ORIGINAL ARTICLE

A Clinical Study of Newborns with Tachypnea: Frequency, Aetiologies and their Outcome

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Author`s Contribution

[1]Conception, synthesis, planning of research and writing of manuscript
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ABSTRACT

Aims & Objectives: To estimate the frequency, aetiologies and outcome of neonates admitted with Tachypnea in Neonatal Intensive Care Unit (NICU) FGPC PGMI Islamabad.

To identify the causes of Tachypnea in newborns, analyze outcome at present, and to plan better outcome in future

Materials & Methods: A prospective study was conducted at Neonatal Intensive Care Unit of Federal Government Polyclinic Hospital PGMI from 1st June 2016 till 31st July 2017.Data were collected from all patients enrolled in the study during this period. Aim of our study is to identify the causes of Tachypnea in newborns, analyze outcome at present, and to plan better outcome in future.

Results: Total 826 neonates were admitted, of which 248 were enrolled in the study. The frequency of tacyopnea was found to be 29.9%.The commonest causes of Tachypnea in our study were Respiratory distress syndrome 82 cases (33.1%), Transient Tachypnea of newborn 71 cases (28.6%) , Meconium Aspiration syndrome 31 cases (12.5%), Congenital heart disease 17 cases (6.8%).Cesearean section was the most common predisposing factor associated with development of RDS & TTN(the two most common causes of respiratory distress in our study) 146 (58.9%) cases. The mortality rate of tacyopnea in our study was 103 cases (41.5%).

Conclusion: Tachypnea is one of the most common problems encountered in neonatal ICUs of which RDS, TTN, MAS and CHD are the common ones. Prematurity, low birth weight neonates and neonates born via Cesearean section show a poorer outcome, needing advanced respiratory support and longer duration of hospital stay. Thus, timely decisions regarding the mode of delivery, prevention of preterm deliveries, and appropriate management of Tacyopnea may reduce neonatal mortality.

Keywords: Respiratory distress syndrome, Transient Tachypnea of newborn, Meconium Aspiration syndrome, Congenital Heart disease, Neonatal Sepsis, Caesarean Section, Neonatal Intensive Care Unit.

Introduction

Tachypnea is defined as Respiratory Rate ≥60 breaths/min in neonates less than two months of age. Tachypnea may or may not be associated with Respiratory distress which can be any combination of the following: Nasal flaring, Grunting, Retractions, and Cyanosis.[1] Respiratory distress is the most common condition in neonates usually occurring within few hours after birth and 0.96%-6% of newborn infants get admitted with respiratory distress owing to both Respiratory and

Non –Respiratory causes,[1] Respiratory causes constitute Transient Tachypnea of Newborn, Respiratory distress syndrome, Meconium aspiration syndrome, Congenital Pneumonia, Congenital Heart Disease, Pneumothorax and Persistent Pulmonary Hypertension etc. Whereas, Non-Respiratory causes comprise of Congenital Anamolies, Metabolic disorders, Polycythemia etc. According to W.H.O criteria, in developing countries, the neonates presenting with Tacyopnea are treated as Pneumonia at first referral unit.[2] However, at NICU, detail history, examination and laboratory investigations lead to confirmation of diagnosis and management. It has been estimated that Respiratory distress is responsible for 40-50% peri-natal[3] and 20 % neonatal deaths,[1] Early recognition, investigations and appropriate treatment would help in lowering the neonate mortality rate, which will also help in reducing the Infant Mortality Rate.

Methodology

This descriptive cross-sectional study was conducted at A prospective, descriptive study was conducted at Neonatal Intensive Care Unit of Federal Government Polyclinic Hospital PGMI from 1st June 2016 till 31st July 2017. All neonates from birth to 28days of life, of either sex were included, irrespective of gestation and birth weight.

All referrals to NICU were seen and a written informed consent was taken from parents prior to their enrolment in the study. All of them were screened for respiratory distress which was defined as respiratory rate ≥60/min, in addition to any positive clinical finding: chest wall in drawings, grunting, nasal flaring or cyanosis.

History, physical examination and investigations were carried out to confirm the diagnosis of various aetiologies of respiratory distress. It included information about the patient which was noted on a preformed questionnaire-having name, age at admission, gender, date of admission and date of discharge. Neonatal data included weight, gestation, mode of delivery, duration of NICU stay.

