

Prevalence of Venous Thromboembolism in Kumasi: A Postmortem-Based Study in a Tertiary Hospital in Ghana

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ABSTRACT

BACKGROUND: There is a dearth of publications on the prevalence of venous thromboembolism in Ghana. Knowledge of the prevalence of venous thromboembolism, which is often undetected clinically, will help save lives as appropriate interventions can be made as well as provide a general clue to clinicians on detecting venous thromboembolism and pulmonary embolism.

METHODS: The study employs a retrospective design with data extracted from the Autopsy Daybook of the Pathology unit, Komfo Anokye Teaching Hospital, 2009 to 2016. Data on patients' demographics were retrieved to establish diagnoses and age and gender distribution. Analysis was made of pulmonary embolism and deep vein thrombosis as a cause of death recorded on death certificates using the criteria of the International Classification of Diseases, version 10.

RESULTS: A total of 150 cases of deep vein thrombosis and/or pulmonary embolism were available for the study period and the results showed an average age of 45.3 years with a standard deviation of 19.96. The ages ranged between 3 years and 96 years with the age group 31 to 40 years being the modal age group. Males recorded the highest number of cases with 92 (59.35%) compared to females with 63 (40.65%). Respiratory disorders, of which pneumonia is the most prevalent, are the leading clinical condition that is often misdiagnosed in place of pulmonary thromboembolism.

CONCLUSION: VTE is a major health problem especially among the elderly, but unfortunately the clinical diagnosis is usually missed by clinicians hence the need to maintain a high suspicion index.

KEYWORDS: Deep vein thrombosis, pulmonary embolism, autopsy finding, cardiac diseases, respiratory disorders, venous thromboembolism

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Introduction

Venous thromboembolism (VTE) presenting as deep vein thrombosis (DVT) and/or pulmonary embolism (PE) is a common clinical problem that is associated with significant mortality globally. Global estimates of mortality and trends vary from region to region. Such information on the prevalence and trends of pulmonary embolism can be of significant help in the planning of national health schemes and strategies for diagnosing and preventing the condition.

Pulmonary embolism, which usually originates from lower extremity DVT, is incidentally discovered emboli, which cause immediate death and are often extremely difficult to detect clinically.^{1,2} It is a condition in which a blood clot (thrombosis) forms in a vein. A chunk of this thrombus may eventually break off and be carried in the blood stream to the lungs. If the

dislodged thrombus is large enough it will cause death immediately. If it is not, there may be time for intervention. But if left untreated, death will occur in over 90% of instances. VTE is the third most frequent cause of cardiovascular death after stroke and myocardial infarction.³

Pulmonary embolism and DVT go hand in hand and in fact, close to 80% of patients with PE have DVT.⁴ Embolism therefore result from the formation of thrombi in the deep veins of the leg and if treatment is targeted at removal of emboli without visiting the underlying cause, and in this case, formation of thrombi, the condition recur and patients are likely to die 4 times as much from PE compared to DVT.^{5,6}

In acute PE, structural obstruction is the principal cause of reduced functionality, but the release of vasoactive and bronchoactive agents like serotonin from platelets may lead



to deleterious ventilation–perfusion matching.⁷ Death usually results from right ventricular failure because as the after-load increases in the right ventricle, tension in the wall increases which subsequently leads to dilatation, dysfunction and subsequently to ventricular ischemia.⁸

Globally, detailed annual estimates of VTE causing PE are hard to establish partly due to the clinically silent nature of the disease.⁹ Concomitantly, VTE does not get the attention it so deserves, particularly in low resource countries and this is regrettable because of the high mortality rate associated with it. Regardless of the increased ante mortem diagnosis of VTEs, less than half of autopsy confirmed PEs are diagnosed ante mortem.¹⁰ The best treatment for the condition is its prevention because of the very high risk it carries and undetectable clinical symptoms and signs that are short-lived for any intervention even if there is.¹ Preventive measures include ambulation, hydration, blood-thinning injections and the use of compression stockings. These measures have been shown to be very effective but under-utilized.

The first step towards reducing the number of deaths from VTE resulting in PE is awareness creation. Unfortunately awareness of VTE in Ghana just like many other countries around the world is very low, among health professionals and the public at large. Research and publication on the subject is therefore necessary in this regard.

Quite distressing however, is that very few studies have been published on the prevalence of PE resulting from VTE in this region. This study employs a retrospective approach to investigate the prevalence of PE, caused by VTE in a tertiary health institution in Kumasi, Ghana.

Methodology

The study was carried out at the Komfo Anokye Teaching Hospital (KATH), the major referral hospital in the middle belt of Ghana with about a 1200 bed capacity. It is located in Kumasi; the commercial nature of the town makes the hospital accessible to all other regions that borders with the Ashanti Region and some others that are farther away. The study was carried out in the Pathology unit, Diagnostics Directorate.

The study employed a retrospective design with data extracted from archived autopsy data from the Pathology unit, Komfo Anokye Teaching Hospital, between 2009 and 2016. Suitable data on DVT and PE as established from autopsy identified from 2009 to 2016 were extracted from the database. Data on demographics was also retrieved from the Autopsy Daybook. All cases meeting the eligibility criteria were recruited for the study.

