

## Pulmonary Embolisms: Epidemiological, Clinical, And Therapeutic Aspects in the Cardiology Department of the Kara University Hospital

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### ABSTRACT

**Introduction:** Pulmonary embolism (PE) is a ubiquitous, serious, and fatal pathology. The aim of this work was to study the epidemiological, clinical, and therapeutic aspects of PE at Kara University Hospital.

**Methods:** This was a retrospective and descriptive study covering January 2021 to September 2023 in the cardiology department of Kara University Hospital. All records of patients hospitalized in the cardiology department for PE during the study period were included.

**Results:** Out of 1148 hospitalized patients, 70 patients were retained, i.e. a prevalence of 6.09%. The mean age of the patients was 46.46 years  $\pm$  16.31 with extremes of 20 years and 77 years with a sex ratio M/F of 0.59. Twenty-eight patients (40%) had consulted between 48 and 72 hours. The risk factors were dominated by: obesity 28.60%, history of VTE 14.30%, long journey 14.30%, tobacco 14.30%, HIV 11.40%, post-operative care 8.60% and prolonged bed rest 8.60%. The main symptoms were: dyspnea (82.90%), cough (51.40%), chest pain (45.70%) and hemoptysis (20%). Pleuropulmonary examination was normal in 47.29% of cases. PE was initially severe in 12 patients (17.14%). On thoracic angioscan, the PE was proximal in 66.67% and in 20.83% of patients it was a bilateral embolism. Eighteen patients (25.71%) had benefited from streptokinase thrombolysis. The average hospital stay was 9.34 days  $\pm$  6.70, with extremes ranging from 2 to 29 days. Three patients (8.57%) died in the hospital.

**Conclusion:** Pulmonary embolism is a serious, fatal and underestimated pathology in sub-Saharan Africa. It is predominates in women. There risk factors are numerous.

### Keywords

Pulmonary embolism, Epidemiology, Clinics, Evolution, Kara (Togo).

### Introduction

Pulmonary embolism (PE) is the third most common cardiovascular pathology worldwide, with an incidence of 100 to 200 cases per 100,000 inhabitants per year. It is estimated that 1-2% of hospitalized patients suffer from PE. The risk of PE doubles with each additional decade of life after the age of 40 [1]. Despite

optimization of care, overall mortality remains high, between 3 and 12% at 30 days after diagnosis and up to 50% in patients with PE classified as « high risk » [2].

In Europe, the prevalence of PE varies between 17-42% of hospitalized patients and 8-52% of autopsied cases [3,4]. In Togo, Darre T. in 2021 in a study of autopsy cases of sudden adult death showed that PE was the leading cause with 19.49% [5]. Pio and Pessinaba reported prevalences of 3.59% and 3.1% respectively in Lomé university hospitals [6,7]. But to date, data on PE is lacking

in Kara, the country's second largest city. It is in this context that we initiated this study, the general objective of which was to take stock of PE at Kara University Hospital.

## Method

This was a retrospective, descriptive study conducted from January 01, 2021 to September 30, 2023 in the cardiology department of the Kara University Hospital Center (CHU Kara). Patients admitted to the cardiology department for pulmonary embolism (PE) during the study period were included in this study. PE was confirmed by clinical and paraclinical signs. Not included in this study were cases of PE not clinically and paraclinically confirmed and all cases of patients hospitalized for PE outside the study period.

The parameters studied were: sociodemographic, clinical, therapeutic and evolutionary data, D-dimer data, ECGs, chest X-rays, cardiac echoDoppler, venous echoDoppler of the lower limbs and thoracic angioscans. The diagnosis of PE was based on :

- Clinical, electrocardiographic, radiographic signs, suggestive of a PE with elevated of D-dimers, associated with the echocardiographic signs of a pulmonary heart and the angioscanographic signs,
- Evocative clinical, electrocardiographic and radiographic signs, D-dimer elevation and echocardiographic signs pointing to thrombus,
- Clinical, electrocardiographic, radiographic signs suggestive of the elevation of D-dimers, the echocardiographic signs of PAH and by the association of a DVT with venous echoDoppler of the limbs.
- Either clinical, electrocardiographic or radiographic signs suggestive of PE, elevated D-dimer levels and the association of a recent DVT.

The D-dimer threshold value was 500 µg/l, adjusted for patient age using the formula (age x10), for patients over 50years of age. Clinical probability was evaluated according to the Wells score and the PESI score and its modified version (sPESI), which enabled us to establish the risks [8]. Our data were analyzed using Sphinx plus software, version 5.1.0.2. The tables were produced using Microsoft Word 2016 and Microsoft Excel 2016 software. Qualitative parameters have been presented in the form of numbers followed by percentages. Quantitative parameters were presented as mean ± standard deviation.

