Scientific Research Publishing

World Journal of Cardiovascular Diseases, 2024, 14, 88-98
https://www.scirp.org/journal/wjcd
ISSN Online: 2164-5337
ISSN Print: 2164-5329

Functional Capacity of Patients with Venous Thromboembolic Disease Six to Twelve Months after Treatment

Hamadou Ba[1], Chris-Nadège Nganou-Gnindjio[1,2], Alexis Noé S. Guiakam[1], Kemnang Yemele Honore[1], Danwe Dieudonné[1], Guy S. Wafeu[1,3]

[1]Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon
[2]Cardiology Department, Yaoundé Central Hospital, Yaoundé, Cameroon
[3]Centre for Research on Filariasis and Other Tropical Diseases, Yaoundé, Cameroon
Email: drhamadouba@gmail.com

How to cite this paper: Ba, H., Nganou-Gnindjio, C.-N., Guiakam, A.N.S., Honore, K.Y., Dieudonné, D. and Wafeu, G.S. (2024) Functional Capacity of Patients with Venous Thromboembolic Disease Six to Twelve Months after Treatment. *World Journal of Cardiovascular Diseases*, **14**, 88-98.
https://doi.org/10.4236/wjcd.2024.142008

Received: October 9, 2023
Accepted: February 26, 2024
Published: February 29, 2024

Abstract

Background: Venous thromboembolism (VTE) is among the leading causes of hospital-related disability-adjusted life years lost. We aimed to determine the prevalence and determinants of functional capacity impairment six to twelve months after an acute VTE event. **Methods:** This was a cross-sectional study conducted between January and April 2021 in two referral hospitals of Yaoundé, including consenting adult patients admitted to these hospitals six to twelve months ago for VTE. We excluded dead patients and those with any comorbidity or symptoms limiting physical activity. The functional outcome was assessed with the six-minute walk test. Functional capacity impairment was defined as walking distance lower than the expected value. **Results:** We included 27 cases in this study with a mean age of 53.2 ± 14.4 years. The prevalence of functional capacity impairment was 29.6% (95% CI: 14.8 - 48.1). Factors associated with poor functional outcome were obesity (OR: 59.5; 95% CI: 4.6 - 767.2; $p < 0.001$), syncope during VTE (OR: 18; 95% CI: 1.6 - 207.4; $p = 0.017$), massive PE (OR: 30; 95% CI: 2.5 - 354; $p = 0.004$), and poor adherence to treatment (OR: 30.3; 95% CI: 2.5 - 333.3; $p = 0.004$). **Conclusion:** Functional capacity impairment is common in the medium-term after VTE and factors associated with this poor outcome are obesity, the severity of the VTE, and poor adherence to treatment.

Keywords

Functional Capacity, Venous Thromboembolism, Six-Minute Walk Test, Cameroon

1. Introduction

Venous thromboembolism (VTE) is a clinical entity including both deep venous thrombosis (DVT) and pulmonary embolism (PE); the latter is usually secondary to thrombi dislodge from clots of DVT and travel to pulmonary arteries [1] [2]. Risk factors are similar for DVT and PE. The exact incidence and prevalence of VTE worldwide are unknown. However, a recent systematic review on the burden of the disease in low-income, middle-income, and high-income countries revealed that the annual incidence rates ranged from 0.75 to 2.69 per 1000 individuals, and increased to 2 - 7 per 1000 among those aged ≥70 years [3]. Furthermore, VTE was the leading cause of disability-adjusted life-years (DALYs) lost in low-income and middle-income countries and was responsible for 7681 hospital-related DALYs lost globally (representing one-third of hospital-related DALYs lost) [4]. This disability may be related to many cardiovascular and pulmonary complications related to VTE. Indeed, hospitalized patients with VTE are particularly at high risk of post-thrombotic disease and thromboembolic pulmonary hypertension [5]. These complications were found respectively in 53% of patients with DVT and 5% of patients with PE in the long-term [6] [7]. Although their pathophysiology is still discussed, they may have an impact on pulmonary and cardiovascular functions and may affect survivors' quality of life through functional capacity impairment. It has been proved that functional capacity is an independent predictor of quality of life, especially in a patient with a pulmonary disease like chronic obstructive pulmonary disease. A recent study carried out by Farmakis and al. revealed that in patients who had an acute episode of PE, 20% had a functional capacity impairment after 1 year of follow-up. This had a considerable impact on their quality of life [8]. Another study carried out by Chow and al. revealed that among apparently well long-term survivors of sub-massive PE, 55% demonstrated below than expected 6 MWT [9]. Although several studies have been done to evaluate VTE patients' outcomes in the medium and long term, data on functional outcomes in this population are scarce especially in a low-income setting like Cameroon. We aimed in this study to determine the prevalence and determinants of functional capacity impairment in the medium-term after VTE in survivors. These data may help to improve treatment strategies by acting on factors threatening the functional outcome of patients after VTE.

