ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF MEDICINE

DEPARTMENT OF INTERNAL MEDICINE

FOUR YEARS RETROSPECTIVE STUDY ON CLINICAL CHARACTERISTICS, RISK FACTORS AND OUTCOMES OF PATIENTS WITH PULMONARY EMBOLISM ADMITTED IN TIKUR ANBESSA SPECIALISED HOSPITAL MEDICAL WARD

BY- ESUBALEW AMANU (MD, INTERNAL MEDICINE RESIDENT)

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BY

Esubalew Amanu (Internal Medicine year 3 resident)

TEL-+251-984-74-50-03

E-MAIL-eselamanhailu@gmail.com

ADVISORS

- Dr. Hanan Yusuf (MD, Internist, Consultant PCCM physician), Department of Internal Medicine, School of Medicine, College of Health Science, Addis Ababa University, Addis Ababa, Ethiopia.

  TEL- +251-911-30-38-50

  e-mail -hananyusufahmed@gmail.com

  Signature_____

- Dr. Seifu Kebede (MD, Internist, Consultant Hematologist), Department of Internal Medicine, School of Medicine, College of Health Science, Addis Ababa University, Addis Ababa, Ethiopia

  TEL-+251-911-40-48-73

  e-mail -Seifu1974@yahoo.com

  Signature_____

DEPARTMENT HEAD

Dr. Tewodros Haile (MD, Internist, Consultant PCCM Physician)

Signature_____

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ABSTRACT

Background- Pulmonary embolism is the third common cardiovascular problem globally. It is a potentially lethal condition and frequently underdiagnosed. The severity and clinical presentation of PE are variable. Hence, correct diagnosis is dif cult. Prompt diagnosis of PE is essential to reduce mortality. Most of the data on the natural history, risk factors and clinical outcomes of PE comes from the Western population and there is lack of data in Africa and in Ethiopia specifically. This study assessed the clinical characteristics, risk factors and outcomes of PE patients in Tikur Anbessa Specialized Hospital, Ethiopia to fill the information gap we have.

Objective- to assess the clinical characteristics, risk factors and outcomes of PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C.

Methods- A hospital based retrospective study was done in 60 patients who were admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. with the main diagnosis of PE confirmed by chest CT with contrast and CTPA. All patients who had complete data were included in the study and their medical charts were reviewed. Data were analysed using SPSS 26 and descriptive analysis was used.

Results- A total of 60 patients studied. Of those 56.7% are females. The median age of patients was 44.6 years. Majority (95%) of the patients were symptomatic and the most common presenting symptoms were; shortness of breath, cough, chest pain, leg swelling and hemoptysis accounting 75%, 50%, 41.7%, 33.3% and 13.3 % each respectively. At presentation 95% were tachypenic, 76.7% tachycardic and 11.7% were hemodynamically unstable. 80% of the studied patients had one or more risk factors for PE. From those risk factors; active cancer, major surgery, peri and post-partum period and immobilization all together accounts the majority (83.3%). 6(10%) patients died in medical ward, 16.7% transferred to medical ICU and 73.3% were discharged improved.

Conclusions and Recommendations- More than half of PE patients were females and 60% were younger than 45 years old. 95% of patients were symptomatic. Majority of the patients admitted had one or more risk factors. Active cancer, major surgeries, peri and post-partum and immobilization constituent the most common risk factors. The coverage of thromboprophylaxis should be increased focusing on patients who have the above risk

factors. And further study should be done which shows the effect of those risk factors on patients' outcomes.

Key words- pulmonary embolism, clinical characteristics, risk factors, outcome, Tikur Anbessa Specialised Hospital, Ethiopia

Table of contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

COPD- Chronic Obstructive Pulmonary Disease

CT- Computed Tomography

CTEPH-Chronic Thromboembolism Pulmonary Hypertension

CTPA- Computed Tomography Pulmonary Angiography

CVD- Cardiovascular Disease

DVT- Deep Vein Thrombosis

HR-Hazard Ratio

ICOPER- International Cooperative Pulmonary Embolism Registry

IPER- Italian Pulmonary Embolism Registry

LMICs- Low- and Middle-Income Countries

OR-Odds Ratio

PE- Pulmonary Embolism

TASH- Tikur Anbessa Specialised Hospital

VTE- Venous Thromboembolism

1-INTRODUCTION

1.1-BACKGROUND OF THE STUDY

Venous thromboembolism (VTE) which consists principally of deep vein thrombosis (DVT) and pulmonary embolism (PE) is a common cause of morbidity and mortality. PE especially can be fatal and is infact a common cause of sudden death. (1).

The correct annual number of VTE events is hard to certain due to difficulties in timely diagnosis mostly due to the following factors: 1) VTE is often clinically silent with the first sign of the disease being sudden fatal death (30–50% of cases). 2) Clinical presentation mimics the characteristics of several other conditions, resulting in mistaken diagnoses. 3) PE detection during autopsy is very difficult. 4) Sensitivity and specificity of diagnostic tests for the disease remain weak. (1)

VTE is globally the third most frequent acute cardiovascular syndrome behind myocardial infarction and stroke. In epidemiological studies, annual incidence rates for PE range from 39-115 per 100 000 population. PE may cause 300 000 deaths per year in the US, ranking high among the causes of cardiovascular mortality. In six European countries with a total population of 454.4 million, more than 370,000 deaths were related to VTE in 2004. Of these patients, 34% died suddenly or within a few hours of the acute event, before therapy could be initiated or take effect. Of the other patients, death resulted from acute PE that was diagnosed after death in 59% and only 7% of patients who died early were correctly diagnosed with PE before death. (2)

Risk factors of VTE have been proposed according to Virchow's triad composed of a hypercoagulable state, vascular injury, and venous stasis. Major general surgery, hip and knee replacement, major trauma, spinal cord injury are the leading risk factors (odds ratio; OR>10) of the usual site VTE, followed by central venous line insertion, chemotherapy, hormonal therapy, hereditary thrombophilia, prior VTE, and malignancy (OR 2–9). (3)

