Original Research Article

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20190715

Clinical profile and outcome of respiratory distress in newborns admitted in rural tertiary health care centre of Maharashtra, India

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Received: 14 December 2018 **Accepted:** 10 January 2019

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ABSTRACT

Background: Respiratory distress is most common symptom complexes seen in newborn infants lead to high mortality. The objectives were to study various etiological factors, maternal and neonatal risk factors for development of respiratory distress along with need for CPAP, mechanical ventilation and surfactant to assess the immediate clinical outcome in newborns.

Methods: The study was conducted at Krishna Hospital and Medical Research Centre, Karad in period of January to August 2018. A total of 100 neonates who were admitted in NICU within 72 hours of life were studied by clinical examination and relevant investigations. The severity of distress was assessed by Silverman-Anderson scoring, Downe's scoring and APGAR scoring respectively for neonates.

Results: It was observed that max, 90% of the distress cases were of respiratory in origin and high severity of distress was observed among 27% newborns. The proportion of respiratory distress was higher, 51% in males and low APGAR score was reported in 14% cases. Among respiratory etiology of respiratory distress, high proportion was of TTNB 35.55%. The maternal and new born factors like maternal age >30 years (32%), gestational age 28-30 weeks (87.5%), gravid 2 and 3 mothers (35%), female gender (32.6%), low birth weight (70%) developed severe distress respectively. The recovery rate of respiratory distress due to respiratory etiology was of 88.8%.

Conclusions: Transient tachypnoea of new-born is the most common cause among new-borns with respiratory distress. New-borns with low gestational age, low birth weight baby, low APGAR score is more prone to develop severe respiratory distress.

Keywords: APGAR score, Downe's scoring, New-born, Respiratory distress, Silverman-Anderson scoring

INTRODUCTION

First breath is the most vital parameter in the beginning of a new life. Respiratory distress is among the most common symptom complexes seen in newborn infants and accounts for half of all the neonatal deaths. Worldwide, among the total newborns, about 3% have had some sort of respiratory distress and which is manifested by a variety of respiratory and non-respiratory disorders. In developed countries, improved diagnosis

and treatment due to technical advancements and increased pediatric and neonatal specializations have led to an impressive fall in neonatal mortality. With the advancement of neonatal ventilation like HFO and ECMO, there is revolutionization in the field of neonatology for respiratory disorders.³

In India, inspite of advancement in the field of neonatology, there is not much decline in the incidence of neonatal mortality and morbidity, with the incidence varying from 30% among pre-term, 20% in post-terms and 4% among term infants. The incidence of respiratory distress varies in relation to various predisposing and underline factors like gender, gestational age, body weight, poor infrastructure, lack of skilled health resources, poor monitoring system etc.

Government of India launched various national health programmed in the field of maternal and child health to achieve optimal health of mother and newborn baby with maximum emphasis on reducing morbidity and mortality. The evidence-based practices for early recognition and appropriate therapy of neonatal respiratory disease may have impressive results in modern medicine.

The present study was undertaken with the aim to know the most common etiological factors responsible for neonatal respiratory distress and the effect of modern advancements like bubble CPAP and mechanical ventilation on the outcome of newborns with severe distress.

METHODS

A hospital based observational type of study was conducted at Krishna hospital and Medical research centre, Karad in the period of January 2018 to August 2018. By purposive sampling method, a total of 100 neonates who were admitted in NICU within 72 hours of life were studied by clinical examination and relevant investigations. The severity of distress was assessed by Silverman-Anderson scoring and Downe's scoring for neonates. ^{5,6}

Silverman-Anderson scoring categorize respiratory distress as mild, moderate, impending and sever on the basis of score ranges as 0-3, 4-6, 7-9 and >10 respectively. The Downe's scoring for respiratory distress measures as clinical respiratory distress mild to moderate if score ranges 0-3 and 3-6 and impending if score is more than 6. The APGAR score was recorded by the end of one minute to assess the vital status of each newborn. The association of variable risk factors both maternal and neonatal was studied for development of severe respiratory distress. They were assessed for the development of distress against time of onset, etiology, requirement of surfactant, CPAP, mechanical ventilation and immediate outcome.

Inclusion criteria

 Newborns with respiratory distress who were admitted in NICU within 72 hours of life.

Exclusion criteria

 Newborns with respiratory distress who were admitted in NICU after 72 hours of life. The study made the standards outlining the declaration of Helsinki and good epidemiological practices. This study did not change or modify the laboratory of clinical practices of each centre and differences of practices were kept as they are. The data collection was anonymous and identifiable patient information was not submitted. Individual researchers were responsible for complying with local ethical standards and hospital registration of study.

Stastical analysis

Microsoft word and SPSS 20.0 version were used to analyze the data. P value of less than 0.05 was considered for statistical significance.

