
Study of Meconium Aspiration Syndrome in Relation to Birth Weight and Gestational age

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ABSTRACT

A prospective observational study conducted in NICU, MLB Medical College, Jhansi. 83 neonates who fulfilled inclusion criteria were studied over a period of 18th months from April 2016 to September 2017. Maternal obstetric history and risk factors were studied and fetal parameters including gestational age, mode of delivery, birth weight, sex, age at onset of respiratory distress, treatment and outcome were noted. The aim of this study was to know the clinical profile of meconium aspiration syndrome (MAS) in neonates and to access relation of gestation. Survival rate can be increased with a planned team approach during perinatal period. Hence this study was undertaken to understand the clinical profile of neonates with meconium aspiration. Out of these 83, 50 babies (60.24%) were out born. Majority of babies belonged to 2.5-3.5 kg weight group (n=55, 66.27%) and were male (n=62, 74.70%). 59.04% of babies with MAS were term babies. Most of MAS babies were delivered to primigravida mothers (n=51, 61.45%). MAS were commonly associated with LSCS born babies (n=45, 54.22%). Majority of babies were vigorous (n=50, 60.24%) had downe's score <4 (n=51, 61.45%). MAS occurred most commonly in babies having fetal distress (42.17%) and in mothers with history of PIH (12.05%). Birth asphyxia was one of the most common associated morbidity (38.55%) followed by septicemia (26.54%) among these MAS babies. MAS is an entity which is commonly seen in term and post term babies with birth weight group 2.5-3.5 kg.

KEY WORDS: Meconium, MAS, MSAF

INTRODUCTION:

Amniotic fluid surrounds the baby in utero and provides a protective and low resistance environment and acts as a cushion for the baby. It is secreted by amniotic membrane, foetal skin and fetal urine. When foetus is in a state of stress, meconium is passed. Meconium staining of amniotic fluid has been considered to be a predictor of poor fetal outcome, because of its direct correlation to fetal distress and increased likelihood of inhalation of meconium with resultant deleterious effects on neonatal lungs. Increased perinatal mortality and morbidity rates have been associated with meconium aspiration syndrome which may manifest as respiratory distress, hypoxemia and acidosis.

The incidence of meconium stained amniotic

fluid in preterm infant is very low. Most babies with meconium stained amniotic fluid are 37 weeks or older, and most meconium stained babies are post mature. An increased incidence of MSAF is noted in presence of fetomaternal stress factors such as hypoxia and infection, independent of fetal maturation.

This study was undertaken to understand the factors causing meconium aspiration syndrome and clinical profile of meconium aspiration syndrome in relation to gestational age and birth weight and their outcome.

MATERIALS AND METHODS:

The study was conducted on newborns appropriate for gestational age and delivered normally, by caesarean section or forceps and fulfilling the inclusion criteria that were presence of meconium stained amniotic fluid, tachypnoea, retractions, grunting or other abnormal signs on physical examination consistent with pulmonary disease, need for supplemental oxygen or ventilator support and a compatible chest radiograph. Newborns having transient tachypnoea of newborn (TTNB),

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hyaline membrane disease (HMD), congenital pneumonia and sepsis, other air leak syndromes, newborn with meconium stained amniotic fluid but without respiratory distress and babies born through meconium stained amniotic fluid with normal chest x-ray were excluded.

A detailed antenatal history was elicited to find out the etiology of passage of meconium into amniotic fluid. Detailed natal history and presenting complaints was also taken. In all meconium stained newborns, APGAR score at 1 min and 5 min, birth weight, gestational age (by Ballard scoring) and respiratory distress (by Downe's score) were recorded.

Detailed examination of the newborn was done with regard to gestational age estimation, anthropometric measurement, general examination & systemic examination.

In all cases of MAS, routine investigations like complete blood count (Hb, TLC, DLC, platelets, PCV and peripheral smear) were done. Septic work up like ESR, CRP and blood culture were done when indicated. Radiological assessment was undertaken with serial X rays as directed by the condition. Transient metabolic disturbances off blood glucose, serum calcium, electrolytes and arterial blood gases (ABG) were investigated and interpreted when required.

RESULTS:

Total number of admission in Sick Newborn Care Unit (SNCU), MLB Medical College, Jhansi from April 2016 to September 2017 were 3291. Out of which, 100 babies came in our SNCU with chief complaints of "Difficulty in breathing or/and delayed cry due to ingestion of meconium stained liquor". Due to insufficient history and data among these 100 babies, only 83 babies were studied. Clinically and on the basis of chest x-ray these babies were diagnosed as meconium aspiration syndrome (MAS).

In our study most of MAS babies were out born (n=50, 60.24%) and were mostly males (n=62, 74.70%) as compared to females (n=21, 25.30%).

When three groups of weight namely, <2.5 kg birth weight, 2.5-3.5 kg birth weight and >3.5 kg birth weight were compared with each other by using 'Z' test, p value was <0.0001, which was highly significant. Thus we can interpret MAS babies predominated in the birth weight group 2.5-3.5 kg (n=55, 66.27%) and >3.5 kg (n=17, 20.48%) as compared to MAS babies in the group below 2.5 kg (n=11, 13.25%).