Other risk factors for VTE include increasing age, obesity, smoking, immobilisation. (4). Blood transfusion and erythropoiesis-stimulating agents are also associated with an increased risk of VTE. (2) Infection is also a common trigger for VTE. Chronic infections

including HIV AIDS and Tuberculosis are reported as risk factors from developing countries. (10, 18)

Identifying these variable risk factors aid in proper risk stratification of patients. The prognosis of PE once it has occurred highly relies on timely and accurate diagnosis, reasonable risk stratification, and well-monitored anticoagulation. PE remains largely underdiagnosed due to the vague and nonspecific clinical manifestations. Prompt diagnosis and recognition of PE patients has been shown to reduce mortality and morbidity. (5)

Among all patients with pulmonary embolism in proximal arteries, 94% presented one of the typical syndromes (hemoptysis/pleuritic pain syndrome, uncomplicated dyspnea syndrome, or circulatory collapse syndrome), whereas in patients with segmental pulmonary embolism, only 72% had one of these presentations. The others with segmental emboli had only calf swelling. Dyspnea or tachypnea occurred in 92% of all patients with pulmonary embolism in whom the pulmonary embolism was proximal, but in only 65% with segmental pulmonary embolism. Dyspnea, tachypnea, or pleuritic pain occurred in 97% of patients with proximal pulmonary embolism and in 77% of patients with segmental pulmonary embolism. (6)

1.2-STATEMENT OF THE PROBLEM

Cardiovascular disease (CVD) constitutes the leading cause of mortality worldwide, especially in low- and middle-income countries (LMICs). In 2012, the World Health Organization estimated that 17.5 million people died from CVD, with over three-quarters of these deaths occurring in low-income countries, such as African countries. Venous thromboembolism (VTE), which comprises deep vein thrombosis (DVT) and its complication, pulmonary embolism (PE), is the third most common cause of CVD globally. It is associated with a high mortality rate, substantial healthcare costs, and a high rate of recurrence. (8)

PE remains an important clinical problem with a high mortality rate. According to the International Cooperative Pulmonary Embolism Registry, the overall crude mortality rate at 3 months was 15.3 % from patients admitted with pulmonary embolism. (7). Data from Italian

Pulmonary registry showed, All-cause mortality was 31.8% in hemodynamically unstable patients and 3.4% in hemodynamically stable patients; the corresponding PE-related deaths were 23.3% and 1.4% respectively. Age >75 (HR 1.50, 95% CI 1.01-2.25), immobilization >3 days before diagnosis of PE (HR 2.54, 95% CI 1.72-3.77) and hemodynamic impairment (HR 6.38, 95% CI 4.26-9.57) were independent predictors for in-hospital death. (9)

The prevalence of VTE and associated mortality are high following surgery, and in pregnant and postpartum women in Africa. The prevalence of pulmonary embolism (PE) in medical patients varied between 0.14% and 61.5%, with a mortality rate of PE between 40% and 69.5%. The case-fatality rate after surgery was 60%. (6). In Sub-Saharan Africa, with changing lifestyles and increase in cardiovascular risk factors, rise in its prominence is largely expected. (10)

The clinical presentation of PE is very non-specific and related to a broad list of symptoms. The commonest signs and symptoms of PE at the time of diagnosis were dyspnea (82%), chest pain (49%), cough (20%), syncope (14%), and haemoptysis (7%) in patients studied in International Cooperative Pulmonary Embolism Registry. (7). It is important to realize that pulmonary embolism is frequently asymptomatic. This was demonstrated by a systematic review of 28 studies that found that among the 5233 patients who had a deep vein thrombosis, 1665 (32 percent) had asymptomatic PE. (10)

In one-year audit of PE patients in Tertiary Hospital of Johannesburg, South Africa, the median age of the patients was 40 years old. HIV infection, tuberculosis and history of immobilisation were the most common risk factors. (4)

In study done at TASH, out of 200 medically admitted patients, 186 (93%) of them had at least two risk factors for VTE development (12). However, data that shows the clinical characteristics of PE patients, independent risks and outcomes are scarce in this hospital and in Ethiopia in general. Given the growing burden of VTE worldwide and the paucity of data from LMICs. This study is intended to assess the clinical characteristics, risk factors and outcomes of PE patients and fill the information gaps and being baseline for further study and possible interventions.

1.3-SIGNIFICANCE OF THE STUDY

Studying the clinical characteristics, risk factors and outcome of patients with pulmonary embolism will help in predicting which patients are likely to develop PE. This prediction in turn will help for applying preventive measures before the occurrence of pulmonary embolism.

This study will show outcomes of the patient (i.e., hospital stay, ICU admission and in hospital mortality). This information is important being baseline for future studies intended to find the association between patients' outcomes and the clinical characteristics and risk factors of patients. Based on the association found, it will be possible to have interventional plans for the reduction of poor outcomes.

2-LITERATURE REVIEW

General Overview

Embolism refers to a blood clot (embolus) that has broken off and is floating freely in the blood vessel. It can travel to another area of the body and cause a blockage of a blood vessel. This embolus travels from veins into right side of the heart. From the right side of the heart it enters to the main pulmonary artery and can get stuck there or move further into one of the lungs. (13)

Pulmonary embolism (PE) refers to obstruction of the pulmonary artery or one of its branches by material (e.g., thrombus, tumor, air, or fat) that originated elsewhere in the body. PE can be classified by the following: (14)

Based on the temporal pattern of presentation, Patients with PE can present acutely, sub-acutely, or chronically. Patients with acute PE typically develop symptoms and signs immediately after obstruction of pulmonary vessels. Some patients with PE may also present sub-acutely within days or weeks following the initial event. Patients with chronic PE slowly develop symptoms of pulmonary hypertension over many years (i.e., chronic thromboembolic pulmonary hypertension; CTEPH). (14)

