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A Study Of Perinatal Outcome In Meconium Stained Amniotic Fluid In Tertiary Care Hospital In Tamil Nadu, India.

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ABSTARCT

Meconium is the name given to substances which have accumulated in the fetal bowel during intrauterine life. Although 69% of newborns pass meconium by 12 hours of age, many infants pass meconium prior to birth as well.1 It has been suggested that the fetus passes meconium in response to hypoxia and that meconium therefore signals fetal compromise. Alternatively, in utero passage of meconium may represent normal gastrointestinal tract maturation under neuronal control. Meconium passage could also follow vagal stimulation from transient umbilical cord entrapment. The significance of meconium in amniotic fluid is a widely debated subject. Traditionally meconium has been viewed as a harbinger of impending or ongoing fetal compromise; however, some investigators believe that it is not associated with fetal hypoxia, acidosis or feta distress. To find out the incidence, study the mode of delivery, relation between meconium staining and fetal heart rate abnormality and clinical correlation of perinatal outcome with thin and thick meconium-stained amniotic fluid. This prospective study was conducted in 2020 at Division Of Obstetrics & Gynaecology Government Tiruvanamalai Medical College, Tiruvanamalai, Tamil Nadu, India. The study group consist of 300 pregnant women selected on the basis of inclusion and exclusion criteria. All of them had meconium-stained amniotic fluid of varying degrees. The fetal heart rate abnormalities were recorded with intrapartum cardiotocography (Non – stress test). The mode of delivery and neonatal outcome were analysed. The control group consist of 100 patients in labour with clear liquor. Majority of the patients were between 21 – 30 years of age in both the groups. In meconium group – 80% and in control group 79%. More than half of the patients were in the gestational age 37 – 40 wks both in study (62.6%) and control group (65%). Nearly half of the patients (50.7%) had thick meconium-stained liquor. In 59% of the patient's meconium was detected in the latent phase of labour. Majority of the cases of meconium-stained liquor were delivered within 1 hour of detection of meconium. Amnioinfusion was given for patients with moderate and thick meconium stained liquor. Among (43 + 154) 195 cases, amnioinfusion was given for 154 cases. In study group, 52.3% had reactive NST and 47.6% had non – reactive NST. In patients with thick meconium stained liquor, 60.53% had non-reactive NST. . $X^2 = 31.5$; P = 0.001. In study group, 158 patients (52.7%) were delivered by LSCS, of which 101 patients had thick meconium-stained liquor $X^2 = 42.3$; P = 0.001. In thin meconium group, with reactive NST, 66% delivered vaginally. But in thick meconium group, irrespective of the NST, most of them were delivered by LSCS. In the control group, majority 59% of the patients delivered by labour natural and 37% delivered by LSCS. Among 158 patients, 31 patients had repeat LSCS in study group. In control group, 14 patients had repeat LSCS. The most common indication for LSCS in the study group is fetal distress, 70.2% vs 18.9% in the control group, Z = 33.4; P = 0.001; Odds Ratio = 10; 95% CI = 4 – 27. Using 1 min Apgar score, only 51.3% of babies had a good Apgar 7/10 at 1 min. In thick meconium, only 39.5% of babies had Apgar 7/10 at 1 min, and 23% of babies had a poor Apgar of 4/10 at 1 min. $X^2 = 16.7$; P = 0.01. Using 5 min Apgar score, 89% of the babies had a good Apgar of 7/10 at 5 mins. Even in patients with thick meconium, 84.9% of babies had a good Apgar of 7/10 at 5 mins. With reactive NST, Apgar score is good in all three groups. The incidence of low Apgar is higher in those with non – reactive NST. This is statistically significant in thin and thick meconium groups. Majority of the babies are in the birth weight range 2.5 to 3.5kg in both study and control group. Many IUGR babies were noticed with, thick meconium stained liquor. Among 157 reactive NST only 21 (13.4%) babies were admitted. Among 143 non-reactive NST, 74 babies (51.8%) were admitted. Majority of the admission is constituted by babies from thick meconium group with non – reactive NST (60.9%). The incidence of non-reassuring fetal heart rate pattern is significantly higher in women with meconium-stained amniotic fluid in labour. There is a significant linear association between the thickness of meconium and abnormal fetal heart rate pattern during labour. The perinatal outcome is good in patients with meconium-stained amniotic fluid and reactive NST. The cesarean section rate, low Apgar Score, neonatal admissions and perinatal mortality were significantly higher with meconium-stained amniotic fluid and non-reactive NST.

