

## A STUDY OF MORBIDITY AND MORTALITY OF PULMONARY EMBOLISM IN A TERTIARY CARE CENTRE

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### Abstract

**Background:** Acute pulmonary embolism (PE), a potentially life-threatening manifestation of venous thromboembolism (VTE), requires early diagnosis and treatment as it is associated with high mortality and morbidity rates among hospitalized patients worldwide. The risk factors of PE include genetic and acquired risk factors which include additional disease and environmental influences. Objectives of the study were to study different cases of pulmonary embolism in terms of etiology, age-group, gender distribution, classification, morbidity, and mortality. **Materials and Methods:** The present cross-sectional, descriptive study was conducted at Grant Medical college and Sir JJ group of hospitals, a tertiary care hospital, from November 2017 to October 2019. Study participants were 60 patients with acute pulmonary embolism. History on several risk factors, and findings of clinical features and diagnostic tests were recorded and analysed. **Result:** Most common risk factors were immobilisation present in 10 (16.7%) patients and surgery <3-month duration in 4 (6.7%) patients. Malignancy in 3 (5.0%) patients, trauma <3m ago in 2(3.3%) patients, smoking in 11(18.3%) patients, COPD in 4 (6.7%) patients and heart failure in 1(1.7%) patient. The hospital mortality rate of patients of pulmonary embolism was in this study was 6.67%. **Conclusion:** Acute Pulmonary embolism is associated with varied clinical features, underlying risk factors and a mortality rate of 7% approximately.

## INTRODUCTION

Acute pulmonary embolism (PE), a potentially life-threatening manifestation of venous thromboembolism (VTE), requires early diagnosis and treatment as it is associated with high mortality and morbidity rates among hospitalized patients worldwide.<sup>[1-3]</sup> Pulmonary embolism may be asymptomatic and may not be suspected, it also does not have specific clinical presentation and thus confirming the diagnosis of PE can be difficult due to nonspecific symptoms, which include cough, dyspnea, hemoptysis and pleuritic chest pain.<sup>[4]</sup> Diagnosis of PE therefore relies on a clinical assessment and objective diagnostic testing.<sup>[5]</sup> Incidence of PE is increasing, associated with the development in the diagnostic methods. The risk factors of PE include genetic and acquired risk

factors which include additional disease and environmental influences. The most common reversible risk factor for PE is obesity, an increasing pandemic globally. Other common reversible risk factors include cigarette smoking and hypertension.<sup>[3]</sup> Acute pulmonary embolism has a high mortality in some patient groups, e.g., in patients with hemodynamic instability or right ventricular dysfunction and thus identification of high-risk patients is vital. However, the tools of risk stratification include clinical scores anamnestic features,<sup>[6,7]</sup> imaging techniques and biomarkers and are under continued research and improvement.<sup>[8]</sup> There are limited comprehensive Indian studies on acute pulmonary embolism despite growing burden and evidence that PE occurs frequently in Indian patients with symptomatic DVT.<sup>[9,10]</sup> The incidence and prevalence of acute pulmonary embolism in India

is also not exactly known. Thus, the present study was conducted to assess morbidity and mortality in patients of pulmonary embolism admitted in a tertiary care centre. Objectives of the study were to study different cases of pulmonary embolism in terms of etiology, age-group, gender distribution, classification, morbidity, and mortality.

## MATERIALS AND METHODS

The present cross-sectional, descriptive study was conducted at Grant Medical college and Sir JJ group of hospitals, a tertiary care hospital, from November 2017 to October 2019. Study participants were 60 patients with acute pulmonary embolism admitted in Medical Ward of tertiary care center.

### Inclusion criteria

1. Clinically suspected cases, CTPA confirmed/ High probability perfusion scans;
2. Both Sexes;
3. Patients giving valid consent;
4. Age >12 years.

### Exclusion criteria

Patients with other causes of respiratory distress, Chest Pain in addition to Pulmonary Embolism. IEC clearance was taken prior to commencement of the study. All Pulmonary thromboembolism patients admitted in hospital and those who fulfilled the inclusion criteria were included in the study. Detailed history was taken followed by clinical examination using the proforma.