When number of cases in three groups of gestational maturity namely preterm, term & post term

were compared with each other by using 'Z' test, p value was <0.0001, which was highly significant, interpreting that there was wide variation in number of comparison group, while p value of <0.0462 between term and post term which was significant, indicating that there was less variation in number of comparison group. Thus we can interpret that MAS babies predominated in term babies (n=49, 59.04%) and post term babies (n=27, 32.53%) as compared to pre term babies (n=7, 8.43%).

In this study it was found that out of total studied MAS babies, majority were delivered to primigravida mothers (n=51, 61.45%). This may be explained by the problems like prolonged labor which is very common in primigravida. A difficult or prolonged labor is more stressful for both mother and baby.

In our study it was observed that most of MAS babies were delivered by lower segment caesarean section (n=45, 54.22%) as compared to normal vaginal delivery (n=38, 45.78%). Baby delivered through meconium stained amniotic fluid was assessed for initial 10-15 sec after delivery and it was found that majority of babies (n=50, 60.24%) were vigorous.

Maximum cases had downe's score <4 (n=51, 61.45%) while only 6.02% of babies had downe's score >6.

In this study regarding the antenatal risk factor the most common was fetal distress which accounted for 35 of 83 cases (42.17%). In this study, it was observed that birth asphyxia was one of the most common morbidity (n=5, 38.55%) followed by septicemia (n=4, 26.54%) among all 83 studied MAS babies.

In these 83 MAS babies 68 babies (81.93%) were treated conservatively and 15 babies (18.07%) were ventilated. Among these 15 ventilated babies only life of 2 babies were saved and 13 babies died.

DISCUSSION:

The present study entitled "Study of Meconium aspiration syndrome in relation to birth weight and gestational age" was carried out in Sick Newborn Care Unit (SNCU), MLB Medical College, Jhansi from April 2016 to September 2017 (18 months). There were 100 babies admitted as meconium aspiration syndrome (MAS) in SNCU, however only 83 newborns fulfilled our inclusion criteria. These babies came with chief complaints of "Difficulty in breathing or / and delayed cry due to ingestion of meconium stained liquor". Clinically and

Table 1: Baseline characteristics of MAS babies enrolled in study

	Number	Percentage
Admission		
Inborn	33	39.76%
Outborn	50	60.24%
Gender		
Male	62	74.70%
Female	21	25.30%
Gestational age (weeks)		
<36 wks	3	3.61%
36-38 wks	4	4.82%
38-40 wks	49	59.04%
40-42 wks	26	31.33%
>42 wks	1	1.20%
Gravida		
Primigravida	51	61.45%
Multigravida	32	38.55%
Mode Of Delivery		
NVD	38	60.24%
LSCS	45	39.76%
Downe's Score		
<4	51	61.45%
4-6	27	32.53%
>6	5	6.02%
Antenatal Risk Factor		
Fetal distress	35	42.17%
PIH	17	20.48%
Anemia	10	12.05%
Oligohydramnios	9	10.84%
PROM	7	8.43%
Others*	5	6.02%
Morbidities		
Birth asphyxia	32	38.55%
Septicemia	22	26.54%
Jaundice	16	19.28%
Pneumonia	8	9.64%
Others*	5	6.02%
Outcome		
Discharge	68	81.93%
Expiry	13	15.66%
LAMA	2	2.40%

Table 2: Comparative study of MAS babies according to birth weight

Birth weight	Z	p value	Significance
<2.5 kg & 2.5-3.5 kg	8.2501	<0.0001	Highly Significant
<2.5 kg & >3.5 kg	16.0709	<0.0001	Highly Significant
2.5-3.5 kg & >3.5 kg	18.2386	<0.0001	Highly Significant

Table 3: Comparative study of MAS babies as per gestational maturity.

Maturity	Z	p-value	Significance
Pre term & Term	5.87139	<0.0001	Highly Significant
Pre term & Post term	6.56487	<0.0001	Highly Significant
Term & Post term	2.02781	<0.0462	Significant

Table 4: Distribution of MAS babies according to birth weight

Maturity	Z	p-value	Significance
Pre term & Term	5.87139	<0.0001	Highly Significant
Pre term & Post term	6.56487	<0.0001	Highly Significant
Term & Post term	2.02781	<0.0462	Significant

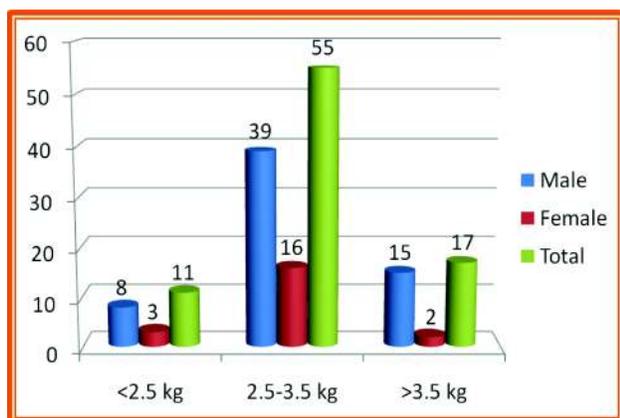


Figure 1: Distribution of MAS babies according to birth weight.