Keywords: Meconium-stained amniotic fluid, Meconium aspiration syndrome, Thick meconium, Perinatal Outcome

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INTRODUCTION

The birth process is described as the most perilous journey an individual ever undertakes. Meconium staining of the amniotic fluid and abnormalities in the fetal heart rate pattern have long been recognized as danger signals in this journey. Whitridge Williams (1903) observed that "characteristic sign of impending asphyxia is the escape of meconium" [1]. Under normal circumstances, passage of meconium is prevented by lack of intestinal peristalsis because of low motilin levels, tonic contraction of anal sphincter and terminal cap of viscous meconium [2]. Meconium is thought to be passed from the fetal gastro-intestinal tract as a response to hypoxia, mesenteric vasoconstriction induced gut hyperperistalsis, falling umbilical venous saturation, vagal stimulation and normal physiological function of a mature fetus [3]. There are two principal reasons why meconium is passed by the fetus-maturity and fetal compromise. Meconium passage reflects maturity of the central nervous system and the gastrointestinal tract [4]. Incidence of meconium-stained liquor increases steadily from 10% at 36 weeks to 30% at 40 weeks and 50% at 42 weeks. Fetal compromise of an acute or subacute nature also leads to passage of meconium. Whatever be the controversies regarding meconium, the following holds true: Clear amniotic fluid is reassuring. Thick fresh meconium in a situation of high risk is of great concern. Presence of abnormal fetal heart rate pattern in the presence of meconium-stained amniotic fluid is a definite indication of fetal compromise [5, 6].

METHODS

This prospective study was conducted in 2020 at Division Of Obstetrics & Gynaecology Government Tiruvannamalai Medical College, Tiruvannamalai, Tamil Nadu, India. The study group consist of 300 pregnant women selected on the basis of inclusion and exclusion criteria. All of them had meconium-stained amniotic fluid of varying degrees. The fetal heart rate abnormalities were recorded with intrapartum cardiotocography (Non – stress test). The mode of delivery and neonatal outcome were analysed. The control group consist of 100 patients in labour with clear liquor.

Inclusion Criteria

- Term gestation
- Singleton pregnancy
- Cephalic presentation
- Primi or multigravida
- With meconium-stained amniotic fluid
- Latent and active stages of labour
- With or without risk factors (medical illness complicating pregnancy).
- PROM

Exclusion Criteria

- Multiple gestation
- Malpresentations
- Congenital anomalies of the fetus
- Polyhydramnios
- Antepartum hemorrhage
- Preterm pregnancy

Patients in labour with meconium-stained amniotic fluid were selected following the inclusion and exclusion criteria. Detailed history was taken and patients were carefully examined for any antepartum or intrapartum risk factors like preeclampsia, IUGR, APH, PROM etc. These patients were clinically monitored during labour. The colour of amniotic fluid and degree of meconium was noted at the time of amniotomy or spontaneous rupture of membranes and at the time of delivery. The time interval between the detection of meconium and the time of delivery were noted. Fetal heart rate abnormalities were recorded using cardiotocograph, after the detection of meconium. Depending upon the degree of meconium, fetal heart rate abnormalities, stage of labour and other risk factors, the time and mode of delivery was decided. After delivery, the immediate fetal wellbeing was assessed by Apgar score at 1 min and 5 minutes. Details such as cord around the neck, meconium staining of the cord, finger nails,

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vernix caseosa, meconium smearing of the body, caput, subgaleal bleed were noted. Weight of the baby taken into account. Evidence of IUGR, posmaturity and congenital anamolies were looked for. After the delivery of placenta, look for its weight, meconium staining, infarcts, calcification etc. Babies were followed up in the neonatal period upto 1 month using reply cards, for anymorbidity and mortality. The morbidity criteria was taken as MAS, chest infections, fever and seizures.

