Research Article

Clinical Profile and Laboratory Investigations of Acute Dyspnea Patients: A Hospital Based Study

Kiran Kumar K V

Assistant Professor, Department of General Medicine, Sapthagiri Institute of Medical Science and Research Centre, Bangalore.

ABSTRACT

Background: Dyspnea is a common symptom in hospitalized adult patients and is among the most serious, as it is often a harbinger of severe pathology. Prevalence of dyspnea varies among clinical settings and patient subgroups; in the community 3% to 25%, outpatient clinics 3.7%, emergency rooms 2.7%, and at hospital admissions 15% to 25%. The study of clinical and laboratory profiles of dyspnea patients is essential for a community practice.

Objectives:

1. To study the clinical profile of acute dyspnea patients
2. To evaluate the underlying etiopathology of acute dyspnea

Materials and Methods: This observational study was be conducted at K.V.G. Medical College & Hospital, Sullia on 150 subjects from March 2016 – Dec 2016.

Result: In the present study, 43 patients had fever, 132 patients had cough, 127 patients had sputum, 11 patients had Hemoptysis, 52 patients had PND, 34 patients had chest pain and 8 patients had syncope as a presentational symptom. Mean heart rate was 111.38/min, SBP was 135.36 mmHg, DBP was 88.85 mmHg, Respiratory rate was 29.48/min. Sp02 was 88.91. Analysis of ECG showed, 24 patients (16.00%) had LVH,29 patients (19.33%) had ST Elevation, 12 patients (8.00%) had T wave inversion, 12 patients (8.00%) had LAD, 34 patients (22.67%) had RAD, 6 patients (4.00%) had CHB, 4 patients (4.00%) had LBBB,17 patients (11.33%) had RBBB. 48 patients (32%) had cardiomegaly, 23 patients (15.33%) had pleural effusion,18 patients (12 %) had consolidation. Patients diagnosed with DKA had mean Ph of 7.11, Pco2 of 21.1 mmHg, and HCO_3 of 9.62 mEq/Lit. When compared, patients diagnosed with Acute exacerbation of COPD and Asthma had mean pH of 7.21, Pco2 of 60.83 mmHg, and HCO_3 of 24.7 mm/l. 30 patients (20.00%) were diagnosed with Acute exacerbation of COPD, 14 patients (9.33%) were diagnosed with Acute exacerbation of Asthma, 22 patients (14.67%) were diagnosed with Pneumonia, 3 patients (2.00%)were diagnosed with Pulmonary embolism, 11 patients (7.33%) were diagnosed with Pleural effusion, 6 patients (4.00%) were diagnosed with Pneumothorax, 24 patients (16.00%) were diagnosed with Acute on chronic CCF, 31 patients (20.67%) were diagnosed with MI with CCF,4 patients (2.67%)were diagnosed with DKA, 2 patients each (1.33%) were diagnosed with Uremic encephalopathy and Hepatic encephalopathy each, 1 patient. (1.33%) was diagnosed with psychogenic dyspnea. Acute exacerbation of COPD had mortality of 11.76%, Acute exacerbation of Asthma had a mortality of 13.33%, Pneumonia had a mortality of 13.64%, Pulmonary embolism had a mortality of 33.33%, Pleural effusion had a mortality of 16.67%, Pneumothorax had a mortality of 50%, Acute on chronic CCF had a mortality of 25.00%, MI with CCF had a mortality of 28.13 %, DKA had a mortality of 25.00%. Overall mortality was 20.67%.

Conclusion: The study concluded that Pneumothorax had the highest mortality (50%) followed by pulmonary embolism (33.33%) and MI with CCF (28.13%). Uremic encephalopathy, Hepatic encephalopathy and psychogenic dyspnea had the least mortality.

Key Words: Pneumonia, Clinical profile, PFT, LRTI, Dyspnea

INTRODUCTION

Dyspnea is the clinical term for breathlessness or shortness of breath. Dyspnoea is taken from the Greek word ''dys'' meaning painful, difficult, or disordered and ''pnoea'' meaning breathing[1]. The experience derives from the interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioral responses'' as defined by the Consensus statement of the American Thoracic Society[2].