2. Methods

2.1. Study Design and Population

We conducted a cross-sectional study at the cardiology units of the Yaoundé Central Hospital and Emergency Center of Yaoundé, two referral hospitals where patients with VTE are treated in Yaoundé city. Data were collected between January and April 2021. Records of adult patients (aged above 18 years) hospitalized 6 to 12 months earlier with a diagnosis of VTE were identified and patients were contacted for inclusion. Before inclusion, informed consent was

obtained from participants, then they were invited to the hospital for data collection. Exclusion criteria were 1) death at discharge or before the data collection period, 2) any comorbidity limiting physical exercise including joint diseases, decompensated heart failure or cirrhosis, stage 4 or 5 renal failure, severe dyspnea or thoracic pain. We also excluded all the participants with absolute or relative contraindication to six minutes' walk test, namely unstable angina or myocardial infarction during the previous month, a resting heart rate > 120, a systolic blood pressure > 180 mm Hg a diastolic blood pressure > 100 mm Hg.

2.2. Data Collection Procedure

After inclusion, sociodemographic data were obtained from the interview. Patients' records were used to collect data on VTE risk factors and clinical signs present at the time of hospitalization for VTE (6 to 12 months earlier). Final diagnosis, treatment received and status at discharge was also retrieved from the records. Long-distance travel was considered as any travel of at least four hours or more in days preceding admission. Bed rest was any activity limitation with bed rest for more than five days before VTE. Massive PE was defined as acute PE with systemic arterial hypotension (systolic blood pressure < 90 mm Hg or drop in systolic blood pressure of at least 40 min for at least 15 minutes) [10]. Treatment adherence was self-reported by the patient, through their subjective perception of compliance with medication since discharge (they were asked to choose between poor and good treatment adherence).

2.3. Functional Capacity Assessment

The six-minute walk test was used to evaluate the functional capacity of participants. It is a simple test that requires no specific equipment nor advanced training and evaluates the global and integrated response of all the systems involved in walking (including cardiovascular, respiratory, nervous, and musculoskeletal systems). The participant was asked to walk quickly on a flat and hard surface for six minutes and the distance covered was measured. Before the exercise, heart and respiratory rates, systolic and diastolic blood pressure, and oxygen saturation were measured at rest and the procedure was explained. During the test, encouragements and remaining time were communicated in even tones as recommended in the official statement of the American thoracic society [11]. At the end of the exercise, the same hemodynamic parameters measured at the beginning were recorded, as well as the number of rests during the exercise. The overall fatigue was assessed using the Borg scale on a scale of 10 [12].

To classify functional activity, walking distance was compared to the predicted distance corresponding to patient's age, gender, weight and height, obtained through the following equation:

Predicted distance for men = (7.5 × height) − (5.02 × age) − (1.76 × weight) − 309

Predicted distance for women = (2.11 × height) − (5.78 × age) − (2.29 ×

weight) + 667

With predicted distance in meters, height in centimeters, age in years, and weight in kilograms. Functional capacity impairment was defined as a predicted distance greater than the walking distance at the six-minute walk test.

2.4. Statistical Analysis

Counts and frequency were used to describe categorical data, while mean ± standard deviation was used for quantitative data description as they were all normally distributed. The prevalence of the main outcome was provided with a 95% confidence interval. Parameters recorded after the six-minute walk test were compared to baseline values using a paired-sample t-test. Factors associated with impaired functional capacity were determined with a Chi-square test or a Fisher's exact test for categorical predictors, respectively when expected all expected numbers in the cross table were greater than or equal to 5 or at least one expected number was less than 5. For quantitative predictors, means were compared using the independent-samples t-test. Multivariate logistic regression analysis couldn't be performed because the sample size was small. P values less than 0.05 were considered statistically significant. All the analyses were performed with IBM SPSS Statistics for Windows (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp).

