



Study On Clinicoetiological Profile & Outcome Of Meconium Aspiration Syndrome In A Tertiary Care Hospital In Odisha

Dr. Sthita Prajnya Beura¹, Dr. Jaya Pandey Mohapatra², Dr. Lipsa Das³, Dr. Saumya Ranjan Patra⁴

^{1,4}PG Resident, ²Associate Professor, ^{3,4}Assistant Professor

Department of Pediatrics, Hi-Tech Medical College & Hospital, Bhubaneswar

***Corresponding Author:**

Dr. Jaya Pandey Mohapatra,

Associate Professor, Department of Pediatrics, Hi-tech Medical College & Hospital, Bhubaneswar

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: Meconium aspiration syndrome is a life threatening respiratory disorder affecting some neonates born through meconium stained amniotic fluid. Incidence of MSAF is observed in 7-22% of livebirth. Among them, 5% of newborns develop meconium aspiration syndrome.

Aim & Objective: To study maternal & neonatal risk factors of meconium aspiration syndrome in neonates & to evaluate its clinical outcome.

Method: Our study was conducted on babies delivered with meconium stained amniotic fluid in our hospital & outborn with such similar characteristics during study period from 1st Oct 2020-31st Sept 2022. Neonates with congenital malformation were excluded. Data regarding maternal & perinatal risk factors were collected. Required investigation report & radiological data were documented. Data regarding outcome & kind of management performed were noted. Data were analyzed according to objective of our study & by using appropriate statistical technique.

Result: Out of 150 collected samples, 139 were inborn & 11 were outborn. Male babies show more prevalence with ratio of male: female 1.09:1. MAS is more commonly observed in mother from rural area. LSCS was most common mode of delivery due to fetal distress. Term baby with thick MSL, nonvigorous at birth face deadly consequence like seizure, sepsis & increased requirement of mechanical ventilation.

Conclusion: Meconium aspiration syndrome contributes to higher mortality & morbidity in perinatal phase of life. Anticipation and necessary aggressive management should be commenced if any suspicion of fetal distress or in nonvigorous baby. Early recognition & timely intervention shall be helpful in decreasing mortality rate in MAS child.

Keywords: Meconium stained amniotic fluid, Meconium aspiration syndrome, Birth weight, Gestational age, Surfactant

Introduction

Meconium is defined as first stool passed by an infant within 24hrs of birth. Incidence of Meconium stained amniotic fluid is within 7-22% of live birth which is also regarded as signs of fetal compromise. Meconium aspiration syndrome (MAS) is a serious & potentially preventable condition which is associated with many maternal & perinatal risk factors. Meconium itself or resultant chemical pneumonitis

mechanically obstructs small airway which subsequently develop atelectasis that might develop vasospasm, hypertrophy of pulmonary arterioles ensuing Persistent Pulmonary Hypertension (PPHN). Development of respiratory distress soon after birth in a neonates born with meconium stained amniotic fluid with characteristic radiologic changes can be regarded as Meconium aspiration syndrome.

Severity of MAS depends upon duration and amount of oxygen requirements as described by cleary & wiswell¹.

1. Mild MAS-requirement of $FiO_2 < 40\%$ for less than 48hrs
2. Moderate MAS-requirement of $FiO_2 > 40\%$ for more than 48 hrs with air leak
3. Severe MAS-Assisted ventilation for more than 48 hrs associated with PPHN & increased mortality & morbidity.

Severe MAS is associated with higher mortality and morbidity in newborn which mandates the earlier intervention like mechanical ventilation or surfactant administration .Very few studies have been done so far which established maternal & neonatal risk factors attributing to the development of MAS. So our present study is to evaluate those risk factors & outcome of meconium aspiration syndrome and to correlate among them.

Materials & Methods

This hospital based prospective study was conducted amongst newborns delivered with meconium stained liquor in Hi-Tech Medical College & Hospital, Bhubaneswar & also from outside with such similar features from 1st October 2020-31st September 2022.

Inclusion Criteria: (1) All newborns delivered with meconium stained amniotic fluid at Hi-Tech Medical College & Hospital,Bhubaneswar or received from

outside with characteristics of MSAF during our period of study.(2)Parents giving consent.