Corresponding Author:

Kiran Kumar K V, MBBS, MD (General Medicine), Assistant Professor, Department of General Medicine, Sapthagiri Institute of Medical Science and Research Centre, Bangalore; Email: kirankumar17121986@gmail.com

Dyspnea is one of the common symptoms in admitted patients. It is a subjective experience that may not be always consistent with physical examination. Patients describe their sensations using a variety of terms such as shortness of breath, chest tightness, increased effort of breathing, suffocation, and air hunger[3].

Dyspnea is the main complaint about 75% of the ambulance service. The prevalence of dyspnea has varied greatly across geographies. The variation is attributed to differences in the distribution of concurrent factors of dyspnea such as aging, gender, and smoking. Dyspnea is extremely common with advancing disease, and at late stages is present in 90-95% of those with COPD, 60-80% of those with CHF and 10-70% of those with cancer, whilst also being common in end-stage kidney disease and most severe in primary lung cancers, affecting 90% [4].

Prevalence of dyspnea varies among clinical settings and patient subgroups; in the community 3% to 25%, outpatient clinics 3.7%, emergency rooms 2.7%, and at hospital admissions 15% to 25%. Population-based studies have shown a prevalence of 9 to 13% for mild to moderate dyspnea among community-residing adults, 15% to 18% among community-residing adults aged 40 years or older, and 25 to 37% of adults aged 70 years and older[5].

AIMS AND OBJECTIVES

- To study the clinical profile of acute dyspnea patients
- To evaluate the underlying etiopathology of acute dyspnea

MATERIALS AND METHODS

This observational study was being conducted at K.V.G. Medical College & Hospital, Sullia

Study design

Observational descriptive study

Study site

Emergency ward and ICU, Department of General Medicine, K.V.G. Medical College & Hospital, Sullia

Duration of study

March 2016 – Dec 2016

Sample size

150

Inclusion criteria

1. Patients aged 18 years or more

2. Dyspnea of < 1week in patients of both sex with age>18 with any one of the following:
   a. Respiratory rate >22
   b. SpO_2 less than 96% in breathing room air
3. Patients giving informed consent to participate in the study

Exclusion criteria

1. Patients aged less than 18 years
2. Patients with dyspnea of >1 week
3. Patients admitted in the hospital who expired in less than 4 hours for whom there was no time period for laboratory evaluation.

Study procedure

A detailed history of the patient will be taken and through clinical examination will be done.

Routine investigations

1. Haemoglobin percentage
2. Total count
3. Differential count
4. Random blood sugar
5. Blood urea
6. Serum creatinine
7. Urine routine
8. Liver function test
9. SpO2 monitoring

Special investigations

1. PCXR
2. ECG
3. Cardiac enzymes
4. ABG
5. BNP
6. D-dimer
7. Peak flow
8. Negative inspiratory force/forced vital capacity
9. Pulmonary function testing
10. Chest CT/ VQ scan/ HRCT
11. Echocardiography

Observation

Table 1: Age profile

Age groups	No. of Patients	Percentage
<20 yrs	5	3.33%
20-30 yrs	24	16.00%
30-40 yrs	34	22.67%
40-50 yrs	26	17.33%
50-60 yrs	32	21.33%
60-70 yrs	29	19.33%
Total	150	100%

Table 2: Associated Symptoms

Symptoms	No. of Patients	Percentage
Fever	43	28.67%
Cough	132	88.00%
Sputum	127	84.67%
Hemoptysis	11	7.33%
PND	52	34.67%
Chest pain	34	22.67%
Syncope	08	5.33%

Table 3: Findings of Clinical examination

Clinical Signs	No. of patients	Percentage
Tachycardia	144	96.00%
Bradycardia	3	2.00%
Tachypnea	150	100.00%
Spo2 < 90 %	114	76.00%
B/L Pedal edema	43	28.67%
Increased JVP	37	24.67%
Third heart sound	12	8.00%
Hepatomegaly	06	04.00%
Rhonchi	117	78.00%
Crepitation	126	84.00%

Table 4: Hematology

Findings	No. of patients	Percentage
Elevated TLC (>11,000)	94	62.67%
Low Platelet count (<1,50,000)	26	17.33%
Elevated hematocrit (>50)	124	82.67%

Table 5: Chest X ray findings

Findings	No. of patients	Percentage
Cardiomegaly	48	32.00%
Pleural effusion	23	15.33%
Consolidation	18	12.00%