## Results

### Socio-Epidemiological Data

From January1, 2021 to September 30, 2023 in the cardiology department of CHU Kara, out of 1,148 hospitalized patients, 70 patients were selected, i.e. a PE frequency of 6.09%. The mean age of patients was 46.46 ± 16.31 (extremes at 20 and 77 years) with a M/F sex ratio of 0.59. Vingt-huit patients (40%) avaient consulté entre 48 et 72h. Les malades étaient référés dans 51,40%. Risk factors were dominated by obesity, history of VTE Table 1.

**Table 1:** Distribution of patients according to risk factors for venous thromboembolism.

	n	%
Obesity	20	28.60
VTE History	10	14.30
Long trip	10	14.30
Smoking	10	14.30
HIV	08	11.43
Recent childbirth	08	11.43
Recent surgery	06	08.60
Prolonged bed rest	06	08.60
Neoplasia	06	08.60
Not found	06	05.70
Diabetes	02	02.90

History, VTE: Venous Thromboembolism Disease, HIV: Human Immunodeficiency Virus.

### Clinic

The reasons for admission were dominated by dyspnea, cough and chest pain. In this study 11.4% of patients were febrile and 17.14% had vascular collapse (Table 2).

**Table 2:** Distribution of patients by admission words and general signs.

	n	%
Dyspnea	58	82.90
Cough	36	51.40
Chest pain	32	45.70
Hemoptysis	14	20.00
Palpitations	12	17.10
Syncope	06	08.60
Oxygen desaturation	62	88.60
Cardiovascular collapse	12	17.14
Fever	08	11.43

Physical signs were dominated by tachycardia, B2 burst at the pulmonary focus and right pulmonary gallop sound. Intermediate clinical probability was the most represented at 42.90%. Table 3 summarizes the different distributions according to central cardiac signs.

**Table 3:** Répartition des patients en fonction des signes physiques cardiovasculaires.

	n	%
Tachycardia	27	38.57
B2 burst at the pulmonary focus	14	20.00
Jugular turgor	10	14.29
Hazer sign	09	12.86
Right-sided gallop	08	11.43
Tricuspid regurgitation murmur	08	11.43
Hepatomegaly	06	08.60
Hepatojugular reflux	05	07.14

TR: Tricuspid Regurgitation.

### Paraclinical

At the paraclinical level, radiographic abnormalities were dominated by cardiomegaly in 28 (40.00%) of cases, followed

by ascension of the diaphragmatic hemicupola in 28 (40.00%) of cases. On ECG, tachycardia was present in 48 patients (68.57%). The S1Q3 aspect was found in 16 cases (22.90%). Incomplete right bundle branch block was present in 19 cases (27.14%). On cardiac Doppler echo, PAH was present in 66 patients (94.29%) followed by right cavitory dilatation in 26 patients (37.10%). The various abnormalities found on the ECG and cardiac Doppler echo are summarized in Table 4.

**Table 4:** Distribution of patients according to ECG and cardiac echo Doppler results.

Signs	n	%
Normal	22	31.40
Tachycardia	48	68.57
Aspect S1Q3	16	22.90
Incomplete RBBB	19	27.14
Signs of ischemia	10	14.30
Right axis deviation	04	05.70
RVH	04	05.70
Pulmonary arterial hypertension (PAH)	66	94.29
right cavitory dilatation	26	37.10
Paradoxical septum	16	22.90
Dilation of the PA trunk	06	08.60
TAPSE low	14	20.00
Thrombus in the PA	04	05.70
Right intracavitory thrombus	10	14.30

IRBBB: Incomplete Right Bundle Branch Block, PAH: Pulmonary Arterial Hypertension, PA: Pulmonary Artery, TAPSE: Tricuspid Annular Plane Systolic Excursion.

Venous echoDoppler of the lower limbs was normal in 8 patients. Thrombi involved the deep network in 62 patients (88.57%), more than half of them at sural level. PE was initially severe at admission in 12 patients (17.14%). Thoracic angioscan was performed in 58 patients (82.86%). The PE was proximal in 66.67% and in 20.83% of patients it was a bilateral embolism. Eighteen patients (25.71%) underwent thrombolysis with streptokinase at a dose of 1,500,000 in 2 hours using an electric syringe pump. The average hospital stay was 9.34 days  $\pm$  6.70, with extremes ranging from 2 to 29 days. Three patients (8.57%) died in hospital.

## Discussion

The prevalence of PE in this study in the cardiology department of Kara University Hospital was 6.09%. This prevalence is double that reported by PIO (3.59%) in 2015 [6] and Pessinaba (3.1%) in 2017 [7] in Lomé. In Benin, the prevalence of PE rose from 7% to 11% from 2007 to 2019 in Cotonou [9,10]. In Burkina-Faso, the frequency of PE was 9.7 [11].

