

Frequency of PPHN in Neonates Having Confirmed Diagnosis of Meconium Aspiration Syndrome

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ABSTRACT

Background: Optimal oxygenation, avoidance of respiratory and metabolic acidosis, normal blood pressure, sedation & pulmonary vasodilator treatment are among the management techniques for persistent pulmonary hypertension of the newborn.

Aim: To find frequency of PPHN in neonates having confirmed diagnosis of meconium aspiration syndrome.

Study Design: Descriptive cross sectional study.

Methodology: Total 240 neonates who fulfilled inclusion criteria were enrolled from Pediatrics Medicine Ittifaq hospital Lahore after getting informed consent form parents or attendants. Basic information like gestational age, gender, birth weight, APGAR score at 7 minutes, mode of delivery were taken (on antenatal record). All cases with confirmed diagnosis of MAS were underwent 2D Echocardiography and PPHN were diagnosed as per operational definition. All diagnostic procedure was done by a single consultant cardiologists. SPSS 20.0 was utilized to analyze the data. For quantitative data, mean and standard deviation were provided, while frequencies and percentages were provided for qualitative factors. Post stratification Chi-square test was applied taking p-value ≤ 0.05 as significant. **Results:** The mean birth weight was 3211.02 ± 412.10 grams with min & max birth weight as 2500 and 3882 g. The mean APGAR score was 7.95 ± 1.41 . There were 85(35.4%) cases who had PPHN while 155(64.6%) cases did not have positive diagnosis of PPHN.

Conclusions: It was concluded that frequency of PPHN in neonates having confirmed diagnosis of meconium aspiration syndrome is very high. So early screening during antenatal visits and adopting preventive strategies can only minimize the risk of meconium aspiration syndrome thus preventing PPHN.

Keywords: Persistent Pulmonary Hypertension, Meconium Aspiration Syndrome, Meconium Stained Amniotic Fluid

INTRODUCTION

Meconium is the first stool of the neonate. It is composed of substances that are swallowed by the fetus during "in utero" period: epithelial cells, mucus, fetal hair and water¹⁻³. Meconium aspiration syndrome (MAS) is characterised by respiratory distress that appears shortly after birth⁴, with aspiration pneumonia confirmed by radiology and the presence of meconium-stained amniotic fluid⁵. MSAF occurs in 5-22% of all pregnancies, and 1-12% of MSAF newborns acquire MAS. MAS is a disease that can show with just modest respiratory symptoms, but it can also have fatal effects despite all therapeutic methods⁶.

Persistent pulmonary hypertension of the newborn (PPHN) is an occurrence of failing circulatory adaptation at birth that affects approximately 2/1000 live born newborns. While it is most commonly seen among term and near-term babies, it can also be seen in premature infants with breathing problems or bronchopulmonary dysplasia.⁷ PPHN is a true problem in MAS-born neonates, and it usually occurs in neonates born via unexpected and unmonitored delivery. The occurrence of PPHN can be minimised by providing adequate antenatal care, as well as regular follow-up of high-risk pregnancies. PPHN is diagnosed with 2D echocardiography¹.

Literature review revealed that, a total of 369 PPHN newborns were found in a retrospective study. PPHN frequency ranged from 1.2 to 4.6 per 1000 live births. PPHN was caused primarily by meconium aspiration syndrome (24.1%). In the majority of cases (84.8%), echocardiography was used to make the diagnosis of PPHN⁸. Another study reported frequency of 122 PPHN was found with 52(42.6%) confirmed diagnosis of meconium aspiration syndrome⁹.

The aim of the study to find PPHN in infants having meconium aspiration syndrome in our local neonates. As no local data is found and reported studies published inconsistent frequency PPHN in infants having meconium aspiration syndrome. If we find high frequency of PPHN then through early screening during antenatal visits we can start prevention strategy to minimize

the risk of meconium aspiration syndrome and then prevent PPHN or once its diagnosed then we can start therapeutic strategy to treat PPHN (after early diagnosis) as these two condition can increase the probability of neonatal complications and mortality.

