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A Clinical Study of Risk factors and Pregnancy outcome in women with Meconium-Stained Amniotic Fluid in labour in a Tertiary care centre

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Abstract

Meconium aspiration syndrome is one of the main causes that increase the mortality and morbidity in neonates. The incidence increases with increase of Gestational age of fetus and is rare before 32 weeks unless with some intrauterine infections increasing to more than 30% in post term pregnancy. Preterm babies may have MSAF because of fetal enteritis due to Listeria, Urea plasma urealyticum, and rotaviral infections[2]. The incidence of Meconium-stained amniotic fluid is 30% at 40 weeks and 50% at 42 weeks. Meconium-stained amniotic fluid is a clinical diagnosis with no practical confirmatory test [(3,4)]. It is also difficult to define the degree of meconium staining as thick and thin and many a times it becomes more of a subjective assessment.

Methods:this study was conducted for a period of 1 year at Shivamogga Institute of Medical Sciences, Shivamogga. The study was done on patients admitted in labour who fulfill the inclusion and exclusion criteria. A detailed history was taken from all patients and examination was done. This was with an aim to look for the risk factors which might cause MSAF. All the patients in the study underwent a similar form of labour management.

Results: In our study a total of 183 babies were enrolled in the study who were born withmeconium-stained liquor out of which 51.3% were thin meconium and 48.63% were thick meconium. Out of which 68.42% of babies with thick meconium and 31.5% babies with thin meconium had APGAR score less than 7, among babies with thick meconium 60.09%and 70% babies

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suspicious and abnormal CTG patterns respective. We alsoobserved that 89.65%of thin meconium babies had vaginal delivery but 69% of thick meconium babies had caesarean section. There were 11(34.37%) babies in thin meconium group and 21(65.62%) babies in thick meconium group who weighed less than 2.5 kg at birth. In our study 87% babies were asymptomatic and needed only routine care while 24 babies went to NICU among them 11 needed ventilators, 9 has MAS and 4 had birth asphyxia

Conclusion: Increasing Grade of MSL is associated with increased adverse outcome. Association of MSL with abnormal CTG is associated with poor outcome, increased caesarean section rate, increased neonatal complications.Meconium-Stained Liquor alone is not associated with an adverse neonatal outcome

INTRODUCTION

All practicing midwives and obstetricians would be familiar with the thick "Green pea soup", meconium. Meconium-stained amniotic fluid is a non welcome event during labour and both obstetricians and neonatologists are bothered about the perinatal outcomes in laboring women presenting with meconium-stained amniotic fluid. There have been references from 1676 about the association between perinatal death and meconium[2].

In 10% of all pregnancies the fetus passes meconium[2].Though passage of meconium could be physiological, it may become an environmental hazard in the presence of fetal acidemia. The latter supervenes acutely and thus it is highly unpredictable and not preventable[11]A term fetus may have passed meconium by nature of its maturity, but if this is innocent, the meconium should have been diluted by adequate liquor[1].If the fetus is preterm then this meconium is abnormal and suspect infection or hypoxia[1].If the meconium is thick then it implies that the liquor volume is reduced and suspect uteroplacental insufficiency and possible fetal compromise[1].Initially the liquor was clear and later becomes meconium stained, it suggests that the fetus may be compromised which could be due to infection or intrapartum hypoxia.[1]

The incidence increases with increase of Gestational age of fetus and is rare before 32 weeks unless with some intrauterine infections increasing to more than 30% in post term pregnancy. Preterm babies may have MSAF because of fetal enteritis due to Listeria, Urea plasma urealyticum, and rotaviral infections[2].The incidence of Meconium-stained amniotic fluid is 30% at 40 weeks and 50% at 42 weeks.

Meconium stained amniotic fluid is a clinical diagnosis with no practical confirmatory test [(3,4)]. It is also difficult to define the degree of meconium staining as thick and thin and many a times it becomes more of a subjective assessment. .