Exclusion Criteria: (1)Neonates diagnosed with congenital malformation like Tracheo-esophageal fistula, Congenital diaphragmatic hernia or any respiratory disorder like Respiratory distress syndrome(RDS), Transient tachypnea of newborn(TTN),Bronchopulmonary dysplasia(BPD).(2) Newborns with Gestational age less than 36 weeks.(3)Parents not giving consent.

Detailed data regarding maternal risk factors (mother’s age, address, socioeconomic state, education status, parity, mode of delivery ,any co-morbid factors ,Indication of LSCS) & peinatal factors (like gestational age, birth weight, APGAR at 1 minute & 5 minute,grading of meconium stained amniotic fluid) were collected. Required investigation report & radiological data were collected &information regarding performed management on basis of respiratory distress were documented. Data were analyzed according to objective of our study by using appropriate statistical technique SPSS 20.

Result:

Out of 150 babies delivered with MSAF characteristics ,49 were thick meconium stained liquor & 101 were thin MSL.

Table 1: Booking status of the mother with the cases

		Type of Meconium		Total
		Thick	Thin	
Booking Status	Booked	47 (95.92)	88 (87.13)	135 (90)
	Unbooked	2 (4.08)	13 (12.87)	15 (10)
Total		49 (100)	101 (100)	150 (100)

Out of 49 (100%) thick MSL, 47 (95.92%) were booked, and 2 (4.08%) were un-booked. Among 101 (100%) thin MSL, 88 (87.13%) were booked, and 13(12.87%) were un-booked. This number of reductions in un-booked cases is because of extensive national programme and incentive for patients' institutional delivery.

Table 2: Residence of the mother with the case

	Type of Meconium		Total
	Thick	Thin	

Residence	Rural	27(55.10)	64(63.37)	91(60.67)
	Urban	22(44.90)	37(36.63)	59(39.33)
Total		49(100)	101(100)	150(100)

Out of 49 (100%) thick MSL, 55.10% (n=27) belongs to rural, and 44.90% (n=22) belongs to urban. Among 101 (100%) thin MSL, 63.37% (n=64) belongs to rural, and 36.63% (n=37) belongs to urban.

Table 3: Socio-economic class of mother with the case

		Type of Meconium		Total
		Thick	Thin	
Modified BG Prasad Scale	Lower	7(14.29)	31(30.69)	38(25.33)
	Lower middle	27 (55.10)	50(49.50)	77(51.33)
	Middle	15(30.61)	20(19.80)	35(23.33)
Total		49(100)	101(100)	150(100)

Among 49(100%) thick MSL, those belonging to lower, lower middle, and middle class were 14.29%,55.10%, and 30.61%, respectively. Among 101(100%) thin MSL, those belonging to lower, lower middle, and middle class were 30.69%, 49.50%, and 19.80%, respectively.

Table 4: illness of mother during pregnancy

		TYPE OF MECONIUM		Total
		Thick	Thin	
Illness during pregnancy	Anaemia	2(4.08)	3(2.97)	5(3.33)
	GDM	0(0)	2(1.98)	2(1.33)
	PIH	16(32.65)	9(8.91)	25(16.67)
	None	31(63.27)	87(86.14)	118(78.67)
Total		49(100)	101(100)	150(100)

In my study, the majority of the mother had no risk factor,i.e.,78.67%. PIH was found in 32.65% of thick MSL and 8.91% of thin MSL. Anaemia of the mother produced 4.08% of thick MSL babies and 2.97% of thin MSL. Only two babies of thin MSL were born to GDM mother.

Table 6: Mode of delivery

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
MODE OF DELIVERY	FORCEPS	15 (31%)	42(41%)	57 (38%)
	NVD	1(2%)	28 (27%)	29 (19%)
	LSCS	33 (68%)	31 (30.6%)	64 (42%)

Out of 150 children, LSCS was commonly associated with 68% of thick MSL & 30.6% of thin MSL. NVD is least commonly associated with thick MSL (2%) & thin MSL (27%).

