



ORIGINAL RESEARCH PAPER

Paediatric Medicine

CLINICO-ETIOLOGICAL PROFILE AND OUTCOME OF ACUTE RESPIRATORY DISTRESS SYNDROME IN PAEDIATRIC INTENSIVE CARE UNIT (PICU) IN A TERTIARY CARE HOSPITAL IN BHUBANESWAR.

KEY WORDS: Acute respiratory distress syndrome, Hypoxemia, Sepsis, MODS, VILI

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ABSTRACT

Objective:-To study the clinical profile of the patients of acute respiratory distress syndrome (ARDS) in terms of etiology and clinical course & to evaluate the outcome of the patients with ARDS in term of mortality. **Study design:-** Prospective observational study. Study was conducted in PICU of HI-Tech medical college, Bhubaneswar. Study group:- All children aged between 3months to 12yrs admitted in PICU from 1st sep 2020 to 31 august 2022,with a diagnosis of pediatric acute respiratory distress syndrome as per pediatric acute lung injury consensus conference definition (PLICC). **Measurements & main results:-** Out of 130 patients having acute respiratory distress syndrome, 64.6% expired in PICU during stay & 35.3% were discharged. Out of admitted 60% were male & 40 % were female. Most common primary etiology was Pneumonia followed by sepsis, other causes may be drowning, trauma, burns, transfusion related acute lung injury. **Conclusion:-** Pediatric acute respiratory distress syndrome contributes to a significant burden in the PICU of developing country and is associated with significant high mortality. Infection remains the most common etiology.

Introduction:-

ARDS is a potentially fatal respiratory condition brought by direct & indirect lung damage from various etiological factor. It is characterized by severe dyspnea, tachypnea, hypoxemia resistant to oxygen supplementation [1] It causes poor lung compliance, severe hypoxemia, bilateral infiltrate on chest radiographs due to protein rich pulmonary oedema, alveolar capillary leakage and pervasive alveolar destruction [2].

Methodology:- This study covered the ARDS patients admitted in PICU of Hi-Tech medical college & Hospital, Bhubaneswar . Approval from Hi-Tech medical college Institutional Ethics committee was taken before the study. All the necessary information regarding the study was explained to the parents of children. Informed written consent was taken from the parents who were willing to participate in the study. Demographic information like age and gender as well as information regarding disease onset in case sheet.

All children in this study were mechanically ventilated in pressure control mode. Their initial ventilator setting including Fio2,PIP, and positive end expiratory pressure (PEEP)were recorded. The on call PICU doctors kept a daily log of physical examination results and ventilator setting for these patients. In our study the predisposing variable for ARDS were divided into direct & indirect lung injury depending on whether the original insult involved the lung eg:- pneumonia, aspiration Or non pulmonary sepsis.

In this study, the individuals were divided into three groups based on the maximal PEEP and PIP employed throughout the ventilator stay.They were divided into three groups according to PEEP: 5-8 cm of water, 9-12 cm of water, and > 12 cm of water. According to PIP, the classification was into two groups: 30-35 cm of H2O and less than 30 cm of H2O. Recruitment techniques, such as prone positioning and ventilator setting modifications, were used when there was evidence of lung de-recruitment to increase oxygenation. Throughout their hospital stay, each patient was followed up on often to track any clinical improvement or deterioration, as well as the emergence of any complications including MODS, DIC, or any

VILI (ventilator induced lung injury). Additionally, the patients had additional testing and received the necessary main diagnosis treatment.

RESULT :-

Distribution of sex group:-

Sex	Frequency	Percentage
Male	78	60
Female	52	40
Total	130	100

Distribution of Viral etiology of Pneumonia ARDS:-

Viral etiology of Pneumonia ARDS	Frequency	Percentage
Adeno	9	37.5
DENGUE	6	25
H1N1	7	29.17
Metapneumo	2	8.33
Total	24	100

Distribution of PaO2/FiO2 :-

PaO2/FiO2	Frequency	Percentage
Mild	0	0
Moderate	49	37.69
Severe	81	62.31
Total	130	100

Distribution of PEEP MAX Group :-

PEEP MAX Group	Frequency	Percentage
Group1 (5 to 8)	28	21.54
Group2 (9 to 12)	30	23.08
Group3(>12)	72	55.38
Total	130	100

Distribution of PIP MAX Group :-

PIP MAX Group	Frequency	Percentage
Group1 (<30)	34	26.15
Group2 (30-35)	96	73.85
Total	130	100

Distribution of Outcome :-

Outcome	In number	In Percentage
Death	84	64.62
Discharged	46	35.38
Total	130	100

Association between Age Group : Outcome

Age Group	Death	Discharged
Age group1 (3 month to 1 year)	57	3
Age group2 (1 year to 5 year)	14	28
Age group3 (5 year to 12 year)	13	15
Total	84	46

Chi-square value: 41.1678; p-value: <0.0001

Association between sex outcome

Age Group	Death	Discharged
Male	53	25
Female	31	21
Total	84	46

Chi-square value: 0.1184; p-value: 0.7307

Distribution of Predisposing factor :-

			Death	Discharged	TOTAL	p-value
Direct (n=87)	Pneumonia (n=83)	Bacteria (n=62)	30 48.39 34.48	32 51.61 36.78	62 100.0 47.69	0.0001
		Viral (n=21)	15 71.43 17.24	6 28.57 6.89	21 100.0 16.15	
		Total	45 54.22	38 45.79	83 100.0	
	Aspiration (n=2)	1 50.0 1.15	1 50.0 1.15	2 100.0 1.54	>0.05	
	Drowning (n=2)	1 50.0 1.15	1 50.0 1.15	2 100.0 1.54	>0.05	
Indirect (n=43)	Non-pulmonary sepsis (n=39)		31 79.48 72.09	6 15.38 13.95	37 100.0 28.46	0.0001
		Trauma (n=1)	1 100.0 2.32	0 0.0 0.0	1 100.0 0.8	
	Burns (n=1)	1 100.0 2.32	0 0.0 0.0	1 100.0 0.77	>0.05	
	TRALI (n=1)	1 100.0 2.32	0 0.0 0.0	1 100.0 0.77	>0.05	
	OTHERS (n=1)	1 100.0 2.32	0 0.0 0.0	1 100.0 0.77	>0.05	