Meconium Staining of Amniotic fluid can cause an increased risk of adverse perinatal outcome due to birth asphyxia, fetal distress, intra-partum fetal death, low Apgar score, Meconium Aspiration Syndrome and neonatal death and hypoxic ischemic encephalopathy as its sequelae. As it increases the risk of chorioamnionitis and operative delivery, maternal morbidity due to surgical intervention and sepsis may be increased[6]. In up to 0.05% cases MAS can cause or contribute to perinatal death. In 33% of MAS long term respiratory problems ensue[2]

Despite a lack of clear evidence between meconium and fetal acidosis at birth, we cannot conclude that presence of meconium with normal FHR pattern poses no threat to the neonate[2].

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Predisposing factor identification, diagnostic techniques that could make us suspect the possibility of meconium, associated fetal factors may help in early diagnosis and may improve adverse perinatal outcomes.

Though many methods are available to diagnose fetal distress during labour, like CTG, Auscultation, STAN, Scalp blood sampling, the simplest and the easiest method may be finding of meconium in the amniotic fluid. It may be substantiated by CTG changes.

Hence this study was conducted to explore the maternal characteristics and probable risk factors associated with meconium staining of amniotic fluid and the maternal and fetal outcome in these subjects.

AIMS AND OBJECTIVES

To determine the maternal characteristics and risk factors for MSAF

To determine the fetal outcome and mode of delivery in patients with meconium-stained liquor during labour.

MATERIALS AND METHODS

INCLUSION CRITERIA

All women in labour beyond the gestational age of 37 weeks with cephalic presentation, Singleton pregnancy in patients with meconium-stained liquor after spontaneous or artificial rupture of membranes during labour.

EXCLUSION CRITERIA

Gestational age <37 weeks, Previous cesarean section, Multiple pregnancy, Malpresentations

MATERIALS AND METHODS

After obtaining ethical clearance this study was conducted for a period of 1 year at Shivamogga Institute of Medical Sciences ,Shivamogga .The study was done on patients admitted in labour who fulfill the inclusion and exclusion criteria. A detailed history was taken from all patients and examination was done. This was with an aim to look for the risk factors which might cause MSAF. All the patients in the study underwent a similar form of labour management. A detailed history and routine clinical examination were carried out in all of them and an admission CTG was done followed by partographic management of the labour once they were into established active labour. Patients who had spontaneous rupture of membranes or who underwent artificial rupture and who had different grades of meconium were enrolled in the study.The meconium staining of the amniotic fluid was classified as Grade I, II, III by visual examination. meconium stained liquor which was translucent, light yellow green in colour was taken as grade I , grade II MSL is opalescent with deep green and light yellow in colour. Grade III was opaque and deep green in color. It was further classified into either thin (Grade I) and Thick (Grade II and III) and this classification was used for documenting the observation and for analysis.

The fetal heart rate was monitored by intermittent auscultation during labour. The fetal heart rate tracing was classified as normal, suspicious, abnormal according the NICE (National Institute of Clinical Excellence) guidelines.The route of delivery and timing of decision to delivery were

