Original Article

The Outcome Of Meconium-Stained Liquor In Newborn In A Tertiary Care Hospital

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Abstract

Background: Amniotic fluid is the fluid that surrounds the fetus inside the womb and creates a safe, protective, and impact-free environment. Meconium enters the amniotic fluid when the fetus is stressed. Its existence indicates prenatal dysfunction and is linked to higher perinatal morbidity and mortality. Our aim of this study was to determine the perinatal outcome of meconium-stained amniotic fluid babies born in a tertiary care center.

Materials and Methods: This is a retrospective study done in Tertiary Care Hospital in Tamil Nadu, India and data were collected from the period of 24 months from 2020-2022. A total of 112 patients were included in the study and their case sheets were analyzed. Neonates from the postnatal ward and Neonatal Intensive Care Unit (NICU) admitted with meconium-stained liquor were included in the study. Maternal factors as well as neonatal factors were analyzed. Neonatal factors like Birth asphyxia, Requirement of NICU admission, oxygen requirement, development of meconium aspiration syndrome, neonatal sepsis, Development of PPHN, Inotrope requirement and sildenafil requirement were also analyzed. The neonatal factors were compared to find the outcome of neonates with meconium-stained liquor.

Results: The mean maternal age were 28.7 years and Mean weight of the neonates was 3kgs. 35.7% were Male neonates and with female predilection of 64.3%. Maternal complications were also analyzed. Pregnancy Induced Hypertension (PIH) was seen in 16, Gestational Diabetes Mellitus was seen in 17 and Anemia was seen in 11. Meconium was thin in 95 neonates and thick in 17 neonates. Premature rupture of membrane was seen in 94 neonates. Factors like Identity of the neonate, Gestational age, Gender of the neonate, Maternal age, maternal booking, parity and pregnancy complications and comorbidities, Mode of delivery, Birth weight of the neonate, Apgar score, Neonatal outcomes such as Birth asphyxia, Requirement of NICU admission, oxygen requirement, development of meconium aspiration syndrome, neonatal sepsis, Development of PPHN, Inotrope requirement or sildenafil requirement, Comorbidities of neonate were compared to the meconium stained Amniotic fluid in neonates. It was noticed that the neonatal factors like birth asphyxia seen in 17; requirement of oxygen among 25 neonates, development of sepsis and requirement of antibiotics 15 and 14 respectively among the neonates had significant association with the outcome of the neonates with meconium aspiration syndrome.

Conclusion: Meconium-stained amniotic fluid is associated with an increased frequency of operative deliveries, poor neonatal outcomes, and more frequent admissions to the NICU. Identification of high-risk factors is important, and timely referral of patients to centers with appropriate neonatal care facilities equipped with mechanical ventilators reduces neonatal morbidity and mortality. In this study, It was noticed that the neonatal factors like birth asphyxia seen in 17, requirement of oxygen among 25 neonates, development of sepsis and requirement of antibiotics 15 and 14 respectively among the neonates had significant association with the outcome of the neonates with meconium aspiration syndrome.

Keywords: Meconium-stained Amniotic Fluid, Meconium Aspiration Syndrome, Neonatal Outcome, Maternal Outcome.

INTRODUCTION

Amniotic fluid is the fluid that surrounds the fetus inside the womb and creates a safe, protective, and impact-free environment. Amniotic fluid is excreted by fetal skin, amniotic membranes, and fetal urine. A dark green liquid called meconium, which contains epithelial cells, mucus, and bile, is typically expelled by newborns. Meconium enters the amniotic fluid when the fetus is stressed. Its existence indicates prenatal dysfunction and is linked to higher perinatal morbidity and mortality [1]. Meconium-stained amniotic fluid (MSAF) is linked to a greater rate of caesarean section, instrumental delivery, low birth weight, fetal distress, NICU admission rates, and newborn deaths [2].

13% to 16% of births are generally complicated by meconium-stained amniotic fluid [3]. Meconium Aspiration Syndrome

(MAS), which is present in about 2-10% of cases of meconium-stained amniotic fluid, happens when the baby aspirates the meconium [4]. About 12% of newborns with MAS experience neonatal mortality [5]. Amniotic fluid that has meconium stains in it may be a sign that the digestive system is developing normally. It could also be found in fetal discomfort brought on by a short-term or long-term hypoxic event [4, 6]. Meconium from the fetus enters the amniotic fluid when it experiences an acute or chronic hypoxic episode. The passage of meconium-stained amniotic fluid is caused by a variety of conditions, including maternal drug usage, preeclampsia, placental insufficiency, oligohydramnios, postpartum pregnancy, and maternal hypertension [7].