Association between MODS : Outcome

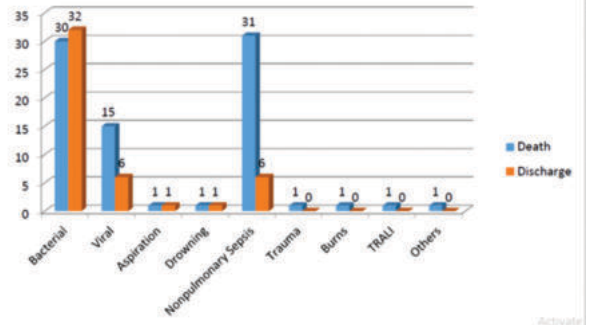
MODS	Death	Discharged
Yes	78	5
No	6	41
Total	84	46

Association between DIC : Outcome

DIC	Death	Discharged
Yes	51	8
No	33	38
Total	84	46

Association between blood culture and outcome

BLOOD CULTURE	Death	Discharged	Total
Positive	18(21.4%)	10(21.7%)	28
Negative	66(78.5%)	36(78.2%)	102
Total	84	46	130



Discussion:-

We divided the etiologies into direct and indirect lung injury. Direct lung injury accounted for 87 out of 130 cases of ARDS (66.9%), whereas indirect lung injury accounted for the rest 43 cases of 130 cases ARDS(36.5%)[3].

In the direct lung injury group, pneumonia was found to be the cause in 83 (95.4%) cases and the rest due to aspiration and drowning. Out of these 83 cases of pneumonia, 62 (74.6%) cases were of bacterial origin and the rest 21 (25.4%) were of viral origin[4].

In the indirect lung injury group, 37 (86.04%) cases were due to non pulmonary sepsis and the rest were due to TRALI, trauma and burns. Hence, our study clearly reveals that pneumonia was the most common direct as well as overall cause of ARDS and non pulmonary sepsis was the most common cause of indirect lung injury[5].

Mortality was seen in 45 out of 87 cases (51.7%) of ARDS due to pneumonia and 35 out of 43 (81.3%) cases of ARDS due to non pulmonary sepsis. These findings in our study was statistically significant (p value 0.0001). In our study it is found that 63.85% of children developed MODS during the hospital stay. Among them 92.85% of children accounted for mortality. The relationship between MODS with outcome found significant in our statistical analysis (p<0.0001)[6].

We found in our study that 37.69% of cases had moderate ARDS (P/F ratio 100-200) and 62.31% cases had severe ARDS (P/F ratio < 100) on DAY 1 of admission. Among the children who had severe ARDS the mortality rate was 75% as compared to 25% in case of moderate ARDS.

Analysis of this result shows statistically significant relation between P/F ratios with mortality (p < 0.0001)[7]. In this study we have found that 21.54% of cases belonged to the Grp 1 in which maximum PEEP used was between 5-8 cmH2o. 23.08% cases was in Grp 2 in which maximum PEEP used was (9-12 cm H2o). And 55.38% cases were in Grp 3 in which max peep used was >12 cm H2o[8].

The mortality rate was more in Grp 3 which was accounted for 85.71% of total mortality (n=72). As compared to Grp 2 in which mortality was 14.29% of total mortality. Least mortality rate found in Grp 1 accounted for only 1.19%.

The findings shown in our study was statistically significant. (p < 0.0001)[9].

We divided study population into 2 group according to the maximum PIP used in the ventilated children. There was 26.15% of cases where we used <30cm H2O OF maximum PIP (Grp 1). On the other side we had 73.85% of cases where we used >35 cm H2O of PIP (Grp 2)[10].

In our study the mortality rate in Grp 1 was 1.19% whereas the same in Grp 2 was 98.81%. The result of the present study showed there was a significant relation between uses of high PIP with increased mortality[11]. (p < 0.0001)

Conclusion:-

The incidence of ARDS studies in India are few and lacking. Early identification and etiology work up for ARDS with timely administration of antibiotics/ antivirals or antimalarial drugs is necessary for the improvement in survival rates in view of increased morbidity and mortality associated with ARDS. More elaborate studies are required to look into the challenges of ARDS and for the benefit of survival outcomes.

Several factors are statistically related to mortality in ARDS, including age, etiological factors, respiratory and ventilator indexes, and degree of organ failure. Among those the following can be concluded, Primary pulmonary pathology (Pneumonia) was associated with ARDS in nearly one third of patients.

Non pulmonary sepsis was identified as a significant predisposing factor for mortality and should be aggressively treated.

Multi organ failure was seen in 91% of patient who died from ARDS. Hence supporting care including invasive monitoring, attention to multiorgan dysfunction are crucial to improve the outcome.

Minimum P/F ratio and HIGH PEEP, PIP value depicted worst outcome. Hence Lung protective strategy and recruitment maneuvers are imperative.

Early identification and etiology work up for ARDS with timely administration of antibiotics/antiviral, is necessary for the improvement in survival rates in view of increased mortality associated with sepsis induced ARDS .

More elaborative studies are required to look into the challenges of ARDS and for the benefit of survival outcome.

Conflict of Interest: :None

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Ethics Committee Aproval from Hi-Tech medical college
Ethics committee,Bhubaneswar

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