This increase in PE prevalence in Africa is linked to a number of factors: the COVID19 pandemic, rising temperatures linked to climate change, and the existence of more diagnostic facilities and more cardiologists in our countries. Compared to European countries, the prevalence of PE varies between 17-42% of hospitalized patients and 8-52% of autoptic checks [3,4]. The low prevalence of PE in our country compared to European series may

be explained by underestimation. How many of these patients died after a complaint such as dyspnea or chest pain or cough or syncope or palpitations? How many pulmonary embolisms are among the sudden deaths recorded here and there in our countries? The solution would be systematic autopsy when deaths occur. The proof in Togo, Darre in Lomé, Togo in 2021 in a study of autopsy cases of sudden adult death showed that PE was the leading cause with 19.49% [5].

The mean age in our sample was 46.46 $\pm$ 16.31 years. These are relatively young subjects in our Black African countries, with a female predominance [12-15]. The female predominance in our series could be explained by the female predominance in the Togolese population and the existence of many more risk factors such as obesity and sedentary lifestyle [16]. It should also be noted that VTE risk factors specific to women, such as pregnancy, peripartum, female hormones, ovarian and uterine tumours, for example play an exclusive role.

Risk factors for PE were dominated by: obesity as well as long journeys, prolonged bed rest and history of VTE. We need to raise awareness among our populations to reduce the incidence of these risk factors. The patient admission time was between 48 and 72 hours in more than 60% of patients in this study. These results are similar to those of Pessinaba [7], who found a mean evolution time of 5.6 days, and Ali in Chad [17], who found that 53% of patients had an admission delay of over 48 hours. This delay in consultation in the first moments following the onset of symptoms reflects the fact that the population studied lacks information and financial means for medical care, which delays consultations. In our context, there are also the problems of beliefs, sessions and houses of miraculous healing and deliverance offered here and there to patients. Delay in consultation or diagnosis is also due to diagnostic errors. In fact, many patients consult paramedical or even medical staff at an early stage, but lack of knowledge of PE or diagnostic doubts mean that patients arrive late in a specialized cardiovascular environment. This delay in consultation or admission has a negative impact on the effectiveness of treatment and worsens the prognosis.

Dyspnea was the most common functional sign in this study followed by cough, chest pain and hemoptysis as reported by other authors in Africa with different proportions. All these results show that the functional complaints of PE in our countries are symptoms that should normally prompt patients to seek prompt medical attention. But dyspnea is confused with asthenia, and chest pain is trivialized. It's true that PE is characterized by its clinical polymorphism. Taken in isolation, symptoms and clinical signs are not very sensitive or specific. When combined with patient's risk factors and history, they take on a clinical value in the form of a predictive score for PE. And it's often when dyspnea is combined with chest pain, or the latter worsens with hemoptoic sputum, that patients are referred to cardiology. In terms of pleuropulmonary examination, 47.29% were normal. This normality of pleuropulmonary examination, in contrast to the high proportion of dyspnea, chest pain and cough, should raise the suspicion of PE and prompt effective treatment, until proven otherwise.

In our series, PE is suspected on the basis of clinical, electrocardiographic, chest radiographic, biological and echocardiographic evidence. The same approach was taken in Mbolla's studies in Congo [18] and Kane's in Senegal [19].

Fibrinolytic treatment with streptokinase was performed in 18 patients at a dose of 1,500,000 in 2 hours using an electric syringe pump. In our opinion, we should not hesitate to thrombolize cases of high-intermediate risk PE that respond poorly to heparin therapy since it will be too late to wait for a shock as a criterion of severity.

In this study, the majority of patients (71.40%) had a favourable outcome. The mortality rate was 8.57%. This mortality rate may be due to delayed admission, the severity of pre-existing myocardial and pulmonary lesions, and the severity of PE on admission.

## Conclusion

Pulmonary embolism is a serious and potentially fatal pathology. It is the third leading cause of death in Western countries. In Africa, once described as rare, the prevalence of PE reported in the literature over the past two decades is increasingly high, but remains underestimated. Delayed consultation and diagnosis, diagnostic errors and the absence of systematic autopsy in our countries are the causes of this underestimation of PE prevalences. Symptoms are dominated by dyspnea, chest pain and cough, contrasting with a normal pulmonary physical examination in half the cases. Pulmonary angioscanner is the gold standard for diagnostic confirmation. But this test is relatively expensive, unavailable and inaccessible to the vast majority of the population. The diagnosis of PE is based on a combination of diagnostic paraclinical tests and tests of certainty that can be carried out at the patient's bedside, and are inexpensive and non-invasive. Curative treatment of PE is based on anticoagulants and thrombolytics. EP mortality is still high. Prevention, early diagnosis and effective early treatment can help improve the prognosis of PE.

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