Based on the presence or absence of hemodynamic stability: PE can be hemodynamically unstable PE also called "massive" or "high-risk" PE. Hemodynamically stable PE also called "submassive or intermediate-risk" PE if there is associated right ventricular strain or "low-risk" PE if there is no evidence of right ventricular strain. Hemodynamically unstable PE is that which results in hypotension. Hypotension is defined as a systolic blood pressure <90 mmHg or a drop in systolic blood pressure of ≥40 mmHg from baseline for a period >15 minutes or hypotension that requires vasopressors or inotropic support and is not explained by other causes. (14)

Based on the presence or absence of symptoms, PE can be symptomatic or asymptomatic. Symptomatic PE refers to the presence of symptoms that usually leads to the radiologic confirmation of PE, whereas asymptomatic PE refers to the incidental finding of PE on

imaging (e.g., contrast-enhanced computed tomography performed for another reason) in a patient without symptoms. (14)

Risk factors

VTE is considered to be a consequence of the interaction between patient-related, usually permanent risk factors and setting-related, usually temporary risk factors. Categorization of temporary and permanent risk factors for VTE is important for assessing the risk of recurrence, and consequently for decision making on chronic anticoagulation. (2)

Major trauma, surgery, lower-limb fractures and joint replacements, and spinal cord injury are strong provoking factors for VTE. Cancer is a well-recognized predisposing factor for VTE. (2)

Estrogen containing oral contraceptive agents are associated with an elevated VTE risk, and contraceptive use is the most frequent VTE risk factor in women of reproductive age. Infection is a common trigger for VTE. VTE may be viewed as part of the cardiovascular disease continuum, and common risk factors such as cigarette smoking, obesity, hypercholesterolemia, hypertension, and diabetes mellitus are risk factors (2).

A study done in Michigan University, USA showed: Immobilization was the most frequent risk factor assessed in patients with pulmonary embolism, and surgery was the usual cause of immobilization. (6). In other study done in Kenya, the most common comorbidities or risk factors were: hypertension 18.8 %. Pulmonary tuberculosis 12.5%; HIV infection 10.9%, puerperium, diabetes mellitus, smoking 9.4% each, dilated cardiomyopathy 7.8%. 20.3% patients had two, 18.8% had three, while 4.7% had more than three comorbidities. Malignancy, pneumonia and oral contraceptives were factors in 3.1% cases each. 4.7% of patients had fracture. (10). Another study done in general hospital in Cameron showed: the most frequent risk factors of a VTE were morbid obesity (44.9%), hypertension (37.2%), immobility (20.5%), long-haul travel (17.9%) and HIV infection (14.1%). (18)

Other study done in our hospital, TASH, being ≥ 60 years old [4.089 (1.176-14.216)] exposes patients to develop VTE four times than those less than 60 years old. Study participants who had rheumatogical disorders [4.625 (0.472-45.300)], lung diseases including pneumonia [7.826 (1.644-37.263)], acute myocardial infarction [41.77 (3.457-504.840)] and stroke <1

month 2.403 (.478-12.087) were 4.625, 7.826, 41.778 and 2.403 more likely to develop VTE than who have not these diseases respectively. (12)

Clinical Characteristics

The overall incidence is higher in males compared with females (56 versus 48 per 100,000, respectively). PE has a wide variety of presenting features, ranging from no symptoms to shock or sudden death. The most common presenting symptom is dyspnea followed by chest pain (classically pleuritic in nature), cough, and symptoms of deep venous thrombosis. (14). Hemodynamic instability is a rare but important form of clinical presentation, as it indicates central or extensive PE with severely reduced hemodynamic reserve. (2).

According to International Cooperative Pulmonary Embolism Registry, 63% of patients were aged 60 years or older. Females were 55% and 45% were males. The systolic blood pressure was below 90 mm Hg in 4·5%. The commonest signs and symptoms of PE at the time of diagnosis were dyspnea (82%), chest pain (49%), cough (20%), syncope (14%), and hemoptysis (7%). (7)

The Italian Pulmonary Embolism Registry also showed: The mean age was 70±15 years, with 14% of the patients being younger than 50 years and 43% older than 75 years of age (11% over 85 years). Females were older than males (mean age 72±15 and 68±15 respectively). 11.7% of patients were hemodynamically unstable at presentation. The most common symptom at presentation was dyspnea (86%), starting between 24 hours and seven days before presentation in the majority of the cases. (9).

A study done in Singapore showed, 91% of the patients presented with submassive PE. 6.1% of patients had saddle PE. The most common presenting symptom was dyspnea (72.3%) followed by chest pain (12.8%), hemoptysis (2.6%), syncope (2.6%) and cardiovascular collapse. (15)

In another study done in Kenya, mean age at diagnosis was 40.8 years (range: 5–86 years) with a peak at 30–50 years. Sixty (46.9%) of the patients were aged 40 years and less, while 34 (26.6%) were aged 60 years and older. (10)

Outcome

Pulmonary embolism (PE) remains a worldwide major health issue. PE is the most common cause of vascular death after myocardial infarction and stroke, and it is the leading preventable cause of death in hospital patients. Analysis of the RIETE registry on trends in the management and outcome of acute PE showed. A 7-day all-cause mortality rate of 2.6% (609 of 23,858 patients). Among hypotensive patients, the 7-day all-cause mortality decreased from 26 of 234 (11.1%) in 2001 to 2005 to 16 of 239 (6.7%) in 2010 to 2013. (16).

International Cooperative Pulmonary Embolism Registry (ICOPER) showed that: The all-cause mortality rate was 11·4% during the first 2 weeks after diagnosis and 17·4% at 3 months. The mortality was 58·3% (56 of 96) in patients who were hemodynamically unstable at the time of presentation and 15·1% (317 of 2093) for those who were hemodynamically stable. Several baseline factors were significantly associated with increased mortality risk. Age over 70 years, bed rest for 5 days or longer, cancer, chronic obstructive pulmonary disease, raised serum creatinine, thrombocytopenia, and an abnormal heart rate (7).

