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# Pulmonary Embolism: Epidemiological, Clinical, Therapeutic and Evolution Aspects in the Medicine Department of Hospital of Mali Bamako

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## Abstract

**Background:** Pulmonary embolism (PE) is a severe form of venous thromboembolic disease. In Africa, prevalence of PE in hospitalized medical patients varies among studies. **Objective:** Aim of this work was to study the epidemiological, clinical, therapeutic and evolution aspects of PE in the medicine department of Mali's Hospital Bamako-Mali. **Methodology:** This was a retrospective cross-sectional study carried out from January 01, 2017 to December 31, 2020 in the medicine department of Mali's hospital Bamako, including all inpatients admitted for PE during the study period. **Results:** Of 1814 hospitalized patients, 54 patients had pulmonary embolism. Hospital frequency of pulmonary embolism was 2.97%. Predominance was female and sex-ratio M/F was 0.38. Mean age in our series was 54.24 ± 1.19 years. Predisposing factors to pulmonary embolism were dominated by obesity 37%, high blood pressure 35.2% and history of cardiovascular disease 20.4%. Dominant signs were dyspnoea and chest pain in 83.3% and 70.4% of cases respectively.

Probability of pulmonary embolism was high in 40.7% according to Wells score. Patients with right heart failure were 22.2%. EKG showed sinus tachycardia 70.4% and S1Q3 aspect 7.4%. Heart right chambers were dilated at transthoracic echography 42.6%. Obstruction was bilateral at chest angio CT for 51.9% and proximal for 42.6%. Deep venous thrombosis was associated at EP in 16.6%. Treatment was low weight molecular heparin followed by vitamin K antagonist or direct oral anticoagulant. One patient was successfully treated by thrombolysis. Hospital mortality was 16.7%. **Conclusion:** PE is a serious disease probably underdiagnosed. It is responsible of important mortality.

## Keywords

Pulmonary Embolism, Epidemiology, Mali's Hospital

## 1. Introduction

Pulmonary embolism (PE) is a severe form of venous thromboembolic disease.

Annual incidence of this disease in the world is between 39 and 115 cases for 100,000 habitants [1]. It is thought to be responsible for 10,000 to 20,000 deaths per year worldwide.

In Africa, prevalence of PE in hospitalized medical patients varies among studies between 0.14% to 61.5%, with a mortality rate between 13.7% and 69.5% [2] [3].

Mortality is higher in patients with undiagnosed and untreated PE [4]. Therefore, a better understanding of presentation of PE is necessary, so that diagnosis can be made early and treatment initiated. However, presentation of PE is highly variable and can pose diagnostic problems [5].

Diagnosis of deep venous thrombosis in a patient with suspected PE is sufficient to start anticoagulant therapy without further exploration [6].

Venous Doppler ultrasound of the lower limbs finds deep venous thrombosis in 30% to 50% of patients with PE [1].

In Mali, hospital studies have found a frequency of 1.6% at the CHU Point G [7] in 2006 and a frequency of 1.21% at the CHU Gabriel Touré [8] in 2018.

Few studies have focused on the epidemiology of pulmonary embolism, hence the motivation for this work, which aimed to identify the epidemiological, clinical, para-clinical, therapeutics and progressive characteristics of pulmonary embolism.

## 2. Patients and Method

This study was carried out in the medicine department of the Mali's hospital in Bamako, Mali.

This was a cross-sectional, descriptive and retrospective study which included all patients admitted with a diagnostic of pulmonary embolism by CT angiography between January 2017 and December 2020. Patients were identified using department's database. It involved files of all patients admitted with a diagnostic

of pulmonary embolism by CT angiography. CT angiography was paraclinical exploration of diagnosis confirmation.

## 2.1. Data Collection

Medical files were retrieved from archives and following data were extracted: socio-demographic factors (age and sex), clinical presentation (chest pain, dyspnoea, haemoptysis, cough, syncope, pulse rate and blood pressure), comorbidities, risk factors of VTE, deep venous ultrasound, electrocardiogram, echocardiography, and CT angiography. Diagnosis of PE was defined by identification of a thrombus in pulmonary artery or any of its branches at CT angiography.

## 2.2. Data Analysis

Continuous variables were expressed as mean standard deviation. Dichotomous variables were expressed as counts and percentages.

