cases of MSAF were in 37-39 gestational age group against the findings by Hiremath et al where majority cases were in 40-42 weeks of gestational age, owing to the departmental consultant preference

practice of termination of pregnancy in postdate patients.¹⁰ Hypertension and prolonged labour were the leading maternal risk factors for MSAF in our study which is similar to the findings by Pendse et al and Kamala et al.^{9,11} It is not uncommon for obstetricians to be more aggressive in labour with MSAF. It has led to high caesarean section rates in MSAF cases, and is almost justified due to associated high perinatal morbidity and mortality in these cases. When thick meconium in early stage of labour is diagnosed with anticipated longer vaginal delivery time, caesarean section is strongly indicated. High rate of caesarean section in thick MSAF group is our study is similar to the studies by Goud et al and most of the studies reviewed.¹² The "thickness" of meconium had a direct bearing on the neonatal outcome. Incidence of birth asphyxia was significantly higher in thick meconium compared to thin meconium. As meconium should always be considered a marker for fetal distress therefore there was a significant effect on the APGAR score of neonates ($p < 0.05$). Nayek classified the MSAF into "thin" and "thick" groups and found that perinatal mortality was higher in the thicker group than in the thin group.¹³ Our study findings support these findings. Neonatal mortality in our study was 5.8%. Incidence of birth asphyxia was 17.24% in our study, compared to 33.1% in Meis et al study.¹⁴ Perinatal morbidity in our study was 27.15%.

Limitations

Our study did not have control group with clear stained amniotic fluid, which could have added strength to the study results.

CONCLUSION

The incidence of MSAF varies greatly with maternal risk factors both antenatal and during intrapartum. Cases with prolonged labour, postdate and hypertension should be dealt with efficient and continuous monitoring of fetal wellbeing during labour and timely managing case of MSAF is of utmost importance. Thick meconium compared to those with thin meconium appeared to have significantly low APGAR score at 1 min and 5 min higher acidemia rates, increased need intensive care unit. Since all fetuses with meconium passage in labour do not have associated maternal risk factors and do not have adverse outcome, it is important to distinguish those who are destined to develop fetal distress promptly and intervene accordingly to prevent meconium aspiration syndrome and sequel.

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