Original Research Article

Study of maternal attributes of neonatal respiratory distress in NICU

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Abstract

Background: The very first breaths of a newborn are distressed, but within minutes the respiration settles and becomes regular. There are many factors which can affect this transition from dependant fetal respiration to independent newborn respiration. **Aim:** To study maternal causes of neonatal respiratory distress admitted in the NICU. Mateiral and Methods: It was conducted at Department of Pediatrics, Government Medical College, Latur, for a period of two years from 1st August 2014 to 31st July 2016. It was a prospective study of consecutively selected patient less than 1 yr of age. **Conclusion:** Caesarean section was the most common predisposing factor associated with the development of respiratory distress in neonates. Antenatal risk factors increase the incidence of RD.
Key Words: maternal attributes, neonatal respiratory distress.

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INTRODUCTION

Neonatal respiratory distress is a common clinical entity in the neonatal intensive care unit.[1] The very first breaths of a newborn are distressed, but within minutes the respiration settles and becomes regular. There are many factors which can affect this transition from dependant fetal respiration to independent newborn respiration. The maternal factors causing neonatal respiratory distress are important in developing countries where socioeconomic variations exist. The preterm neonates are more likely to have respiratory distress. (2) Regardless of the cause, if not recognized and managed quickly, respiratory distress can escalate to respiratory failure and cardiopulmonary arrest. Therefore, it is imperative that any health care practitioner caring for new born infants can readily recognize the signs and symptoms of respiratory distress, differentiate various causes, and initiate management strategies to prevent significant complications or death. The neonatal mortality by respiratory distress can be decreased by proper monitoring of neonates in NICU and knowing the etiology of respiratory distress in neonates and managing according to the etiology; knowing the maternal illness and other conditions leading to respiratory distress.

MATERIALS AND METHODS

The present study was conducted at a well-equipped NICU. NICU has separate inborn and outborn sections where neonates were admitted. It was conducted at Department of Pediatrics, Government Medical College, Latur, for a period of two years from 1st August 2014 to 31st July 2016.

Study Design: It was a prospective study of consecutively selected patient less than 1 yr of age admitted in the NICU of this hospital fulfilling the inclusion criteria

Selection of study population

Inclusion Criteria: All the Newborns less than equal to 28 days admitted in the NICU (Inborn/Outborn) with clinically identified respiratory distress. In this study newborns who were admitted to the Neonatal Intensive Care Unit with clinically identified RESPIATORY DISTRESS were included in the study. 400 newborns were recruited for this study as per the criteria.

Clinical History and Evaluation

All the Newborns less than equal to 28 days with clinically identified respiratory distress were included in this study. Procedure was explained to the parents and consent was taken. All of them, after fulfilling the inclusion criterion were enrolled in the study and studied in details with regards to prenatal history, natal and neonatal course. Their mothers' previous obstetric history, family history, antenatal, natal and post-natal risk factors which includes maternal chronic disease, prolonged rupture of membranes, bleeding, pregnancy induced hypertension drugs taken during pregnancy, gestational age assessment by LMP, small for date, low birth weight baby, perinatal asphyxia, traumatic delivery, septicemia and hyperbilirubinemia,. Complete clinical examination Anthropometry, Investigations and Treatment given were noted down. All this information was recorded in predesigned and prevalidated proforma.

Statistical Analysis

Statistical analysis was performed using the statistics software STATA 10 for windows. The analysis of Student's t-test was used for comparisons of means. Categorical variables were compared using Chi square test and Fischer's exact test.

RESULTS

Table 1: Place of Delivery (Inborn and Out born) of Neonates admitted with Respiratory Distress

Place of Delivery	Frequency	Percentage
In born	295	73.75
Out born	105	26.25

Out of 400 neonates admitted in NICU with respiratory distress, 295 (73.75 %) neonates were inborn and 105 (26.25 %) were out born.

Table 2: Correlation of Mode of delivery with Place of Delivery in Neonates

	Place of Delivery		
Mode of Delivery	**Outborn**	**Inborn**	**Total**
Caesarean	56	171	227(56.75%)
Normal Vaginal	49	123	172(43.25%)
Instrumental	00	01	01
Total	**105**	**295**	**400**
		P value: 0.5806	

Above table shows correlation of mode of delivery with place of delivery in neonates with Respiratory Distress. Fifty six (53%)out born and 171(57 %) inborn neonates born by caesarean section who presented with respiratory distress in NICU. Forty nine outborn and 123 inborn neonates born by normal vaginal delivery who presented with respiratory distress in NICU. There was no statistically significant difference was found between the place of delivery and mode of delivery (P=0.5806).