Data entry and analysis were done with the software Microsoft Word 2010 and IBM SPSS 21.0 French version for Windows.

## 2.3. Study Parameters

Parameters of study were: socio-demographic data (age and sex), thromboembolic risk factors [1], diagnosis (frequency, clinical and paraclinical exams), medication used for the initial anticoagulant treatment and hospital outcome of inpatients.

## 3. Results

We collected 54 patients out of 1814 hospitalized patients, this mean hospital frequency of 2.97%. Mean age of patients was 54.24 ± 19.19 years with extremes of 23 and 86 years. Patients aged 39 years and older accounted for 74% (n = 40) (Table 1).

Female sex was predominant with sex ratio M/F of 0.38. Main symptoms were dyspnoea on exertion 83.3% (n = 45) and chest pain 70.4% (n = 38) (Table 2). Physical examination showed at admission right heart failure for 22.2% (n = 12) of patients, collapse for 18.5 (n = 10).

Risk factors for venous thromboembolism were dominated by obesity 37% (n = 20), high blood pressure 35.2% (n = 19) and history of cardiovascular disease 20.4% (n = 11) (Table 3).

Wells score was intermediate in 53.7% (n = 29) and high in 40.7% (n = 22).

EKG showed sinus tachycardia 70.4% (n = 38) and S1Q3 appearance 7.4% (n = 4). Right chambers were dilated on cardiac ultrasound 42.6% (n = 23). PE was bilateral on CT angiography in 51.9% (n = 28) and proximal in 42.6% (n = 23).

Deep venous thrombosis was associated with PE in 16.7% (n = 9).

The mortality risk score from European Society of Cardiology guidelines was low in 20.4% (n = 11), intermediate low in 50% (n = 27), intermediate high in 11.1% (n = 6) and high in 18.5% (n = 10).

Table 1. Repartition of age range and gender.

| Age range (years) gender | Female | Male | Frequency | Pourcentage |
|---|---|---|---|---|
| [23 - 39] | 12 | 2 | 14 | 25.9 |
| [39 - 55] | 12 | 2 | 14 | 25.9 |
| [55 - 71] | 9 | 3 | 12 | 22.2 |
| [71 - 87] | 6 | 8 | 14 | 25.9 |
| Total | 39 | 15 | 54 | 100 |

Table 2. Repartition of symptoms.

| Symptoms | Frequency | Pourcentage |
|---|---|---|
| Dyspnoea | 45 | 83.3 |
| Chest pain | 38 | 70.4 |
| Cough | 17 | 31.5 |
| Palpitation | 16 | 29.6 |
| Haemoptysis | 8 | 14.8 |
| Syncope | 5 | 9.3 |

Table 3. Repartition of thromboembolism risk factors.

| Venous thromboembolism risk factors | Frequency | Pourcentage |
|---|---|---|
| Obesity | 20 | 37 |
| High blood pression | 19 | 35.2 |
| History of cardiovascular disease | 11 | 20.4 |
| Diabetes mellitus | 8 | 14.8 |
| Cancer | 5 | 9.3 |
| Smoking | 4 | 7.4 |
| Oral contraception | 3 | 5.6 |
| Postpartum | 3 | 5.6 |
| Bed rest | 2 | 3.7 |
| Thrombophilia | 2 | 3.7 |
| Absence of risk factors | 5 | 9.3 |

The first medication for anticoagulation was enoxaparin, a low molecular weight heparin at admission in 88.9% (n = 48) of cases. The goal of international normalized ratio was between 2 and 3. Patients with renal failure at admission was 11.1% (n = 6), they were treated with Calcium Heparinate. A relay by acenocoumarol and vitamin K antagonist was done in 88.9% (n = 48) of cases.

Rivaroxaban 15 mg bid was introduced after initial anticoagulation by heparin in 11.1% (n = 6) of patients. Ten patients had collapse during hospitalization.

One female patient who had collapse one day after admission underwent successful thrombolysis with Actilyse. Evolution during hospitalization was marked by death for 9 patients (16.7%). Seven patients from who died had collapse. They

did not benefit thrombolysis because of unavailability of medication.

## 4. Discussion

Limits of our study were his single-center character and retrospective method of collection of data.

