Characteristics of Patients with Pulmonary Embolism at Dr. Soetomo General Hospital Surabaya, from 2019-2021

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Abstract

Background: A complication of venous thromboembolism is pulmonary embolism. Pulmonary embolism is a type of cardiovascular disease caused by a thrombus in the pulmonary artery. Nonspecific symptoms and a wide range of clinical to asymptomatic presentations make diagnosing this disease challenging.
Objective: In this research, the patient profiles of pulmonary embolism patients admitted at Dr. Soetomo General Hospital in Surabaya from 2019 until 2021 were analyzed.
Materials and Methods: This descriptive study utilizes a retrospective methodology using secondary data from the medical record of individuals who suffered pulmonary embolisms during 2019 and 2021.
Result: A total of 33 pulmonary embolism patients met the inclusion criteria. Patients were dominated by men (66.7%) and age groups 36-45 and 56-65 years (30.3%). The most symptom was shortness of breath (43.3%). The Geneva score was dominated by the intermediate group (78.8%). PESI scores were overwhelmed by the class III group (36.4%). Vital signs are within normal limits, except respiratory rate results above normal with an average of 24x/min. Complete blood is within normal limits, except white blood cell results above normal with an average of 12.2 10^3/μl. %). Based on the CT scan results, most thrombi were found in the distal pulmonary artery (60%). The anticoagulant group is the most widely administered pharmacological therapy (76.5%).
Conclusion: The majority of pulmonary embolism patients are men over 40, with the most frequent symptoms being shortness of breath and the most thrombus locations found in the distal pulmonary artery

Keywords: Pulmonary Embolism, venous thromboembolism, characteristic, clinical profile

1. Introduction

VTE, also known as venous thromboembolism, is a condition where blood clots develop in deep veins. VTE commonly manifests as deep vein thrombosis and pulmonary embolism. Pulmonary embolism is the majority cause of sudden deaths and the third most prevalent cardiovascular disease [1]. Pulmonary embolism originates from the thrombus or DVT, which detaches and ruptures, then migrates from the venous circulation to the pulmonary blood vessels and clogs the pulmonary artery system [2]. Pulmonary embolism has the same pathological process as DVT, but a pulmonary embolism is fatal and difficult to detect.

Nonspecific symptoms of pulmonary embolism make the disease difficult to diagnose. In some cases, the most frequent symptoms or complaints of pulmonary embolism are shortness of breath, rapid and shallow breathing, chest pain, palpitations, syncope, coughing up blood, and swelling of the extremities. Although there

are challenges in diagnosing pulmonary embolism, early diagnosis is necessary because the earlier treatment is very effective [3]. Due to a large number of pulmonary embolism patients with non-specific and even asymptomatic symptoms, clinical score assessments are made to increase confidence that patients have pulmonary embolism before performing supporting examinations. The Geneva and Wells scores are the two most widely used and validated clinical rules. These scores classify the probability of pulmonary embolism into low, medium, and high. The higher the score, the higher the likelihood of a pulmonary embolism [4]

Many types of supporting examinations can be performed to diagnose pulmonary embolism. A 2013 study stated that supporting tests to establish the diagnosis of pulmonary embolism most often are CTPA, venous ultrasound, echocardiography, troponin, and V/Q scan[5]. CTPA is the gold standard in the diagnosis of pulmonary embolism. This examination is used to determine the location of the thrombus in the pulmonary artery. Based on the site of the thrombus, pulmonary embolism can be divided into two categories, namely central or proximal pulmonary embolism and distal pulmonary embolism [6]. A thrombus in the primary or proximal pulmonary artery is defined as a central pulmonary embolism. In contrast, a clot found in the pulmonary arteries branch is referred to as a distal pulmonary embolism [6]. Therapy for pulmonary embolism based on ESC 2019 can be given in anticoagulant and thrombolytic groups. Still, this therapy was selected based on risk stratification and the hemodynamic state of the patient[7].

This study aimed to examine the profiles among pulmonary embolism patients.

2. Material and Method

A retrospective descriptive approach was applied in this research, which used secondary data from patient health records who had pulmonary emboli at Dr. Soetomo General Hospital Surabaya between January 2019 and July 2021. The ethics committee has approved this research with ethics number 0935/117/4/IX/2021

Thirty-three patients in total met the inclusion criteria. The findings of this study were evaluated using Microsoft Excel and presented in the form of a table. Observed variables include; age, gender, symptoms, geneva score, PESI score, vital signs, CBC, thrombus location, and type of pharmacological therapy.

3. Result

In total, 33 patients fulfilled the inclusion criteria. Men (66.7%) between the ages of 36 and 45 and 56 to 65 made up the majority of participants in this study. The most common symptom of pulmonary embolism patients in this study was shortness of breath (43.3%). The results of the vital signs examination were within normal limits, but an increase in the respiratory rate was found. Complete blood was also at normal limits, but an increase in leukocytes was found. The majority of Geneva scores are in the intermediate category (78.8%), while PESI scores dominated in the Class III category (36.4%). The results of supporting examinations using a CT scan showed the discovery of a thrombus in the distal pulmonary artery (60%), and 76.5% of patients used anticoagulants as therapy.

