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Original Research Article

A prospective study on meconium-stained liquor and neonatal outcome in correlation with cardiotocography in a teritiary care centre

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ABSTRACT

Background: The presence of meconium-stained liquor is assumed to be definitive cause of foetal distress, due to hypoxia. The aim of the study was to analyse the risk factors, route of delivery and neonatal outcome in correlation with foetal CTG.
Methods: It was a prospective study of 100 women with term pregnancy in labour room with meconium-stained liquor in Department of Obstetrics at Sri Devaraj Medical College, Kolar. The period was from 01st August 2023 to 31st January 2024.Details included in the study were maternal high-risk factors, route of delivery, foetal and neonatal outcomes.
Results: The women were divided into 2 groups according to the type of meconium staining: thin and thick group. Maternal factors like prolonged labour (8%), oligohydramnios (10%) and Anaemia (18%) preeclampsia (48%), IUGR (6%), GDM (10%) were seen. High caesarean section rate (76%) due to foetal distress was observed in thick meconium. Incidence of birth asphyxia was also higher in thick meconium. 14 had birth asphyxia and 18 had meconium aspiration syndrome. Out of 78 cases of women with thin meconium 76 were with reactive CTG and 2 were with non-reactive CTG who were delivered by caesarean section. Out of 22 cases of women with thick meconium 4 were with reactive CTG and 18 were with non-reactive CTG who were delivered by caesarean section. Out of 100 cases of meconium-stained liquor, no cases of thin had neonatal death and 2 cases of thick had still birth.
Conclusions: Meconium-stained liquor markedly enhanced the neonatal morbidity and mortality.

Keywords: Cardiotocography, Meconium, Meconium aspiration syndrome, Neonatal outcome

INTRODUCTION

Amniotic fluid has provided the foetus protection against many intrauterine complications. Meconium is a waste product formed in foetal intestines, consisting water, desquamated cells from intestine and skin, gastrointestinal mucin, lanugo hair and intestinal secretions. Meconium staining of liquor has been counted as a sign of foetal 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] Some of the causes being post term pregnancy, placental insufficiency secondary to a hypoxic stress (leading to transient rise of partial pressure of carbon dioxide (PCO2) or fall in partial pressure of oxygen (PO2) in the umbilical arteries), oligohydramnios- pressure and repetitive compression on the umbilical cord, preeclampsia, maternal drug abuse, especially of tobacco and cocaine, prolonged labour, anaemia, intrauterine growth retardation , promote the passage of meconium in utero.[3-6] This meconium increases foetal risk, morbidity and mortality .

The presence of meconium-stained amniotic fluid (MSAF) is assumed to be surest sign of foetal distress in utero due to foetal hypoxia. Meconium acts as a good culture medium, causes an inflammatory response it is aspirated from the foetus whenever it causes obstruction in the lungs. The aim of obstetric care is to prevent maternal and foetal adverse effects. To decrease foetal morbidity and

mortality, early detection and intervention for foetal distress is important. The presence of meconium in amniotic fluid (AF) with the detection of an abnormal foetal heart rate with CTG is said to indicate foetal distress which can lead to still birth or the birth of an asphyxiated baby resulting in brain damage, neurological complications. This study was an attempted to determine whether the meconium staining of AF has an impact on high risk factors predisposing to foetal distress at labour and to accurately evaluate the condition and outcome of foetus, with the help of data obtained.

METHODS

A prospective observational study of the women admitted in labour room with meconium-stained liquor at obstetrics and gynaecology department, Devaraj Medical College, Kolar was carried out from 01st August 2023 to 31st January 2024. Women with term pregnancy, cephalic presentation, with meconium-stained liquor after spontaneous or artificial rupture of membranes during labour were included in the study. Women with preterm labour or breech presentation were excluded. Study participants were grouped into 2 categories according to clinical grading of meconium. Group I (thin)-thin meconium stained at the time of rupture of membrane or later. Group II (thick)-thick meconium stained at the time of rupture of membrane or later during labour. Obstetric management of the cases was done as per the labour room protocols.

All the babies delivered were kept in observation for 24 hours. Babies normal APGAR and did not develop any complications within 24 hours after birth were placed with the mother. Babies with any signs of complications within 24 hours were kept in neonatal intensive care unit for further management. Babies were followed-up up to 7th day and their clinical condition was assessed and if any abnormal findings were present, they were noted. For statistical data analysis (SPSS) software version 21 was used.

RESULTS

Total 100 women, with meconium liquor during labour were studied. Maternal factors and neonatal outcome were analysed. 76 % in the study group (19-25yrs) had thin meconium (Table 1). 14% cases belonged to 26-32 age groups 31-38yrs age group contributing to 10%. 68% women in study group were primi gravida with thin meconium-stained liquor and 32% in multi were thick meconium stained, there was no significant association between gravidity and meconium (Table 2). 76% cases belonged to 37 to 38 weeks of gestation. 39-40 weeks and 40 weeks contributing to 20% and 4% respectively (Table 3).