The Italian Pulmonary Embolism Registry (IPER) also showed: over all in-hospital, mortality was 6.7%. All-cause and PE related in-hospital death occurred respectively in 31.8% and 23.3% in hemodynamically unstable and in 3.4% and 1.4% in hemodynamically stable patients. In unstable patients, all-cause death occurred in 62.7% of those with cardiac arrest at presentation, in 36.4% of those with shock and in 17% of those with isolated hypotension. (9).

Another study done in Spanish Emergency Department (ESPHERIA registry) showed: In-hospital mortality was 3.8% (n=15) for PE. (17). A study done in Singapore showed, the overall in-hospital mortality was 5%. Factors associated with mortality were massive PE, tachycardia at presentation, right ventricular dysfunction and cardiogenic shock. Bleeding complications occurred in 10.2% of patients (major bleeding in 3.5%). (15)

There was a study done in general hospital found in Cameroon that showed, the in-hospital mortality rate during a VTE was 10%. (18). Another study in Kenya showed mortality rates of 28.1 % (10).

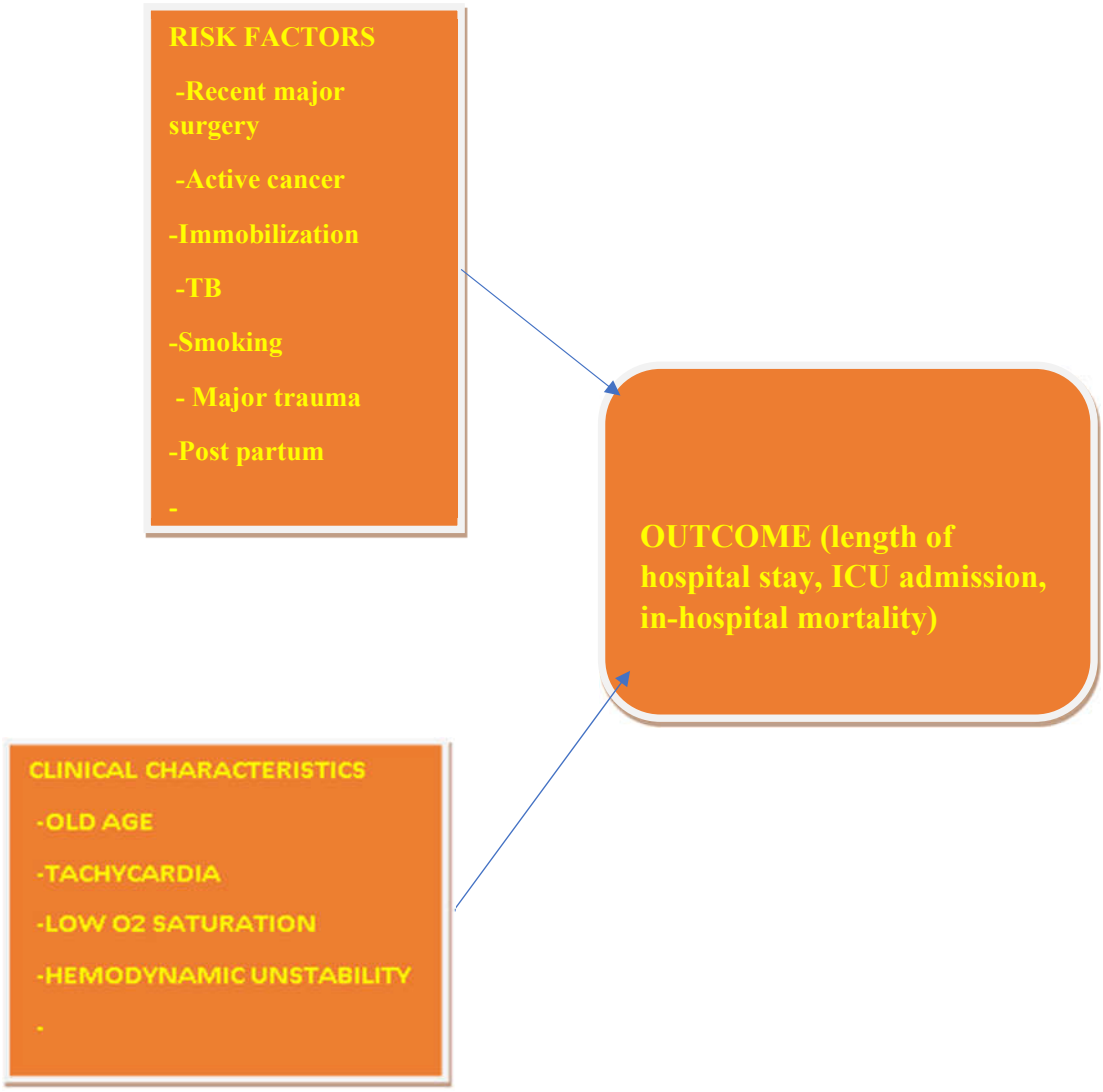

Fig-1- Conceptual framework on clinical characteristics, risk factors and outcomes of pulmonary embolism patients

3-OBJECTIVES OF THE STUDY

3.1-GENERAL OBJECTIVE OF THE STUDY

-To assess clinical characteristics, risk factors and outcomes of pulmonary embolism patients admitted in Tikur Anbessa Specialised Hospital medical ward from December 2016 G.C.to July 2020 G.C.

3.2-SPECIFIC OBJECTIVES OF THE STUDY

-To assess clinical characteristics of pulmonary embolism patients admitted in Tikur Anbessa Specialised Hospital medical ward from December 2016 G.C.to July 2020 G.C.

- To identify risk factors of pulmonary embolism patients admitted in Tikur Anbessa Specialised Hospital medical ward from December 2016 G.C.to July 2020 G.C.

- To assess outcomes of pulmonary embolism patients admitted in Tikur Anbessa Specialised Hospital medical ward from December 2016 G.C.to July 2020 G.C.

4-RESEARCH METHODS AND MATERIALS

4.1-STUDY DESIGN AND PERIOD

A retrospective study involving patients' chart review of PE patients admitted in medical ward of Tikur Anbessa Specialised Hospital from December 2016 G.C.to July 2020 G.C.

