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Epidemiology and Clinical Pattern of Intermediate and High Risk Pulmonary Embolism in Sub-Saharan Africa

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Abstract

Background: Many studies have been carried out on pulmonary embolism (PE) in general in our country. But to the best of our knowledge, they have never been focused on specific stages of PE according to the last classification predicting the mortality at 5 years specially for the intermediate (IR-PE) and high risk (HR-PE) of pulmonary embolism. **Objective:** We describe the epidemiology and clinical pattern of intermediate and high-risk pulmonary embolism (PE) in two hospitals in Cameroon. **Methods:** This was a retrospective cross-sectional study carried out in two reference hospitals of Yaoundé-Cameroon on a 6 years period from January 1st, 2015 to December 31st, 2020. All complete medical records of patients aged 20 years and more, with a confirmed diagnosis of pulmonary embolism and risk stratification were included. Statistical analysis was done using SPSS version 18.0. **Results:** The medical records of 86 patients were analysed. The mean age was 52.5 ± 15.9 years with a sex ratio of 0.59. The cumulative prevalence of intermediate and high risk PE was 5.9%. The proportions of ILR-PE, IHR-PE and HR-PE were respectively 40.7%, 40.7% and 18.6%. Obesity, use of combined oral contraceptive pills and previous VTE were the most frequent risk factors. Symptoms were dominated by dyspnoea and chest pain and the physical sign most frequently found was tachycardia. **Conclusion:** Prevalence of intermediate and high risk PE remains high in our context. Risks factors and clinical manifestations are similar to the data found in the literature.

Keywords

Epidemiology, Clinical Pattern, Pulmonary Embolism, Cameroon

1. Introduction

Venous thrombolembolism (VTE) includes pulmonary embolism (PE) and deep venous thrombosis (DVT). The incidence in Europe and the United states is estimated to be 1 - 2 per 1000 person-years, and lower in Asia and South America [1]. Data on the epidemiology of VTE very scarce in Africa and are in most cases hospital based. In a systematic review, Danwang and colleagues reported a prevalence of DVT of 2.4% to 9.6% in postoperative patients and between 0.14% and 61.5% in medical patients [2]. The incidence and prevalence of VTE are increasing worldwide. In a large study in the USA, Deitelzweig *et al.* found an increased prevalence of 33.1% between 2002 and 2006 [3]. Furthermore, they estimated in a projection that this prevalence would more than double in 2050. This persistent increase in prevalent VTE is driven by patient age, comorbidities such as cancer, obesity and cardiovascular diseases, trauma and surgery [4]. In sub-Saharan Africa, similar trends of these risk factors are also found [5]-[7]. In the past years, the COVID-19 pandemic has also contributed to the increase in the burden of VTE in general and in PE in particular. Gabet *et al.* found in France that compared to the period 2017-2019, the prevalence of PE and inpatient case fatality rate increased two-fold and three-fold respectively during weeks 12 - 19 of 2020 [8]. It is estimated that one third of all patients with a new diagnosis of VTE have PE [9]. PE is associated with a high mortality risk, especially in elderly patients and up to 5% of patients may develop chronic thromboembolic pulmonary hypertension and cor pulmonale [10]. In our country, non recent data is available on the epidemiology of VTE specially on its sub group. This study aimed to describe the epidemiology and clinical pattern of intermediate and high risk PE in two reference hospitals of Yaoundé, Cameroon.

2. Methods

2.1. Study Design and Setting

This was a retrospective cross-sectional study carried out in the Yaoundé general hospital (YGH) and university teaching hospital (YUTH).

2.2. Study Period

We retrospectively collected data from January 1st, 2015 to December 31st, 2020.

2.3. Study Population

Inclusion criteria: We included patients aged 20 years and above, with a confirmed diagnosis of PE and with risk stratification as intermediate (low and high) and high.

Exclusion criteria: Patients who had missing or incomplete medical records were excluded.

2.4. Sampling

All the medical records found with eligible criteria during the study period were included.

2.5. Data Collection

We searched the archive units to scout out all the medical files of the patients selected and information were recorded into the data collection form. We ensured confidentiality, as each data collection form was encoded. We obtained relevant information such as sex, age, occupations and placed of residence in order to determine the prevalence and sociodemographic aspects of these groups of patients. The risks factors, vital parameters on admission, clinical presentation in order to determine clinical aspects. We finally obtained relevant statistics from the statistics departments of the hospitals on the number of admissions in the ICU units and conventional hospitalization wards for the said studied period.

2.6. Statistical Analysis

All the variables on data collection forms were coded and entered into Epi Data entry client on a computer. We then imported the data into Microsoft excel 2013 and under the supervision of a statistician, the data were analysed using Statistical Package for Social Science (SPSS) version 18.0. Tables were drawn up using Microsoft Office Excel and Word 2013. Continuous variables were expressed as means and standard deviation whereas categorical variables were expressed as proportions and percentages. The results were presented in figures and tables, generated by excel 2013 after necessary editing.