Table 7: Indication of LSCS

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
INDICATION OF LSCS	CPD	3(8.5%)	8(27.5%)	11(17.1%)
	FETAL DISTRESS	18(51.4%)	12(41.3%)	30(46.8%)
	OLIGO+FETAL DISTRESS	7(20%)	2(6.8%)	9(14%)
	PREV CS	7(20%)	7(24%)	14(21.8%)
		35(100%)	29(100%)	64

In my study, indication of LSCS is due to fetal distress in 46.8%, previous cs in 21.8% & cephalopelvic disproportion in 17.1%.

Table 8: Distribution of cases according to gender

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
SEX	FEMALE	26(53%)	45(44.5%)	71(47.3%)
	MALE	23(46.9%)	56(55.4%)	79(52.6%)
TOTAL		49(100%)	101(100%)	150

Out of 150 cases, 49 were thick, among them 26 were female & 23 were male. Among the babies delivered with thin MSL, mostly were male amounting to 56 (55.4%) and female amounting to 45 (44.5%).

Table 9 : Gestational age of cases

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
GESTATIONAL AGE ON WEEKS	34-36 WKS	1(2%)	2(1.9%)	3(2.1%)
	36-40 WKS	47(95.9%)	88(87.1%)	135(90.2%)
	>40 WKS	1(2%)	11(10.8%)	12(8%)
TOTAL		49(100%)	101(100%)	150

Majority of cases born in between 36-40 weeks out of which 47 are of thick MSL & 88 are of thin MSL. Only 3(2.1%) babies were born in between 34-36 weeks & 12(8%) after 40 weeks.

Table 10: Type Of Baby

	TYPE OF MECONIUM		TOTAL
	THICK	THIN	

TYPE OF BABY	NONVIGOROUS	21(42.8%)	11(10.8%)	32(21.3%)
	VIGOROUS	28(57.1%)	90(89.1%)	118(78.6%)
TOTAL		49(100%)	101(100%)	150

Out of 150 cases, 118 were vigorous & 32 were nonvigorous. Among the nonvigorous babies, 10.8% were thin & 42.8% were thick MSL. 57.1% & 89.1% of vigorous babies were of thick & thin type MSL respectively.

Table 11: Admission in NICU

		Type of meconium		TOTAL
		Thick	Thin	
Admission in NICU	No	15(30.9%)	60(60.2%)	75(50%)
	Yes	34(69.2%)	41(39.8%)	75(50%)
TOTAL		49(100%)	101(100%)	150

In my study, majority of thick MSAF, 34 (69.2%) of thick MSF & of 41(39.8%) of thin MSL got admitted in NICU. Total 50% were admitted and 50% were shifted to motherside & kept on further observation. Percentage of admission in NICU is higher in thick MSL.

Table 12: Chest X Ray Of Admitted Case

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
CHEST X RAY	MAS	12(34.2%)	2(5%)	14(18.6%)
	NORMAL	20(57.1%)	37(92.5%)	57(76%)
	PNEUMOTHORAX	3(8%)	1(2.5%)	4(5.5%)
TOTAL		35(100%)	40(100%)	75

Among 35 thick MSL, Normal study, MAS & pneumothorax were seen in 34.2%, 57.1% & 8% babies respectively. Similarly in thin MSL, normal study, MAS, pneumothorax were seen in 5%, 92.5%, 2.5% children respectively.

Table 13: Type Of Treatment

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
TYPE OF TREATMENT	O ₂ +IVFLUID	12(34.2%)	32(80%)	44(58.6%)
	O ₂ +IVFLUID+ANTIBIOTIC	9(25.7%)	5(12.5%)	14(18.6%)
	O ₂ +IVFLUID+ANTIBIOTIC+ANTICONVULSANTS	14(40%)	3(7.5%)	17(22.6%)

TOTAL	35(100%)	40(100%)	75
-------	----------	----------	----

Out of 75 babies, 34.2% in thick MSL ,80% in thin MSL received Oxygen ,Iv fluid.25.7% of thick MSL & 7.5% of thin MSL received Oxygen ,Iv fluid, Antibiotic respectyvely.In severe cases associated with seizure ,40% in thick MSL & 7.5% in thin MSL received all above treatment along with anticonvulsants.