4.2-STUDY AREA

This study was conducted in Tikur Anbessa specialised Hospital. It is located in Addis Ababa, the capital city of Ethiopia. It was established in 1972. TASH is the largest referral hospital in the country and is now the main teaching hospital for both clinical and preclinical training of most disciplines.

4.3-SOURCE POPULATION

All patients admitted in medical ward in TASH from December 2016 G.C.to July 2020 G.C.

4.4-STUDY POPULATION

Pulmonary embolism patients admitted in medical ward from December 2016 G.C.to July 2020 G.C.

4.5-ELIGIBILITY CRITERIA

4.5.1-Inclusion Criteria

- All patients > 13 years of age admitted in Tikur Anbessa Specialized Hospital medical ward since December 2016 G.C, with the diagnosis of pulmonary embolism suspected clinically and confirmed by contrast chest CT scan or CTPA.

4.5.2-Exclusion Criteria

- Patients with incomplete data

4.6-STUDY VARIABLES

-Socio-demographic data of PE patients

-Clinical characteristics of PE patients

-Risk factors of PE patient

-Outcomes of patients

4.7-OPERATIONAL DEFINITIONS

Pulmonary embolism-is clinically diagnosed by the treating physicians based on clinical symptoms and confirmed by imaging namely Chest CT with contrast or CTPA with evidence of filling defect in any segment of pulmonary artery (arteries)

Hemodynamically unstable PE- when patients have systolic blood pressure < 90 mmHg

Outcome – Length of hospital stay, ICU admissions and in-hospital mortality of PE patients.

Adult patient- In Tikur Anbessa Specialized Hospital patients above the age of 13 are admitted in adult medical ward.

Active cancer- a cancer diagnosed within the previous six months, recurrent, regionally advanced or metastatic. A cancer for which treatment has been started within six month, or haematological cancer that is not in clinical remission.

Recent major surgery- major surgeries done in the previous 4 weeks. Major surgeries are any invasive operative procedures in which a more extensive resection is performed, organs are removed, or normal anatomy is altered.

Tachycardia- Pulse rate above 100 beat per minute

Tachypnea- Respiratory rate of above 20 breath per minute

4.8- SAMPLE SIZE

All patients admitted in TASH medical ward with primary diagnosis of pulmonary thromboembolism which was confirmed by chest CT with contrast or CT pulmonary arteriography in the study period were included.

4.9-SAMPLING PROCESS

Consecutive sampling technique was used involving all patients fulfilled the inclusion criteria. This study used patients' chart as a source of data. The chart number was found from the registration book in respective wards. All Patients who had formally reported chest CT or CTPA attached to the patients' chart were included in the study

4.10-DATA COLLECTION INSTRUMENT

Data was collected by written questionnaire, which was developed through referring published researches done worldwide on similar problem. The tool was commented and approved by respective advisors. Data was collected from patients' medical charts using the questionnaire developed. The data was collected by the primary investigator

4.11-DATA QUALITY ASSURANCE

The data collection tool was tested on 5 % of the sample before beginning the actual data collection in order to identify any missing components and difficulties during implementation. During data collection, the data collection tool was checked for their completeness by the principal investigator.

4.12-DATA PROCESSING AND ANALYSIS

The collected data was checked for completeness and variables were coded in SPSS 26.0 in the variable view prior to entering. Later on, data was entered and cleaned before analysis. Descriptive statistics were carried out to describe the sociodemographic, clinical characteristics, risk factors and outcomes of patients. Tables, Bar graphs and pie charts were used to demonstrate findings.

4.13-ETHICAL CONSIDERATION

Approval from Addis Ababa University, School of Medicine ethical review board was received before the enrolment of this study. The information collected will not be discussed referring the patient's name. The data will be used only for the intended purpose of the study

5-RESULT

A total of 130 patients' medical charts were reviewed after the record number was found from registration book of respective wards. These charts were selected because the diagnosis written on the registration book was PE. Of the reviewed charts, 60 were complete according to the inclusion criteria.

Socio-demographic characteristics of patients

More than half (56.7%) of the patients enrolled in the study were females. But after the age of 45 years, males and females are equal in proportion. Age groups of 15-30 and 31-45 account 30% each and age group of 46-60 and above 60 account 20 % each. The median age is 44.6 years with standard deviation of 16.8 years.

Table 1- Socio-demographic characteristics of PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. (N-60)

sex	female	34(56.7%)
	male	26(43.3%)
Age (years)	15-30	18(30.0%)
	31-45	18(30.0%)
	46-60	12(20.0%)
	>60	12(20.0%)

