

# State of Care of Venous Thromboembolic Disease at an Emergency Centre in Sub-Saharan Africa: Case of the Yaoundé Emergency Centre in Cameroon Over the Past 5-Years

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## ABSTRACT

**Introduction:** Venous Thromboembolic Disease (VTE) is a common pathology responsible for a significant morbidity and mortality. We aimed to study its epidemiological, diagnostic, therapeutic and prognostic aspects in adults hospitalised in the Yaoundé Emergency Centre, Cameroon.

**Methodology:** Eligible patients presenting from the information system from 1st January 2016 to 31st December 2020 were identified retrospectively from the Yaoundé Emergency Centre (Yaoundé, Cameroon). Age, sex, diagnosis, therapeutics, prognosis factors were recorded. VTE was confirmed from archived diagnostic imaging. Statistical analyses were performed by SPSS 23 software.

**Results:** VTE was confirmed in 112 of 7847 patients indicated hospital prevalence at 1.4%. On the 112 files, 98 were retained because of completed files. The mean age was  $57.60 \pm 15.36$  years. Females were in the majority (64.3%). Dyspnea was the most frequent reason for consultation (49.0%), VTE was isolated in 13 patients (13.3%). Isolated Pulmonary embolism was demonstrated in 73 patients (74.5%) and was predominantly bilateral (67.7%). Treatment consisted mainly of low molecular weight heparin (96.9%) and rivaroxaban (80.6%). In-hospital mortality was 13.3%. Syncope or discomfort on entry was the independent risk factor for in-hospital mortality, and the prescription of rivaroxaban was a protective factor in the onset of death during hospitalisation.

**Conclusion:** The estimated hospital prevalence of VTE at the Yaoundé Emergency Centre was 1.4%, and the intrahospital mortality rate of 13.3%. There is a need for prospective and multicentre researches and intensification of population education on symptoms and risks factors of VTE disease to allow an early consultation.

**Keywords:** Venous thromboembolic disease; Deep vein thrombosis; Pulmonary embolism; Epidemiology

## INTRODUCTION

Venous Thromboembolic disease (VTE) is a condition characterised by the formation of a blood clot or thrombus that obstructs a vein and obstructs the flow of blood [1].

It represents a major public health problem because of its constantly increasing morbidity and mortality and its high cost of care [2]. It is the third leading cause of cardiovascular death after myocardial

infarction and stroke [3]. In Europe, the annual incidence of VTE is 70 to 140/100,000 people [4]. In Africa, little data exist on the epidemiology of VTE; a systematic review in 2017 showed that the prevalence of Pulmonary Embolism (PE) in hospitalised patients was between 0.14 and 61.5%, and the rate of mortality varied between 40% and 69.5% [5]. In Togo, the prevalence of PE varies between 17 and 42.6% in hospitalised patients [6]. In

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Cameroon, as in sub-Saharan Africa, VTE is still underdiagnosed [7]. A study conducted by Etoundi, et al. in 2015 at the Yaoundé Central Hospital showed a prevalence of 1.6% [8].

VTE diagnosis poses considerable difficulties in clinical practice, especially in emergency medicine, due to the polymorphism of its manifestations and the absence of symptoms or pathognomonic signs [9]. Although a certain proportion of patients often require more invasive therapeutic techniques, the treatment of VTE is mainly based on the use of anticoagulants, including Direct Oral Anticoagulants (DOACs), which have been increasingly used in recent years [10].

Faced with the significant incidence of VTE, the underdiagnosed situation, and its considerable morbimortality, it is judicious to analyse the epidemiology, clinical manifestation, paraclinical characteristics, management and prognosis of this pathology in our context.

## METHODOLOGY

### Population and type of study

We conducted a cross-sectional study with a retrospective collection. Patients of both sexes were hospitalised from January 2016 to December 2020. Deep Vein Thrombosis (DVT) was confirmed by venous ultrasound coupled with Doppler, and PE was confirmed by thoracic CT angiography.

### Data collection

After obtaining administration authorisations, information was obtained from hospitalisation registers and patient medical records. The variables studied were sociodemographic data (age, sex, occupation), clinical data (height, temperature, blood pressure, pulse, ambient oxygen saturation, clinical probability scores, risk factors for VTE, and clinical signs of VTE), paraclinical data (D-dimers, electrocardiogram, venous ultrasound of the limbs coupled with Doppler, pulmonary CT angiography, transthoracic echocardiography), treatment and the outcome (cure or death).