RESULTS

A total of 100 neonates were admitted in Pediatric Neonatal ICU with a clinical condition of respiratory distress of which max, 90% belonged to respiratory etiology (Table 1).

Table 1: Distribution based on etiology of distress.

Etiology	Frequency (%)
Respiratory	90 (90)
Cardiac	06 (06)
Others	04 (04)

Figure 1 shows, 48% neonates were delivered before attainment of the term delivery and of which 8% delivered with extremely pre-term.

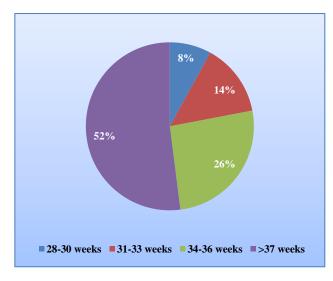


Figure 1: Gestational age wise distribution of neonates.

According to Figure 2, there is apparent gender difference among neonates with proportions of males (51%) as compared to females (49%).

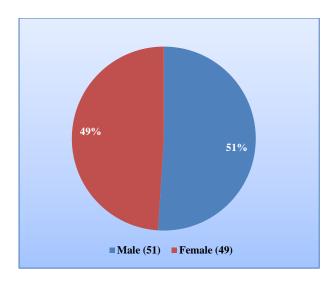


Figure 2: Sex wise distribution of new born.

As per Silverman-Anderson and Downe's scoring; max, 50% newborns were moderately distressed following respiratory etiology (Table 2).

Table 2: Distribution of new born based on degree of severity of respiratory distress.

Respiratory	S-A	Downer's	Frequency
distress	score	score	(%)
Mild	<3	<3	23 (23)
Moderate	3-7	3-6	50 (50)
Severe	>7	>6	27(27)

Among the 100 neonates, healthy Apgar score (>7 by the end of one minute) was reported among 86% newborns. Max, 57.14% neonates with severe respiratory distress were with unhealthy Apgar score (<7 by the end of one minute) (Table 3).

Table 3: Apgar score at one minute versus severity of respiratory distress.

Apgar score (at 1 minute)	Total cases (n=100)	Mild RD	Moderate RD	Severe RD
<7	14	3 (21.42%)	3 (21.42%)	8 (57.14%)
7-8	24	3 (12.50%)	8 (33.33%)	13 (54.16%)
9-10	62	30 (48.38%)	26 (41.93%)	6 (9.67%)

Table 4: Etiological factors versus severity of respiratory distress.

Etiological factors		Total cases	Mild	Moderate	Severe	χ^2	P
Respiratory etiology	TTNB	32 (35.55%)	17 (53.12%)	12 (37.50%)	3 (9.37%)	29.23	0.0001
	HMB	29 (32.22%)	1 (3.44%)	15 (51.72%)	13 (44.82%)		
	MAS	18 (20.00%)	2 (11.11%)	10 (55.55%)	6 (33.33%)		
Pneumonia	Cong.	11 (12.22%)	1 (9.09%)	8 (72.72%)	2 (18.18%)		
Mode of delivery	N. Vaginal	44 (44.00%)	20 (4.54%)	10 (22.72%)	14 (31.81%)	1.70	0.41
	Caesarean	56 (56.00%)	24 (42.85%)	19 (33.92%)	13 (23.21%)	1.79	
	Primi-gravida	46 (46.00%)	18 (39.13%)	16 (34.78%)	12 (26.08%)	4.93	0.29
Parity	Gravida-2 and 3	40 (40.00%)	23 (57.50%)	10 (25.00%)	7 (17.05%)		
	Multi-gravida	14 (14.00%)	9 (64.28%)	4 (28.57%)	1 (7.14%)		
	>2kg	58 (58.00%)	30 (51.72%)	18 (31.03%)	10 (17.24%)	29.16	0.0001
Birth weight	1.5-1.99kg	25 (25.00%)	7 (28.00%)	14 (56.00%)	4 (16.00%)		
_	<1.5kg	17 (17.00%)	0 (00.00%)	5 (29.41%)	12 (70.58%)		
Matanasi	<21	28 (28.00%)	14 (50.00%)	8 (28.57%)	6 (21.42%)	0.87	0.92
Maternal age	22-30	47 (47.00%)	23 (48.93%)	11 (23.40%)	13 (27.65%)		
(years)	>30	25 (25.00%)	11 (44.00%)	6 (24.00%)	8 (32.00%)		
Gender	Male	51 (51.00%)	15 (29.41%)	25 (49.01%)	11 (21.56%)	2.01	0.22
	Female	49 (49.00%)	8 (16.32%)	25 (51.02%)	16 (32.65%)	3.01	
Gestational age (weeks)	28-30	8 (8.00%)	0 (00.00%)	1 (12.50%)	7 (87.50%)		0.0001
	31-33	14 (14.00%)	1 (7.14%)	7 (50.00%)	6 (42.85%)	21.22	
	34-36	26 (26.00%)	7 (26.92%)	14 (53.84%)	5(19.23%)	21.33	
	>37	52 (52.00%)	15 (28.84%)	28 (53.84%)	9 (17.30%)		