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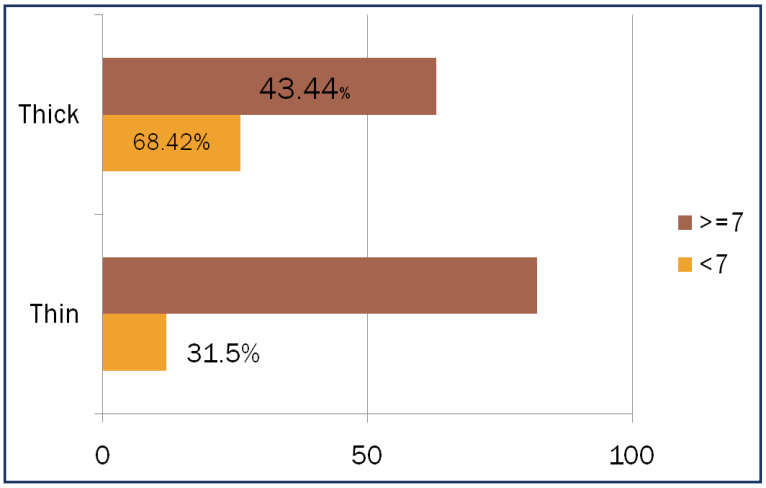
decided based on the maternal parameters and fetal heart rate tracings. Decision for Cesarean was taken on other obstetric parameters also,otherwise the patients were allowed to deliver vaginally withroutine monitoring.The maternal characters like age, parity, socioeconomic status, past pregnancy outcome, antenatal care as booked or unbooked, other medical disorders, BMI, spontaneous or induced labour, use of oxytocin, the route of delivery, instrumental delivery, birth weight of the baby, MAS, need for ventilation, NICU admission, APGAR at birth were noted. Babies were followed till discharge, or any other adverse outcomes and the results were tabulated and studied. Fetal outcome with meconium was also studied in relation to intrapartum FHR patterns.

Results

FETAL OUTCOME ACCORDING TO GRADES OF MECONIUM-STAINED LIQUOR AND APGAR SCORE

Age, parity, Duration of gestation, Socioeconomic status, BMI, booked vs unbooked, anemia, hypertensive disorders, Previous outcome, Diabetes,



FETAL HEART RATE PATTERNS IN CTG WITH GRADES OF MECONIUM-STAINED LIQUOR

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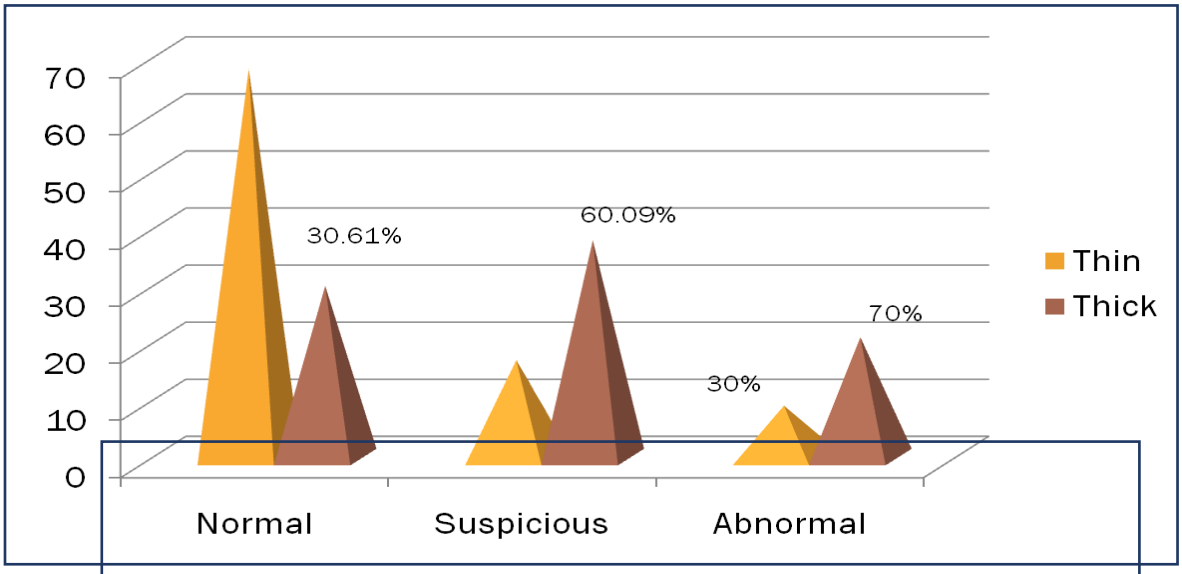

