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Original Research Article

A Clinical-Epidemiological Assessment of the Patients with Acute Respiratory Distress Syndrome (ARDS) Admitted in (ICU)

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Abstract

Aim: To analyse the clinical characteristics of patients with acute respiratory distress syndrome (ARDS) who were hospitalized to the Intensive Care Unit (ICU).

Material and Methods: The IGIMS Department of Medicine in Patna, Bihar, India, performed this descriptive retrospective research. Study population: ICU patients 13 or older with acute respiratory distress syndrome. Any patient 13 or older hospitalized with acute respiratory distress syndrome was included in this investigation. Study duration was one year.

Results: Patients ranged in age from 20 to 70. The majority of patients were 31–40. Patients were mostly male (57.14%) and barely 30 female (42.85%). 42 patients (60%) had direct ARDS and 28 had indirect (40%). Out of 70 patients, 40% had DM, 25.71% HTN, 51.42% CKD, 57.14% CLD, 15.71% alcoholic men, 40% smokers, 84.28% experienced shock. Mild ARDS were 18.57% (13), moderate 67.14% (47), and severe 14.28% (10). Deaths totaled 70% (49). Severe ARDS caused 80% of fatalities.

Conclusions: Most ICU patients with ARDS had chronic renal illness, chronic liver disease, HTN, DM, or CCF. Early intervention to address these comorbidities will enhance ARDS outcomes. The majority of deaths in this research were from severe ARDS. Thus, PaO2/FiO2 ratio predicts ARDS mortality.

Key Word: Acute Respiratory Distress Syndrome, ICU

Introduction

Acute Respiratory Distress Syndrome (ARDS) is a serious and sometimes deadly syndrome marked by sudden respiratory failure caused by non-cardiogenic pulmonary edema and low levels of oxygen in the blood. First documented in 1967 by Ashbaugh et al., Acute Respiratory Distress Syndrome (ARDS) has since emerged as a significant area of concern in the field of critical care medicine owing to its elevated rates of illness and death. Despite progress in medical care and an improved knowledge of its underlying mechanisms, ARDS still presents considerable difficulties in terms of diagnosing, managing, and treating the condition. [1] ARDS is characterized by the Berlin criteria, which encompass the sudden appearance of symptoms within one week of a recognized clinical injury, the presence of chest opacities on imaging that cannot be fully accounted for by effusions, collapse of a lobe or the entire lung, or the presence of nodules, as well as hypoxemia with a PaO2/FiO2 ratio below 300 mm Hg despite positive end-expiratory pressure (PEEP) of at least 5 cm H2O. The severity of ARDS is categorized as mild (PaO2/FiO2 ratio 200-300), moderate (PaO2/FiO2 ratio 100-200), and severe (PaO2/FiO2 ratio <100) depending on the level of hypoxemia. [2] The worldwide incidence of ARDS is variable, although it is estimated to impact about 10% of patients admitted to intensive care units (ICUs) and up to 23% of patients who need mechanical ventilation. The fatality rate for Acute Respiratory Distress Syndrome (ARDS) remains substantial, with research indicating rates ranging from 30% to 50%, depending upon the severity of the disease and the presence of underlying medical disorders. The syndrome is often linked to many causes, including as sepsis, pneumonia, aspiration, trauma, and pancreatitis. [3] The pathogenesis of ARDS is characterized by an intricate interaction between inflammatory and immunological responses, which ultimately leads to heightened permeability of the alveolar-capillary barrier. This, in turn, causes pulmonary edema, reduced lung compliance, and compromised gas exchange. Important factors