Table 4 shows distribution of maternal risk factors in the study group. Antepartum and intrapartum risk factors which were associated with meconium were 18% cases of prolonged labour, oligohy dromnios in 10% of the cases, preeclampsia in 32% of the cases and 18% of the cases with anemia, 10% postdated pregnancy, GDM 12%. Preeclampsia, anemia and GDM had a significant association with meconium-stained liquor. More than one risk factor was seen in 38% cases.75% cases had spontaneous labour in thin group, whereas in thick meconium group it was 52.4%. Among induced cases, 14% cases had thick meconium-stained liquor. Increased association of meconium staining was seen in mothers with spontaneous of labour probably because of other associated risk factors. There was a significant association with the consistency of meconium and the route of delivery. Incidence of caesarean section was highest in thick group 81.8% compared to 2.5% in thin group as shown in Table 8. About 56% of Neonates had normal birth APGAR , 24 % had birth asphyxia, 18% of the new borns developed meconium aspiration syndrome and there was no Neonatal mortality in the present study as shown in Table 9.

Table 1: Age wise distribution of patients.

Age in yrs	N	Percent
19-25	76	76
26-32	14	14
31-38	10	10

Table 2: Distribution of patients with reference to gravidity.

Gravida	Consistency of liquor	N	Percent
Primi	Thin	68	68
Multi	Thick	32	32

Table 3: Gestational age wise distribution of patients.

Gestational age in weeks	N	Percent
37-38	76	76
39-40	20	20
40	4	4

Table 4: Maternal risk factors.

Risk factor	No. of cases	Percent	Mixed factor	Percent
Prolonged labour	18	18	Prolonged labour	8
Oligohydromnios	10	10	Anemia and oligohydromnios	14
Preeclampsia	32	32	Preeclampsia and oligohydromnios	4
Anemia	18	18	Anemia and prolonged labour	8
Post-dated	10	10	Past dates and oligohydromnios	5
GDM	12	12	GDM and pastdates	7

86% of the study group foetuses are of normal growth and only 14% of the babies were growth retarded. No much significance noticed between foetal growth with meconium stained liquor (Table 5).

Table 5: Distribution of normal growth and growth retarded babies.

Foetal growth	N	Percent
Normal growth babies	86	86
IUGR	14	14

Out of 78 cases of women with thin meconium-stained liquor, 76% were with reactive CTG and 2%were with Non-reactive CTG who were delivered by caesarean section (Table 6).

Table 6: Status of CTG in thin meconium-stained liquor patient.

CTG status	N	Percent
Reactive	76	76
Non-reactive	2	2

Out of 22 cases of women with thick meconium-stained liquor,4% were with reactive CTG and 18% were with non-reactive CTG who were delivered by caesarean section (Table 7).

Table 7: Status of CTG in thick meconium-stained liquor patients.

CTG status	N	Percent
Reactive	4	4
Non-reactive	18	18

Table 8: Mode of delivery.

Total no of cases	Normal deliveries	Percent	Caesarean section	Percent
Thin -78	76	97.4	2	2.56
Thick -22	4	18.1	18	81.8
Total 100	80		20	

Table 9: Neonatal outcome.

Neonatal outcome	N	Percent
Normal APGAR	56	56
Birth asphyxia	24	24
Meconium aspiration syndrome	18	18
Neonatal death	-	-
Thin	0	0
Thick	2	2

DISCUSSION

In our study, 68% 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 meconium were in the age group of 21-30 years.[7,8] In our study 90% of cases with meconium belong to the same age group. 68% cases were primi gravida which is similar to the study results by Kamala et al.[9] In present study, more cases of meconium 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 in our study which is similar to the findings by Pendse et al and Kamala et al.[9,11] It is common for obstetricians to be more nervous in labour with meconium. It has led to high caesarean section rates, and is almost justified due to associated high neonatal morbidity and mortality in these cases. When thick meconium in early stage of labour is diagnosed, caesarean section is invariably indicated. Higher rate of caesarean section in thick group in 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 impact on the neonatal prognosis. Incidence of birth asphyxia was significantly higher in thick meconium when compared to thin meconium. Nayek classified the meconium 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 2.5%. Incidence of birth asphyxia was 14% in our study, compared to 33.1% in Meis et al study.[14,15]

This study has limitation, as study did not have control group with clear liquor, which could give strength to the study results.

CONCLUSION

The incidence of meconium varies with maternal risk factors both antenatal and during labour. Significant changes were seen in cardiotocography of thin meconium liquor and thick meconium liquor which needs more evaluation to rule out ongoing hypoxia. Cases with prolonged labour, postdate and hypertension should be dealt with careful continuous monitoring of foetal heart during labour and timely management of meconium is of prime importance. Thick meconium compared with thin meconium appeared to have significantly low Apgar score at 1 min and 5 min higher metabolic acidosis, increased need for intensive care unit. Because all foetuses with meconium during labour do not have maternal risk factors and do not have adverse outcome, it is important to recognise those who are prone to develop foetal distress and intervene promptly to prevent meconium aspiration syndrome and sequel.

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