Table 6: ECG Findings

Findings	No. of patients	Percentage
LVH	24	16.00%
ST changes	29	19.33%
T wave inversion	12	8.00%
LAD	12	8.00%
RAD	34	22.67%
CHB	6	4.00%
LBBB	4	2.67%
RBBB	17	11.33%

Table 7: Echocardiography Findings

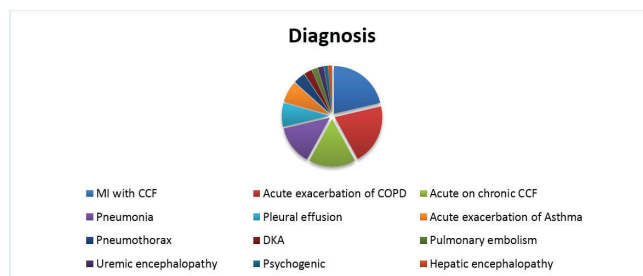| Findings	No. of patients	Percentage
LVSD	36	24.00%
LVDD	33	22.00%
RWMA	21	14.00%
LVH	18	12.00%

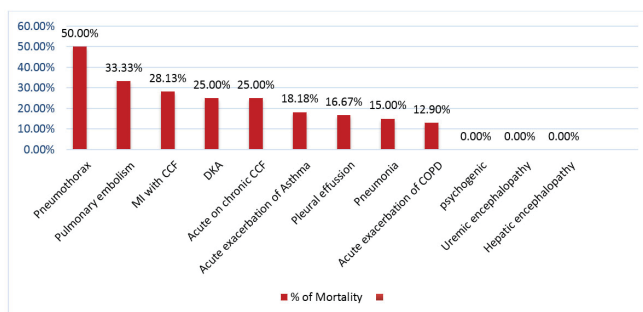**Diagram 1:** Diagnosis of acute dyspnea

Diagram 2: Mortality in acute dyspnea

DISCUSSION

The present study was conducted from March 2016 to Dec 2016 with the objective to study the clinical profile of acute dyspnea patients and to evaluate the underlying etiopathology of acute dyspnea at K.V.G. Medical College & Hospital, Sullia.

Demography

There were 5 patients within 20 years, 24 patients between 20-30 years, 34 patients between 30-40 years, 26 patients between 40-50 years, 32 patients between 50-60 years, 29 patients between 60-70 years. There were 78 male patients and 72 female patients. The mean age of patients was 61.4 years.

In the study by Shrestha et al., the mean age of patients was 63.8 years with a minimum of twenty-two and a maximum of eighty-four years. Sixty patients were female and forty were male. Anne Maree Kelly et al. found that elderly patient was represented in higher proportion compared to the younger population.

The finding that most patients are older (more than 60% aged > 60 years) is not surprising as the chronic conditions associated with dyspnea including COPD, heart failure, and acute coronary syndrome become more common with age. However, patients with DKA present with type 1 Diabetes mellitus and hence present in younger age.

Symptomology

In the present study, 43 patients had fever, 132 patients had cough, 127 patients had sputum, 11 patients had Hemoptysis, 52 patients had PND, 34 patients had chest pain, and 8 patients had syncope as presentational symptom. The mean heart rate was 111.38/min, SBP was 135.36 mmHg, DBP was 88.85 mm Hg, Respiratory rate was 29.48/min. Sp02 was 88.91.

Anne Maree Kelly et al. observed that Bilateral crepitations were present in 31.5% of patients, Wheeze present in 20.4% patients, Localized rhonchi/bronchial breathing present in 3.7%, Widespread rhonchi present in 6 % of patients presenting with acute dyspnea [6].

Various studies have predicted PND has low sensitivity (<30%) but 75% specificity to diagnose heart disease[7]. PND and orthopnea though share a close relationship in terms of pathophysiology, they are temporally separated in most patients. Hence, the absence of PND can rule out the probability of a CCF [8,9].

Persistent Tachycardia is one of the earliest signs of acute pulmonary embolism and data from the present study substantiate it. Published Case series across the globe observed that tachycardia as a regularly associated sign of pulmonary embolism. When combined with observation of low Pa02 (< 60 mmHg), the sensitivity of the diagnosis of pulmonary embolism increases. Observations from our studies support this finding.