Pulmonary embolism is an underdiagnosed disease due sometimes to the atypical clinical presentation. In Africa, hospital studies have found a PE frequency of 3.1% at Lomé, Togo [3]. In our series, hospital frequency was 2.9%. Pulmonary embolism is a thromboembolic disease that increases in frequency with age. In Africa, some studies have found PE in people with a mean age around 50 years. At Lomé, average age was 52.7 ± 14.4 years with extremes of 27 and 81 years [3]. In Cameroon, average age of patients was 52 years [9].

In our study, mean age of our patients was 54.24 ± 19.19 years. Predominance was female with a sex ratio M/F of 0.38. The same result was observed in the CHU Gabriel Touré of Bamako with a sex ratio of 0.4 [8] and in the Pessinaba's one at Lomé with a sex ratio of 0.45 [3].

In our series, we noticed a female predominance for patients younger than 71 years old and it was male for patients older than 71 years. Women of childbearing age are more affected than men in the same age group. This difference could be explained by association of thromboembolic event with pregnancy and use of oral contraception. In contrast, the risk in older women is lower than that of men in the same age group [10]. Clinical signs of PE are nonspecific. In the majority of cases, PE is suspected in a patient with dyspnoea, chest pain, syncope or haemoptysis [1]. At Lomé, symptoms were dyspnoea (98.0%), chest pain (78.4%), cough (60.8%), haemoptysis (31.4%) and syncope (29.4%) [3]. In Cameroon, it was dyspnoea (83.4%), chest pain (78.6%) and syncope (5.8%) [9]. For our patients, main symptoms were exertion dyspnoea (83.3%) and chest pain (70.4%). In our series, 20.4% of patients had right heart failure. At Lomé, risk factors founded were hypertension and diabetes in 39.2% and 17.6% of cases, respectively [3]. In Cameroon, predominant risk factors were obesity (49.5%), hypertension (35.0%), recent long trip (24.3%) and cancer (18.4%) [9]. In our study, risk factors for venous thromboembolism were dominated by obesity (37%), high blood pressure (35.2%) and heart failure (22.2%). Wells score was high in 40.7% of our patients. Wells score for PE was high in 49% of cases at Lomé [3]. EKG showed sinus tachycardia (70.4%) and S1Q3 appearance (7.4%). At Lomé, EKG noted sinus tachycardia (78.4%), right heart hypertrophy (49.0%) and an S1Q3T3 appearance (47.1%) [3]. In Cameroon, sinus tachycardia was observed in 63.4% and S1Q3T3 appearance in 37.6% [9]. Right heart cavities were dilated on cardiac ultrasound in 42.6% of our patients.

In Cameroon, right ventricular dilation was observed in 26% and systolic pulmonary pressure as high in 35% [9].

In our series, PE was bilateral on CT angiography in 51.9% and proximal in 42.6%. In Cameroon, PE was bilateral in 38.8% and proximal in 72.8% [9]. At

Lomé in Togo, PE was bilateral in 57%, right in 26%, left in 17% [3].

Deep vein thrombosis (DVT) was associated with PE in 16.6%. In Cameroon, DVT was associated in 24.3% [9]. Menta [8] founded association PE and DVT in 38.09%.

Majority of our patients were treated with low molecular weight heparin (LMWH). Patients with renal impairment (11.1%) were treated with calcium heparinate. A relay by vitamin K antagonist (VKA) was done in 88.9%. A direct oral anticoagulant (DOA), rivaroxaban was prescribed in 11.1% of patients. One patient underwent thrombolysis successfully with Actilyse. In Cameroon, initial anticoagulant treatment was LMWH followed by VKA in 89.3% and DOA (rivaroxaban) in 10.7% [9]. In our study, hospital mortality was 16.7% which is higher than rate founded by Pessinaba at Lomé with 13.7% [3] and lower than those founded by Menta at Bamako [8] with 19.05% and by Ngahane in Cameroon with 18.4% [9].

## 5. Conclusion

PE is a serious condition that is probably underdiagnosed. It is more common in women. Age of onset is younger in Africa compared to Europe. Clinic is dominated by dyspnoea and chest pain. With the epidemiological transition, predominant risk factors are obesity, hypertension and heart disease. Confirmatory diagnosis based on CT angiography is increasingly available in Africa. Direct oral anticoagulants take an increasingly important place in the therapeutic arsenal. Evolution of PE is marked by significant mortality.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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