Table 3: Gravidity of the mother in neonates admitted with respiratory distress in NICU

Gravida	Frequency	Percentage%
Gravida 1	219	54.75
Gravida 2	143	35.75
Gravida 3	24	6
Gravida >3	14	3.5
Total	**400**	**100**

Out of 400 neonates with respiratory distress, maximum children were born to primigravida mothers 219 (54.75%), followed by 143 (35.75%) Neonates were born to gravid 2 mothers, 24 (6%) neonates were born to mothers with gravida 3 and remaining 14 (3.75%) neonates were born to mothers > gravida 3.

Table 4: Correlation of Maternal illness with Place of Delivery in Neonates

Maternal illness	Inborn (n=295)	%	Outborn (n=105)	%	Total
No illness	120	40	39	37	159
Anemia	68	23	22	20.95	90
Pregnancy induced hypertension (PIH)	57	19.3	26	24.76	83
Oligohydromnios	25	8.4	10	9.5	35
Fever	16	5.4	5	4.7	21
Polyhydromnios	5	1.6	1	0.95	06
Maternal Sepsis	2	0.6	1	0.95	3
Eclampsia	2	0.6	1	0.95	3
Total	**175**	**59.32**	**66**	**62.85**	**400**
⧖2-value	**1.56,p-value=0.98,Not Significant,p>0.05, df=7**				

P value: 0.98

In the above table, anemia 68 (23%) was the most common maternal illness associated with respiratory distress in inborn neonates while pregnancy induced hypertension was seen in 26 (24.76%) out born neonates. In inborn neonates, 175 (59.32%) mothers out of 295 and 66 (62.85%) in outborn neonates had respiratory distress. There was no statistically significant difference was found between the place of delivery and maternal illness (P=0.98)

Table 5: Proportion of neonates in outborn and inborn NICU

Inborn neonates		Outborn neonates	
with respiratory distress	Total	with respiratory distress	Total
295 (13.4 %)	2200	105 (35%)	300
⨯2-value		13.27,p=00.0003,Significant	

The study included 295(13.4%) neonates out of 2200 inborn admissions and 105(35%) neonates out of 300 outborn admissions in NICU.

Table 6: Correlation of Meconium stained amniotic fluid with place of delivery in Neonates

	Place of Delivery		
	Outborn	Inborn	Total
MSAF	10(9.5%)	41(13.9%)	51
MAS	8 (25.8%)	23(74.1%)	31
Total	**105**	**295**	**400**
⨯2-value	**2.30,p-value=0.12,Not Significant, df=1**		

Ten outborn and forty one inborn neonates had history of MSAF who presented with respiratory distress in NICU. There was no statistically significant difference was found between the place of delivery and MSAF (P=0.12).

Table 7: Socioeconomic status and etiology of respiratory distress

Socio economic status	TTN (%)	MAS(%)	Congpneumonia (%)	Persistent pulmonary hypertension	HMD(%)	CongAnomalies (%)	Cardiac anomalies (%)	Birth asphyxia (%)	Othercauses
upper class (n=6)	2 (1.25)	1 (3.22)	0	0	2 (1.86)	0	1 (5.26)	0	0
Middle upper class n=38	16 (10)	3 (9.6)	2 (7.7)	0	8 (7.47)	0	3 (15.8)	5 (10)	1
Middle lower class n=124	43 (26.8)	9 (29.03)	11 (42.3)	0	36 (33.64)	2(33)	8 (42.1)	15 (30.6)	0
Upper lower class n=198	84 (52.5)	12 (38.7)	12 (46)	1	54 (50.46)	4(66)	6 (31.6)	25 (51)	0
Lower class	15 (9.3)	6 (19.35)	1 (3.84)	0	7 (6.54)	0	1 (5.26)	4 (8.2)	0
Total	**160**	**31**	**26**	**01**	**107**	**6**	**19**	**49**	**1**

Chi value =90.10,p=0.0001, Significant, df=32

When socio economic status of neonates with respiratory distress was considered, out of 400 neonates with respiratory distress, most of the neonates were in upper lower class 198 (49.5%) followed by 124 (31%) were in middle lower class. The upper lower class had suffered more than other classes when etiology of respiratory distress was considered. All diseases but cardiac anomalies were common in upper lower class.