During collection, prolonged bed rest was considered when it was more significant than three (03) days, and a long trip was defined by a duration greater than 5 hours.

DVT was retained in front of VTE confirmed by venous ultrasound of the limbs coupled with Doppler, whatever the probability score. The PE had confirmed by pulmonary CT angiography. PE was considered massive when associated with arterial hypotension (systolic blood pressure <90 mmHg) or peripheral signs of shock.

### Statistical analysis

Data were collected using Microsoft Excel 2016 and CS Pro 7.5 software and analysed using SPSS 23.0 software. The results were expressed as frequencies and percentages for the qualitative variables and as means  $\pm$  standard deviation or median (interquartile range) for the normally distributed and skewed quantitative variables. The Chi-square test was used for the comparison of categorical variables. Binary logistic regression was used in multivariate analysis to search for factors associated with death. P values less than 5% were considered significant.

### Ethical considerations

Ethical clearance (N°2021/072/UDM/PR/CIE) was obtained

from the Ethics Committee of the Université des Montagnes. The administrative authorisation was obtained from the study site. The investigation conforms with the principles outlined in the Declaration of Helsinki.

## RESULTS

### Sociodemographic characteristics of the study population

From January 2016 to December 2020, we identified 112 cases of VTE out of 7,847 hospitalised patients, i.e. an intra-hospital prevalence of 1.4%. A total of ninety-eight (98) patients with complete files were included, of which 63 were female (64.3%) with an F/M sex ratio of 1.8. The mean age was  $57.60 \pm 15.36$  years, with extremes of 22 and 92 years (Table 1). Most of the patients (37.8%) were housewives.

### Clinical features

Dyspnea was the most frequent reason for consultation (49.0%). At entry, more than half of patients (68.4%) had low ambient oxygen saturation (oxygen saturation <95%). Systolic, diastolic blood pressure and temperature were normal in the majority of cases. Tachycardia and tachypnea were found in 59.2% and 85.7% of cases, respectively. Oedema or limb swelling was the most common clinical sign of deep vein thrombosis with 68.0% of the total.

Regarding patient risk factors for VTE, Immobilization was the most frequent factor (32.6%). No risk factor was found in 10.2% of cases (Table 2).

The Wells score [8] was assessed for suspected DVT and/or PE in 19 patients. The intermediate probability was the most common (57.9%). The modified Geneva score [8] was evaluated in the event of suspected PE in 10 patients. The intermediate probability was also the most frequent (50.0%) (Table 3).

### Paraclinical characteristics

Biologically, a D-dimer assay was performed in 62 patients. They all had a level of D-dimers greater than 500 ng/mL by the ELISA method [4].

**Table 1:** Sociodemographic characteristics of the study population.

Variables	Total (N=98)	Percentages (%)
<b>Age groups (in years)</b>		
21-40	16	16.3
41-60	35	35.7
61-80	43	43.9
81-100	4	4.1
<b>Sex</b>		
Female	63	64.3
Male	35	35.7
<b>Profession</b>		
housewife	37	37.8
Independent	22	22.4
Retire	17	17.3
State employee	15	15.3
Private employee	3	3.1
Student	2	2
No profession	2	2

**Table 2:** Distribution of patients according to risk factors for VTE.

Variables	Total (N=98)	Percentages (%)
Immobility		
Prolonged bed rest (>3 days)	20	20.4
Long trip (>5 hours)	12	12.2
Traumatism	15	15.3
Recent surgery		
Orthopedic	10	10.2
Abdominal	2	2
No factor found	10	10.2
History of VTE	7	7.1
Cancer	6	6.1
Human Immunodeficiency Virus	1	1
Medications		
Chemotherapy	2	2
Estrogen-progestogen	1	1
Childbirth	1	1

**Table 3:** Distribution of patients according to clinical probability scores assessed at entry.

Variables	Total (N=98)	Percentage (%)
<b>Wells score (N=19)</b>		
Low probability	3	15.8
Intermediate probability	11	57.9
Strong probability	5	26.3
<b>Modified geneva score (N=10)</b>		
Low probability	1	10
Intermediate probability	5	50
Strong probability	4	4

The morphological assessment performed was a venous ultrasound of the limbs coupled with Doppler, pulmonary CT angiography, electrocardiogram and transthoracic echocardiography.

