A STUDY OF CLINICAL PROFILE AND OUTCOME OF RESPIRATORY DISTRESS IN NEW-BORN BABIES IN KING GEORGE HOSPITAL, ANDHRA MEDICAL COLLEGE, VISAKHAPATNAM, ANDHRA PRADESH, INDIA: A PROSPECTIVE STUDY

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ABSTRACT

BACKGROUND

A variety of disorders of respiratory system and non-respiratory disorders like intracranial injury, cardiac failure metabolic disorders, septicaemia and congenital malformations can manifest clinically with respiratory distress.(1,2)

RDS DEFINITION = RESPIRATORY DISTRESS (RDS)

Is diagnosed clinically by the presence of at least two of the following criteria namely, respiratory rate of >60/minute, retractions, flaring of the alae nasi, expiratory grunt and cyanosis at room air on two consecutive examinations at least hour apart.

AIMS OF THE STUDY

To assess the clinical outcome of respiratory distress in new-born. To study the various Risk factors associated with development of severe respiratory distress in the new-born. To study the usefulness of chest x-ray to identify the cause of respiratory distress in neonate.

METHODS

The study was carried out in the Department of Paediatrics, AMC, KGH. Prospective study of 200 new-borns with respiratory distress who were admitted in NICU, between July 2014 to August 2015.

INCLUSION CRITERIA

All new-borns admitted to NICU within 24 hrs. of birth with RDS in both pre and term babies.

EXCLUSION CRITERIA

All new-borns admitted to NICU after 24 hrs. of birth with RDS. The severity was assessed by using Downes.(3) clinical scoring and X-rays. Therapy/Treatment and mortality was documented to assess the severity of RDS.

RESULTS

154 cases with distress are of respiratory system in origin out of which 45% were due to Meconium aspiration syndrome, 56% of other conditions responsible for RDS.

CONCLUSION

Meconium aspiration syndrome (MSA) is the most common cause of RDS in new-born, risk factors like meconium stained liquor, vaginally delivered new-borns, preterm gestation age, & female sex.

KEYWORDS

Respiratory Distress Syndrome (RDS), Neonate, Meconium Aspiration Syndrome, Transient Tachypnoea, Congenital Pneumonia, Diaphragmatic Hernia.

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INTRODUCTION: Respiratory distress is diagnosed clinically by the presence of at least two of the following criteria namely, respiratory rate of >60/minute, retractions (Subcostal Xiphoid And Suprasternal Recession), flaring of the alae nasi expiratory grunt and cyanosis at room air on two consecutive examinations at least hour apart respiratory distress may vary from 7–8% among live births.

The incidence varies from 30% among preterms, 20% among post-terms to 4% in term babies.(1) A variety of disorders of respiratory system and non-respiratory disorders like intracranial injury, cardiac failure metabolic disorders, septicaemia and congenital malformations can manifest clinically with respiratory distress.(2) Improved diagnosis and treatment due to technological advancements and increased paediatric and neonatal specialisation have led to an impressive fall in neonatal mortality.

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Ventilators have revolutionised the outcome of respiratory failure in neonates. Newer therapies are aimed at alleviating the physiological abnormalities of the immature or diseased lung while avoiding potentially harmful levels of oxygen and positive pressure ventilatory support.

OBSERVATIONS AND RESULTS: Present study was conducted from July 2014 to August 2015. A total of 200 neonates with respiratory distress who fulfilled the inclusion criteria were included.

Aetiology	Frequency n=200
Respiratory system	154
CNS	37
CVS	7
Diaphragmatic hernia	2