2.5. Ethical Considerations

The study was conducted following the principles of ethics in research involving humans as stated in the Helsinki declarations [13]. Administrative authorizations were obtained from hospitals where patients were recruited, and ethical clearance was also obtained from the Centre regional ethics committee for human health research (N°: 1150/CRERSHC/2021). Before inclusion, the study procedure was explained to the participants with the advantages and disadvantages of its participation, and written informed consent was obtained.

3. Results

3.1. Description of the Study Population

During the selected study period, 2941 patients were admitted to the cardiology units including 50 cases (1.7%) of venous thromboembolism. We included 27 subjects, 02 refused to participate, 03 were unable to walk and 18 died in the 06 months following VTE. The mean age of included patients was 53.2 ± 14.4 years, males were representing 29.6% of the population. The most common VTE risk factors were hypertension, diabetes, thromboembolic heart disease, and recent long trip found respectively in 11 (40.7%), 6 (22.2%), 6 (22.2%), and 6 (22.2%) patients. The most frequent clinical signs were dyspnea (77.8%) followed by chest pain (51.9%) and edema of the lower limbs (40.7%) (**Table 1**). As described in **Table 2**, pulmonary embolism (PE) was more frequent than deep venous thrombosis (59.3% vs 18.3%), with a massive form found in 6 (22.2%)

Table 1. Clinical factors associated with functional capacity impairment in the study population.

Variables	Overall (n = 27)	Functional capacity		OR (95% CI)	P value
		Impaired (n = 8)	Normal (n = 19)		
Male, *n* (%)	8 (29.6)	3 (37.5)	5 (26.3)	1.7 (0.3 - 9.7)	0.658
Age (yrs), Mean ± SD	53.2 ± 14.4	56.8 ± 16.4	51.6 ± 13.6	-	0.409
Urban environment, *n* (%)	21 (77.8)	3 (37.5)	18 (94.7)	0.03 (0.003 - 0.4)	0.004
VTE risk factors, *n* (%)					
Orthopaedic surgery	1 (3.7)	0 (0)	1 (5.3)	-	1.000
Post-partum	1 (3.7)	0 (0)	1 (5.3)	-	1.000
Bed rest	2 (7.4)	0 (0)	2 (10.5)	-	1.000
Long distance travel	6 (22.2)	3 (37.5)	3 (15.8)	3.2 (0.5 - 21.2)	0.319
HIV infection	2 (7.4)	0 (0)	2 (10.5)	-	1.000
COVID-19 infection	2 (7.4)	1 (12.5)	1 (5.3)	2.6 (0.1 - 47.01)	0.513
Past history of VTE	2 (7.4)	0 (0)	2 (10.5)	-	1.000
Hypertension	11 (40.7)	3 (37.5)	8 (42.1)	0.8 (0.2 - 4.5)	1.000
Smoking	3 (11.1)	2 (25)	1 (5.3)	6.0 (0.5 - 78.6)	0.201
Diabetes	6 (22.2)	2 (25)	4 (21.1)	1.3 (0.2 - 8.7)	1.000
Thromboembolic heart disease	6 (22.2)	3 (37.5)	3 (15.8)	3.2 (0.5 - 21.2)	0.319
Clinical signs, *n* (%)					
Syncope	5 (18.5)	4 (50)	1 (5.3)	18 (1.6 - 207.4)	0.017
Thoracic pain	14 (51.9)	4 (50)	10 (52.6)	0.9 (0.2 - 4.7)	1.000
Dyspnoea	21 (77.8)	6 (75)	15 (78.9)	0.8 (0.1 - 5.6)	1.000
Cough	3 (11.1)	1 (12.5)	2 (10.5)	1.2 (0.09 - 15.7)	1.000
Haemoptysis	3 (11.1)	1 (12.5)	2 (10.5)	1.2 (0.09 - 15.7)	1.000
Gallop	1 (3.7)	1 (12.5)	0 (0)	-	0.296
Lower limb pain	10 (37)	4 (50)	6 (31.6)	2.2 (0.4 - 11.7)	0.415
Lower limbs oedema	11 (40.7)	4 (50)	7 (36.8)	1.7 (0.3 - 9.1)	0.675
Homan's sign	9 (33.3)	2 (25)	7 (36.8)	0.6 (0.09 - 3.6)	0.676
Obesity	9 (33.3)	7 (87.5)	2 (10.5)	59.5 (4.6 - 767.2)	<0.001

COVID-19: Coronavirus disease 2019; VTE: Venous thromboembolism.

patients. There was no association between the therapeutic choice (AVK or DOA) and a functional capacity impairment. Furthermore, poor adherence to treatment was strongly associated with a functional capacity impairment. (OR: 30 p = 0.004).