Due to lack of local data regarding frequency of PPHN among infants having meconium aspiration syndrome, we planned current project. Thus, results of present study can help us in adopting and making preventive strategies for this health issue among neonates.

METHODOLOGY

This cross sectional study was conducted 12 April 2018 to October 2018 from Neonatal Unit of Pediatrics Medicine, Ittifaq Hospital, Lahore after IRB permission. Sample size of 240 is calculated at 5.0% level of significance and 5.0% margin of error and taking expected percentage of PPHN as 19%.¹⁰ Patients age 0-28 days with either gender, gestational age at the time of birth 37-42 weeks, birth weight 2500-4000g, any mode of delivery and confirmed diagnosis of MAS (on the basis of history and evidence of meconium in liquor during perinatal period along with tachypnea >60/min were included. Congenital malformation of heart, lung and diaphragm (assessed clinically on Echo) patients were excluded. Basic information like gestational age, gender, birth weight, APGAR score at 7 minutes, mode of delivery were taken. All cases with confirmed diagnosis of MAS were underwent 2D Echocardiography and PPHN were diagnosed. All diagnostic procedure was done by a single consultant cardiologists.

Statistical Analysis: SPSS 20.0 was utilized to analyze the data. For quantitative data, mean and standard deviation were provided, while frequencies and percentages were provided for qualitative factors. Post stratification Chi-square test was applied taking p-value ≤ 0.05 as significant.

RESULTS

There were 116(48.3%) cases born at 37-39 weeks and 124(51.7%) cases were born during 40-42 weeks of gestation. There were 113(47.1%) male and 127(52.9%) female cases. There were 119(49.6%) neonates were < 15 days of age and 121(50.4%)

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neonates were 15-28 days old. A total of 86(35.8%) neonates had 2500 – 3000 g weight and 154(64.2%) cases had weight as 3001–3900 g as shown in Table-1.

Table-1: Generalized parameters among neonates

	Mean	Frequency (%)
Age (days)	Mean±SD	13.73±8.08
	<15 days	119(49.58%)
	>15days	121(50.42%)
Gender	Male	113(47.06%)
	Female	127(52.92%)
Gestational age (weeks)	Mean±SD	39.49±1.67
	37-39	116(48.33%)
	40-42	124(51.67%)
Birth weight (g)	Mean±SD	3211.02±412.10
	2500-3000g	86(35.83%)
	3001-3900	154(64.17%)

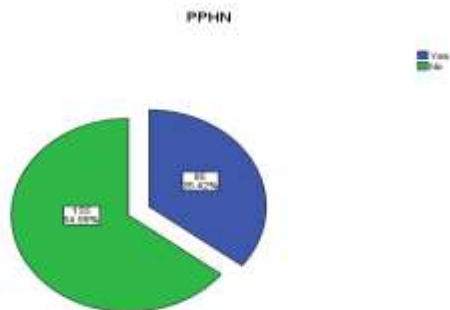
Neonates born through C-section were 80 (33.3%) and neonates were born SVD 160 (66.7%) as shown in Figure-1. The mean APGAR score was 7.95±1.41. A total of 145(60.4%) cases had APGAR score as 6-8 and 95 (39.6%) neonates had APGAR score as 9-10.

Figure-1: Mode of Delivery



There were 85 (35.4%) cases who had PPHN while 155 (64.6%) cases did not have positive diagnosis of PPHN as shown in Figure-2.

Figure-2: Distribution of PPHN



When data was stratified according to age, gender, gestational age, birth weight, mode of delivery and Apgar score at 7 minutes, no significant difference of PPHN was found in these strata, p-value > 0.05 as shown in Table-2.