Table 1. Characteristics of patients

	Category	Frequency	Percentage (%)
Sex	Men	22	66,7
	Women	11	33,3
Age	12-16	1	3
	17-25	0	0
	26-35	2	6,1
	36-45	10	30,3
	46-55	6	18,2
	56-65	10	30,3
	≥ 65	4	12,1
Sign and Symptoms	Dyspnea	29	43,3
	Tachypnea	3	4,5
	Pleuritic chest pain	9	13,4
	Swelling	13	19,4
	Hemoptysis	3	4,5
	Cyanosis	1	1,5
	Syncope	6	9,0
	Tachycardia	3	4,5
Thrombus location	Proximal pulmonary artery	6	40
	Distal pulmonary artery	9	60
Pharmacological treatment	Anticoagulants	26	76,5
	Thrombolytic	1	2,9
	Others	7	20,6

Table 2. Clinical Score

	Category	Frequency	Percentage (%)
Geneva score	Low	4	12,1
	Intermediate	26	78,8
	High	3	9,1

	Class I	9	27,3
	Class II	7	21,2
PESI score	Class III	12	36,4
	Class IV	2	6,1
	Class V	3	9,1

Table 3. Vital signs and CBC

	Parameters	**Mean**
	Temperature (°C)	36,5
	RR (/minute)	24
Vital signs	HR (/minute)	97
	BP (mmHg)	112/74
	SpO2 (%)	95
	HCT (%)	35,2
	Hb (g/dL)	11,5
CBC	Rbc (10^6/μl)	4
	Wbc (10^3/μl)	12,2
	Platelet (10^3/μl)	272
	MCHC (g/dL)	31,7

4. Discussion

In this study, the male sex was obtained more than the female. A previous study in 2020 also found that most pulmonary embolism patients were male [8], [9]. There have not been many studies that explain why males are more likely to experience pulmonary embolisms than women. However, smoking is among the risks for VTE in men because men make up the majority of heavy smokers. The Ministry of Health stated that based on the Global Adult Tobacco Survey 2021 showed that the prevalence of smokers in Indonesia was the highest experienced by men at 64.7%. According to a meta-analysis study, smokers are slightly more prone to VTE than non-smokers. High plasma fibrinogen levels are associated with smoking, whereas increased fibrinogen levels are related to a higher risk of pulmonary embolism.[10], [11][12]

The majority of the pulmonary embolism patients in this study were between the ages of 36-45 and 56-65, with an average age of around 50. These results are supported by a 2021 study that states that the average age of pulmonary embolism patients is 60 – 65 years[13]. The incidence of pulmonary embolism increases with

age. It is related to the presence of comorbid risk factors in the elderly such as heart failure, malignancy, and immobility associated with surgery and hospitalization.[14]

The most common symptom found in this study is shortness of breath. The most common pulmonary embolism patient symptom, according to research done in 2021, also found a similar finding [15]. Although the symptoms of pulmonary embolism are not specific, the most typical symptom of pulmonary embolism is shortness of breath, which is brought on by hypoxemia due to pulmonary artery occlusion [15][16]

The PESI score in this study was dominated by the class III group or the intermediate category group, namely 12 patients. Previous studies have also shown similar results, that most pulmonary embolism patients are in the PESI Class III category[17], [18]. As for the Geneva score, in this study, most patients were in the intermediate category. Other studies in several European countries also had similar results, that most pulmonary embolism patients fall into the intermediate category[19], [20]. The results of the vital signs examination in this study were within normal limits, but there was an increase in respiratory rate results. Similarly, CBC results are also within normal limits, but there is an increase in the number of leukocytes.

Based on the CT scan results, most patients with pulmonary embolism found the thrombus in the distal pulmonary artery of the lungs. This result is supported by previous studies that also stated that the location of thrombus in pulmonary embolism is mainly found in the distal pulmonary artery of the lungs. There have not been many studies discussing the differences in the causes of thrombus in the proximal[6], [21], and distal arteries of the lungs, but the size of the thrombus can be one of the factors. While a minor embolism obstructs the distal pulmonary artery, a larger embolus clogs the proximal pulmonary arteries.

Anticoagulants are the most widely used therapy in pulmonary embolism patients. A previous study in 2003 also stated that most pulmonary embolism patients use anticoagulants as therapy[22]. The high administration of anticoagulants is because anticoagulants are early therapy of pulmonary embolism and can reduce recurrence in patients. Anticoagulants should be administered to patients suspected of pulmonary embolism before a confirmed diagnosis, as long as the risk of bleeding is considered low. Anticoagulants should not be delayed in pulmonary embolism patients unless contraindications are present.[23][24]

5. Conclusion

Patients with pulmonary embolism at Dr. Soetomo General Hospital Surabaya are mostly men over 40, and the most common symptom is shortness of breath. The majority of clinical scores are in the intermediate category. The location of thrombus is found mainly in the distal artery of the lungs. The most commonly administered therapy is the anticoagulant group

Acknowledgements

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