3.2. Functional Capacity

The mean walking distance at six minutes' walk test was 473.9 ± 188.9 m, ranging from 110 m to 752 m. Heart rate, respiratory rate, and systolic and diastolic

Table 2. Paraclinical and therapeutic factors associated with functional capacity impairment in the study population.

Variables	Overall (n = 27)	Functional capacity		OR (95% CI)	P value
		Impaired (n = 8)	Normal (n = 19)		
Diagnosis, *n* (%)					
PE	16 (59.3)	4 (50)	12 (63.2)	0.6 (0.1 - 3.1)	0.675
DVT	5 (18.3)	2 (25)	3 (15.8)	1.8 (0.2 - 13.4)	0.616
DVT + PE	6 (22.2)	2 (25)	4 (21.1)	1.3 (0.2 - 8.7)	1.000
Massive PE	6 (22.2)	5 (62.5)	1 (5.3)	30 (2.5 - 354)	0.004
Treatment, *n* (%)					
Compression stockings	11 (40.7)	4 (50)	7 (36.8)	1.7 (0.3 - 9.1)	0.675
VKA	4 (14.8)	1 (12.5)	3 (15.8)	0.8 (0.07 - 8.7)	1.000
DOA	23 (85.2)	7 (87.5)	16 (84.2)	1.3 (0.1 - 14.9)	1.000
Poor treatment adherence	6 (22.2)	5 (62.5)	1 (5.3)	30.3 (2.5 - 333.3)	0.004
No complication at discharge	22 (81.5)	4 (50)	18 (94.7)	0.05 (0.005 - 0.6)	0.017

DVT: Deep venous thrombosis; DOA: Direct oral anticoagulants; PE: Pulmonary embolism; VKA: Vitamin K antagonist.

Table 3. Description of six minutes' walk test results of the study population.

Variables	At rest	After six min walk test	*p*-value
Heart rate (beats/min), *Mean* ± *SD*	79.8 ± 9.1	96.1 ± 18.8	<0.001
Respiratory rate (resp/min), *Mean* ± *SD*	20.2 ± 2.5	29.3 ± 6.3	<0.001
SaO_2 (%), *Mean* ± *SD*	96.8 ± 1.0	95.4 ± 1.8	0.005
Systolic blood pressure (mmHg), *Mean* ± *SD*	129.2 ± 10.1	133.3 ± 10.9	<0.001
Diastolic blood pressure (mmHg), *Mean* ± *SD*	83.8 ± 6.5	85.9 ± 6.8	<0.001
Number of rests, *Mean* ± *SD*	*NA*	1 ± 1.1	-
Pic VO2 (ml/kg/min), *Mean* ± *SD*	*NA*	16.01 ± 4.5	-
Borg scale, *Mean* ± *SD*	*NA*	9.04 ± 4.2	-
Walking distance (m), *Mean* ± *SD*	*NA*	473.9 ± 188.9	-
Impaired functional capacity*, n (%)	*NA*	8 (29.6)	-

*Impaired functional capacity was defined as walking distance less than the predicted distance obtained from the equation developed by Enright PL *et al.* [20]. NA: Not applicable; SaO_2: Oxygen saturation rate; SD: Standard deviation.

Table 4. Summary of the determinant of functional capacity impairment.

Variables	Overall (n = 27)	Functional capacity		OR (95% CI)	P value
		Impaired (n = 8)	Normal (n = 19)		
Urban environment, n (%)	21 (77.8)	3 (37.5)	18 (94.7)	0.03 (0.003 - 0.4)	0.004
Syncope	5 (18.5)	4 (50)	1 (5.3)	18 (1.6 - 207.4)	0.017
Obesity	9 (33.3)	7 (87.5)	2 (10.5)	59.5 (4.6 - 767.2)	<0.001
Poor treatment adherence	6 (22.2)	5 (62.5)	1 (5.3)	30.3 (2.5 - 333.3)	0.0044
No complication at discharge	22 (81.5)	4 (50)	18 (94.7)	0.05 (0.005 - 0.6)	0.017

blood pressure significantly increased after the test respectively from 79.8 ± 9.1 to 96.1 ± 18.8, from 20.2 ± 2.5 to 29.3 ± 6.3, from 129.2 ± 10.1 to 133.3 ± 10.9, and from 83.8 ± 6.5 to 85.9 ± 6.8 (Table 3). The prevalence of functional capacity impairment was 29.6% (95% CI: 14.8 - 48.1) (Table 3).

