

**ANALYSIS OF RISK FACTORS AND CLINICAL FEATURES IN RESPIRATORY FAILURE PATIENTS AT A TERTIARY CARE TEACHING HOSPITAL**N. Sree Keerthi<sup>1\*</sup>, B. Vyshnavi<sup>1</sup>, S. Sai Charitha<sup>1</sup> and Dr. N. Surendra Reddy<sup>2</sup><sup>1</sup>Student, Department of Pharmacy practice, Sri Padmavathi School Of Pharmacy, Tiruchanoor, Tirupathi, Andhra Pradesh, India.<sup>2</sup>Assisatnt professor, Department of Pharmacy practice, Sri Padmavathi School Of Pharmacy, Tiruchanoor, Tirupathi, Andhra Pradesh, India.**\*Corresponding Author: N. Sree Keerthi**

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**ABSTRACT**

Smoking increases the risk of exacerbations of Chronic Obstructive Pulmonary Disease (COPD) resulting in the development of acute respiratory failure. Alcohol can also contribute to the risk of respiratory failure owing to its effects on the functional units of respiratory system. It is also evident from the previous reports that obesity is among such risk factors.<sup>[1]</sup> This study can add to the existing data focusing on alcoholism and smoking.

**Objectives:** To determine the risk factors based on patient's social habits, previous medical history. To identify the underlying cause for developing respiratory failure and to identify the allied clinical features. **Results:** This is a cross sectional study, where the data of 50 inpatients of TBCD (Tuberculosis and Chest Department) was collected using a specially designed proforma, between the period of October to November 2016. Out of 50 in patients, respiratory failure was seen mostly among males (66%) compared to females (34%), among whom smoking (48%) and alcoholism (38%) were the major risk factors. Cough, breathlessness and fever were most commonly observed symptoms related to respiratory problems. While decreased SpO<sub>2</sub>, decreased breath sounds and crepitations were most frequently observed characteristic features. **Conclusion:** Smoking and alcoholism abuse pose greater risk for many diseases. Hence, awareness has to be created among the public not only to follow the government instructions properly to have a control over their smoking and alcoholic habits, but also in sales of these illegal abusing products.

**KEY WORDS:** Alcohol, Smoking, Respiratory failure.**INTRODUCTION**

Respiratory failure is defined as a failure to maintain adequate gas exchange and is characterized by abnormalities of arterial blood gas tensions.<sup>[1]</sup> It occur when disease of the heart or lungs leads to failure to maintain adequate blood oxygen levels (hypoxia) or increased blood carbon dioxide levels (Hypercapnia). By definition, hypoxemic respiratory failure is characterized by an arterial oxygen tension (PaO<sub>2</sub>) of < 8 kPa (60mmHg) with normal or low arterial carbon dioxide tension (PaCO<sub>2</sub>). In contrast, hypercapnic respiratory failure is the presence of a PaCO<sub>2</sub> > 6 kPa (45mmHg) and PaO<sub>2</sub> < 8 kPa.<sup>[2]</sup> Respiratory failure can be acute (develops within minutes or hours in patients with no or minor evidence of pre-existing respiratory disease), acute on chronic (an acute deterioration in an individual with pre-existing respiratory failure) or chronic (develops over several days or longer in patients with existing respiratory disease).<sup>[3]</sup> Respiratory failure can also be classified based on the pathophysiologic derangements.

Type I (Hypoxemic – PaO<sub>2</sub> <60 at sea level) due to failure of oxygen exchange, Type II (Hypercapnic - PaCO<sub>2</sub> >45): due to failure in mechanisms of exchanging or removing carbon dioxide, Type III Respiratory Failure: Perioperative respiratory failure due to low functional residual capacity in the setting of abnormal abdominal wall mechanisms, Type IV respiratory failure due to shock.<sup>[4]</sup>

However, management of acute respiratory failure is challenging with high mortality in patients with high respiratory and cardiac diseases.<sup>[5-7]</sup> Most of the cases require to be treated based on the underlying cause. There are different causes for distinguished types of respiratory failure. Though acute respiratory failure seems to include heterogeneous groups, Pneumonia, COPD, acute respiratory infections and heart failure are the major causes, which can lead to mortality<sup>[8]</sup> and risk of mortality increases with the presence of comorbid conditions.