Table 1

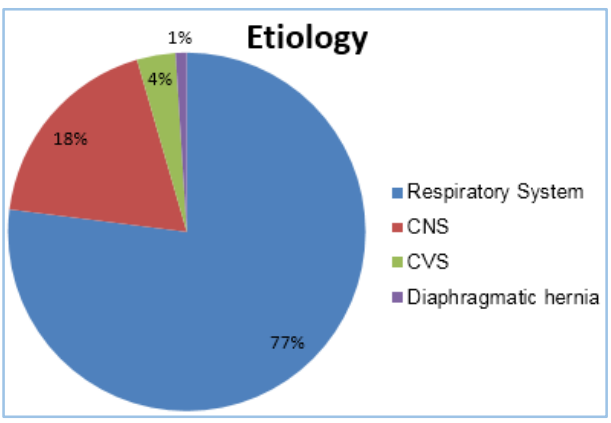


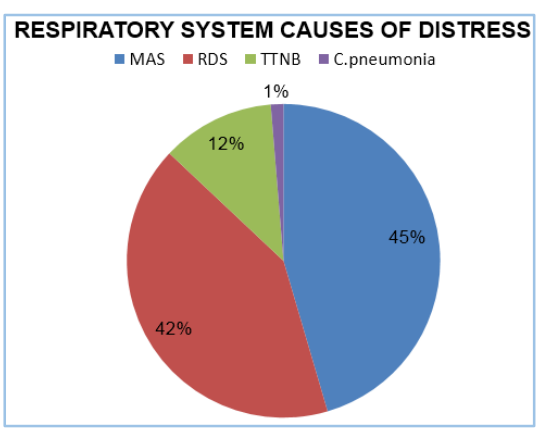
Fig. 1

Aetiology	Frequency n=200
Respiratory System	154
CNS	37
CVS	7
Diaphragmatic Hernia	2

Table 2

Respiratory System Causes of Distress in New-born:

Diagnosis	No. of. Cases
MAS	70
RDS	64
TTNB	18
Congenital Pneumonia	2
Total	**154**



Final Diagnosis versus Severity of RDS:

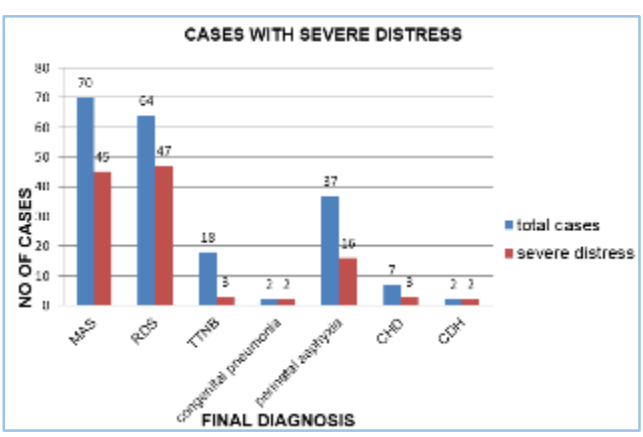
Final Diagnosis	Frequency n=200	Severity of Distress n= 118	%
Meconium Aspiration Syndrome	70	45	64.2%
Respiratory Distress Syndrome	64	47	73.4%
Transient Tachypnoea of New-born	18	3	16.6%
Congenital Pneumonia	2	2	100%
Perinatal Asphyxia	37	16	43.2%
Congenital Heart Disease (CHD)	7	3	42.8%
Congenital.[4] Diaphragmatic Hernia	2	2	100%

100% of new-borns diagnosed as CDH and congenital pneumonia.[5] had severe distress. 73.4% of RDS, 64.2% of MAS (45 out of 70), 43.2% of perinatal asphyxia (16 out of 37) babies, 42.8% of CHD (3 out of 7), 16.6% of TTNB (3 out of 18) babies had developed severe RDS.

Method of Assessing Severity of RDS:[6]

Grading of Respiratory Distress	Silverman Anderson Score
Mild	<3
Moderate	3-7
severe	>7

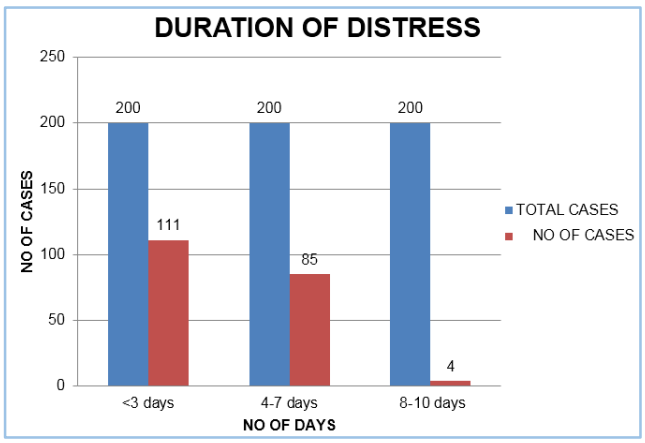
Final Diagnosis versus Severity of RDS:



Duration of RDS for Total Cases:

Duration	Total Cases	No. of Cases
<3 days	200	111
4-7 days	200	85
8-10 days	200	4

Duration of RDS for Total Cases:



Out of 200 total cases, 111 cases had distress for 1 to 3 days, 85 cases had distress for 4-7 days and only 4 cases had distress for 8-10 days.