The outcome meant a hemodynamically stable baby taking and tolerating feeds and fit to be shifted out of NICU, or Reffered when baby needed management by pediatric cardiologist/pediatric surgeon or when baby succumbed to treatment.

Data was analyzed through SPSS -21. Percentages were calculated for all descriptive/categorical variable including gender, aetiologies, and outcome. Mean values were computed for age, weight, gestational age. Stratification was done by age, gender, mode of delivery, weight, gestation, and duration of stay to see the impact of variables on the outcome and among aetiologies individually.

Results

Total 826 neonates were admitted in NICU of Polyclinic hospital during study period i.e. 1st June 2016 to 31st July 2017. Out of 826, 248 were enrolled in the study that fulfilled the study inclusion criteria, and 30% of neonates had tacyopnea.

The mean gestation age was 35.8±3.2 weeks (range: 23 – 40 weeks), where 10 (4.0%) neonates were extremely premature (<28 weeks of gestation), 25 (10.1%) were very premature (28 – 32 weeks of gestation), 134 (54.0%) were premature (33 – 37 weeks of gestation), and 79 (31.9%) were full term. Out of 248 neonates, 139 (56.0%) were males while 108 (43.5%) were females. The mean birth weight was 2.3±0.8 kg (range: 0.5 – 4.5 kg). 146 (58.9%) neonates were delivered via cesarean section.

Mean duration of stay was calculated to be 4.9±4.4 days with a median value of 3.0 days. Duration of stay in hours is given in table 1. A significant association of duration of stay has been found with mortality and different causes of respiratory distress as shown in table 1 and 2 respectively.

RDS was the most common diagnosis 82 neonates (33.1%), followed by TTN 71 cases (28.6%), MAS 31 cases (12.5%), CHD 17 cases (7.0%), NNS 10 cases (4.0%), Congenital Pneumonia 8 cases (3.2%), Community Acquired Pneumonia 7 cases (2.8%), birth asphyxia 4 cases (1.6%), and others 18 cases (7.3%). Table 2

There were 103 (41.5%) expiries, 126 (50.8%) discharges and 19 (7.6%) neonates were referred. 15 (6.0%) were referred to cardiology, 3 (1.2%) referred to surgery and 1 (0.4%) was referred due to 100% of occupancy of ventilator at the time.

Table 1: Comparison of various clinical characteristics with outcome of neonates in study group n=246

Sr. #	Clinical characteristics	Outcome		P value
		Expired n = 103	Discharged n = 145	
1.	Age			0.05
	• < 6 hours	99 (96.1%)	130 (89.7%)	
	• > 6 hours	4 (3.9%)	15 (10.3%)	
2.	Gender			NS
	• Male	54 (52.4%)	85 (58.6%)	
	• Female	49 (47.6%)	60 (41.4%)	
3.	Mean weight in kg (mean±SD)	33.9±3.7	37.1±2.05	0.001
4.	Gestational age in weeks (mean±SD)	1.9±0.8	2.6±0.6	0.001
5.	Weeks of gestation			
	• Extremely premature (<28 weeks)	10 (9.7%)	-	0.001
	• Very premature (28 – 32 weeks)	19 (18.4%)	6 (4.1%)	
	• Premature (33 – 37 weeks)	60 (58.3%)	74 (51.0%)	
	• Full term 38 – 42 weeks)	14 (13.6%)	65 (44.8%)	
6.	Mode of delivery			0.004
	• SVD	53 (51.5%)	49 (33.8%)	
	• LSCS	50 (48.5%)	96 (66.2%)	
7.	Mean duration of stay in days	4.0±4.5	5.5±4.2	0.007
8.	Duration of stay in hours			
	• <24 hrs	27(26.2%)	2(1.4%)	
	• 24 hrs	25(24.3%)	23(15.9%)	
	• 36 hrs	4(3.9%)	1(0.7%)	
	• 48 hrs	19(18.4%)	39(26.9%)	0.001
	• 72 hrs	8(7.8%)	17(11.7%)	
	• 96 hrs	4(3.9%)	21(14.5%)	
	• 120 hrs	2(1.9%)	9(6.2%)	
	• >120 hrs	14(13.6%)	33(22.8%)	