Clinical features of respiratory failure vary according to the underlying cause that majorly include cough, wheezing, sputum production, chest pain, fever and chills (in case of infection), paroxysmal nocturnal dyspnea, orthopnea, stridor, elevated JVP, tachycardia, arrhythmias.<sup>[9]</sup> Diagnosis includes physical examinations and characteristic features based on the previous history to find out the underlying cause and laboratory investigations like blood gas analysis (ABG), complete blood count, chest x-ray, Electrocardiogram (ECG), electrocardiogram, cardiac serologic markers, pulmonary function tests, bronchoscopy and microbiology.<sup>[9]</sup> Treatment is based on the initial assessment often referred to as the ABCDE (airway, breathing, circulation, disability, exposure) approach.<sup>[2]</sup> This helps the physician to proceed for initial therapy before going further based on the etiology. Non invasive mechanical ventilation seems to be the best option for acute respiratory failure.<sup>[10-11]</sup> Apart from this other therapeutic options are antimicrobial agents, glucocorticoids, bronchodilators, diuretics, positive airway pressure, vasodilators, morphine, inotropy, revascularization, invasive methods like tracheostomy and endotracheal intubation.<sup>[4]</sup>

To the best of our knowledge, there is no work done before to picturize the risk factors for the development of respiratory failure, despite of the fact that smoking increases the risk of exacerbations of COPD ending up with respiratory failure. However, it is also evident from the previous reports that obesity is also the risk factor for development of respiratory failure.<sup>[12]</sup>

## METHODOLOGY

This cross sectional study was conducted in TBCD department at a 1000 bedded multispecialty institution, SVRRGG hospital, by taking ethical committee approval from Sri Padmavathi School Of Pharmacy. The study was conducted between October to November 2106. The sample size was 50 patients. Data was collected from both male and female in patients with their willingness. Inclusion criteria was based on SpO<sub>2</sub> (<90%), those who are diagnosed to have respiratory failure and patients with grade IV breathlessness. Patients whose data was not available, who were not available at the bed side and those with multi organ involvement were excluded from the study. The data was collected using specially designed proforma including demographic details like age, gender, religion, occupation, disease details, smoking and alcoholism, past medical and medication history, SpO<sub>2</sub>, drug chart. The risk factors were analyzed based on the duration of smoking and alcoholism, admitting diagnosis, past medical and medication history. The clinical features were obtained from the case sheets.

## RESULTS AND DISCUSSION

**Table 1: Gender wise distribution.**

Gender	No. of Patients	Percentage
Female	17	34%
Male	33	66%

This table depicts that most of the people with respiratory failure were males, followed by females and this is because of their personal habits like smoking and alcoholism, which can exacerbate the existing medical condition leading to respiratory failure.

**Table 2: Risk factors for respiratory failure.**

Risk Factors	No. of Patients	Percentage
Smoking	24	48%
Alcoholism	19	38%
Smoking and alcoholism	19	38%
Others(underlying diseases)	25	50%

This table illustrates that smoking is the major risk factor among all despite of the underlying cause. Most of the patients (48%) had risk factor of smoking and among these, even chronic alcoholics and smokers starting from 15 to more than 40yrs (19 patients) of habit were also there, which contributed to almost 38% of risk for the development of respiratory failures. It is also interesting to note that all those who had the habit of alcoholism also had the smoking habit.

Though it is not completely understood about the pathophysiology of respiratory insufficiency due to chronic alcoholism, it is evident from the previous literature that diffuse activation of inflammatory cells and cytokines leads to the lung Parenchymal damage, fluid leakage into the lungs. Prolonged and heavy exposure to alcohol impairs mucociliary clearance, may complicate asthma management and likely worsens outcomes including lung function and mortality in COPD patients.<sup>[13-14]</sup>

NNAL (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol) is a metabolite of NNK (nitrosamine 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone, or nicotine-derived nitrosamine ketone), a potent carcinogen found only in tobacco products. This can be considered as the cause for development of respiratory failure in patients with smoking.<sup>[15]</sup>

Underlying conditions that contributed to respiratory failure other than smoking and alcoholism were COPD (32%), Tuberculosis (26%) and other diseases (14.89%) like Hydatid liver cyst, Epilepsy, Hypertension and Asthma (10.63%), Pneumonia (8.5%), Lung infections (6.38%), Bronchiectasis and Carcinomas (4.25%) like Brain metastasis and Broncho alveolar carcinoma and Steroid abuse, allergen exposure and other lung abnormalities (2.12%).