Final Diagnosis versus Duration of RDS:

Final Diagnosis	Total Cases	Distress for Less Than 3 Days	Distress for 4-7 Days	Distress for 8-10 Days
MAS	70	49	20	1
RDS	64	13	50	1
Perinatal Asphyxia	37	29	7	1
TTNB	18	18	0	0
CHD	7		7	
Congenital Pneumonia	2		1	1

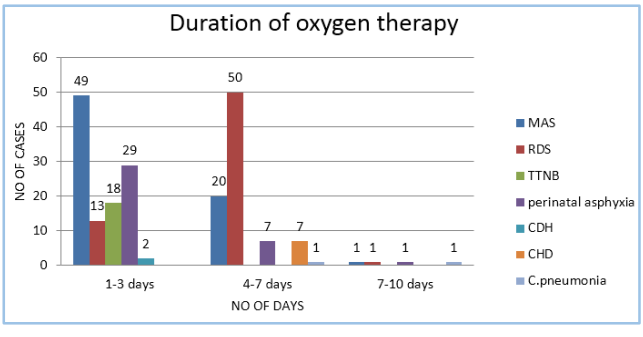
Final Diagnosis versus Duration of RDS: 100% of babies with TTNB, 78% of babies with perinatal asphyxia, 70% of new-borns with MAS and 21% of babies with RDS had distress for less than 3 days.

100% of cases with respiratory distress due to congenital heart disease, 69% (44 out of 64) of cases with RDS, 1 out of 2 cases with congenital Pneumonia, 28% of cases with MAS and 19% (7 out of 37) of cases due to perinatal asphyxia had distress for 4 to 7 days. 1 case each of MAS, perinatal asphyxia, congenital pneumonia and 1 case with RDS had distress for 8 to 10 days.

Duration of Oxygen Therapy versus Severity of RDS:

Final Diagnosis	Frequency n=200	Severe Distress n= 118	No. of Days on Oxygen		
			1-3 Days	4-7 Days	7-10 Days
MAS	70	45	49	20	1
RDS	64	47	13	50	1
TTNB	18	3	18		
C.pneumonia	2	2		1	1
Perinatal Asphyxia	37	16	29	7	1
CHD	7	3		7	
CDH	2	2	2		

Majority (55.5%) of new-born with RDS required oxygen treatment for less than 3 days as compared to 42.5% of new-born with RDS for 4-7 days and another 2% for 7-10 days. 21 out of 70 new-borns of MAS (30%) & 51 out of 64 new-borns with RDS (79.8%) required oxygen more than 3 days. In comparison, requirement of oxygen was less than 2 days in all cases of TTNB in spite of severe RDS.



No. of Days Required	Frequency n=200	Severe Distress n=118	Mean	Std. Deviation	Minimum	Maximum
1-3 Days	111	51	2.354	0.6933	1.0	3.0
4-7 Days	85	63	4.494	.7867	4.0	6.0
8-10 Days	4	4	8.500	1.000	8.0	10.0
Total	**200**	**118**				

Duration	Oxygen Days
r *	.331
P value	.0001
Total	**195**

Statistically Significant.

Out of the total 200 new-borns with respiratory distress, all the babies required oxygen.[7] in view of their distress. It was observed that the more severe is the distress the more is the duration of oxygen requirement and is statistically correlated.

Treatment Intervention

Final Diagnosis	Frequency n= 200	Surgical Intervention	Mechanical Ventilation	Surfactant Therapy	CPAP
MAS	70	0	0	0	0
RDS	64	0	6	10	4
Perinatal Asphyxia	37	0	0	0	0

TTNB	18	0	0	0	0
CHD	7	0	0	0	0
CDH.[5]	2	1	1		
C. pneumonia	2	0	0	0	0

Surgical intervention was done in one case of Congenital Diaphragmatic Hernia.[4] 6 cases of RDS required surfactant with mechanical ventilation and 4 cases required surfactant and CPAP support.

Mortality:

Final Diagnosis	Frequency n=200	Mortality
MAS	70	0
RDS	64	3
Perinatal Asphyxia	37	0
TTNB	18	0
CHD	7	0
CDH	2	2
C. pneumonia.[8]	2	0

In the present study, mortality was 2.5% (5 out of 200 cases). 3 cases with RDS and 2 cases with CDH.