Venous ultrasound of the limbs coupled with Doppler revealed 25 cases (25.5%) of DVT. The left lower limb was the most affected limb (44.0%). The thrombus was more localised in the popliteal vein (40.0%). The proximal extension was the most prominent (64.0%).

Pulmonary CT angiography revealed 85 cases (86.7%) of PE (Table 4). It was bilateral (67.1%), segmental and predominantly sub-segmental (45.9%) mainly. Massive pulmonary embolism was found in 6 patients (7.1%).

Fifty-four (54) of the patients had the EKG performed. Sinus tachycardia was found in 51.9%, and the S1Q3 aspect was present in 20.4% of patients. Transthoracic echocardiography was performed in 32 patients; the most common indirect sign for PE was pulmonary arterial hypertension in 68.8% of cases.

### Therapeutic aspects

In our study population, non-drug treatment was mainly based on oxygen therapy (78.6%) and the prescription of compression stockings (60.2%).

Drug management was based on the prescription of anticoagulants

and streptokinase thrombolysis (6.1%). The most frequently prescribed anticoagulants were low molecular weight heparin (Table 5), Direct Oral Anticoagulants (DOACs) such as rivaroxaban (80.6%), Anti Vitamin K (AVKs) such as acenocoumarol (4.1%) and fluindione (2%).

### VTE prognosis

Patients with isolated PE had a favourable intrahospital outcome in 84.9%. Those presenting exclusively DVT had an excellent result in 100% of cases. For those patients who had VTE, i.e. both DVT and PE, the outcome was favourable in 83.3%, with a mortality rate of 16.7%.

Regarding the overall patient prognosis, the median length of hospital stay in the study population was 6 (4-9) days with extremes of one day and 24 days. The outcome was favourable in 86.7%, and there was an overall intra-hospital mortality rate of 13.3%. The median time to death during hospitalisation was 5 (4-9) days, with extremes of one day and 24 days.

### Factors associated with in-hospital mortality

Bivariate analysis and binary logistic regression model were used to search for an association between sociodemographic, clinical, paraclinical and therapeutic variables. The dead and the non-death were carried out first.

Massive PE increased the risk of death during hospitalisation by 8.20 times (8.20 (1.45-46.24) P=0.029). Syncope or discomfort on entry increased the risk of death during hospitalization by 12.45 (1.85-83.71) P=0.016). Furthermore, no other factor was associated with the occurrence of death during hospitalisation. After binary logistic regression, syncope or malaise was an independent risk factor for in-hospital mortality (22.68 (1.51-339.22) P=0.024). The

**Table 4:** Distribution according to abnormalities found on pulmonary CT angiography.

Variables	Total (N=85)	Percentages (%)
<b>Sites</b>		
Bilateral pulmonary embolism	57	67.1
Right pulmonary embolism	22	25.9
Left pulmonary embolism	6	7.1
<b>Localisations</b>		
Segmental and sub-segmental	39	45.9
Troncular	20	23.5
Sub segmental	15	17.6
Segmental	11	12.9

**Table 5:** Management of VTE disease in the study population.

Variables	Total (N=98)	Percentages (%)
Low molecular weight heparin	95	96,9
Rivaroxaban	79	80,6
Oxygen therapy	77	78,6
Compression stockings	59	60,2
Thrombolysis (Strepto kinase)	6	6,1
Acenocoumarol	4	4,1
Fluindione	2	2,0

prescription of rivaroxaban was a protective factor in the occurrence of death during hospitalisation (0.04 (0.00-0.23)  $P < 0.001$ ).

## DISCUSSION

This study aimed to describe the epidemiology, clinical manifestations, paraclinical characteristics, management and prognosis of VTE in the Yaoundé emergency centre, Cameroon.

During the studied period, 112 cases of VTE of 7,847 hospitalised patients were identified, i.e. an intra-hospital prevalence of 1.4%. On the ninety-eight (98) patients eligible, the mean age ( $57.60 \pm 15.36$  years) is close to that reported in Cameroon by Skajaa, et al. [11] in 2016, which was  $56.4 \pm 15.8$  years. Etoundi, et al. [8] in 2015, on the other hand, still in Cameroon had regained an average age of  $50.61 \pm 25$  years. This difference could be explained by the latter's study at the Yaoundé central hospital, including the main maternity ward. However, we had fewer obstetric risk factors such as pregnancy and childbirth, which generally occur before 50. The most represented age group was 61-80 years, identical to Fofana, et al. study [12] in 2019 in Mali.