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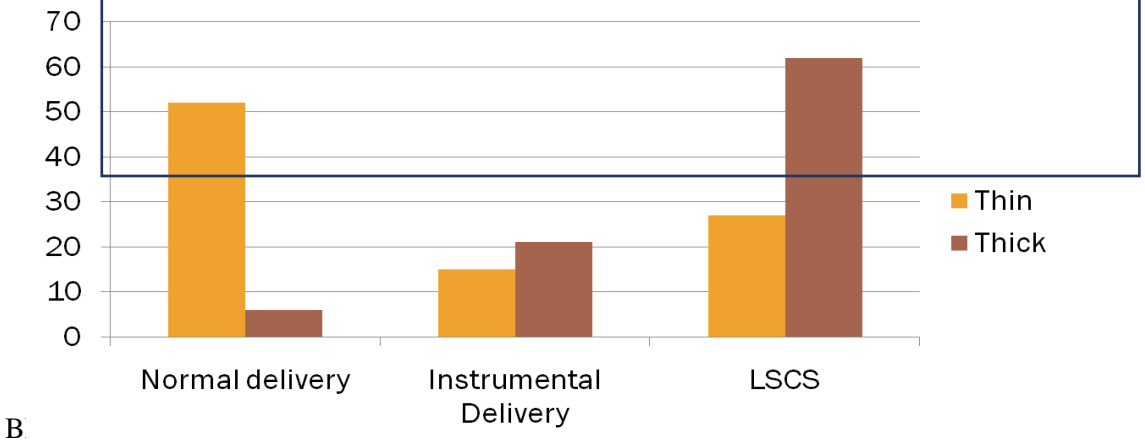

B

Grades of MSL	<2.5kgs	>=2.5kgs
Thin	11 (34.37%)	83 (54.96%)
thick	21 (65.62%)	68 (45.03%))
total	32	151

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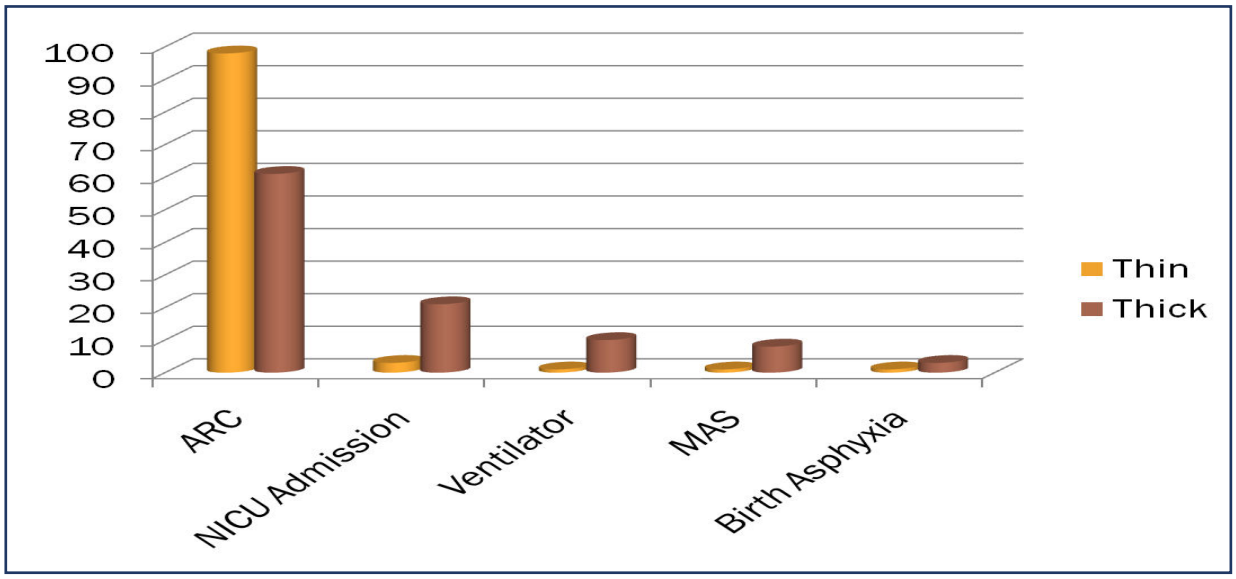
NEONATAL OUTCOME ACCORDING TO GRADES OF MECONIUM-STAINED LIQUOR