Risk Factors for Development of Severe RDS:[6]
Liquor:

Liquor	Frequency n=200	Severe Distress n=118	%
Clear	130	73	56.1%
Meconium Stained	70	45	64.2%

A p value- 0.265 Chi-square value 1.24 statistically not significant but there is a percentage difference. 64.2% of new-borns (45 out of 70) born to mothers with meconium-stained liquor developed severe respiratory distress compared to 56.1% of the new-borns (73 out of 130) born to mothers with clear liquor.

Mode of Delivery:

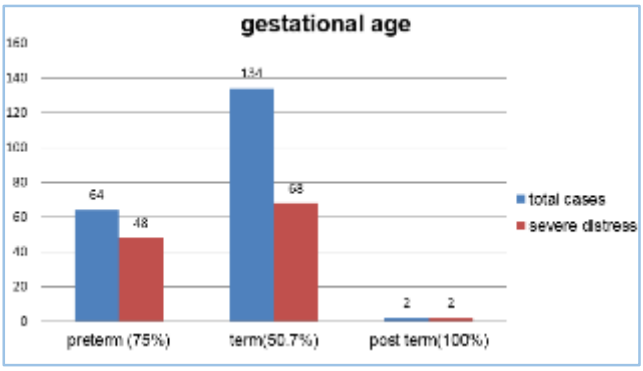
Mode of Delivery	Frequency n=200	Severe Distress n=118	%
Caesarean	76	36	47.3%
Vaginal delivery	124	82	66.1%

P value-.009 is significant. There is association between type of delivery and development of severe distress. 66.1% of new-borns (82 out of 124) born by normal vaginal route developed severe RDS compared to 47.3% of the new-borns (36 out of 76) born by caesarean section.

Gestational Age of the Baby:[6,8]

Gestational Age	Frequency n=200	Severe Distress n=118	%
preterm	64	48	75%
Term	134	68	50.7%
Post term	2	2	100%

P value- 0.003 Chi-square- 11.937 statistically significant. 75% of preterm new-borns (48 out of 64) developed severe respiratory distress compared to 50.7% (68 out of 134) term babies and 2 post-term new-borns had severe distress.



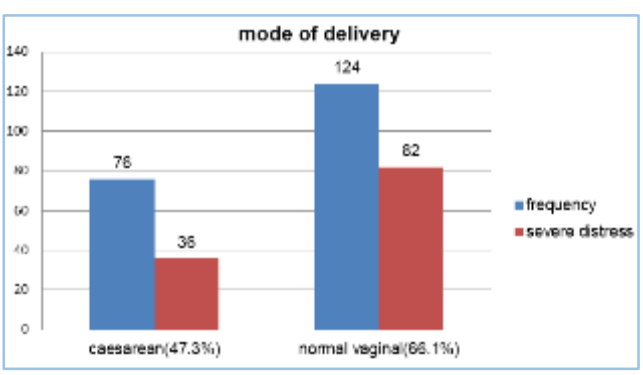
New-Born Sex:

Sex	Frequency=200	Severe Distress n=118	%
Male	128	70	54.6%
Female	72	48	66.6%

P value 0.098 statistically not significant.

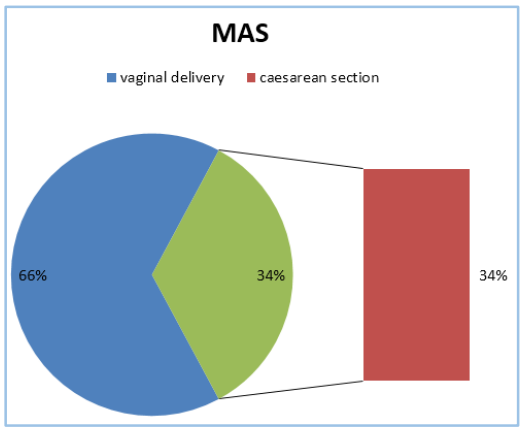
66.6% of the new-borns (78 out of 72) female babies developed severe respiratory distress as compared to 54.6% (49 out of 128) male babies. M.Lureti.[9] shows the frequency of RDS was higher in males than in females.