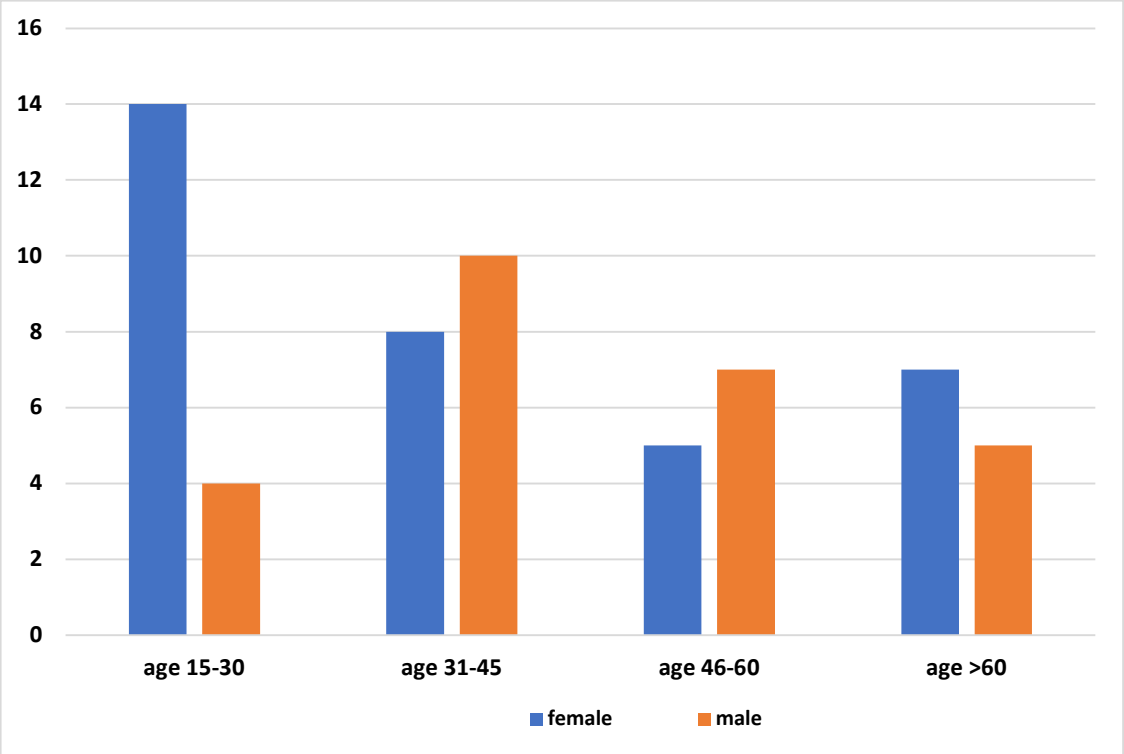

Figure 2- Age distribution based on sex of PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. (N-60)

Clinical Characteristics

The majority (95 %) of patients were symptomatic. The commonest symptom being shortness of breath which accounts (75 %) followed by cough (50 %), chest pain (41.7%), leg swelling (33.3%), haemoptysis (13.3%) and collapse (3.3%). But majority of the patients (73.4%) presented with more than one symptom.

95% of patients were tachypenic, 76.7% were tachycardic, 38.3 % had leg edema at presentation and 11.7 % were hemodynamically unstable.

Table 2- vital signs and laboratory investigation of PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. (N-60)

	Min.	Max.	Mean	Std.Deviation
Pulse rate(beat/min)	75	150	111.7833	14.76722
Respiratory rate(bpm)	18	48	31.5333	6.58572
Systolic blood pressure(mmHg)	70	159	104.7833	19.58994
Oxygen saturation (%)	68	98	83.6167	6.57703
Laboratory investigations				
INR at admission	1.0	1.8	1.2197	0.1811
INR at discharge	1.3	4.3	2.2762	0.53466

58 patients had INR at discharge. From those 36.2 % of them had INR value of less than 2, 55.2 % had between 2 and 3, and the remaining 8.6 % had INR value of greater than 3.

CT scan finding (location of PE)

All pulmonary embolisms were objectively confirmed by standard radiological methods. The radiological variables analysed for the present study were categorised as: unilateral versus bilateral lung involvement; and truncal (principal arteries), lobar, segmentary, multi-sub segmentary and isolated sub segmentary pulmonary embolism according to the most proximal clot seen in pulmonary arteries

Among 60 patients who had CT scan: 35% had segmental and subsegmental involvement in pulmonary artery branches, bilateral main pulmonary artery was involved in 20 %, right and left pulmonary arteries are involved in 21.7 % and 15 % of patients respectively. Pulmonary trunk was involved in 8.3 % of patients.

Risk factors

Of 60 patients who were involved in this study; majority of them (80 %) had one or more risk factors for PE. The most common risk factors identified are active cancer (23.3%), major surgery (21.7%), peri and post-partum (20 %) and immobilization (18.3 %). The remaining risk factors are: previous VTE, diabetes mellitus, tuberculosis, major trauma, use of oral contraceptive and HIV/AIDS in decreasing frequency. 10.6 % of patients had more than risk factors

Table-3 frequency and percentage of risk factors for PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. (N-60)

Risk factors	**Frequency (percentage)**
Active Cancer	14(23.3%)
Major Surgery	13(21.7%)
peri and post-partum	12(20.0%)
Immobilization	11(18.3%)
Diabetes	5(8.3%)
Previous VTE	5 (8.3%)
Major trauma	3(5.0%)
TB	3(5.0%)
Smoking	2(3.3%)
Oral contraceptive use	1(1.7%)
HIV	1(1.7%)

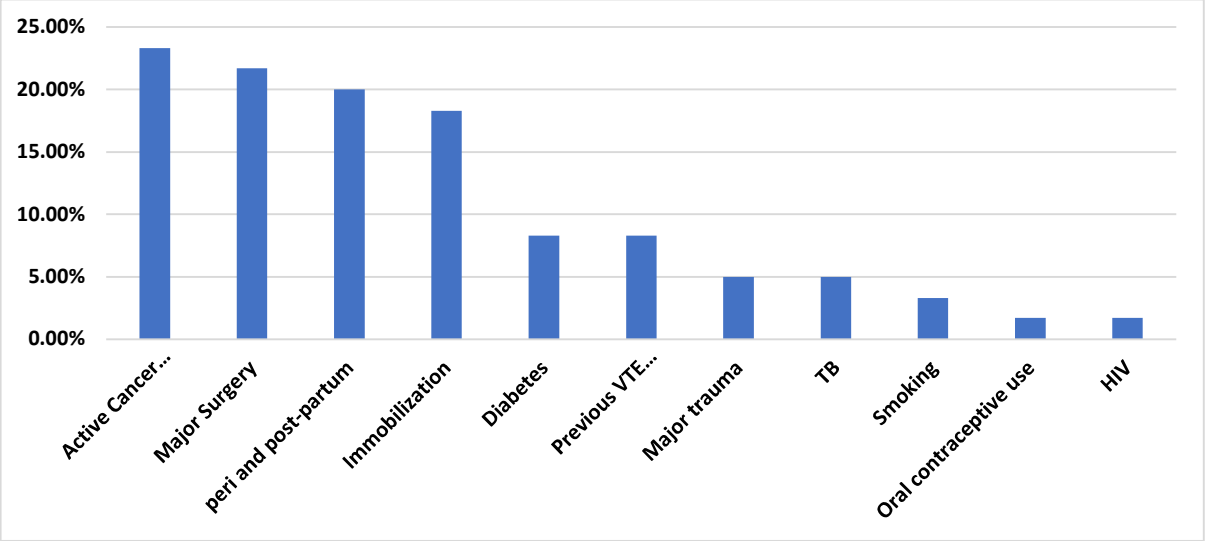

Figure 3- Risk factors of PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. (N-60)

Treatment given

All of the patients were put on anti-coagulant management for PE. The most common used management was UFH with warfarin, given for 85 % of patients; rivaroxaban for 8.3 %, enoxaparin with warfarin for 5% and UFH alone for 1.7 %.