Following investigations were carried out on all participants: Chest X Ray, ECG, Complete Blood Count, Renal Function Test, Liver Function Test,

Serum Electrolytes, Random Blood Sugar. Other Tests: USG Abdomen and Pelvis, D-Dimer Level, CTPA Scanning, Ventilation Perfusion Scanning, Color Doppler Study, Apla Acla, Sr. Homocysteine, and 2D Echo Cardiograph. Thrombophilia Profile: Test for inherited and acquired thrombophilic State, Protein S & Protein C, Antithrombin III, Factor V Leiden and Prothrombin 20210 a Mutation.

Patient was diagnosed to have pulmonary embolism if there was evidence of thrombus in CT pulmonary angiogram/high probability ventilation perfusion scan. Patients were considered to have massive pulmonary embolism if there was evidence of hemodynamic compromise (systolic BP <90 mmHg); as sub-massive if there was right ventricular dysfunction on echocardiography with no hemodynamic compromise. Patients were classified as minor pulmonary embolism cases if there was no evidence of these features. Statistical Package for the Social Sciences (SPSS) version 23.0 was used for analysis. Categorical variables are presented as percentages.

## RESULTS

Distribution of age, gender, clinical features, diagnostic findings, and classification of pulmonary embolism patients in the study is shown in the [Table 1]. All patients received low molecular weight heparin (LMWH) which was followed by warfarin. Thrombolysis was performed in 24(40%) patients. Thrombolysis and mortality in hospital in Pulmonary embolism patients is shown in [Table 2].

**Table 1: Distribution of age, gender, and clinical features and diagnostic findings in study participants. (n=60)**

Age-group	Number	%	Comorbid Conditions	Number	%	Risk factors	Number	%
21-30 yrs	2	3.33	Diabetes mellitus	16	26.67	Immobilisation	10	16.7
31-40 yrs	9	15	CVD	14	23.33	Surgery(<3m)	4	6.7
41-50 yrs	14	23.33	COPD	4	6.67	Malignancy	3	5
51-60 yrs	25	41.67	Hypothyroidism	1	1.67	Trauma(<3m)	2	3.3
61-70 yrs	7	11.67	Chronic liver disease	2	3.33	Current Smoker	11	18.3
>70 yrs	3	5	Chronic renal failure	2	3.33	Heart failure	1	1.7
Gender	number	%	Clinical features	number	%	COPD	4	6.7
Males	39	65	Dyspnea	53	88.33	Echo findings	number	%
Females	21	35	Syncope	37	61.67	PAH	51	85
Chest X Ray findings	number	%	Chest pain	11	18.33	RV dysfunction	52	86.7
Normal	54	90	Fever	7	11.67	Thrombus in Pulmonary artery, RV	3	5
Wedge shaped opacity	3	5	Cough	6	10	Normal	6	10
Lobar collapse	2	3.33	ECG Abnormalities	number	%	Venous doppler lower limbs	number	%
Pleural effusion	1	1.67	Sinus Tachycardia	55	91.67	Evidence of DVT	47	78.33
CT pulmonary angiogram findings (n=37)	number	%	RV Strain Pattern	38	63.33	No evidence of DVT	13	22
Thrombus in main and lobar arteries	32	86.49	S1Q3T3 Pattern	24	40	D dimer and Troponin I positivity	number	%

Thrombus in subsegmental arteries	5	13.51	RBBB	8	13.33	D dimer	59	98.33
Perfusion defects	number	%	Classification of PE	number	%	Troponin I	42	70
Perfusion defects present	18	81.82	Massive	15	25			
Perfusion defects absent	4	18.18	Sub-massive	38	63.33			
			Minor	7	18.42			

**Table 2: Thrombolysis and mortality in hospital in Pulmonary embolism.**

Thrombolysis treatment (n=24)	number	%
Underwent thrombolysis	24	40
Did not undergo thrombolysis	36	60
Mortality	number	%
Died	4	6.67
Survived	56	93.33

## DISCUSSION

In the present study, the mean age of patients of pulmonary embolism was 51.73(±10.72) yrs. Majority 25(41.67%) patients were in the age group of 51-60 years, followed by 14(23.33%) patients in the age group of 41-50 yrs. Kamerkar DR et al., study<sup>9</sup> on real-world information on patient characteristics, management strategies, clinical outcomes, and temporal trends in VTE was obtained. Mean age was 47 (±16) years. In the study by Calvin Davidsingh S et al.<sup>[11]</sup> patients who were newly diagnosed to have pulmonary embolism the mean age was 52.1 years. In our study 65% were male patients and a similar 70% of male patients were seen Kamerkar DR et al., study. <sup>9</sup> However nearly 90% of males were seen in studies Ng AC et al.<sup>[12]</sup> and Lolly M et al., studies.<sup>[13]</sup>