2.7. Ethical Considerations

Before carrying out the study, we obtained ethical clearance approval from the Ethical Committee and research institute of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I N˚559/UYI/FMSB/VDRC/DAASR/CSD. We collected the data for the study under strict respect of patient confidentiality. As such, patients' files were coded, so as not to disclose identity and information collected was encoded and used for the sole purpose of this study. Also, all patient files were examined within the archive of this institution without any modification of their contents.

3. Results

92 medical files were set apart for our study amongst witch 6 medical files were excluded for 4 medical files were missing and 2 were incomplete. Therefore, the sample size of our study was made of 86 patients with an intermediate or high risk PE (40 from the YGH and 46 from the YUTH) were analysed (**Figure 1**). The total number of patients admitted during the 5-year period was 1450 patients in the two hospitals. Out of which, 86 cases were intermediate to high risks PE. Giving a 5.9% prevalence of intermediate to high risks PE in our study. There was 10.5% of

associated DVT. In our study population, we found a female predominance in 54 cases (62.8%) and the total male 32 either 37.2%. The sex ratio was 0.59. The ages of the population ranges from 23years to 89 years, with a mean age was 52.49 ±15.92 years (Table 1). Obesity (34.9%) was the most frequent risk factor followed by the use of combined oral contraceptive pills (22.09%) and previous VTE (18.60%). In the overall patients past history, the most presented PE risk factor was hypertension in 39 cases (45.3%), follow by obesity (stage I and stage II) in 30 cases (34.9%), diabetes in 27 cases (31.4%). The use of oral contraception was found in 19 cases (22.1%), previous VTE disease and heart failure were found each in 16 cases (18.6%), 13 patients were aged above 65 years (15.1%), immobility due to car travel and bed rest >3 days were found in 12 cases (14%) and 10 cases (11.6%) respectively, chronic infections (HIV and tuberculosis) in 12 cases (14%) and cancer in 2 cases (2.3%. Concerning the clinical presentation at the admission, Dyspnoea was the most frequent symptom found in our study in 74 cases (86%), follow by chest pain in 53 cases (61.6%). Dry cough was found in 37 cases (43%). Orthopnoea and palpitations were equally present respectively in 14 cases (16.3%) and 11 cases (12.8%). As far the simplified PESI score was concerned, we observed that the sPESI score 1 was the most predominant score in 38 cases (44.2%) and class III was the most represented class in 42 cases. As physical signs, tachycardia was the most predominant in 36 cases (41.9%), follow by lower limb swelling (LLS). None of the patient presented haemoptysis nor syncope at admission (Table 2). On paraclinical findings, the majority of the cases had D-dimers levels > 500 mg/dl, with a total of 69 cases (80.2%) whereas 17 cases (19.8%) had d-dimers levels <500 mg/dl. Cardiac troponin I and T were abnormally elevated in 62 cases (72.1%) and 52 cases (60.5%) respectively. The most predominant para clinical findings were cardiomegaly in 23 cases (26.7%) on the chest Xray, sinus tachycardia in 63 cases (73.3%) and S1Q3T3 sign in 46 cases (53.5%) on electrocardiography, also 58 cases (67.4%) and 59 cases (68.6%) respectively revealed right ventricular dysfunction and right heart dilation (Table 3).

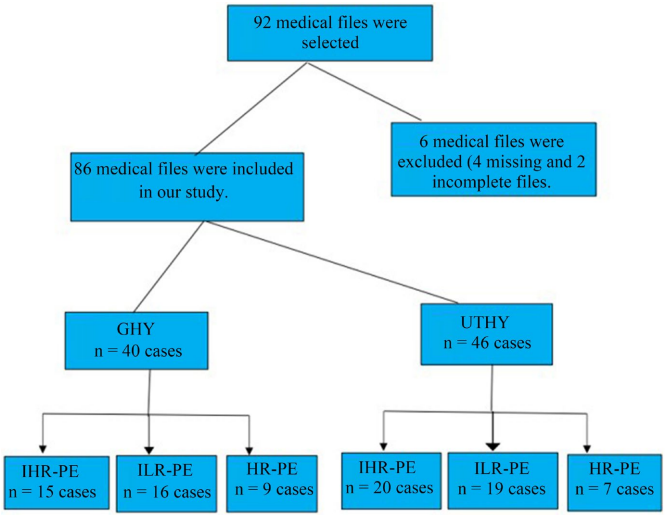

Figure 1. Flow chart distribution of the study population.

Table 1. Sociodemographic characteristics and risk factors of PE.