Table 2: Various causes of respiratory distress among neonates in study group n=246

Sr. #	Diagnosis	No. of neonates (%)
1.	RDS	82 (33.1%)
2.	TTN	71 (28.6%
3.	MAS	31 (12.5%)
4.	CHD	17 (7.0%)
5.	Pneumonia	15 (6.0%)
6.	NNS	10 (4.0%)
7.	Birth asphyxia	4 (1.6%)
8.	Others	18 (7.3%)

Discussion

Respiratory distress in neonates has a spectrum of aetiologies with variable outcomes. Early recognition and management of respiratory distress is important as neonates with respiratory distress are 2-4 times more likely to die than those without respiratory distress.[4]

In our study, the frequency of tachypnea in the newborn was 29.9%, whereas a study conducted in NICU of child health NICH Karachi showed it to be 33.3%[4] while it was 88.4% among neonates who were admitted at NICU of Ahmed Maher Hospital Cairo.[2] Another study conducted in India, showed the incidence to be 2.83%[6], whereas a study conducted at Mathur et al India found the incidence to be 29.6%.[7] It was found to be 13.7% in another study conducted at KIMS Hospital India.[3] A study conducted at

Table 3: Comparison of clinical characteristics with various causes of respiratory distress among neonates in study group n=246

Clinical Characteristics	Causes of respiratory distress								P value
	TTN	RDS	MAS	CHD	Pneu	NNS	BA	Other	
No. of patients n(%)	71(28.6%)	82(33.0%)	31(12.5%)	17(6.8%)	15(6.1%)	10(4.0%)	4(1.6%)	18(7.2%)	NA
Gender									
• **Male**	44(62.0%)	46(56.1%)	14(45.2%)	12(70.6%)	9(60.0%)	5(50.0%)	1(25.0%)	8(44.4%)	NS
• **Female**	27(38.0%)	36(43.9%)	17(54.8%)	5(29.4%)	6(40.0%)	5(50.0%)	3(75.0%)	10(55.6%)	
MOD n(%)									0.001
• **SVD**	17(23.9%)	36(43.9%)	13(41.9%)	8(47.1%)	9(60.0%)	4(40.0%)	1(25.0%)	14(77.8%)	
• **LSCS**	54(76.1%)	46(56.1%)	18(58.1%)	9(52.9%)	6(40.0%)	6(60.0%)	3(25.0%)	4(22.2%)	
Birth weight in kgs (mean±SD)	2.8±0.6	1.7±0.6	2.8±0.5	2.7±0.7	2.7±0.8	1.9±0.6	2.7±0.4	1.4±0.7	0.01
Duration of stay in days (mean±SD)	3.8±1.8	4.4±3.9	3.9±2.7	9.2±8.1	5.2±3.0	12.6±6.1	3.0±2.1	5.1±5.7	0.001
Gestational age in weeks (mean±SD)	37.6±2.0	33.5±2.2	38.1±1.4	37.4±1.7	37.8±1.2	34.8±2.2	38.4±1.1	32.0±5.7	0.01
Outcome									
• **Death**	1(1.4%)	60(73.2%)	14(45.2%)	3(17.6%)	6(40.0%)	7(70.0%)	1(25.0%)	11(61.1%)	0.01
• **Alive**	70(98.6%)	22(26.8%)	17(54.8%)	14(82.4%)	9(60.0%)	3(30.0%)	3(75.0%)	7(38.9%)	

BIRDEM found the frequency to be 34.1% [2013]. Another study conducted at Maharshtra India concluded that frequency of neonatal respiratory distress was 0.96-12% if live births[8] and the frequency of neonatal respiratory distress in a study conducted at Sudan was 4.83% .[9]

The most common causes of tachypnea were RDS 82 cases (33.1%), TTN 71 cases (28.6%), MAS 31 cases (12.5%).

In our study, 33.1 % presented with R.D.S, similarly, a study conducted at BIRDEM it was found to be 31% [1], another study conducted at Larkhar India found it to be 26.75%.[8] In other studies, it was found to be 31.5%[3], 23%[10] ,17.2%[6] respectively. A study conducted at Agha Khan Hospital Karachi found the incidence to be 23%.[4] Among the 82 neonates with RDS, 46 were male (56.1%) and 36 (43.9%) were females.36 (43.9%) were born via spontaneous vaginal delivery and 46 (56.1%) were born via LSCS. The average birth weight in neonates presenting with RDS was 1.7±0.6, their mean gestational age was 33.5±2.2. The mean duration of stay in our NICU in neonates with RDS was 4.4±3.9 days. There were a total of 60 deaths (73.2%) whereas 22 cases (26.8%) were discharged and called for follow up.