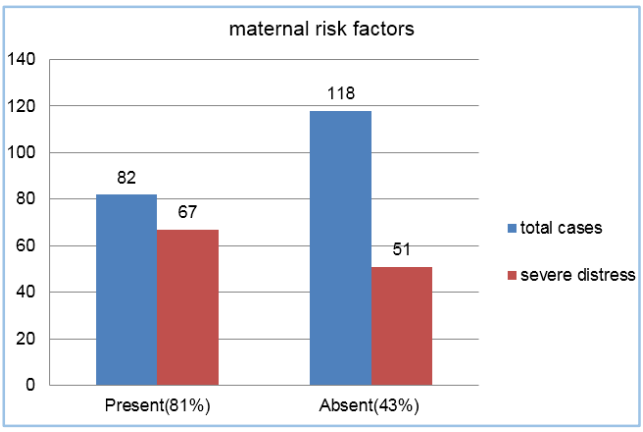
Mode of Delivery:



Mode of Delivery in MAS Babies:

MAS	Total Cases (70)
Caesarean	24
Normal	46





Gestational Age of the Baby:

Gestational Age	Frequency n=200	Severe distress n=118	%
Pre-term	64	48	75%
Term	134	68	50.7%
Post-term	2	2	100%

P value- 0.003 chi- square- 11.937 statistically significant.

75% of preterm new-borns (48 out of 64) developed severe respiratory distress compared to 50.7% (68 out of 134) term babies and 2 post term new-borns had severe distress. Kwang Sun Lee et al[5] has shown that gestational age of less than 32 weeks or less the incidence of RDS was more when compared to the gestational age between 33 to 36 weeks. C. Dani.[6] has shown that gestational age was associated with RDS in new-born.

New-born Sex:

Sex	Frequency=200	Severe Distress n=118	%
Male	128	70	54.6%
Female	72	48	66.6%

P value 0.098 statistically not significant

66.6% of the new-borns (78 out of 72) female babies developed severe RDS as compared to 54.6% (49 out of 128) male babies.

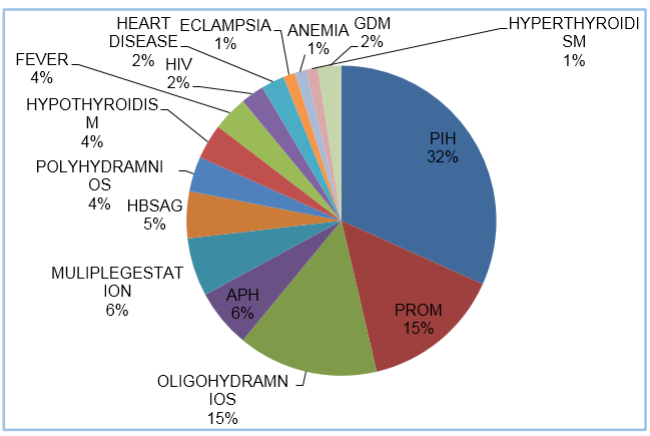
Maternal Risk Factors:

Maternal Risk Factors	Total Cases n=200	Severe Distress n=118	%
present	82	67	81.7%
absent	118	51	43.2%

X2=6.801, p=0.0091 very highly significant.

81% (67 out of 82) of new-borns with maternal risk factors had severe distress as compared to 43% (51 out of 118) without maternal risk factors.

Antenatal Risk Factors for Distress:



Out of 2 mothers with GDM complicated pregnancy, 1 baby had distress due to MAS and 1 had distress due to TTNB.

Abnormal Radiological Findings: In 75.5% of new-borns with respiratory distress, abnormal chest X-ray findings were reported. 100% of the new-borns with MAS (70 out of 70), RDS (64 out of 64), congenital pneumonia (2 out of 2) and CDH (2 out of 2), had abnormal X-ray findings compared to 44.4% (8 out of 18) of new-borns with TTNB. 71.4% of new-borns with congenital heart disease had abnormal X-rays.

None of the new-borns with perinatal asphyxia had abnormal x-ray chest findings. In MAS out of 70 cases, 52(74.2%) cases had hyperinflated lungs and 18(25.7%) cases had infiltrates. In RDS out of 64 cases, 47(73.4%) cases had bilateral reticulogranular pattern, 13(20.3%) cases had low volume lungs, and 3(4.6%) cases had white out lungs. In TTNB out of 18 cases, 2 had bulging fissure, 5 cases had hilar vessel prominence and 1 case had cardiomegaly.