Variables	Number	Percentage (%)
Age categories		
[20 - 45]	31	36.05
[46 - 65]	36	41.86
[66 - 89]	19	22.09
Gender		
Female	54	62.79
Male	32	37.21
Residence		
Urban	70	81.39
Rural	16	18.61
Occupation		
Public sector	26	30.23
Private sector	18	20.93
Retired	22	25.58
Housewife	20	23.26
Risk factors		
Obesity	30	34.88
COC	19	22.09
Previous VTE	16	18.60
Heart failure	16	18.60
Old age	13	15.12
Prolonged car travel	12	13.95
Chronic infections	12	13.95
Bed rest > 3 days	10	11.63
Blood transfusion	09	10.46
Cancer	02	2.32

COC: combined oral contraceptive. VTE: venous thromboembolism.

Table 2. Clinical signs and symptoms distribution.

Variables	Number	Percentage (%)
Symptoms		
Dyspnoea	74	86.05
Chest pain	53	61.62
Cough	37	43.02
Orthopnoea	14	16.28
Palpitations	11	12.79
Lower limb pain	09	10.46

Continued

Signs		
Tachycardia	36	41.86
Lower limb swelling	07	8.13
Low grade fever	04	4.65
Accentuated S2 sound	04	4.65
Right sided gallop	01	1.16
sPESI score		
1	38	44.19
2	33	38.37
3	14	16.28
4	01	1.16

sPESI: simplified pulmonary embolism severity index.

Table 3. Paraclinical finding.

Variables	Number	Percentage (%)
Biology		
Raised d-dimers	69	80.23
Abnormal troponin Ic	62	72.09
Abnormal troponin Tc	52	60.46
ECG		
Sinus tachycardia	63	73.26
SIQ3T3	46	53.49
T-wave inversion	30	34.88
ST segment elevation	10	11.63
Atrial fibrillation	04	4.65
TTE		
RV dilatation	59	68.60
RV dysfunction	58	67.44
Pulmonary hypertension	46	53.49
RA thrombus	12	13.95
CTA		
Unilateral thrombus	52	60.46
Bilateral thrombus	34	39.53

ECG: electrocardiography. TTE: transthoracic echocardiography. CTA: Computed tomography angiography.

4. Discussion

This was a 5-years retrospective descriptive study which aimed to describe the

sociodemographic and clinical aspects, determining the prevalence of intermediate-high, intermediate-low risks and high risks PE groups in ICU and Internal medicine of two hospitals in Yaounde (GHY and UTHY). In our study there was a female predominance in concordance with the available literature. The overall cumulative prevalence of intermediate and high risk PE was higher than the ones obtained in previous studies in Cameroon. Abah *et al.* reported in 2015 a prevalence of 0.97% of PE, all risk categories, from 2010 and 2013 in the town of Bamenda. Owono Etoundi *et al.* also reported in 2015 a very low prevalence of 0.14% of pulmonary embolism in the Yaoundé central hospital [11] [12]. This differences may account for the rising prevalence of PE in general on one hand, and on the other hand for differences in study methodology. Indeed, Abah *et al.* only included patients admitted with medical illnesses and Owono Etoundi *et al.* studied PE in patients admitted in the ICU and cardiology department were they have greater chances of receiving appropriate prophylaxis for VTE. In contrary, other authors found higher prevalences of PE. This is the case of Amar *et al.* with 61.5% and Bahloul *et al.* with 17.5% [13] [14]. This differences are explained by the fact that these studies were performed in patients having important comorbidities; tuberculosis for the first and chronic obstructive pulmonary disease for the second. The proportions of the IHR-PE and the ILR-PE in our study were similar with what was found in other regions of the Wold. Slawek-Szmyt *et al.* [15] reported in Poland 47.5%, 23.75% and 17.5% of IHR-PE, ILR-PE and HR-PE respectively in a 1-year prospective study, Becattini *et al.* in Italy [16], 30%, 36.7% and 11.6% respectively and Araszkiewicz *et al.* [17] in Poland, 52% and 19.4% respectively for intermediate high-risk group and the high risk groups. The most frequent risk factors of VTE in this study were known traditional risk factors [1]. According to the literature, the most frequent symptoms were dyspnoea, chest pain and cough [18] as in our studied population, The most clinical symptom identified was dyspnea in 74 cases (86%), follow by chest pain in 53 cases (61.6%). This was similar to the 80% dyspnea and 60% chest pain obtained by *peire-marie-roy et al.* [19], this was however higher in the result obtained by *Charles et al.* with dyspnea (50%) been the most presented symptom follow by chest pain (39%) in the population [20]. This difference can be explained by the varying clinical presentation of acute pulmonary in itself on admission.

5. Study limitations

This study had some limitations that need to be mentioned. Firstly, the retrospective design did not permit us to have full control over the accuracy with which information concerning the patients were collected and recorded. Secondly, a good number of medical records were incomplete or missing and were therefore excluded from analysis.

6. Conclusion

The prevalence of intermediate and high risk PE is high and increasing compared

to the previous years in our context. Risk factors and clinical presentation of the patients were similar to the data found in the literature. Proper management of risk factors and adequate pharmacologic prophylaxis may help to fight against this persistent rise in the incidence of PE.

Conflicts of Interest

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

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