3.3. Determinants of Functional Capacity Impairment

Patients living in urban environment had lower risk of functional impairment (OR: 0.03; 95% CI: 0.003 - 0.4; p = 0.004), as well as those who had no compilation on discharge (OR: 0.05; 95% CI: 0.005 - 0.6; p = 0.017). In contrast, obesity (OR: 59.5; 95% CI: 4.6 - 767.2; p < 0.001), syncope during VTE (OR: 18; 95% CI: 1.6 - 207.4; p = 0.017), massive PE (OR: 30; 95% CI: 2.5 - 354; p = 0.004), and poor adherence to treatment (OR: 30.3; 95% CI: 2.5 - 333.3; p = 0.004), were significantly associated with impaired functional capacity. Table 4 shows more details on factors associated with impaired functional capacity.

4. Discussion

Functional capacity is essential for almost all daily activities. VTE is usually an acute life-threatening attack requesting emergency care, with high morbidity and mortality rates. Moreover, survivors of VTE may present medium-term complications affecting their functional capacity. We found in this study that about 30% of patients admitted for PE or DVT six to twelve months ago had functional capacity impairment. Determinants of this impairment were living environment, obesity, the severity of PE, and adherence to post-hospitalization treatment (mainly vitamin K antagonists and direct oral anticoagulants).

VTE represented 1.7% of all admissions in the cardiology units of the study sites, similarly to the prevalence found in other African settings. Diedhiou *et al*. reported a prevalence of 1.67% of patients with VTE in Dakar, Senegal [14]. Although VTE seems rare in our setting, several cases are present and require adequate management, in order to reduce mortality and morbidity related to this clinical entity. Among patients with VTE, PE was found in 59.3% of subjects, a higher proportion reported by Etoundi *et al*. five years ago in the same context [15]. This difference can be explained by the greater availability of CT scans and the increased number of patients performing this exam. The most common VTE risk factors were cardiovascular risk factors like hypertension and diabetes. VTE-specific risk factors like orthopedic surgery, long-distance travel, and bed rest were rarer.

In our study population, the mean walking distance after VTE was 473.9 ± 188.9 m. This distance was similar to the results reported by Dürr *et al*., in a group of patients with a chronic pulmonary obstructive disease where the mean distance was 435.5 ± 103.7 m [16]. Chronic obstructive pulmonary disease (COPD) is known to affect respiratory capacity through airflow limitation, thus affecting walking distance. Similar results found in our study suggest that attention must be paid to patients with VTE after discharge, at least for those with

other pulmonary diseases like COPD. Moreover, 29.6% of patients had functional capacity impairment. This value is lower than the 45% of patients with the impaired functional outcome on discharge found by Danielsbacka and al. in a group of adults with PE [17]. The difference can be due to the definition of functional capacity impairment. Indeed, they used the cut-off of walking distance ≤ 85% of the predicted value. A systematic review demonstrated that following a pulmonary embolism there was an 18% prevalence of persistent RV dysfunction and an 11% prevalence of moderate to severe dyspnea, suggesting a significantly higher rate of poor functional status after PE. Furthermore, PE survivors walk substantially shorter distances than predicted on the 6-minute walk test [18]. Consensus on the definition of functional capacity impairment is needed as suggested by other authors. The differences between these results can also be explained by the delay in assessment. At discharge, patients may have some residual symptoms like dyspnea which affect their results of the six-minute walk test. In the study reported by Danielsbacka *et al*., respiratory-associated chest pain and dyspnea were found respectively in 30% and 60% of patients on discharge [17]. It appears therefore crucial that information is given to patients on functional impairment at discharge with the potential impact on patient's activities, as well as on the possibility of persistence of that impairment until one year and above after the attack.