DISCUSSION:

Assessment of Clinical Outcome: Early diagnosis of new-born distress is very important for its management and good clinical outcome. This study has made an attempt in early identification of the causes of new-born distress by clinical assessment of its severity, risk factor association and abnormal radiological findings.

Maternal Risk Factors:

Antenatal Risk Factors	Total Cases	MAS	RDS	TTNB	PERINATAL .ASPHYXIA	C. PNEUMONIA	CHD	CDH
PIH	26	4	17	1	4	0	0	0
Oligohydramnios	12	7	2		1		2	
PROM	12	7	2		1		2	
APH	5	1	3	1				
Twin	5		4		1			
HBS AG	4	2			1		1	
Polyhydramnios	3		2				1	
Fever	3	1	2					
Hypothyroidism	3	1			2			
HIV	2	1		1				
Eclampsia	1		1					
Anaemia	1	1						
Hyperthyroidism	1				1			
Heart disease	2		1	1				
GDM	2	1		1				
Total	**82**	**26**	**34**	**5**	**11**		**6**	

In a study done by Bassey G.[10] Inimgba NM, over a period of 5 years i.e. 2008 to 2012 showed that the commonest intrapartum complication was foetal distress in 42.86%. In study done by Bassey et al[10] foetal distress was seen in 42.8% of total multiple gestation pregnancy.

In the present study out of 200 babies, 134 (67%) were term babies, 64(32%) were preterm and 2 babies (1%) were post-term babies; 75% of preterm new-borns (47 out of 64) developed severe RDS compared to 50.7% (68 out of 134) in term new-borns. In a study by Santhosh et al[11] in 2011, it was observed severe distress was more common in preterm babies than term babies. C. Dani.[6] and M. Lureti has also observed in their studies that preterm babies were more associated with RDS when compared to term babies.

In the present study out of 200 babies 130(65%) babies born with clear liquor and 70(35%) babies born with meconium stained liquor. 64.2% of new-borns (45 out of 70) born to mothers with meconium stained liquor developed severe RDS compared to 56.1% of the new-borns (73 out of 130) born to mother with clear liquor. In the present study all the babies born with meconium stained liquor are of full term and post term gestational age. In a study done by Monen L.[11] et al concluded that meconium-stained amniotic fluid more prevalent with increasing term gestation.

In the current study among 200 babies, 124(62%) were delivered by normal vaginal delivery and 76(38%) were delivered by caesarean section. 66.7% of new-borns (82 out of 124) born by normal vaginal route developed severe RDS compared to 47% of the new-borns (36 out of 76) by caesarean section. A study conducted by Santhosh et al in 2013 showed that majority of Preterm babies were delivered vaginally developed severe RDS.[12] In our study, all the babies with TTNB were delivered by caesarean section.

In a Study done by Tudehope and Smith showed that TTNB was more common in babies born by caesarean section.

In the present study out of 200 cases identified with RDS, 77% were respiratory in origin, 18% were CNS origin, 4% were of CVS causes, 1% were due to CDH. The commonest cause among respiratory origin was meconium aspiration syndrome (35%) followed by RDS (32%) and transient tachypnoea of new-born (9%). The only surgical cause for respiratory distress in the present study was CDH (1%). Surgical intervention was done in one case of Congenital Diaphragmatic Hernia. One baby with CDH was operated within 48 hours and required ventilator care post-operative day, Fetal Care Center Cincinnati, despite the advances in neonatal care, such as high-frequency oscillatory ventilation, inhaled nitric oxide, and ECMO, the mortality rate of isolated CDH remains substantial.

In our study, majority 95% required O2 more than 24 hours which implied O2 requirement depends on the severity of respiratory distress. Mortality in the present study was 2.5% (5 out of 200). 2 cases due to CDH. 3(60%) cases were due to RDS. In the present study, among 6 cases ventilated for RDS 3(50%) cases expired.

CONCLUSIONS

1. Meconium aspiration syndrome (MSA) is the most common cause of RDS in new-born.
2. Almost 60% of new-borns with RDS developed severe RDS who required intensive monitoring.
3. Risk factors like meconium stained liquor, vaginally delivered new-borns, preterm gestation age, & female sex of new-born were associated with severe RDS in new-borns.
4. Immediate clinical outcome of new-born RDS in term of mortality rate is variable and depends on the cause of new-born distress.
5. Chest radiograph taken early during the course of the RDS in new-born is important diagnostic tool for early identification of the cause of distress.

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