From the previous literature, it is understood that COPD, Asthma, Pneumonia and other lung infections, allergen exposure can contribute to the increased risk of developing respiratory failure. In our study, we found that COPD and TB contributed to the highest percent of risk while Asthma and pneumonia were less evident.

We observed that no female had the habit of smoking, alcoholism or even pawn chewing. Hence it is also evident that most of the patients who were affected with respiratory failure owing solely to other diseases were females and only a few were males suggesting that smoking and alcoholism habit is the major provoking factor in them.

**Table 3: Clinical manifestations.**

Admission Complaints	No. of Patients	Percentage
Cough	47	94%
Breathlessness	44	88%
Fever	31	62%
others(underlying condition)	50	100%

Characteristic clinical manifestations of respiratory failure depends on the underlying etiology and most commonly observed clinical symptoms were cough (94%), breathlessness (88%), fever (62%) and others symptoms of underlying illnesses like loss of appetite, loss of weight, pedal edema, chest pain and others have contributed to almost equal percentage of the actual clinical manifestations.

Loss of appetite and loss of weight were observed in old TB and TB defaulter cases. Pedal edema and chest pain were observed in patients with pleural effusion. Remaining other symptoms was due to other underlying diseases like COPD, Asthma, Pneumonia and various others conditions. Even two cases were related to cancers like brain metastasis and Broncho alveolar carcinoma.

**Table 4: Characteristic features of respiratory failure.**

Characteristic Feature	No. of Patients	Percentage
Decreased SPO2	30	60%
Decreased Breath sounds	21	42%
Crepitations	19	38%
Alterations in VF and VR	18	36%
Wheezing	8	16%
Decreased chest wall movements	3	6%
Dyspnea	2	4%

Generally different characteristic features like cough, breathlessness, fever, Decreased SPO2, decreased breath sounds, alterations in VF (vocal fremitus) and VR (vocal resonance), Crepitations, Wheezing, decreased chest wall movements, dyspnea will be seen in respiratory failure. In this study, we observed that decreased SPO2 (60%)

was most commonly observed followed by Decreased breath sounds (42%), Crepitations(38%), Alterations in VF and VR(36%), Wheezing(16%), Decreased chest wall movements(6%) and Dyspnea(4%). Blood gas analysis (ABG) can be the best marker for confirmation of respiratory failure. Keeping in view that patients cannot afford for the test, ABG was not performed.

**Table 5: Drug prescribing pattern.**

Drugs Prescribed	No. of Patients	Percentage
Symptomatic therapy	50	100%
Antibiotics	50	100%
Nebulization and spacers	31	62%
Oxygen inhalation	25	50%
Corticosteroids	23	46%
Vitamin supplements	16	32%

As discussed earlier, different therapeutic options are available for treating respiratory failure among which Non invasive mechanical ventilation is the standard therapy. We observed that symptomatic therapy contributed to the highest percentage which was given to provide symptomatic relief irrespective of underlying cause that included Furosemide, Tramadol, Ranitidine, Diclofenac, Pantoprazole, Paracetamol, Deriphylline (Theophylline + Etophylline), Spironolactone, Forecox (Isoniazid, Ethambutol, Pyrazinamide and Rifampin) to treat Pulmonary TB, Other diuretics and antihypertensives. This is followed by antibiotics, nebulization and spacers (62%), oxygen inhalation (50%), corticosteroids (46%) and vitamin supplements (32%).

**Table 6: Antibiotic drugs.**

Antibiotics Prescribed	No. of Patients	Percentage
Metronidazole	34	68%
Amikacin	23	46%
Amoxicillin+Clavulanic Acid	20	40%
Ceftriaxone	11	22%
Piperacillin + Tazobactam	10	20%
Azithromycin	7	14%

Among all the antibiotics used Metronidazole was prescribed in majority of cases with highest percentage of 68% followed by Amikacin (46%), Amoxicillin + clavulanic acid (40%), Ceftriaxone (22%), Piperacillin +Tazobactam (20%) and Azithromycin (14%).