In the present study, most common risk factors were immobilisation present in 10 (16.7%) patients and surgery <3-month duration in 4 (6.7%) patients. Malignancy in 3 (5.0%) patients, trauma <3m ago in 2(3.3%) patients, smoking in 11(18.3%) patients, COPD in 4 (6.7%) patients and heart failure in 1(1.7%) patient. In the study by Kamerkar DR et al.<sup>[9]</sup> h/o DVT (34%), surgery including orthopedic surgery (28%), trauma (16%), and immobilization >3 days (14%) were the most common risk factors for VTE. Lolly M et al.<sup>[13]</sup> reported majority of the patients had at least 1 risk factor for embolization (58.5%) with smoking being the most important risk factor.

In the present study, among total 60 (100%) patients with pulmonary embolism the most common comorbidities were diabetes mellitus in 16(26.67%) patients, cardiovascular diseases (CVD) in 14(23.33%) patients and chronic obstructive pulmonary disease (COPD) in 4(6.67%) patients. In the study by Kamerkar DR et al.<sup>[9]</sup> Hypertension (25%), diabetes (19%), and neurological disease (other than stroke) (8%) were the most common comorbidities. In the present study, dyspnoea was the most common symptom present in majority 53(88.33%) patients, followed by syncope present in 37(61.67%) patients, chest pain was present in

11(18.33%) patients. Lolly M et al.<sup>[13]</sup> reported dyspnea (71.7%) and syncope (17.0%) as the predominant symptoms. 39.6% patients had tachycardia and 22.6% had hypotension.

In the study by Lolly M et al.<sup>[13]</sup> echocardiography was done in all patients. 45 patients (84.9%) had pulmonary arterial hypertension, 31 patients (58.4%) had evidence of RA/RV dysfunction and 3 patients (5.7%) had evidence of thrombus in heart. Calvin Davidsingh S et al.<sup>[11]</sup> noted echocardiography showed 30 patients (85.7%) had pulmonary arterial hypertension, 31 patients (88.5%) had evidence of RV dysfunction and 4 patients (16.7%) had evidence of thrombus in PA, RV. In our study, D dimer and Troponin I were positive in 59(98.33%) patients and 42(70%) patients respectively. Calvin Davidsingh S et al.<sup>[11]</sup> study 34 patients (97.14%) showed positive d-dimer reports. Among 35 patients, 24 (68.5%) had positive troponin values.

In the present study, V/Q scan was done in 22(36.67%) patients, among which perfusion defects were present in 18(81.82%) patients. In Calvin Davidsingh S et al.<sup>[11]</sup> study V/Q scan was done in 14 patients (40%) and CT pulmonary angiogram (CTPA) was done in 24 patients (68.5%). All patients in our study received low molecular weight heparin (LMWH) which was followed by warfarin. Thrombolysis was performed in 28(46.67%) patients. In Agarwal R et al., study,<sup>[14]</sup> thrombolysis with streptokinase was performed in 14 (58.3%) patients. All patients received low molecular weight heparin followed by warfarin.

The hospital mortality rate of patients of pulmonary embolism was in this study was 6.67%. Mortality was significantly associated with male gender, presence of risk factors and increasing age. In the study by Kamerkar DR et al.<sup>[9]</sup> mortality was 7% among patients diagnosed with VTE during hospital stay versus 1% in those hospitalized with diagnosed VTE. In the study by Ng AC et al.<sup>[12]</sup> 3% patients died in-hospital during the index PE admission. Lolly M et al.<sup>[13]</sup> reported a mortality rate of 7.5%. Chang WT et al.<sup>[15]</sup> reported advanced age, male sex, and comorbid diabetes mellitus indicated a higher incidence of mortality and major adverse cardiovascular events.

## CONCLUSION

Acute Pulmonary embolism is associated with varied clinical features, underlying risk factors and a mortality rate of 7% approximately.

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