Table 14: Type Of Airway Management Required

		TYPE OF MECONIUM		TOTAL
		THICK	THIN	
TYPE OF AIRWAY MANAGEM ENT REQUIRED	OXYGEN	15(42.8%)	22(62.8%)	37(50%)
	CPAP	13(37%)	14(40%)	27(35%)
	MECHANICAL VENTILATION	7(20%)	4(11.4%)	11(15%)
	SURFACTANT	6(17.1%)	2(5.7%)	8(10%)
TOTAL		35(100%)	40(100%)	75

Out of 35 thick MSL, Oxygen, CPAP, mechanical ventilation & surfactant are required in 42.8%,37%,20% & 17% respectively. Among 40 thin MSL, 62.8%,40%,11.4% & 5.7% required oxygen, CPAP, mechanical ventilation & surfactant respectively.

Discussion

In my study conducted at Hi-Tech Medical College & Hospital, Bhubaneswar during 1st Oct 2020-31st Sept 2022,total number of deliveries done was 1255.Out of them MSAF was observed in 150. Incidence of MSAF in our study during that period is 11.9% which is greater than the incidence of 6.7% as observed in **Joseph et al²** study but as per **Nath et al³** study, incidence was 17.6% out of which 6.5% showed MAS features. Majority of babies are of booking cases amounting to 90% on contrary to **Rajlaxmi mundra⁴** study, where unbooked caes showed higher prevalence of 72.12%. Predominantly mother from rural area were delivered amounting to 60.67% of MSAF baby. According to modified B.G PRASAD Scale, lower middle class,lower & middle class revealed 52.3%,25.3% & 23.3% of MSL babies respectively. On contrary to **Akmal et al⁵** ,MSAF delivered from mother belong to upper & upper middle class socioeconomic scale. My study reveals that mother having co-morbid risk factors like PIH, GDM & Anemia present with MSAF in 16.67%,1.33%,3.33% respectively. Similarly **Bhide et al⁶** study also demonstrated 13.8% cases associated with PIH.I found that thick MSL babies experience more of LSCS or assisted deliveries than

in thin MSL .**Narang et al⁷** study also described 54.2% babies born through LSCS ,30.7% through NVD & 11.8% through forceps. Majority of mothers undergo LSCS because of fetal distress in 46.8% followed by oligohydramnios & fetal distress additionally in 14% which is similar to **Gupta study⁸** in which LSCS was observed in 25% babies of meconium stained liquor. Like **Berkus et al⁹**, my study describes male babies have slight predominance of 52.6% than female babies(47.3%).Preponderantly babies of gestational age of 36-40 weeks born through MSAF had increased incidence of 90.2% where babies of <36 weeks & > 40 weeks were with incidence of 2.1% & 8 % respectively which is similar to **Gurmeet singh et al¹⁰** where most term babies were associated with MSL but **Rajalxmi et al⁴** study showed that it had predominant post-term babies. After routine newborn care, babies were categorized into vigorous & nonvigorous baby.In my study, Vigorous babies (78.6%) outnumbered non-vigorous baby(21.4%). Out of 32 non-vigorous babies, 42.8% babies were of thick MSL & 10.8% were thin MSL .In my study, babies admitted to NICU were 50% of which majority are of thick type(69.2%) followed by thin type (31.8%).Similarly **Vaghela et al¹¹** study demonstrated that increased admission rate associated

with thick MSL. Among 35 newborns delivered with thick MSL, normal study, MAS & pneumothorax were observed in 34.2%, 57.1% & 8% respectively. Out of 40 newborns born with thin MSL, normal study, MAS & pneumothorax were recorded in 5%, 92.5% & 2.5% respectively with p-value < 0.01 which is statistically significant. Thick MSL babies were more prone to MAS & pneumothorax than thin MSL which is similar to Raghav *et al* study where radiography revealed 80% of MAS & 5% of pneumothorax & 5% of atelectasis.