Outcomes

In this study the outcomes are; in hospital mortality, ICU transfer, discharge improved and length of stay in hospital.

From 60 patients analysed; 6 patients (10 %) died with the treating physicians' possible immediate cause of death being PE, 16.7% of them transferred to medical ICU, and 73.3 % of them discharged improved. From those discharged improved 68.2 % of them stayed in hospital more than 10 days and the remaining stayed 10 days and less. The minimum length of stay is 6 days and the maximum is 46 days with a median of 14 days.

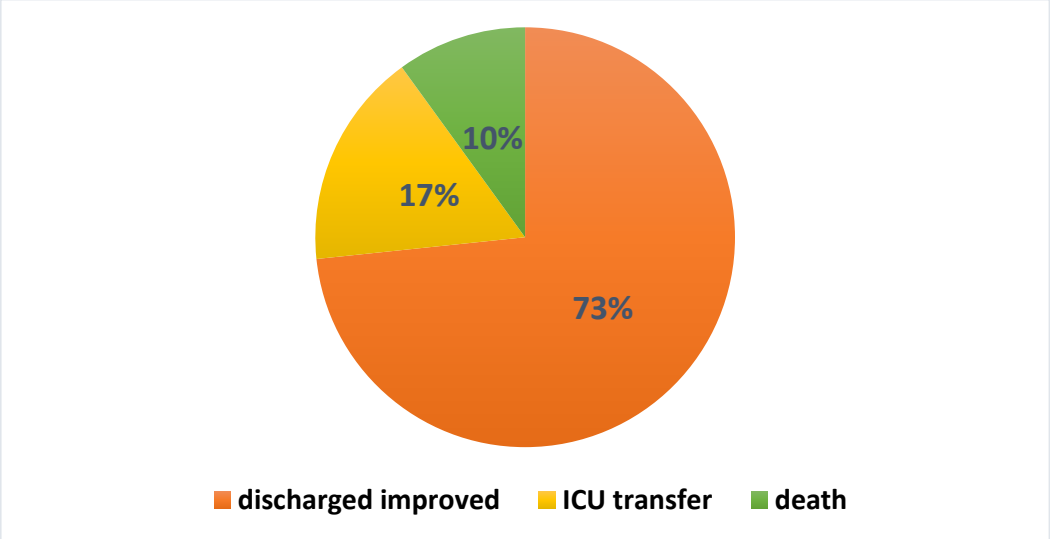

Figure 4- Outcomes of PE patients admitted in TASH medical ward since December 2016 GC. (N60)

7 patients (11.7 %) were hemodynamically unstable at presentation. And none of them were discharged improved. 5 of them died (71% of them) and the remaining 2 were transferred to Medical ICU.

Table 4- Outcomes of PE patients admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C. stratified based on hemodynamic stability

	Hemodynamically unstable	Hemodynamically stable
discharged improved	0	44
ICU transfer	2	8
death	5	1

6-DISCUSSION

The objective of this study was to assess the clinical characteristics, risk factors and outcomes of patients who were admitted in TASH medical ward from December 2016 G.C.to July 2020 G.C.

In this study 60 patients were enrolled. Females accounted for 56.3 %. And the mean age of patients was 44.6 years. This result is comparable with the study conducted in Kenya tertiary hospital where the mean age of patients was 40.8 years and there was female predominance (10). In study done in Johannesburg the median age of patents was 40 years which is congruent with the current study (4). However, patients in this study are much younger compared to patients who were included in Italian Pulmonary Embolism Registry and International Cooperative Pulmonary Embolism registry in which the mean age was 70 years and 62.3 years respectively (9,7). This could be due to the lower life expectancy and the presence of comorbidities and risk factors for PE in younger patients in our setup.

In this study majority (95%) of the patients were symptomatic. The most common symptom was shortness of breath accounted (75%) followed by cough, chest pain, leg swelling, hemoptysis and collapse accounted; 41.7%, 33.3%, 13.3% and 3.3 % respectively. This result is congruent with what was found in International Cooperative PE Registry which showed the commonest symptom was shortness of breath (82%), followed by chest pain, cough and hemoptysis (7). Similar result was found from Italian PE registry, shortness of breath accounted 86% (9). Study done in South Asian patients showed shortness of breath accounted 72.3% (15).

The most common sign seen in patients in this study was tachypnea, followed by tachycardia and peripheral edema. This is comparable from what was found in study done in Southeast Asian patients (15). In this study patients who were hemodynamically unstable at presentation accounted for 11.7 % which is the same as that was found in Italian PE Registry (9).

In this study 80 % of those 60 patients involved in this study had recognized risk factor(s) for PE. From those who had risks, 10.6% of them had more than one risk factors. Active cancer, major surgery, peri and post-partum and immobilization are the majority of risk factors identified. The remaining are diabetes, previous VTE, tuberculosis, major trauma, use of oral contraceptive and HIV in decreasing frequency.