Table 8: Socio economic status and outcome of respiratory distress

Socio economic status	Discharge	Death	Percentage of Mortality
upper class (n=6)	5	1	16.6
Middle upper class (n=38)	33	5	13.15
Middle lower classn=124	97	27	21.7
Upper lower class n=198	149	49	24.74
Lowern=34	30	4	11.76
Totaln=400	**314**	**86**	**21.5**

Chi square value =4.80,p=0.30,Not Significant, df=4

The upper lower class had most neonates with respiratory distress (198) as well as the deaths 49 (24.74 %) In this table, upper lower class had maximum mortality 56.97 % of all deaths followed by middle lower class 31.39 %.

Table 9: Diagnosis of neonates with respiratory distress

Diagnosis	Inborn (%)	Outborn (%)	Total
Transient Tachypnea of new born	122(43.72)	38(36.19)	160(40%)
Respiratory distress syndrome	74(25.1%)	33(31.4)	107(26.75%)
Birth asphyxia related respiratory distress	38(12.9)	11(10.47)	49(12.25%0
Meconium aspiration syndrome (MAS)	23(7.8)	08(7.6)	31(7.75%)
Congenital pneumonia	21(7.11)	05(4.76)	26(6.5%)
Congenital heart diseases	14(4.74)	05(4.76)	19(4.75%)
Congenital anomalies	03(1.01)	03(2.85)	06(1.5%)
Persistent Pulmonary Hypertension	00	01(0.95)	01
Other conditions	00	01(0.95)	01
Total	**295**	**105**	**400**

In this table, 122 (43.72%) inborn and 38 (36.19%) outborn neonates had diagnosis of TTN who presented with respiratory distress in NICU whereas 74(25.1%) inborn 33(31.4%) and outborn neonates had RDS. There was no statistically significant difference was found between the place of delivery and diagnosis in neonates (P=0.261). The most common cause of neonatal respiratory distress was TTN 160(40%) followed by 107 (26.75%) respiratory distress syndrome. Third cause was birth asphyxia.49 (12.25%).

DISCUSSION

Respiratory distress is one of the commonest disorder encountered within the first 48-72 hours of life. It occurs in 0.96 to 12%[1-5] of live births and is responsible for about 20% of neonatal mortality[3]. Respiratory pathology is the commonest (32-54%) autopsy finding among early neonatal deaths. The spectrum of respiratory distress in neonates includes transient tachypnea of the newborn, hyaline membrane disease, meconium aspiration syndrome, pneumonia and other miscellaneous causes. In developing countries there is a paucity of studies on causes of respiratory distress in neonates due to maternal factors. The place where this study was conducted is a tertiary health care hospital receiving referrals of sick and complicated maternal delivery. Hence inborn neonates with respiratory distress are more than out born neonates. The inborn neonate usually had less severe form of respiratory distress (transient tachypnea of newborn). Haque *et al* and Arad I *et al*[4] similar to this study found out that more admissions of neonates with respiratory distress were present in inborn unit. In the present study, (56.75%) new born were born by caesarean section. 56% outborn and 57 % inborn neonates born by caesarean section presenting with respiratory distress in NICU. Thus caesarean section deliveries were more than normal vaginal delivery. Zaazou MH *et al* and Kamal MM *et al* (2011) [5] found that cesarean section was the most common factor associated with development of respiratory distress in neonates as 84.6% of cases were delivered by caesarean section. Milner *et al*., and Saunders *et al*(1978)[6] noted that infants born by elective caesarean section had much higher incidence of development of respiratory distress. They attributed this mainly to the higher volumes of interstitial and alveolar fluid compared with those born vaginally. Gerten *et al* and Coonard DV et.al (2005)[7] reported that in addition to prematurity, the other risk factors for development of respiratory distress syndrome included maternal diabetes, cesarean section delivery, second born twins and asphyxia. At peripheral level heath care facilities are limited. The newborns born by caesarean sections are more because high risk cases referred to district places or a tertiary heath care centre where specialists and proper set up is present. In the present study, out of 400 neonates with respiratory distress, maximum children were born to primigravida mothers 54.75%, followed by 35.75% neonates were born to gravida 2 mothers. In a study by C Dani *et al* and Reali MF *et al*(1999)[8] primigravida mothers had more neonates with respiratory distress. Contrasting finding was noted by Joel N K *et al* (2016)[9] in their study that the respiratory distress was more in newborns of multipara mothers. Numan N H *et al*[10] reported respiratory distress was more in neonates born to multipara mother 42 (84 %) than primipara mothers 8 (16 %). In this study, anemia 68 (23%) was the most common maternal illness associated with respiratory distress in inborn neonates while pregnancy induced hypertension was seen in26 (24.76%) out born neonates. In inborn neonates, 175(59.32%) mothers out of 295 and 66 (62.85%) in outborn neonates had respiratory distress. Mohammed Hesham Zaazou etal and Kamal MM *et al* (2011)[5] observed that maternal risk factor mostly associated with neonatal respiratory distress was PROM followed by hypertension, diabetes mellitus and twin deliveries. Swarnakar *et al* and Manish swarnkar *et al* (2015)[11] observed that maternal risk factor mostly associated with neonatal respiratory distress was PROM followed by hypertension, diabetes mellitus and twin deliveries. In the present study anemia was the most common risk factor because the study was conducted in a rural setting with wide prevalence of iron deficiency in mothers. In present study the outborn babies with respiratory distress were most commonly associated with