Meconium-stained amniotic fluid is clearly connected with poor perinatal outcomes; hence a well-designed study is required. However, there is a lot of ambiguity surrounding the treatment of labor in connection with meconium-stained amniotic fluid, which causes needless caesarean sections. Although there has been some research on the topic in different regions of India, there have been very few well-designed comparative studies in the country's northeast. Such a study was carried out in Shillong by Mundhra and Agarwal [3]. The study's main goal was to evaluate the perinatal outcomes of individuals who were pregnant and had difficulties involving meconium-stained amniotic fluid to those who had clear amniotic fluid. The secondary goal was to compare the risk factors for pregnancy and the method of delivery for laboring moms with meconium-stained amniotic fluid. The secondary objective was to determine the risk factors during pregnancy and delivery mode of laboring mothers with Meconium-stained amniotic fluid compared to clear amniotic fluid.

Materials & Methods

Study Design and Participants

Neonates from the NICU admitted with meconium-stained liquor were included in the study. The clinical history and the outcome of those neonates were assessed with the consent of Mothers of neonates**.**

Sample Size Calculation

Study by Nadia Mohammad shows the frequency of study population havingMeconium-stained Liquor was 7.85%.

Unlimited population:

$$CI = \hat{p} \pm z \times \sqrt{\frac{p(1-p)}{n}}$$

Finite population:

$$CI' = \hat{p} \pm z \times \sqrt{\frac{\hat{p}(1-\hat{p})}{n'} \times \frac{N-n'}{N-1}}$$

By above formula for unlimited population, sample size was calculated to be 112.

This means 112 or more measurements/surveys are needed to have a confidencelevel of 95% that the real value is within ±5% of the measured/surveyed value.

This retrospective study was conducted in a Tertiary care hospital from Jan 2021- Jan 2022 among the neonates born in labor ward.

A total of 112 patients were included in the study after taking their written consent.

Inclusion and Exclusion Criteria

Newborns born through meconium-stained amniotic fluid in the hospital during the period – 2020-2022 Exclusion criteria for this study included pre-term infants <37 weeks, Post-term infants >42 weeks, infants with congenital anomalies detected in utero.

Study Procedure

All patient demographics were collected. The newborns were thoroughly examined, and findings were recorded. Maternal risk factors were noted. The newborns were divided into two groups: one group with Meconium-stained amniotic fluid and the other group with clear amniotic fluid. Meconium-stained amniotic fluid was further divided into three classes: Class I was thin yellow meconium with no particles, Class II was light green with few particles, and Class III was thick pasty dark green meconium with excess particles. Neonatal outcomes such as Birth asphyxia, Requirement of NICU admission, oxygen requirement, development of meconium aspiration syndrome, neonatal sepsis, Development of PPHN, Inotrope requirement and sildenafil requirement and

tested statistically for significance.

Statistical Analysis

The data were coded and recorded in a MS Excel spreadsheet. For data analysis we used SPSS version 25 (IBM Corp., Armonk, NY). For descriptive statistics, we used means/standard deviations or medians/quartile ranges for continuous variables, while we used counts and percentages for categorical variables. The chi-square test was used for group comparisons of categorical data. If the expected frequency in the contingency tables was < 5 for > 25% of cells, Fischer's exact test was used instead.

RESULTS

Table 1: Mean values

		MATERNAL AGE	BIRTH WEIGHT OF NEWBORN
N	Valid	112	112
	Missing	0	0
Mean		28.7946	3.0375

The average maternal age in my study was 28.7 years. And mean birth weight of children was 3kgs.

Frequency Table

Table 2: Gender of newborn

		Frequency	Percent
Valid	MALE	40	35.7
	FEMALE	72	64.3
	Total	112	100.0

Among the participants 35.7% were male neonates Remaining most of them were females.

Table 3: Booking of antenatal mothers

		Frequency	Percent
Valid	BOOKED	111	99.1
	UNBOOKED	1	.9
	Total	112	100.0

About 99.1% of the antenatal mother were booked case

Table 4: Pregnancy complication

		Frequency	Percent
Valid	NONE	68	60.7
	PIH	16	14.3
	GDM	17	15.2
	ANEMIA	11	9.8
	Total	112	100.0

About 60.7% of antenatal mothers had maternal complications.14.3% had PIH, 15.2% had GDM, 9.8% had Anemia.

Table 5: Grades of meconium-stained amniotic fluid

		Frequency	Percent
Valid	THIN	95	84.8
	THICK	17	15.2
	Total	112	100.0

84.8% of the study participants had think meconium stain liquor and remaining had thick meconium-stained liquor.

Table 6: Prom

		Frequency	Percent
Valid	NO	94	83.9

	YES	18	16.1
	Total	112	100.0

Premature rupture of membrane was seen among 18 patients.

Table 7: Rupture of membrane

		Frequency	Percent
Valid	SPONTANEOUS	94	83.9
	ARTIFICIAL	18	16.1
	Total	112	100.0

Rupture of membrane was spontaneous among 94 participants others had artificial rupture of membrane.