This is in contrary to the result found in one-year audit on PE in Johannesburg where HIV, TB, immobilization and smoking accounted the majority of risk factors (4). This may be due to the difference in prevalence of HIV, TB and smoking. Additionally, it may be due to the presence of other hospitals in which majority of TB and HIV patients are treated. In study done in general hospital in Cameroon, the commonest risk factors identified are obesity and hypertension (18). The reason for not obesity be a risk factor in my study may be lack of data about patients' body habitus. In another study done in Spain the most common risk factor identified are age>70, obesity and immobility (17). This is in contrary to my study and the possible explanation is the difference in life expectancy and body habitus in the general population.

In this study, majority (73%) of patients were discharged improved from hospital. The median length of stay in hospital before discharge was 14 days. 17% of the studied patients were transferred to medical ICU and 10% of them died in the hospital with the cause of death being PE. This result is congruent with the result found in study done in general hospital in Cameroon where all in hospital mortality was 10.3% (18). It is also comparable with the result found in Italian Registry and in study done on Southeast Asian patients which is 6.7% and 5 % respectively (9,15). In study done in Spain emergency department the mortality is 3.8% (17). the discrepancy in mortality rate may be due to better care in Spain. But in Kenya tertiary hospital the mortality was 21.8% which is much higher than this study and the reason mentioned was late presentation of patients due to poor access to health facility (10).

7-STRENGTH/LIMITATION OF THE STUDY

This is retrospective study which used patients' chart as source of data. Incompleteness and un organized chart keeping were the challenge faced. These affect to assess the whole risk factors because they were not all documented. More than half of patients who were treated in this hospital as a case of PE had no either contrast chest CT scan or CTPA which limited the number of patients involved in this study. Due to low sample size, it was not possible to assess association between demographic data, clinical characteristics and risk factors with outcomes Despite these limitations this study included all necessary information in order to achieve its objectives.

8-CONCLUSIONS

The aim of this study was to assess clinical characteristics, risk factors and outcomes of chest CT or CPA confirmed patients.

More than half of PE patients were females and 60% were younger than 45 years old. 95% of patients were symptomatic and the most common symptom was shortness of breath followed by cough, chest pain, leg swelling and hemoptysis.

Majority of the patients admitted had one or more risk factors. Active cancer, major surgeries, peri and post-partum and immobilization constituent the most common risk factors. Diabetes, previous VTE, TB, smoking, HIV and use of oral contraceptive constituent the remaining.

Almost three-fourth of patients were discharged improved. The median length of stay was 14 days .17 % of patients were transferred to medical ICU. In hospital mortality was 10% and all of the deaths were attributed to PE.

9-RECOMMENDATIONS

PE is one of the most common cause of morbidity and mortality. The study indicated that most of patients who diagnosed were younger than 45 and three of the most common risk factors are active cancer, major surgery and peri and post-partum. In study done in the same set up the prevalence of thromboprophylaxis is only 37.5% (10). So, the coverage of thromboprophylaxis should be increased focusing on patients who have the above risk factors.

This study only described the clinical characteristics, risk factors and outcomes. So further study should be done which shows the effect of those factors on outcomes. For detail and complete information about every patient diagnosed PE; having hospital-based registry is required.

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11-ANNEX

Questionnaire for clinical characteristics, risk factors, and outcomes of PE patients admitted in Tikur Anbessa Specialized Hospital medical ward since December 2016 GC.

1- Demographic data of the patient

1.1- Medical card No----------

1.2- Sex 1- male 2- female

1.3- Age ----------years

1.4- Residence 1-urban 2- rural

1.5- Educational level 1-illitrate 2) 1-8 3) 9-12 4) college or University

2- Risk factors

2.1-Did this patient have one or more risk factors? 1- YES 2-NO

2.2- If yes, which risk factor the patient had? You can mark more than one risk factors mentioned below

a- Immobilization more than 3 days
b- Recent major surgery
c- Active cancer
d- HIV
e- Obesity
f- TB

g- Peri-partum and post-partum

h- Oral contraceptive use

i- Major trauma

j- Smoking

k- Previous venous thromboembolism

l- Other----------

3-Clinical characteristics

3.1- clinical symptoms

Was the patient symptomatic? 1-YES 2-NO

If the patient was symptomatic, which of the following symptoms did this patient have?

More than one answer is possible.

a- Cough

b- Shortness of breath

c- Chest pain

d- Hemoptysis

e- Collapse

f- Leg swelling

g- Other----------

3.2- clinical signs

At first presentation

a- Pulse rate----------

b- Respiratory rate----------

c- Blood pressure - systolic---------- diastolic

d- Leg edema 1- yes 2- no

e- Oxygen saturation……%

3.3- Laboratory investigation

CBC (baseline)

White Blood Cell-------- N%----------L%

Hemoglobin---------g/dl

MCV----------fl

RDW----------

Platelet count----------

Coagulation profile

Base line

PT----------sec INR---------- PTT----------sec

At the time of discharge or death

PT---------- sec INR---------- PTT----------sec

4-Treatment given specific for pulmonary embolism

a- Unfractionated Heparin
b- Low molecular weight Heparin
c- Warfarin
d- Other……..

5-Contrast CT finding based on the main involved segment of pulmonary artery(ies)

a- Main pulmonary
b- Right pulmonary artery
c- Left pulmonary artery
d- Bilateral pulmonary arteries
e-Segmental and subsegmental pulmonary arteries

6-Outcome of patients

What was the outcome of the patient?

a- Discharged improved

   If discharged length of hospital stay in days----------

b- ICU transfer

c- Death

Declaration form

Declaration

I, the under signed, declared that this is our original work, has never been presented in this or any other university, and that all the resources and materials used for the research, have been fully acknowledged.

Principal investigator

Name: Esubalew Amanu (MD, Internal Medicine year 3 Resident)

Signature: _____

Date: _____

Advisor

Name: Dr. Hanan Yusuf (MD, Internist, Consultant PCCM Physician)

Signature: _____

Date: _____

Advisor

Name: Dr. Seifu Kebede (MD, Internist, Consultant Hematologist)

Signature: _____

Date: _____

Department Head

Name: Dr. Tewodros Haile (MD, Internist, Consultant PCCM Physician)

Signature: _____

Date: _____