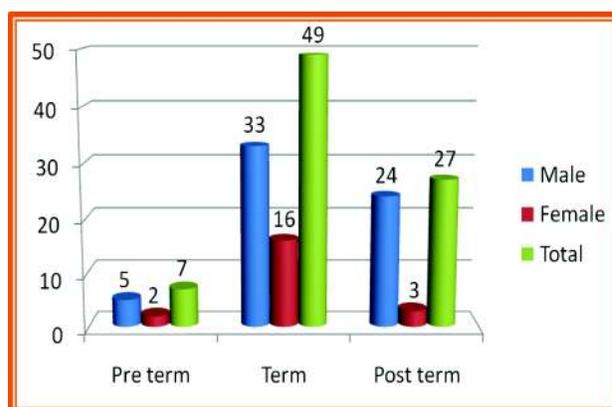


Figure 2: Distribution of MAS babies as per gestational maturity.

on the basis of chest x-ray they were diagnosed as meconium aspiration syndrome.

In our study it was observed that MAS most commonly occurred in babies having birth weight more than 2.5 kg (86.75%) as compared to babies having birth weight less than 2.5 kg (13.25%).

In a study by Bharati Rao et al^[1], the birth weight of babies with MSAF was in the range of 1600-3800 gm, with mean birth weight of 2.516 gm. Shilpa Shivanna et al^[2] in their study, found that average birth weight of newborn who passed meconium in uterus was 3 kg. While according to Ashtekar et al^[3] study among 52 MAS babies, most of MAS babies were 2.5-3.5 kg i.e.70.70% & only 13.5% weighted >3.5 kg.

Thus all above all studies show similar results as observed in our study.

On the basis of last menstrual period (LMP) and expected date of delivery (EDD) it was found that among total 83 MAS babies 5 babies (8.43%) were preterm, 49 babies (59.04%) were term and 27 babies (32.53%) were post term. Ballard scoring too showed that majority of MAS babies belonged to gestational age of 38–40 weeks (59.04%) and 40–42 weeks (31.33%).

In Narang et al^[4] study 95.4% babies were term (>36 weeks of gestation) and none of the babies was under 33 weeks of gestation. Suresh GK et al^[5]

observed in their study that the mean gestational age was 38.41 ± 2.31 weeks in babies born with thick meconium stained liquor and $37.80 + 2.27$ weeks in babies born with thin meconium stained liquor. Erkkola et al^[6] demonstrated that 95% cases of MAS belonged to gestational age more than 36 weeks. Satish D. Ashtekar et al^[3] study on 52 MAS babies, found that 27 MAS babies had gestational age of 38-40 weeks (51.90%). Urvashi Sharma et al^[7] observed that 5% neonates were less than 37 weeks of gestation, 77.50% of neonates were between 37-40 weeks and 17.50% were more than 40 weeks. All these studies are consistent with our study.

All 83 MAS babies required respiratory support in the form of oxygen, CPAP or mechanical ventilation. 26 cases (31.32%) needed CPAP support and 15 cases (18.07%) required mechanical ventilation. Among the babies on mechanical ventilation 15.66% (13) babies expired. Thus out of total 83 MAS babies, 68 (i.e. 81.93%) babies were discharged successfully, 2 babies (i.e. 2.40%) left against medical advice and 13 babies (i.e. 15.66%) expired.

However Wiswell TE et al^[16] found, that of neonates with MAS, 29.7% require mechanical ventilation. In MK Behera et al^[15] study out of the total 42 MAS babies, 29 survived and 13 (13%) expired. Out of 52 MAS babies in the study by Astekar et al^[3], 12 (23.07%) babies required mechanical ventilation, out of which 8 (15.3%) died during treatment. In the study by Nath GDR et al^[11] 81.93% were treated conservatively, 18.07% were ventilated. Mortality occurred in 06 cases (10.34%) with birth asphyxia being the main cause of death in 50% cases, followed by isolated ARF.

CONCLUSION:

Meconium Aspiration Syndrome was the common cause of respiratory distress in neonates in our study. Males are more affected than females. Majority of babies belonged to birth weight between 2.5-3.5 kg. Term babies of gestational age 38-40 weeks are more prone to develop MAS as compared to preterm and post term babies. Babies born to primigravida mother frequently developed MAS, when compared to multigravida mother. MAS are commonly associated with LSCS born babies. Most of the babies with MAS are vigorous at birth but they too

require observation postnatally for development of signs of MAS. Most common antenatal risk factor for MAS babies is fetal distress. Birth asphyxia and septicemia are most common morbid conditions, as well as the cause of mortality, associated with MAS.

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