Obesity was significantly associated with functional capacity impairment. Previous studies have shown that obesity affects respiratory function through mechanical effects and mediators produced by adipose tissue. In patients with VTE, there is a combination of effects that worsen the respiratory function impairment. Interventions to fight against obesity will be useful both to prevent VTE as well as functional capacity impairment. This is especially important in an urban setting, as patients living in urban areas are exposed to lifestyle changes that predispose them to obesity, and are at higher risk of poor functional outcomes in case of VTE.

Overall, the severity of VTE was associated with poor functional capacity. Indeed, massive PE and syncope on admission were risk factors for functional capacity impairment in our study. A similar result was found by Goldhaber *et al*. In a population of patients with PE, systolic arterial hypotension was identified as a significant mortality prognosis factor [19]. Thus, a severe form of VTE affects not only mortality but also functional outcome in survivors. This association may be explained by the extent of pulmonary damage, which may significantly reduce respiratory capacity. In the same line, patients with no complications on discharge were at lower risk of functional capacity impairment. The severity of PE should also be considered during treatment and information of patients.

Some limitations can be acknowledged in this study. First of all, the sample size was low, thus reducing the power of statistical tests and the ability to detect a significant difference between the groups. They may be other risk factors that

were not identified in our data. Furthermore, the multivariate analysis couldn't be done as the sample size was low. The risk factors identified in this study may be the effect of some confounding factors. Finally, as we didn't have the baseline six-minute walk test result of each patient, the functional impairment observed here may not be related to VTE. However, this study is among the rare ones evaluating the medium-term functional outcome of patients with VTE in a low-income setting. More powerful studies with better control of potential confounders will improve the results reported in this study.

5. Conclusion

The functional capacity of patients admitted for VTE was impaired for about 30% of the population six to twelve months after the event. This should be considered when informing patients about their outcomes after VTE. Determinants of functional capacity impairment were obesity, the severity of the disease assessed by syncope on admission, systolic hypotension, and poor adherence to post-hospitalization treatment. The absence of complications at discharge and in the urban environment was also associated with good functional outcomes. Studies with a larger sample size and better control of potential confounders may help to improve these results.

Disclosures

The authors declare no conflict of interest. This study did not receive fund from any organization.

Acknowledgements

The authors would like to thank the staff of the cardiology unit of the Yaoundé Central Hospital and of the Emergency Center of Yaoundé.

Authors Contribution

Conception and design: BH, CNN,
Data collection: ANG, GSW,
Data analysis and interpretation: BH, CNN,
Manuscript drafting: BH, CNN, GSW,
Manuscript revision: BH, CNN, GSW, KYH, DD,
Approval of the final manuscript: All the authors.

References

[1] Haley, M. and Phillippe, P. (2017) Overview of Venous Thromboembolism. *AJMC—Managed Care News, Research, and Expert Insights*, **23**, S376-S382. https://www.ajmc.com/view/overview-of-venous-thromboembolism

[2] Bruni-Fitzgerald, K.R. (2015) Venous Thromboembolism: An Overview. *Journal of Vascular Nursing*, **33**, 95-99. https://doi.org/10.1016/j.jvn.2015.02.001

[3] ISTH Steering Committee for World Thrombosis Day (2014) Thrombosis: A Major Contributor to the Global Disease Burden. *Journal of Thrombosis and Haemostasis*,

12, 1580-1590.

[4] Jha, A.K., Larizgoitia, I., Audera-Lopez, C., Prasopa-Plaizier, N., Waters, H. and Bates, D.W. (2013) The Global Burden of Unsafe Medical Care: Analytic Modelling of Observational Studies. *BMJ Quality & Safety*, **22**, 809-815. https://doi.org/10.1136/bmjqs-2012-001748

[5] Fanikos, J., Piazza, G., Zayaruzny, M. and Goldhaber, S.Z. (2009) Long-Term Complications of Medical Patients with Hospitalacquired Venous Thromboembolism. *Thromb Haemost*, **102**, 688-693. https://doi.org/10.1160/TH09-04-0266

[6] Korkmaz, A., Ozlu, T., Ozsu, S., Kazaz, Z. and Bulbul, Y. (2012) Long-Term Outcomes in Acute Pulmonary Thromboembolism: The Incidence of Chronic Thromboembolic Pulmonary Hypertension and Associated Risk Factors. *Clinical and Applied Thrombosis/Hemostasis*, **18**, 281-288. https://doi.org/10.1177/1076029611431956

[7] Bova, C., Rossi, V., Ricchio, R., Greco, A., Bloise, A., Daniele, F., *et al*. (2004) Incidence of Post-Thrombotic Syndrome in Patients with Previous Pulmonary Embolism. A Retrospective Cohort Study. *Journal of Thrombosis and Haemostasis*, **92**, 993-996. https://doi.org/10.1160/TH04-03-0178

[8] Farmakis, I.T., Valerio, L., Barco, S., Christodoulou, K.C., Ewert, R., Giannakoulas, G., *et al*. (2023) Functional Capacity and Dyspnea during Follow-Up after Acute Pulmonary Embolism. *Journal of Thrombosis and Haemostasis*, **22**, 163-171.