## CONCLUSION

Smoking and alcoholism are the major risk factors for many diseases like cancers, liver diseases and even increases the risk for development of respiratory failure. Though the government has taken many initiatives to curb the practice of smoking and alcoholism, it has not been properly followed by the public. This still remains a major problem, which mainly effects on the economy in

the form of medical expenses to treat their alcohol and smoking associated illnesses. Proper counseling has to be provided to the community and appropriate action should be taken by the government against this issue.

## REFERENCES

- Gurmeet Singh, Ceva W. Pitoyo. Non-invasive Ventilation in Acute Respiratory Failure. *The Indonesian Journal of Internal Medicine*, January 2014; 1(46): 74-80.
- Abdullah Pandor, Praveen Thokala, Steve Goodacre, Edith Poku, John W Stevens, Shijie Ren, Anna Cantrell, Gavin D Perkins, Matt Ward and Jerry Penn-Ashman. Pre-hospital non-invasive ventilation for acute respiratory failure: a systematic review and cost-effectiveness evaluation. *Journal of health technology assessment*, 2015; 19(42): 1-130.
- Baudouin S, Blumenthal S, Cooper B, Davidson C, Davison A, Elliott M, et al. Non-invasive ventilation in acute respiratory failure – British Thoracic Society standards of care committee. *Thorax*, 2002; 57: 192–211.
- Kasper D.L, Braunwald E., Fauci A.S., Hauser S.L., Longo D.L., Jameson J.L., Isselbacher, K.L. *Harrison's Principles of Internal Medicine*, 16th Edition. New York: McGraw- Hill Professional, 2004.
- Delmere S, Ray P. Acute respiratory failure in the elderly: diagnosis and prognosis. *Age Ageing*, 2008; 37: 251–257.
- Aminzadeh F, Dalziel WB. Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Annals of Emergency Medicine*, 2002; 39: 238–47.
- Ray P, Birolleau S, Lefort Y, Becquemin MH, Beigelman C, Isnard R, et al. Acute respiratory failure in the elderly: etiology, emergency diagnosis and prognosis. *Journal of Critical Care*, 2006; 10: R82.
- The Health and Social Care Information Centre. *Hospital Episodes Statistics for England: Linked ONS-HES Mortality Data, 2009–10*. 2010. URL [www.hesonline.nhs.uk](http://www.hesonline.nhs.uk).
- Karen E.A. Burns MD MSc, Maureen O. Meade MD MSc, Azra Premji MSc RRT, Neill K.J. Adhikari MDCM MSc. Noninvasive ventilation as a weaning strategy for mechanical ventilation in adults with respiratory failure: a Cochrane systematic review. *Canadian Medical Association journal*, 18 February 2014; 186(3): 112-122.
- Behrendt C.F. Acute respiratory failure in the United States: Incidence and 31-day survival. *Journal of Chest*, 2000; 118(4): 1100-1105.
- Jennifer G. Wilson, MD, MS1 and Michael A. Matthay, MD. Mechanical Ventilation in Acute Hypoxemic Respiratory Failure: A Review of New Strategies for the Practicing Hospitalist, 2014 July; 9(7): 469–475.
- Ahmed S. Bahammam, Suhaila E. Al-Jawder. Managing acute respiratory decompensation in the morbidly obese. *Journal of Asian Pacific Society of Respirology*, 2012; 17: 759–771.
- Joseph H. Sisson, M.D. Alcohol and Airways Function in Health and Disease. *National Institute of health*, 2007 August; 41(5): 293–307.
- Lokendra Thakur et al. Alcohol Consumption and Development of Acute Respiratory Distress Syndrome: A Population-Based Study. *International Journal of Environmental Research and Public Health*, 2009; 6: 2426-2435.
- Carolyn S. Calfee et al. Cigarette Smoke Exposure and the Acute Respiratory Distress Syndrome. *Journal of critical care medicine*, 2015 September; 43(9): 1790–1797.