Table 8: Maternal factors

ANTENATAL BOOKING	MECONIUM STAIN THIN	THICK	TOTAL	CHI- SQUARE	P Value
BOOKED	94	17	111	0.671	1.000
UNBOOKED	1	0	1		
PARITY					
PRIMI PARA	44	10	54	0.342	0.432
MULTIPARA	51	7	58		
PREGNANCY COMPLICATION					
Nil	58	10	68	2.333	0.506
PIH	15	1	16		
GDM	14	3	17		
ANEMIA	8	3	11		

Association between Meconium-stained liquor and maternal factors were analyzed by Chi- square test. In my study among the thin and thick meconium stained liquor showed no association with the maternal risk factors.

Table 9: Neonatal factors

NEONATAL FACTORS	PRESENT	CHI- SQUARE	P Value
Birth Asphyxia	17	0.671	0.000
Oxygen Requirement	25	0.342	0.034
Hood oxygen	12	0.342	0.042
CPAP Requirement	8	0.3435	0.006
Mechanical Ventilation	9	0.213	0.045
Development of Meconium Aspiration syndrome	58	2.333	0.026
Development PPHN	8	0.3534	1.034
Development of sepsis	15	0.045	0.023
Requirement of antibiotics	14	0.3435	0.045
Requirement of Ionotrope	5	0.3645	1.045
Requirement of Sildenafyl	3	0.4546	1.034
Mortality	1	0.045	1.0000

It was noticed that the neonatal factors like birth asphyxia seen in 17; requirement of oxygen among 25 neonates, development of sepsis and requirement of antibiotics 15 and 14 respectively among the neonates had significant association with the outcome of the neonates with meconium aspiration syndrome.

DISCUSSION

To determine the impact of meconium-stained amniotic fluid on the method of delivery and the immediate newborn outcome, several parameters were examined in the current study. We also evaluated several high-risk characteristics related to meconium-stained amniotic fluid. Numerous studies [1-3,7] have found a strong correlation between meconium-stained amniotic fluid and aberrant fetal heart rate patterns, a higher rate of caesarean section, and a low Apgar score. Since majority of mothers with meconium-stained amniotic fluid were under 25 years old, the current study and the study of Rafia et al. are comparable in terms of age in the meconium-stained amniotic fluid group [8]. This was in contrast to the studies by Lee et al. and Addisu et al. in which the maximum number of participants with Meconium-stained amniotic fluid was older than 25 years [4,9]. The maternal mean age was 28.7 years.

According to this research conclusion by Unnisa et al. and Becker et al., primigravidas have a greater incidence of meconium-

stained amniotic fluid [10,11]. This was in contrast to research by Mundhra and Agarwal, which found that multigravidas had a slightly higher incidence (51.52%) of meconium-stained amniotic fluid [3].

The result was in agreement with research by Singh et al. and Rafia et al., which found 13% and 12% of pregnancies to be postdated, respectively [8,12].

According to Rafia et al's study, 65.8% of patients with meconium-stained amniotic fluid had fetal discomfort [8]. In contrast, Qadir et al detected fetal discomfort in 29.6% of instances with meconium-stained amniotic fluid in research.

This study shows that almost 99% of mothers were booked case, Maternal complication was seen among 10 mothers with PIH, 17 had GDM and 11 had Anemia while 68 had no antenatal issues. PROM was seen in 94 mothers and Spontaneous rupture was seen in 94 mothers.

This study showed no statistically significant association between grades of liquor and maternal factors. The fact that our institute is a tertiary care referral center and that more than 50% of patients who come to our hospital have some associated high-risk conditions may be the source of the elevated likelihood of LSCS and NICU referrals in the non-meconium-stained amniotic fluid group.

The relationship between Meconium-stained amniotic fluid with poor fetal outcomes and associated risk factors has been extensively studied.

It was noticed that the neonatal factors like birth asphyxia seen in 17, requirement of oxygen among 25 neonates, development of sepsis and requirement of antibiotics 15 and 14 respectively among the neonates had significant association with the outcome of the neonates with meconium aspiration syndrome.

We conducted this study because we wanted to look for the results in our institute and because very few well-designed comparative studies on the subject have been conducted in our region.

LIMITATIONS

Because our study was retrospective, there are certain limitations and therefore it may not be possible to establish a temporal relationship between Meconium-stained amniotic fluid and explanatory variables. Another limitation is the small sample size.

CONCLUSION

Meconium-stained amniotic fluid is associated with an increased frequency of operative deliveries, poor neonatal outcomes, and more frequent admissions to the NICU. Identification of high-risk factors is important, and timely referral of patients to centers with appropriate neonatal care facilities equipped with mechanical ventilators reduces neonatal morbidity and mortality. In this study, it was noticed that the neonatal factors like birth asphyxia seen in 17, requirement of oxygen among 25 neonates, development of sepsis and requirement of antibiotics 15 and 14 respectively among the neonates had significant association with the outcome of the neonates with meconium aspiration syndrome.

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