(TTNB: transient tachypnoea of newborns, HMB: hyaline membrane disease, MAS: meconium aspiration syndrome)

According to Table 4 max, 35.55% cases of respiratory distress were belonged to TTNB type of respiratory etiology however, severe respiratory distress was

significantly higher, 44.82% observed in HMB type of respiratory etiology (p<0.05). Max, 32% and 87.5% of neonates born to mothers with maternal age >30 years

and gestational age 28-30 weeks developed severe respiratory distress and low gestational age is significantly associated with respiratory distress (P<0.05). Higher proportion of newborns (26.08%) born to primi-para mothers developed severe distress. The gender shows apparent differences in respiratory distress however, severe respiratory distress was predominantly high seen in female children, 32.6%. Low birth weight is significantly associated with respiratory distress (p<0.05). The vaginal mode of delivery showed that 31.8% neonates developed severe distress.

Table 5: Management and outcome of respiratory distress of respiratory etiology (N=90).

Variables	Yes (%)
Need for CPAP	65 (72.22)
Need for mechanical ventilation	49 (54.44)
Need for use of surfactant	32 (35.55)
Recovered	80 (88.84)

The treatment interventions for respiratory distress include as CPAP needed by 72.22%, mechanical ventilation by 54.44% and surfactant was required in 35.55% cases. The recovery rate of respiratory distress in neonates admitted in NICU observed was of 88.84% (Table 5).

DISCUSSION

Respiratory distress in neonates is the most common cause of admission to a neonatal ICU in a tertiary care hospital identification of risk factors associated with development of severe distress and early diagnosis of the cause is very important in the management of neonatal distress for better clinical outcome. Study reported max, 90% cases of respiratory belonged to respiratory etiology. A study conducted by Gouyon J et al, has also been reported max, 72% cases towards respiratory etiology. Among the respiratory etiology of distress, present study revealed max, 35.55% were followed TTMB whereas HMB was 32.22%. A study conducted by Morrison J et al, also reported similar pattern however, exact opposite pattern was observed by Nagendra K with apparent differences as reported by our study. 10,11

The study observed 27% newborn have had severe respiratory distress which was less as compared to study conducted by Derek C.¹² Study also revealed max, 57.14% newborn developed severe respiratory distress had low APGAR score. Similar findings have also been reported by Lureti M et al, Fidanovski D et al and Gouyon J et al. ^{13,14,9}

Our study observed that max, 32% of newborns born to mothers with maternal age >30 developed severe distress, 87.5% of newborns of gestational age 28-30 weeks developed severe distress, 35% of newborns born to gravid 2and 3 mothers developed severe distress, 32.6% of female children developed severe distress, 70%

newborns weighing below kgs developed severe distress, 31.8% of newborns born of normal vaginal delivery developed severe distress respectively. Advanced maternal age responsible for newborn respiratory distress also reported by Dani C et al and Smith A et al respectively. 15,16

Primi para was significantly associated with respiratory distress has been reported by Dani C et al, whereas multipara noted by Mathur N et al. 15,17 The caesarean mode of delivery was associated for newborn respiratory distress mentioned by Dani C et al, Geller E et al and Gouyon J et al, respectively. 9,15,18 Low gestational age at the time of delivery was a risk factor for respiratory distress also observed by Dani C et al, and Lureti M et al. 13,15 The studies conducted by Lureti M et al and Miller H et al, also mentioned that low birth weight is a risk factor for respiratory distress among newborn baby. 13,19 They also reported respiratory distress was more in male babies as compared to female one and statement is exact opposite to our finding.

The study revealed maximum, 88.8% recovery rate among newborns with respiratory distress of respiratory origin. Similar finding, 84.12% has been also noted by Rubalteli FA et al, however; study conducted by Srivastava S et al, reported 50% recovery from respiratory distress among newborns. 20,21

CONCLUSION

Transient tachypnea of new-born is the most common cause among new-borns with respiratory distress which develop immediately after birth. New-borns with low gestational age, birth weight and APGAR score are more prone to develop severe distress therefore maximum attention should be given on maternal health during pregnancy and quality maternal and child health care services.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Kshirsagar VY, Kshirsagar AY, Mohite RV. Clinical profile and outcome of respiratory distress in newborns admitted in rural tertiary health care centre of Maharashtra, India. Int J Contemp Pediatr 2019;6:713-7.