RESULTS

Table 1: Age Of Patients

Age (Years)	Meconium group		Non – meconium group	
	Number ofpatients	Percentage	Number ofpatients	Percentage
16 – 20	12	4%	6	6%
21 – 25	120	40%	36	36%
26 – 30	120	40%	43	43%
31 – 35	48	16%	15	15%

Majority of the patients were between 21 – 30 years of age in both the groups. In meconiumgroup – 80% and in control group 79%. $X^2 = 1.2$; $P = 0.76$

Table 2: Gestational Age

Gestational age (wks)	Meconium group		Non – meconium group	
	Number ofpatients	Percentage	Number ofpatients	Percentage
37 – 40	188	62.6%	65	65%
40 – 42	102	34%	34	34%
> 42 W	10	3.3%	1	1%

More than half of the patients were in the gestational age 37 – 40 wks both in study (62.6%) and control group (65%).

Table 3: Classification Of The Patients With Respect To Degree Of Meconium

Density of meconium	Number of patients	Percentage
Thin meconium	105	35%
Moderate meconium	43	14.3%
Thick meconium	152	50.7%
Total	300	100%

Nearly half of the patients (50.7%) had thick meconium-stained liquor.

TABLE 4: Stage of labour when meconium was detected

Stage of labour	Number of patients	Percentage
Latent phase	177	59%
Active phase	123	41%
Total	300	100%

In 59% of the patients meconium was detected in the latent phase of labour.

Table 5: Time Interval Between Detection Of Meconium And Delivery

Density ofmeconium	< 1 hour	1 – 3 hours	? 3 hours
Thin MSAF	47	35	23
Moderate MSAF	20	19	4
Thick MSAF	126	24	2

Majority of the cases of meconium stained liquor were delivered within 1 hour of detection of

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meconium.

X^2 = 57.5 ;P = 0.001.Amnioinfusion was given for patients with moderate and thick meconium stained liquor.Among (43 + 154) 195 cases, amnioinfusion was given for 154 cases.

Table 6: NST Changes In Meconium Group With Respect To Degree Of Meconium

Density of meconium	Reactive NST		Non-reactive NST		Total number of patients
	Number ofpatients	%	Number ofpatients	%	
Thin meconium	78	74.28%	27	25.71%	105
Moderatemeconium	19	44.19%	24	55.81%	43
Thick meconium	60	39.47%	92	60.53%	152
Total	157	52.33%	143	47.67%	300

In study group, 52.3% had reactive NST and 47.6% had non – reactive NST. In patients with thick meconium stained liquor, 60.53% had non-reactive NST.X^2 = 31.5 ; P = 0.001

Table 7: NST Changes In Non – Meconium Group

NST	Number of patients	Percentage
Reactive NST	86	86%
Non reactive NST	14	14%

14% of the patients had non-reactive NST.

Table 8: Mode Of Delivery In Meconium Group With Respect To DifferentDegrees Of Meconium

Density of meconium	Labour Natural		LSCS		Forceps		VBAC		Total
	Patients	%	Patients	%	Patients	%	Patients	%	
Thin MSAF	65	61.9%	3	31.4%	7	6.6%	-	-	105
ModerateMSAF	13	30.2%	24	55.8%	5	11.6%	1	2.3%	43
Thick MSAF	44	28.9%	101	66.4%	3	1.9%	4	2.6%	152
Total	122	40.7%	158	52.7%	15	5%	5	1.7%	300

In study group, 158 patients (52.7%) were delivered by LSCS, of which 101 patients had thick meconium stained liquor.X^2 = 42.3 ;P = 0.001. In thin meconium group, with reactive NST, 66% delivered vaginally. But in thick meconium group, irrespective of the NST, most of them were delivered by LSCS.