ECG Findings

An ECG with ST-segment changes constitutes strong evidence supporting the diagnosis of cardiac ischemia. However, clinicians must remember that neither normal biomarkers nor a non-diagnostic ECG can rule out cardiac disease in the ED. The initial ECG is normal in approximately 20 percent of patients subsequently diagnosed with myocardial infarction, and only 33 percent of initial ECGs are diagnostic. The ECG may also reveal signs of pulmonary embolism (PE) (right heart strain), pericardial effusion (diffuse low voltage, electrical alternans), and other disease processes. However, the sensitivity and specificity of the ECG for PE is limited. It is helpful to compare the ECG with prior studies.

Despite the availability of newer diagnostic tests such as radionuclide imaging and echocardiography, the ECG remains of prime importance in the evaluation of patients with suspected ischemic heart disease. Multiple studies using animal models have documented the link between ventricular repolarization and depolarization of body surface ECG tracing with transmembrane electrical recordings, which have given rise to a pathophysiological basis and explanation of ECG changes, under different clinical conditions. Although most of the ECG abnormalities detected in patients in the emergency department or CCU are caused by primary cardiac diseases, ECG changes do not invariably imply cardiac diseases.

In present study, Analysis of ECG showed, 24 patients (16.00%) had LVH,29 patients (19.33%) had ST Elevation,12 patients (8.00%) had T wave inversion, 12 patients (8.00%) had LAD, 34 patients (22.67%) had RAD,6 patients (4.00%) had CHB,4 patients (4.00%) had LBBB, 17 patients (11.33%) had RBBB. In a study of 9-year period by Malkayahalom et al., 5,400 patients were hospitalized in CCU; 1,350 were diagnosed as ST-elevation myocardial infarction (STEMI); and 4,050 patients were diagnosed as non-ST-elevation myocardial infarction (NSTEMI) [14].

In present study, ECG findings were also appreciated for pulmonary embolism and COPD (RAD). However, S1Q3T3 pattern was not observed in the present study.

Chest Radiograph

In the present study, 48 patients (32%) had cardiomegaly, 23 patients (15.33%) had pleural effusion, and 18 patients (12%) had consolidation.

Signs of acute decompensated heart failure (ADHF) that appear on a CXR include: cardiomegaly, cephalization of blood vessels, interstitial edema, and vascular congestion. Pleural effusions may be present. Radiograph may lag behind the clinical picture and approximately 20 percent of patients admitted with ADHF have a nondiagnostic CXR. Observations from the present study showed Kerley B lines, Chest infiltrates, Cardiomegaly. However, though Lung ultrasound is more sensitive than CXR in diagnosing ADHF it was not used in the present study.

Although an infiltrate on CXR is considered the "gold standard" for diagnosing pneumonia, radiographs obtained early in the clinical course may be non-diagnostic. Volume depletion may also lead to a negative initial CXR. Recent studies have observed that contrary to past studies, the appearance of the CXR (lobar versus diffuse disease) does not accurately predict the nature of pneumonia (typical versus atypical). The present study observed non-cardiogenic infiltrates with symptoms as criteria for pneumonia.

Large lung volumes and a flattened diaphragm on CXR suggest air trapping, which occurs with COPD or asthma (10). Unilateral air trapping suggests a foreign body. Many patients with mildly or moderately severe COPD and most

patients with asthma have an unremarkable CXR. However, the present study has observed hyperinflation on chest X-ray.

Arterial blood gases

In the present study, patients diagnosed with DKA had mean pH of 7.11, Pco2 of 21.1 mmHg and HCO_3 of 9.62 mEq/Lit. When compared, patients diagnosed with acute exacerbation of COPD and Asthma had mean Ph of 7.21, Pco2 of 60.83 mmHg, and Hco3 of 24.7 mm/l.

In a study by Pankajseth et al. on clinical profile of DKA, mean pH was 7.13 and mean HCO_3 was 12.46 mm/further, mean RBS was 535.6 mg/dl. As evident from the comparison of the present study with study by Set et al., pH and bicarbonates will be lower and Pco2 will be higher in DKA when compared to COPD patients[11].

Hence, ABG is useful in the management of acute dyspnea with DKA and COPD patients which can decide upon bicarbonate infusion in DKA and Ventilator requirements in COPD patients.