involved in the process include pro-inflammatory cytokines, such as tumor necrosis factor-alpha (TNF-α), interleukin-1 (IL-1), and interleukin-6 (IL-6), which have a role in causing damage to the endothelium and epithelial cells. Fibrosis and long-term lung damage may occur in survivors as a result of the injury and healing processes. [4] Individuals suffering with Acute Respiratory Distress Syndrome (ARDS) often exhibit pronounced difficulty in breathing, rapid breathing, and low levels of oxygen in the blood that do not respond to further oxygen therapy. Physical examination may uncover indications of respiratory difficulty, such as the use of auxiliary muscles, cyanosis, and widespread crackles detected by auscultation. ARDS often begins suddenly and often advances fast, requiring mechanical breathing in the majority of instances. [5] ARDS development is linked to several risk factors, including acute lung injuries like pneumonia and aspiration, as well as indirect injuries like sepsis, severe trauma, and large transfusion. In addition, those with genetic predispositions and coexisting diseases such as persistent alcohol misuse and obesity are more prone to developing ARDS. [6-9] The primary emphasis in managing ARDS is on providing supportive care, with mechanical ventilation serving as the central aspect of therapy. Utilizing low tidal volume ventilation at a rate of 6 ml/kg of anticipated body weight has been shown to enhance survival by reducing the occurrence of lung damage caused by mechanical breathing. Additional supportive interventions include the use of positive end-expiratory pressure (PEEP) to avert the collapse of alveoli, putting the patient in a prone posture to enhance oxygenation, and adopting a conservative approach to fluid management in order to mitigate pulmonary edoema. [10-12] Pharmacological treatments for ARDS have undergone thorough investigation, but have shown very limited effectiveness. Corticosteroids have shown efficacy in some subsets of patients, notably those with late-phase Acute Respiratory Distress Syndrome (ARDS). Additional treatments, such as neuromuscular blockade and the use of extracorporeal membrane oxygenation (ECMO), are only used for severe instances and when hypoxemia does not respond to other treatments. [13]

Material and Methods

This research was undertaken at the Department of Medicine at IGIMS, located in Patna, Bihar, India for one year. It was a retrospective study aimed at describing and analyzing data. Study population: Individuals aged 13 years or above who have been hospitalized to the Intensive Care Unit (ICU) and have been diagnosed with Acute Respiratory Distress Syndrome (ARDS). This research included all patients who were hospitalized with a diagnosis of Acute Respiratory Distress Syndrome and were 13 years of age or older. The definitive diagnosis of Acute Respiratory Distress Syndrome (ARDS) was established based on the fulfilment of two of the specified criteria. Level of seriousness: Oxygenation refers to the process of adding oxygen to a substance or environment. Mild: A range of 200 mmHg < PaO2 /FiO2 ≤ 300 mmHg The range for moderate severity is defined as a PaO2/FiO2 ratio more than 100 mmHg and less than or equal to 200 mmHg. Severe: The ratio of arterial oxygen partial pressure to fractional inspired oxygen concentration is less than or equal to 100 mmHg. Acute onset refers to the occurrence of symptoms within one week following a clinical event or the development of new or worsening respiratory symptoms.

The chest radiographs reveal bilateral opacities that are indicative of pulmonary edema, which cannot be entirely attributed to effusions, lobar/lung collapse, or nodules.

The absence of left atrial hypertension indicates that hydrostatic edema is not the main underlying cause of respiratory failure. If there are no risk factors for acute respiratory distress syndrome (ARDS), it is necessary to do an objective test, such as echocardiography, to exclude the possibility of hydrostatic edema.

The eligible patients, or their family, were interviewed and provided written informed consent. A comprehensive history was obtained and a thorough clinical examination was conducted. Patients were treated appropriately.

Statistical Analysis

The statistical analysis was conducted using the SPSS (version 25) software programmed for Windows, developed by SPSS Science in Chicago, IL, USA.

Results

The patients ranged in age from 20 to 70 years. The majority of patients were between the age range of 31 to 40 years. The majority of the patients, accounting for 57.14%, were men, while just 30 patients, or 42.85%, were girls. Out of the total number of patients, 42 (60%) had direct ARDS, whereas 28 (40%) had indirect ARDS. Among the 70 patients, 40% of them had DM (diabetes mellitus), 25.71% had HTN (hypertension), 51.42% had CKD (chronic kidney disease), 57.14% had CLD (chronic liver disease), 15.71% were alcoholic men, 40% were smokers, and 84.28% had shock. The prevalence of mild ARDS was 18.57% (13 cases), moderate ARDS accounted for 67.14% (47 cases), and severe ARDS represented 14.28% (10 cases). The mortality rate was 70%, resulting in 49 fatalities. The majority of fatalities (80%) occurred in individuals with severe Acute Respiratory Distress Syndrome (ARDS).