Table 2: Comparison of frequency of PPHN with respect to different parameters

	PPHN		P value
	Yes	No	
Age Group (days)			
<15	42(35.3%)	77(64.7%)	0.969
>15	43(35.5%)	78(64.5%)	
Gender			
Male	44(38.9%)	69(61.1%)	0.282
Female	41(32.3%)	86(67.7%)	
Gestational age(weeks)			
37-39	39(33.6%)	77(66.4%)	0.574
40-42	46(37.1%)	78(62.9%)	
Birth Weight (g)			
2500-3000	34(39.5%)	52(60.5%)	0.319
3001-3900	51(33.%)	103(66.9%)	
Mode of Delivery			
C section	28(35%)	52(65%)	0.924
SVD	57(35.6%)	103(64.4%)	
APGAR score			
6-8	47(32.4%)	98(67.6%)	0.229
9-10	38(40%)	57(60%)	

DISCUSSION

Meconium aspiration syndrome (MAS) can happen before, during, or after birth. Advanced gestation, lower Apgar score, caesarean section births, fetal heart rate anomalies, and diverse ethnicities have all been linked to an increased risk of MAS¹¹.

It refers to a spectrum of clinical evidences in perinatal period which includes meconium staining of skin and umbilical cord, presence of meconium at or below vocal cords, development of respiratory distress and typical chest X-ray findings^{12,13}. Meconium Aspiration Syndrome is a significant cause of death in otherwise healthy term & post term infants¹⁴. As MAS is usually associated with continuous pulmonary hypertension of the newborn (PPHN), several factors, including low pO2 and pH, coexisting intrauterine hypoxia & perhaps vasoactive chemicals in the meconium itself, contribute to its development¹⁵.

In current study the mean age of subjects was 13.73±8.08 days. There were 113(47.1%) male & 127(52.9%) female cases. There were 85(35.4%) cases who had PPHN while 155(64.6%) cases did not have positive diagnosis of PPHN. A study reported frequency of PPHN was found in 53% in infants with confirmed diagnosis of meconium aspiration syndrome⁹ while another study found that 19% infants had PPHN in infants having meconium aspiration syndrome⁹.

In one study, most of the PPHN cases, 78(64%), had gestational ages greater than 37 weeks. Caesarean section was used in 70(57.4%) of the patients, whereas 52(42.6%) had spontaneous vaginal delivery⁹. Another study was conducted in 2017, with 102(68%) male patients and 48 (32% female) individuals. The most common form of delivery in MAS patients (56%) was Caesarean section¹⁶.

One previous study assessed the newborn's chronic pulmonary hypertension¹⁷. Through a retrospective assessment of 29 neonates with continuous pulmonary hypertension, they stated that their 9-year experience in the therapy of PPHN. The wide range of PPHN etiologies, vasodilator therapy complications, assisted ventilation management; death rates and morbidity were all examined. The average birth body weight was 2706±692 gm and the average gestational age was 37.2± 3.0 weeks (range:131-411weeks). Meconium aspiration syndrome (n=8), perinatal asphyxia (n=7), respiratory distress syndrome (n=5), sepsis and/or pneumonia (n=4) were the underlying clinical disorders¹⁸. Another study showed that the most important risk factors related with MAS that lead to the development of PPHN include pneumothorax, change in pattern of fetal heart beat & asphyxia. Avoiding asphyxia & pneumothorax may be the key to decrease the frequency of PPHN and MAS mortality¹⁹.

Limitations of study: Small group of population followed by limited financial and human resources added to our limitations.

CONCLUSIONS

It was concluded that frequency of PPHN in neonates having confirmed diagnosis of meconium aspiration syndrome is very high. So early screening during antenatal visits and adopting preventive strategies can only minimize the risk of meconium aspiration syndrome thus preventing PPHN.

Authorship and contribution Declaration: Each author of this article fulfilled following Criteria of Authorship:

SA, MJ & NNA: Overall supervision and Write up and literature review.

SAK&MA: Literature review help in write-up.

All authors agree to be responsible for all aspects of their research work.

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