TTN was the second most common cause of Respiratory distress with the frequency of 28.6% i-e 71 cases. A study conducted at Sudan had TTN which was found among 28% of neonates.[9] as found in our study. Other studies found the incidences to be 42.7% [5], 40.7%[6], 40 %[8], 37.[5] There were two studies conducted at Rajasthan India and Agha Khan Karachi Pakistan having incidences of TTN which was 10%[10,4] respectively. 44 neonates (62%) were male and 27 (38%) were females 17 cases (23.9%) were born via Spontaneous vaginal delivery and 54 cases (76.1%) were born via LSCS. The mean birth weight in neonates born with TTN was 2.8±0.6kg and the mean gestational age was 37.6±2.0 weeks. The mean stay of duration was 3.8±1.8 days. 70 cases (98.6%) were discharged and followed up and there was 1 expiry with TTN (1.4%).

Meconium Aspiration Syndrome was found to be the third most common cause of tachypnea in our study with a frequency of 12.5% (31cases). One study found the incidence to be 9.3%[6] whereas another study found the incidence to be 10.2%.[5] 17% of cases of MAS were

included in a study conducted at Agha khan hospital.[4] In a study conducted at Rajasthan India, the incidence of MAS was 20.5% [10] while in another study the incidence was found to be 10.7%.[3] Out of 82 neonates,14 were male and 17 were females born with MAS (45.2% and 54.8% respectively).13 neonates (41.9%) were born via Spontaneous vaginal delivery whereas 18 neonates (58.1%) were born via LSCS. The mean birth weight was found to be 2.8±0.5kgs, and mean duration of stay of neonates with MAS was 3.9±2.7 days. The mean gestational age was 38.1±1.4weeks. 17 neonates (54.8%) were discharged and called for follow up. And 14 neonates (45.2%) had expired.

Congenital Heart disease was found to be the fourth most common cause with an incidence of 6.8% (17 cases). One study conducted at Birdem India showed the incidence to be 10.4%.Two studies showed the incidence to be 3.3%[5] and 3.57% [10] respectively, while another study found only 1.3%[3] cases with CHD. A total of 12 males (70.6%) and 5 females (29.4%) presented with CHD and associated Respiratory distress. 8 neonates (47.1%) were born via spontaneous vaginal delivery and 9 (52.9%) were born via Caesarean section. The mean birth weight was 2.7 ±0.7kg and mean gestational age was found to be 37.4±1.7 weeks. Mean duration of stay was 9.2 ± 8.1days.14 neonates (82,4%) were discharged, and 3 neonates (17.6%) had expired.

Neonatal sepsis was found to be the fifth most common cause of respiratory distress in our study with an incidence of 4% (10 cases). In one study the incidence of neonatal sepsis was found to be 37.9%[4] whereas in another study conducted at KIMS Hospital NICU it was 7.8%.[3] Another study showed the incidence to be 38.9%.[10] A study conducted at BIRDEM hospital was 16.1% .[1] A total of 5 males and 5 females presented with NNS and Respiratory distress. 4 were born via spontaneous vaginal delivery and 6 were born via LSCS. The mean birth weight was 1.9±0.6 kg and mean gestational age was found to be 34.8±2.2 weeks. Mean duration of stay was 12.6 .3 neonates were discharged (30%), and 7 neonates had expired(70%).

Conclusion

Knowing the causes will certainly help to plan for the provision of better facilities as far as neonatal care is concerned.

Respiratory distress is one of the most common problems encountered in neonatal ICUs of which R.D.S, T.T.N, M.A.S, Congenital Heart disease, NNS and Peri-natal Asphyxia are important causes. Preterm, low birth weight neonates show a poorer outcome, needing advanced respiratory support and longer duration of hospital stay. Thus, prevention of preterm deliveries and appropriate management of Respiratory distress may reduce neonatal mortality.

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