The female majority (64.3%) in this series agrees with another study reported in Mali by Coulibaly, et al. [13] in 2018, who had found a female predominance in 63.22%. Khaldi, et al. [14], in 2013 in Algeria, had also observed this female predominance in 61.1% of cases. These data are consistent with the literature and would probably be related to factors specific to the female sex [8].

The prevalence of VTE disease in this study was 1.4%. It is lower than Etoundi, et al. study [8] reported in 2015, 1.6%. It can be explained by the decrease in the number of hospitalisations observed in 2020 compared to other years. Indeed, because of the 2019 Coronavirus pandemic, sure respiratory signs such as dyspnea, cough, chest pain are also found in cases of PE. Patients who had these signs were probably referred to specialised centres for the management of SARS-COVID-19 patients. Our hospital's prevalence is lower than that reported by Sista, et al. study [15] in 2019 in Ivory Coast, which found a hospital prevalence of 5.4%; it could be explained by the more extended period of their study 10-year.

High blood pressure was the most common cardiovascular risk factor at 38.8%. Similarly, Konaté, et al. [16] in 2020 and Black, et al. [17] in 2011 founded arterial hypertension in 39% and 50% of cases; maybe because of the steadily increasing cardiovascular risk factors in sub-Saharan Africa.

Prolonged immobilisation was the most common risk factor for VTE with 32.6%. Indeed, prolonged immobilisation is responsible for blood stasis at the origin of thrombogenesis [18-20].

The thrombus was more localised in the popliteal vein (40.0%), and the proximal extension was predominant (64.0%). Expressed, segmental and subsegmental PE was the most represented respectively in 67.1% and 45.9%, in agreement with Walbane in Bamako [21] in 2015, who found expressed PE in 61.90%. Pulmonary arterial hypertension was the indirect sign favouring PE, the most seen on transthoracic echocardiography, in 68.8%. This result is close to 70% of Delluc A [22] in 2020 and could be explained by the increase in resistance to blood flow in small-calibre pulmonary arteries following the obstruction caused by the clotted blood [23].

Regarding management of VTE, low molecular weight heparin at curative dose was prescribed in 96.9%; this is close to the results of Abah, et al., which were 94.9%. Rivaroxaban and AVKs were prescribed in 80.6% and 6.1%, respectively, different from Coulibaly, et al. study, which found the prescription of low molecular weight heparin and anti vitamin K in 94.25% and 85%, respectively, because of the increasing use of DOACs in our context, since few years, and due to its simplicity of use compared to VKAs which require biological monitoring [13].

The overall intra-hospital mortality was 13.3%, close to the Wilbur, et al. study [24], which reported mortality of 13.6% in semi-urban areas in Cameroon in 2019. In Mali, Delluc, et al. [22] reported in-hospital mortality of 22%. This difference is explained by the inadequacy of the technical platform, in particular the absence of an intensive cardiological care unit in their structure.

Massive PE increased the risk of death during hospitalisation by 8.20 times, following the literature [25]. Syncope or malaise as a reason for consultation or clinical sign of PE increased the risk of in-hospital death by 12.45 and 5.95, respectively. This association between malaise or syncope with mortality could be explained by the hemodynamic shock caused by massive PE [25,26]. Patients who received rivaroxaban were 0.05 times more likely not to die during hospitalisation. Indeed, according to some studies, treatment with rivaroxaban has a potentially improved benefit-risk profile than conventional treatment [27].

## CONCLUSION

The estimated VTE incidence at the Yaoundé Emergency Centre was 1.4%, and the intrahospital mortality rate of 13.3%. Oedema or swelling of the limb and dyspnea are the main symptoms of DVT and PE. There is a need for prospective and multicentre research to regularly determine the epidemiology, state of management, and prognosis. Also, we shall intensify the education of the population on symptoms and risks factors of VTE disease to allow an early consultation.

## LIMITATIONS OF THE STUDY

The small size of the final sample (98) and some numerous incomplete or briefly reported files, given that we retained only patients with a confirmed diagnosis of VTE based on elements contained in the medical records and especially results of venous ultrasound of the limbs coupled with Doppler for DVT and pulmonary CT angiography results for PE. Secondly, our study was monocentric. Given this, the size is not representative enough the population. This raises the need for prospective and multicenter cohort studies to provide more information and target epidemiological intervention strategies on venous thromboembolism disease.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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