Table 9: Mode Of Delivery In Non-Meconium Group With Respect To NST Changes

NST	Labour Natural		LSCS		Forceps		Total
	Patients	%	Patients	%	Patients	%	
Reactive	54	62.8%	28	32.6%	4	4.65%	86
Non-Reactive	5	35.7%	9	64.3%	-	-	14
Total	59	59%	37	37%	4	4%	100

Among 86 cases of reactive NST, 62.8% of cases delivered by labour natural. Among 14 casesof non-reactive NST, 64.3% of cases delivered by LSCS.X^2 = 5.4;P = 0.07

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Table 10: Indications For Cesarean Section In Study And Control Group

S.No.	Indications	Study Group	Control Group
1.	Fetal distress	111 (70.2%)	7 (18.9%)
2.	CPD	28	15
3.	CPD with fetal distress	5	-
4.	Persistent occipito posterior	1	2
5.	Failed induction	3	7
6.	Previous LSCS with PROM	6	1
7.	Other Causes	4	5
	Total No. of Patients	158	37

Among 158 patients, 31 patients had repeat LSCS in study group. In control group, 14 patients had repeat LSCS. The most common indication for LSCS in the study group is fetal distress, 70.2% vs 18.9% in the control group, Z = 33.4; P = 0.001; Odds Ratio = 10; 95% CI = 4 – 27.

Table 11: Apgar Score At 1 Min In Meconium Group With Respect To DifferentDegrees Of Meconium

1 minApgar	Thin MSAF		Moderate MSAF		Thick MSAF		Total
	Patients	%	Patients	%	Patients	%	
7/10	71	67.62	23	53.5	60	39.5	154 (51.3%)
5/10, 6/10	22	20.9	16	37.2	57	37.5	95 (31.7%)
4/10	12	11.4	4	9.3	35	23.0	51 (17%)
Total	105		43		152		300

Using 1 min Apgar score, only 51.3% of babies had a good Apgar 7/10 at 1 min. In thick meconium, only 39.5% of babies had Apgar 7/10 at 1 min, and 23% of babies had a poor Apgar of 4/10 at 1 min.$X^2 = 16.7$; P = 0.01

Table 12: Apgar Score At 5 Mins In Meconium Group With Respect To DifferentDegrees Of Meconium

5 minApgar	Thin MSAF		Moderate MSAF		Thick MSAF		Total
	Patients	%	Patients	%	Patients	%	
7/10	97	92.4	41	95.4	129	84.9	267 (89%)
5/10, 6/10	6	5.7	2	4.7	20	13.2	28 (9.3%)
4/10	2	1.9	-	-	3	1.9	5 (1.7%)
Total	105		43		152		300

Using 5 min Apgar score, 89% of the babies had a good Apgar of 7/10 at 5 mins. Even in patients with thick meconium, 84.9% of babies had a good Apgar of 7/10 at 5 mins.$X^2 = 6.3$;P = 0.18

Table 13: Relationship Between Density Of Meconium, NST And Apgar Score

Density ofmeconium		7 /10		5/10, 6/10		4/10		Tota	
		Patients	%	Patients	%	Patients	%		
Thin MSAF	Reactive	75	96.1%	2	2.6%	1	1.3%	78	X^2= 20.3
	Non-reactive	17	63%	7	26%	3	11%	27	P= 0.001
ModerateMSAF	Reactive	17	89.5%	2	10.5%	-	-	19	X^2= 0.04P=0.84
	Non-reactive	21	87.5%	3	12.5%	-	-	43	
ThickMSAF	Reactive	57	95%	3	5%	-	-	60	X^2= 29.2
	Non-reactive	50	54.3%	27	29.3%	15	16.3%	92	P= 0.001
Total		237	79%	44	14.6%	19	6.3%	300	

With reactive NST, Apgar score is good in all three groups. The incidence of low Apgar is higher in those with non – reactive NST. This is satistically significant in thin and thick meconium groups.