DISCUSSION

Fetal condition during labour is usually assessed by fetal heart rate and checking the presence of meconium in the amniotic fluid[13,14]. The passage of meconium may be a normal physiological event reflecting fetal maturity. It may on the other hand reflect fetal hypoxia or increased vagal activity from cord compression[15].The detection of MSL during labour often causes apprehension and anxiety for the patient as well as the health provider as it is often considered as indication of fetal distress[16]. Generally thick meconium is associated with poor perinatal outcomes[17,18].The exact reason of passage of meconium in the liquor is poorly understood. It could reflect the state of compensated fetal distress as it is suggested by few babies who are acidotic during labour[19].Acute or chronic fetal hypoxia can result in the passage of meconium in utero[20]. Also, the incidence of meconium passage during labour increases with gestational age 30% at 40 weeks, 50% at 42 weeks[21]. The MSAF and its association are still very important determinants of perinatal morbidity and mortality, and a successful management of such pregnancies is only possible after better understanding pathophysiology of meconium passage[22].Presence of meconium below vocal cord is known as meconium aspiration and occurs in 20-30% of all infants with MSAF with around 12% mortality[23]. MSAF alone is not an indication for caesarean section, however with MSAF needs strict supervision during labour for better perinatal outcome[24]. The low Apgar scores may be because of direct vasoconstrictor effect of meconium on umbilical vein that results in vasospasm in leading to impaired placental blood flow[25]. Infants with APGAR Score<7 at 5 min are three times more likely to have abnormalities on neurological examination[26].

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Presence of meconium in absence of fetal heart rate abnormalities is not suggestive of fetal compromise and does not require any intervention. The increased rate of emergency Caesarean Section, Instrumental Vaginal Delivery for fetal distress, meconium aspiration syndrome and neuro developmental handicaps are possible problems with MSAF. After the initial hypoxic bout initiating the passage of meconium, subsequent repetitive bouts due to prolonged labour or abnormal uterine activity may cause severe asphyxia. Such repetitive bouts can be avoided by careful fetal monitoring, active management of labour and optimal care after birth. This would help avoid unnecessary caesarian sections in all cases of meconium-stained liquor in absence of a definitive indication. The clinical diagnosis of perinatal asphyxia is based on several criteria, the two main ones being evidence of cardiorespiratory and neurological depression (Defined as an APGAR Score remaining <7 at 5 min after birth) and evidence of acute hypoxic compromise with academia[27].

In our study total of 183 babies were born with meconium-stained liquor out of which 51.3% were thin meconium and 48.63% were thick meconium. Nirmala et al, in her study, showed that there were 1267 deliveries among which MSL = 100(7.89%); Grade 1 MSL =39%, grade 2 MSL =43%, grade 3 MSL = 18%[28]. Surekha et al, in her study, there were 3673 deliveries among which MSL deliveries = 120(3.48%);Grade 1 MSL=34.16%, Grade 2 MSL= 29.16%, Grade 3 MSL= 36.66%[29].

In our study 68.42% of babies with thick meconium and 31.5% babies with thin meconium had APGAR score less than 7, Nirmala et al in her study, there were only one baby (0.18%) in Grade 3 MSL, no babies in Grade 1 and Grade 2 MSL at 5-minute APGAR Score <7[28].