Table 1: sex distribution of patients

Gender	Number	&
Male	40	57.14%
Female	30	42.85%
Total	**70**	**100 %**

Table 2: % Direct and Indirect ARDS cases among males and Females

	Males	**Females**
Direct ARDS	23 (57.5%)	19 (63.33%)
Indirect ARDS	17 (42.5%)	11 (36.66%)
Total	40	30

Table 3: Age wise distribution of no.of cases (%)

Age group	Number	%
21- 30 years	15	21.42
31-40 years	36	51.42
41-50 years	09	12.85
51-60 years	04	5.71
61-70 years	06	8.57

Table 4: Clinical Outcome

	Number of cases	%
Recovered	21	30%
Died	49	70%
Total	70	100%

Table 5: Mortality rates among mild, moderate and severe ARDS

ARDS severity	**Percentage Deaths**
Mild ARDS	53.84%
Mod ARDS	72.34%
Sev ARDS	80%

Table 6: Severity of ARDS

Pao2/Fio2 (Severity)	No. of patients	Percentage (%)
200-300 (Mild ARDS)	13	18.57%
100-200 (Mod.ARDS)	47	67.14%
less than 100 (sev.ARDS)	10	14.28%
Total	70	100

Figure 7: Risk factors of ARDS

Risk factors	No. of cases	Percentage
CLD	40	57.14%
CKD	36	51.42%
CCF	53	75.71%
HTN	18	25.71%
DM	28	40%
Smoking	28	40%
Alcoholic	11	15.71%
Shock	59	84.28%

Discussion

Advanced age is a standalone risk factor for death in cases of Acute Respiratory Distress Syndrome (ARDS). In our research, the highest death rate was seen among those in the middle age group [7-15.]

Multiple studies indicate that Dm is linked to a decreased likelihood of getting ARDS. [16-19] However, several studies indicate a greater death rate among individuals with both Acute Respiratory Distress Syndrome (ARDS) and Diabetes Mellitus (DM). [20] Several studies have shown a reduced death rate in people with diabetes mellitus with

septic shock. [21]. Several studies have shown that there is no substantial correlation between mortality from Acute Respiratory Distress Syndrome (ARDS) and Diabetes Mellitus (DM). [22-24] Our research discovered that there is no correlation between diabetes mellitus (DM) and mortality in patients with acute respiratory distress syndrome (ARDS). A research found that sepsis-associated acute respiratory distress syndrome (ARDS) is linked to higher fatality rates, more severe illness, and a lower PaO2/FiO2 ratio. [25] The present research did not report such a connection. Smoking, drunkenness, and sexual activity have all been shown to be linked to death in cases of acute respiratory distress syndrome (ARDS). [26-32] Our investigation did not find any connection between smoking, drunkenness, or sex and death due to ARDS. The LUNG SAFE trial found that the death rate was 34.9% for patients with mild ARDS, 40% for those with moderate ARDS, and 46.1% for those with severe ARDS. [33] Our research found that the death rate for mild ARDS was 54%, for moderate ARDS was 72%, and for severe ARDS was 80%. Our research found that the majority of ARDS patients had comorbidities rather than lung infections. However, Vigg et al. [34] conducted research that revealed a significant prevalence of lung infections, with 35 cases being the highest recorded number. In this investigation, we did not see a statistically significant increase in mortality with increasing age. However, other studies have shown a substantial association between age and death. Nevertheless, research done by Agarwal et al. [35] concluded that there is no statistically significant disparity in outcomes between young patients and individuals aged 50 years or older. Our research demonstrates a correlation between the PaO2/FiO2 ratio at admission and the likelihood of survival. Patients with a ratio between 200 and 300 exhibit higher survival rates, whereas those with a ratio below 100 have a higher mortality rate. Research conducted by P. Squara [36] demonstrated a similar correlation. The mortality rate seen in our research is 70%. The research conducted by Agarwal et al. reported a mortality rate of 47.8%. There is no substantial difference in fatality rates between Direct ARDS and Indirect ARDS.

Conclusion

The majority of ARDS patients admitted to the ICU had pre-existed comorbidities such as chronic kidney disease, chronic liver disease, hypertension, diabetes mellitus, and congestive heart failure. Implementing early interventions to manage these comorbidities would undoubtedly enhance the prognosis of individuals with ARDS. The majority of deaths in the group under investigation were attributed to the severe category of Acute Respiratory Distress Syndrome (ARDS). The PaO2/FiO2 ratio is a significant prognostic indicator for death in ARDS. It has been shown that ventilatory care of patients with ARDS is of utmost importance.

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