[9] Chow, V., Ng, A.C.C. and Seccombe, L. (2014) PW076 Impaired Long-Term Functional Capacity of Survivors of Submassive Pulmonary Embolism Utilizing the Six-Minute Walk Test. *Global Heart*, **9**, e275-e276. https://www.sciencedirect.com/science/article/abs/pii/S2211816014022376 https://doi.org/10.1016/j.gheart.2014.03.2215

[10] Kucher, N. and Goldhaber, S.Z. (2005) Management of Massive Pulmonary Embolism. *Circulation*, **112**, e28-e32. https://doi.org/10.1161/CIRCULATIONAHA.105.551374

[11] American Thoracic Society (2002) ATS Statement Guidelines for the Six-Minute Walk Test. *American Journal of Respiratory and Critical Care Medicine*, **166**, 111-117. https://doi.org/10.1164/ajrccm.166.1.at1102

[12] Borg, G.A. (1982) Psychophysical Bases of Perceived Exertion. *Medicine & Science in Sports & Exercise*, **14**, 377-381. https://doi.org/10.1249/00005768-198205000-00012

[13] World Medical Association (2013) World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. *JAMA*, **310**, 2191-2194. https://doi.org/10.1001/jama.2013.281053

[14] Diedhiou, D., Sarr, A., Ndour-Mbaye, N.M., KA-Cisse, M. and Diop, S.N. (2012) Phlébite des membres inférieurs en médecine interne Aspects épidémiologiques, Cliniques et étiologiques A propos de 40 cas dakarois. *Médecine d'Afrique Noire*, **58**, 172-176.

[15] Owono, E.P., Esiène, A., Bengono, R., Amengle, L., Afane, E.A. and Ze Minkandé, J. (2015) Venous Thromboembolic Disease. Epidemiological Aspects and Risk Factors in a Cameroonian Hospital. *Health Sciences and Disease*, **16**, 1-4.

[16] Dürr, S., Zogg, S., Miedinger, D., Steveling, E.H., Maier, S. and Leuppi, J.D. (2014) Daily Physical Activity, Functional Capacity and Quality of Life in Patients with COPD. *COPD: Journal of Chronic Obstructive Pulmonary Disease*, **11**, 689-696. https://doi.org/10.3109/15412555.2014.898050

[17] Danielsbacka, J.S., Olsén, M.F., Hansson, P.O. and Mannerkorpi, K. (2018) Lung

Function, Functional Capacity, and Respiratory Symptoms at Discharge from Hospital in Patients with Acute Pulmonary Embolism: A Cross-Sectional Study. *Physiotherapy Theory and Practice*, **34**, 194-201.
https://doi.org/10.1080/09593985.2017.1377331

[18] Sista, A.K., Miller, L.E., Kahn, S.R. and Kline, J.A. (2017) Persistent Right Ventricular Dysfunction, Functional Capacity Limitation, Exercise Intolerance, and Quality of Life Impairment Following Pulmonary Embolism: Systematic Review with Meta-Analysis. *Vascular Medicine*, **22**, 37-43.
https://doi.org/10.1177/1358863X16670250

[19] Goldhaber, S.Z., Visani, L. and De Rosa, M. (1999) Acute Pulmonary Embolism: Clinical Outcomes in the International Cooperative Pulmonary Embolism Registry (ICOPER). *The Lancet Journal*, **353**, 1386-1389.
https://doi.org/10.1016/S0140-6736(98)07534-5

[20] Enright, P.L. and Sherrill, D.L. (1998) Reference Equations for the Six-Minute Walk in Healthy Adults. *American Journal of Respiratory and Critical Care Medicine*, **158**, 1384-1387. https://doi.org/10.1164/ajrccm.158.5.9710086