Diagnosis

30 patients (20.00%) were diagnosed with Acute exacerbation of COPD,14 patients (9.33%) were diagnosed with Acute exacerbation of Asthma, 22 patients (14.67%) were diagnosed with Pneumonia, 3 patients (2.00%) were diagnosed with Pulmonary embolism, 11 patients (7.33%) were diagnosed with Pleural effusion, 6 patients (4.00%) were diagnosed with Pneumothorax, 24 patients (16.00%)were diagnosed with Acute on chronic CCF, 31 patients (20.67%) were diagnosed with MI with CCF, 4 patients (2.67%) were diagnosed with DKA, 2 patients each (1.33%) were diagnosed with Uremic encephalopathy and Hepatic encephalopathy each, 1 patient (1.33%) was diagnosed with psychogenic dyspnea.

In a study by Shrestha et al., 52.9 % pneumonia and 47.1 % were heart failure. Other associated medical conditions were bronchial asthma, hypothyroidism, interstitial lung disease, and tuberculosis[12].

Anne Maree Kelly et al. observed that the most common diagnoses were lower respiratory tract infection (20.2%), heart failure (14.9%), chronic obstructive pulmonary disease (13.6%), and asthma (12.7%). In the EURODEM pilot study by S. Laribi, 22% had a cardiac cause and 15% had both cardiac and respiratory components.

In a study by Gottikonda et al., patients with ADHF constituted 43%, and patients having both cardiac and non-cardiac cause of dyspnea constituted 28% mostly with a diagnosis of ischemic cardiomyopathy (ICMP) with chronic kidney disease (CKD), COPD, or interstitial lung disease (ILD) with RV failure, and ADHF with pneumonia. The remaining patients had other causes like ARDS (7%), COPD (4%), acute pulmonary embolism (7%), acute pneumonia (4%), volume overload (4%), and massive pleural effusion (3%)[13].

The present study observed that 53.19 % of CCF patients had LV systolic dysfunction and 40.43% of CCF patients had LV diastolic dysfunction. Heart failure was earlier understood as pump failure or left ventricular (LV) systolic dysfunction, but several studies found that several patients admitted with heart failure had a normal systolic function and were labeled as heart failure patients with normal LV systolic function, later on, defined as a separate entity as Diastolic heart failure (DHF). Differentiating LVSD from LVDD helps in the management of diuretics and Inotropes. In earlier studies, DHF was presumed to account for approximately one-third of all patients with heart failure, but over the last two decades, these perspectives have changed substantially with an increase in the prevalence of DHF to almost half of all heart failure cases. Observation from the present study supports the findings of previous studies[18,40].

Mortality

Acute exacerbation of COPD had a mortality of 11.76%, Acute exacerbation of Asthama had a mortality of 13.33%, Pneumonia had a mortality of 13.64%, Pulmonary embolism had a mortality of 33.33%, Pleural effusion had a mortality of 16.67%, Pneumothorax had mortality of 50%, Acute on chronic CCF had a mortality of 25.00%, MI with CCF had a mortality of 28.13 %, DKA had a mortality of 25.00%. Overall mortality was 20.67%.

Spontaneous pneumothorax is regarded as a common and benign clinical entity; however, it can be life-threatening if it progresses to tension pneumothorax. As evident in the present study, Tension Pneumothorax presents with the highest risk of mortality. A study by Saiphoklang et al. observed that Causes of pneumothorax were pulmonary tuberculosis (55.9%), chronic obstructive pulmonary disease (41.2%), and pneumonia (23.5%). The mortality rate was 12%[14].

Myocardial infarction itself has a mortality of 20-25%. However, when complicated by CCF, mortality rate doubles. In a study by Zorbozan et al., they observed that the presence of CCF increases the mortality rate significantly. The present study showed 28.13% of mortality among patients of MI with CCF [15,16].

The present study found that dyspnea is a common reason for presentation to ED and that these patients make up approximately 10% of ward admissions and 20% of ICU admissions making them a high consumer of acute healthcare resources.

CONCLUSION

The study concluded that Pneumothorax had the highest mortality (50%) followed by pulmonary embolism (33.33%)

and MI with CCF (28.13%). Uremic encephalopathy, Hepatic encephalopathy, and Psychogenic dyspnea had the least mortality.

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