In my study, babies were managed conservatively with IV fluid & oxygen in 58.6%, while antibiotics are required in 18.6% & anticonvulsants were administered in 22.6%. **Raghuraman *et al*¹⁴**, in his study, found many of neonates with MAS (14 out of 20) were managed with Oxygen & IV fluid & **Nath *et al*³** study also showed 68% were managed conservatively. My study also revealed babies born with MSL may require oxygen in 50%, CPAP in 35%, mechanical ventilation in 15% & surfactant in 10%. On contrary to **Espinhera study¹⁵** & **Meena Priyadarshini¹⁶** study described that 43.1% & 48.5% needed ventilator support respectively

Though in my study, mothers are from lower & lower middle class society with 90% of them are booked because of increased accessibility to government based BSKY scheme in our private institution where early intervention & advanced modality of treatment is affordable to patients. In our study, deadly complication like pneumothorax are associated with most commonly thick MSL where appropriate therapy is provided quickly with CPAP Or Surfactant as a result less invasive airway management is required.

Conclusion

MSAF by itself has no significance unless it produces complication or requiring admission in neonatal unit. In our study, most of babies who were born through MSAF had normal outcome while few percentage had complications. MSAF is associated with increased morbidity, majority of which are of thick MSL suggesting that consistency of meconium had direct bearing in neonatal outcome. Social class of mother has no association with outcome of MSL babies. Further research has to be carried out to establish association of socioeconomic state of mother with outcome of MSL babies.

References

1. Cleary GM, Wiswell TE meconium stained amniotic fluid & the meconium aspiration syndrome-An update. *Pediatr Clin North Am* 1993
2. Joseph .babies born to mothers with meconium stained amniotic fluid international journal of contemporary medical research 2017;4(7):1457-1461
3. Nath GDR *et al* study .Study on clinical profile of MAS in relation to GA & BW & their immediate outcome .*Int j Contemp Pediatric* 2017Nov;4(6):2142—2150
4. Rajlaxmi Mundhra and Manika Agarwal, Fetal Outcome in Meconium Stained Deliveries *Journal of Clinical and Diagnostic Research*. 2013 Dec, Vol-7(12): 2874-2876
5. Akmal ,Meconium aspiration in neonates: combined obstetric & pediatric intervention improves outcome: *May 1996, Volume 46, Issue 5*.
6. Bhide SS, Shendurnikar N, Aiyer S, Baxi SR. Neonatal outcome after meconium stained amniotic fluid. *J Obstet Gynaecol India*. 1994;48:933-5.
7. Narang A, Nair PM, Bhakoo ON, Vashishi: K. Management of meconium stained amniotic fluid: A team approach. *India Pediatr* 1993; 30: 9-13
8. Gupta V, Bhatia BD, Mishra OP. Meconium stained amniotic fluid: antenatal, intrapartum and neonatal attributes. *Indian Pediatr* 1996;33:293–7
9. Berkus MD, Langer O, Samueloff A, Xenalkis EM, Field NT, Ridgway LE. Meconium-stained amniotic fluid: increased risk for adverse neonatal outcome. *Obstet Gynecol*. 1994 Jul; 84 (1): 115-20
10. Gurmeet Singh, Onkar Singh*, Karuna Thapar Neonatal outcome in meconium stained amniotic fluid: a hospital based study *Int J Contemp Pediatr*. 2017Mar;4(2):356-360
11. Vaghela HP, Deliwala K, Shah P. Fetal outcome in deliveries with meconium stained liquor. *Int J Reprod Contracept Obstet Gynecol* 2014;3:909-12.
12. Wiswell, T.E., Tuggle, J.M. and Turner, B.S. Meconium aspiration syndrome: Have we made a difference? *Pediatrics*, 1990;85:715-721.
13. Grishma Hirani*, Rupinder Kaur*, Basanthkumar GR A Study on clinical profile of meconium aspiration syndrome in relation to

- gestational age and birthweight and their immediate outcome RGUHS Med Sciences, April 2015/ Vol. - 5 / Issue-2.
14. T S Raghu Raman and D G Jayaprakash, neonatal outcome in meconium stained deliveries - A Prospective study. Med J Armed Forces India. 1997 Jan; 53(1):15-18.
 15. Espinhera MC et al, Meconium aspiration syndrome – the experience of a tertiary centre. Rev portal pneumol 2011 mar – apr; 17(2):71-6.
 16. Dr. Meena Priyadarshini.V, Dr. Seetha Panicker, Meconium Stained Liquor and Its Fetal Outcome - Retrospective Study IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). Volume 6, Issue 2 (Mar.- Apr. 2013), PP27-31.