Table 14: Apgar Score At 5 Mins In Non – Meconium Group With Respect Of NST

Apgar at 5 min	Reactive NST	Non-reactive NST	Total
⍰ 7 /10	86	13	99
5/10, 6/10	-	1	1
⍰ 4/10	-	-	-
Total	86	14	100

All patients with reactive NST had a good Apgar of ⍰ 7/10 at 5 mins.

Table 15: Apgar Score At 1 Min In Non – Meconium Group With Respect To NST

Apgar at 1 min	Reactive NST	Non-reactive NST	Total
⍰ 7 /10	67	12	79
5/10, 6/10	19	2	21
⍰ 4/10	-	-	-

About 79% of patients had a good Apgar of ⍰ 7/10 at 1 min.

DISCUSSION

In the study group, 50.7% of patients had thick meconium-stained liquor, 14.3% had moderate meconium and 35% of patients had thin meconium-stained liquor. In the study group, 47.6% of the patients had non-reactive NST vs 14% in the control group, (P= 0.001) [7]. This shows that the incidence of non – reassuring fetal heart rate pattern was significantlyhigher in women with meconium stained amniotic fluid in labour (47.6% vs 14%).The reason for higher fetal heart rate abnormalities in the present study may be explained as follows : The criteria for FHR abnormalities in the present study are persistent tachycardia / bradycardia, absence of variability, repetitive late decelerations, whereas in Starks study, the criteria forFHR abnormalities was only late decelerations. Depending upon the density of meconium, in patients with thick meconium-stained liquor, majority (60.5%) had non – reactive NST and 39.5% had reactive NST [8]. In the study group, almost half of the patients (52.7%) were delivered by cesarean section as compared to 37% in the control group. (52.7% vs 37%). In this present study, 42% of the patients delivered vaginally, 52.7% of patients were delivered by cesarean section and 5% had instrumental delivery (X^2 = 42.3, P = 0.001) [9]. In patients with reactive NST only 13.4% of the babies were admitted, but in those with non – reactive NST 51.8% of babies were admitted (P = .0001).In this present study, when MAS incidence is further classified depending upon the density of meconium, the MAS incidence in thick meconium stained liquor in 16.4%, in moderate meconium stained liquor 2.3% and in thin meconium stained liquor it is 3.8% [10]. In this present study, with respect to NST, there was no neonatal deaths in those patients with reactive NST and there were 10 neonatal deaths in those with non – reactive NST. (7% vs 0) P = 0.003,95% CI = 7% ranging from 2% to 12% [11,12]. This again indicates that meconium-stained amniotic fluid has a significant risk of causing perinatal mortality only when it is associated with FHR abnormalities [13-15].

CONCLUSION

The incidence of non-reassuring fetal heart rate pattern is significantly higher in women with meconium-stained amniotic fluid in labour. There is a significant linear association between the thickness of meconium and abnormal fetal heart rate pattern during labour. The perinatal outcome is good in patients with meconium-stained amniotic fluid and reactive NST. The cesarean section rate, low Apgar Score, neonatal admissions and perinatal mortality were significantly higher with meconium-stained amniotic fluid and non-reactive NST. So, meconium in the amniotic fluid is associated with obstetric hazard and significantly increased risk of adverse neonatal outcomes, only when it is associated with fetal heart rate abnormalities. The main clinical value of meconium-stained amniotic fluid is to alert the obstetrician to look for further signs of fetal compromise.

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