In our study , among babies with thick meconium 60.09%and 70% babies suspicious and abnormal CTG patterns respectively , In Meena Priyadarshini et al study, the normal CTG patterns were 49(56.97%) in Grade I MSL, 45(44.11%) in Grade 2 MSL and 16(25.80%) in Grade 3 MSL; Suspicious CTG patterns were 28(32.55%) in Grade I MSL, 38(37.25%) in Grade 2MSL, 24(28.70%) in Grade 3 MSL; Abnormal CTG patterns were 9(10.46%)in Grade 1 MSL, 19(18.62%) in Grade 2 MSL, 22(35.48%) in Grade 3 MSL[30].

When mode of delivery was compared with grades of meconium staining, we observed that 89.65%of thin meconium babies had vaginal delivery but 69% of thick meconium babies had cesarean section, In Meena Priyadarshini et al study, there were 86(34.4%)vaginal deliveries, 58(23.2%) instrumental vaginal delivery and 106(42.4%)caesarean section.(Table 7).The total number of vaginal deliveries including instrumental vaginal deliveries were 144(56.7%).The caesarean sectionrate is higher among Grade 2 and 3 MSL compared to Grade 1 MSL in our study. Patil et al in his study, showed the caesarean rate as 42%[31] Espinheira MC et al in his study, showed the caesarean rate as 62.5%[32].

In our study there were 11(34.37%) babies in thin meconium group and 21(65.62%) babies in thick meconium group who weighed less than 2.5 kg at birth.In contrast to our study, Nirmala et al in her study, observed birth weight <2.5kg in 1(2.6%) with Grade 1 MSL, 2(4.65%) in Grade 2 MSL, 2(11.11%) in Grade 3 MSL[28]. On the other hand, Rekha Kumari et al in her study, observed birth weight <2.5kg in 30(40%) of the neonates who had MSL[33].

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In our study 87% babies were asymptomatic and needed only routine care while 24 babies went to NICU among them 11 needed ventilators, 9 has MAS and 4 had birth asphyxia. Rekha Kumari et al in her study, 63(84.0%) were asymptomatic and 1(1.3%) had birth Asphyxia[33]. Khazardoost et al observed 64(21.1%) with meconium aspiration syndrome[34]. Espinheira MC et al in his study, there were 1.4% of NICU admission of which 43.1% needed ventilatory support and 5% had meconium aspiration syndrome[32].

ACOG 2007 also states that no routine suctioning would prevent MAS in cases of MSAF. If the infant is depressed, intubation and infraglottic suctioning is recommended and thus it may not be a preventable event[11].

In more recent studies the overall frequency of meconium-stained amniotic fluid has ranged from 5 to 24.6% (median 14%) of all deliveries[5].

Perinatal mortality increased from 2 per 1000 birth with clear amniotic fluid to 10 per 1000 with meconium stained amniotic fluid. Severe foetal academia, meconium aspiration syndrome, delivery by caesarean section (7-14 %) was also increased. It is concluded that meconium in amniotic fluid associated with an obstetric hazard significantly increased risk of adverse neonatal outcome[7].

Katz and Bowes (1992) emphasized the prognostic uncertainty of meconium[8].

Nathan and Co workers concluded that meconium is a low risk factor and may cause perinatal mortality to the tune of 1 per 1000 births[9].

Fenton and Steer associated fetal heart rate patterns with meconium and outcome and concluded that passage of meconium was not significant with FHR of >110. The introduction of FBS brought more clarity to the situation[2].

Further studies have been emphasizing the finding that there is no association between meconium and fetal hypoxia which has been strengthened with the use of fetal pulse oximetry and fetal hemoglobin analysis[2].

Ramin and associates (1996) studied 8000 MSAF and found the risk factors for MAS to be, academia at birth, forceps delivery, LSCS, Intrapartum heart rate abnormalities, depressed APGAR at birth and need for ventilation at birth[10].

CONCLUSION

Meconium-Stained Liquor alone is not associated with an adverse neonatal outcome, 87% of babies remained asymptomatic despite MSL and required only routine care. Increasing Grade of MSL is associated with increased adverse outcome. Association of MSL with abnormal CTG is associated with poor outcome, increased caesarean section rate, increased neonatal complications.

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