PIH indicating poor maternal follow up during the ANC period. Ten outborn and forty one inborn neonates had history of MSAF who presented with respiratory distress in NICU in the present study. Meconium aspiration syndrome was forth most common cause of neonatal respiratory distress. The MAS was more in outborn than inborn newborns among the MSAF deliveries. In a study by Zaazou MH *et al* and Kamal MM *et al* (2011)[5] Meconium aspiration syndrome (MAS) was the third most common cause of respiratory distress in the neonates. The upper lower class had most neonates with respiratory distress[198] as well as the deaths 49 (24.74 %) Lucy K and Smith *et al* (2010)[12] had demonstrated estimated time trends in the deprivation gap in neonatal mortality by cause of death. Neonatal mortality rates were more than twice as high in the most deprived areas of England than in the least deprived areas, and the relative gap widened over time. They concluded that neonatal deaths would be 39% lower if all areas had the same neonatal mortality rates as the least deprived areas. This widening relative deprivation gap in all cause neonatal mortality is particularly associated with an increase in the proportion of deaths associated with immaturity at less than 24 weeks ' gestation, for which the deprivation gap in mortality is widest. Lucy K and Smith also pointed out that the all cause morbidity and mortality due to prematurity, sepsis, congenital anomalies, accidental deaths were more in the low socioeconomic status. In the present study similar findings were observed as low socioeconomic status (upper lower class and middle lower class) had more burden of neonatal morbidity. The upper lower class had most neonates with respiratory distress [(198)] as well as the deaths 49 (24.74 %) In this table, upper lower class had maximum mortality 56.97 % of all deaths followed by middle lower class 31.39 %. Chelsea A Ruth *et al* and Roos N *et al* (2012)[13] had a cohort of 6.1 % were born preterm and 32.4 % were of low socioeconomic status. low socio economic status was associated with independent increased risk. Recognition that the morbidities associated with prematurity continue into early term gestation and are further compound by socio economic is important to develop strategies for improving care of early term infants, avoiding iatrogenic complications and prioritizing public health interventions. Arntzen *et al* and Nybo Andersen *et al* (2004)[14] observed the educational gradients in neonatal mortality (mortality occurring in the first 28 days of life). They noted throughout the study period children of mothers with more than 12 years of education had the lowest risk of death. The risk was slightly higher among offspring of women with 10–12 years of education, while offspring of mothers with only a mandatory education had the highest risks though out the observation period. Oakley *et al* and laura *et al* (2005-2006)[15] reported a multivariate analysis of risk factors for infant mortality, with specific focus on deprivation and socio-economic status. they studied data on all singleton live births in England and Wales in 2005-06 using Carstairs index. They noted socioeconomic deprivation had a strong independent effect on infant mortality i.e, risk of death increasing with increasing levels of deprivation. The strength of this relationship was significant even if neonates were low birth weight, preterm or small-for-gestational-age

CONCLUSION

Caesarean section was the most common predisposing factor associated with the development of respiratory distress in neonates. Antenatal risk factors increase the incidence of RD. There is a need to prioritize antenatal care and counseling to pregnant mothers that includes multivitamin and folic acid supplementation, screening for diabetes, hypertension and, if possible, provision of detailed fetal evaluation in mothers with bad obstetric history or those having febrile illness during first trimester.

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