Information extracted from data on post mortem records from the Pathology unit shows that the unit performs on the average the unit receives 2200 cadavers each year with approximately 1300 autopsies every year (59.1%). Out of this, VTE cases account for approximately two percent (1.7%). All cases with DVT/PE as the main diagnosis or as an underlying cause

of death were selected. All cases meeting these eligibility criteria were recruited for the study.

Cases of VTE as diagnosis but inadequate information on patients were excluded from the study.

Ethical approval

The committee on Human Research Publication and Ethics of the School of Medicine and Dentistry, Kwame Nkrumah University of Science and Technology and the Komfo Anokye Teaching Hospital, Kumasi gave approval for the study.

Results

A total of 150 cases of VTE (DVT/PE) were available for the study period and were retrieved.

The results showed an average age of 45.3 years with a standard deviation of 19.96. The ages ranged between a minimum of 3 years to 96 years with the age group 31 to 40 years being the modal age group. Males recorded the highest number of cases with 92 (59.35%) compared to females with 63 (40.65%).

Age distribution

The results show that the age group 31 to 40 years recorded the highest number of cases by frequency and the male to female ratio stands at 1.46:1. The prevalence of PE by age is as depicted by Table 1 below.

Sex distribution

Results showed that PE is more prevalent in males than in females with 92 (59.35%) and 63 (40.65%) respectively. Figure 1 below gives a summary of the sex distribution.

Clinical diagnosis for pulmonary embolism/thrombosis

A summary of the clinical diagnosis of patients included in the study revealed that 47.7% of the patients were brought in dead (BID), followed by respiratory disorders 24.5%. Others account for 27.8%. This is demonstrated in Table 2.

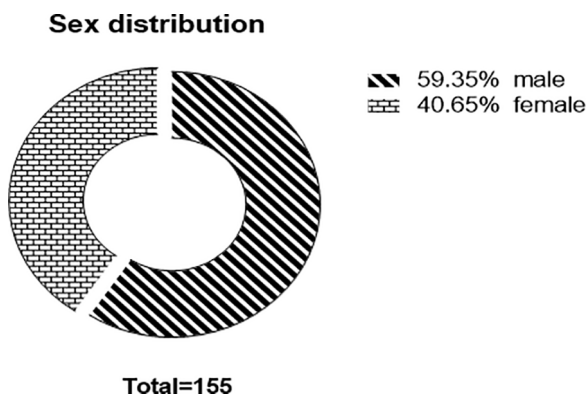
Figure 2 also depicts the graphical summary of the commonly made clinical diagnoses of PE. The graph shows that respiratory disorders of which pneumonia is principal is highly prevalent, accounting for 15.5 % of all the clinical diagnosis with only 5 (3.2%) of the cases rightly diagnosed as PE. Table 2 and Figure 2 below give a summary of the results.

Yearly trend analysis of the prevalence of PE

The results show a sharp increase in prevalence from 2008 through to 2010 followed by a steady decline to a minimum in 2013. This was again followed by a sharp rise from 2013 towards 2016. The yearly trend of cases of pulmonary embolism is shown by Figure 3.

Table 1. Age distribution of incidence.

AGE GROUP	FREQUENCY	PERCENT	CUMULATIVE (%)
≤10years	6	3.9	3.9
11 to 20years	12	7.7	11.6
21 to 30years	23	14.8	26.5
31 to 40years	28	18.1	44.5
41 to 50years	26	16.8	61.3
51 to 60years	25	16.1	77.4
61 to 70years	18	11.6	89.0
>70years	17	11.0	100.0
Total	155	100.0	

**Figure 1.** Sex distribution for pulmonary embolism prevalence.

Discussion

This study employed a retrospective approach to determine the prevalence of VTE (DVT/PE) among autopsies done at KATH in Kumasi, Ghana from 2009 to 2016.

A summary of the clinical diagnosis of patients included in the study revealed that 47.7% of the patients were brought in dead (BID), followed by respiratory disorders, 24.5%. The remaining diagnoses accounted for 27.8%, as demonstrated in Table 2. However, PE was suspected in only 3.2% of the patients. These varied clinical diagnoses reveal that, VTE is evasive and not easily detected clinically; in many cases sudden fatal PE is the first symptom of the disease.^{9,11} Cohen et al showed that of the estimated 370012 VTE related deaths across the 6 EU countries, 126145 (34.1%) were from sudden fatal PE and 217394 (58.75%) were from PE related deaths. Among others, it was anticipated that VTE was diagnosed in 26473 (7.15%) (and presumably treated).¹² This finding is slightly higher than that recorded in the current study (3.2%). Several inferences can thus be drawn from this report and this study; First of all, there is substantial evidence that VTE resulting in PE is quite common, the diagnosis is usually missed, leading to death in most cases, and that the diagnosis in such cases is confirmed only at

post-mortem examination. This unfortunate situation could be changed if clinicians develop high level of suspicion of VTE for all high-risk hospitalized patients.

While malignancies are not listed in this study, Khoran et al¹³ showed that cancer patients stand a higher risk of developing VTE than others, among which lymphoma is more pronounced.¹⁴ Thromboprophylaxis should therefore be used in these patients more frequently to prevent VTE associated morbidity and mortality.

We found out that those brought in dead (BIDs) accounted for the highest percentage of VTE, which is attributed to many reasons. Principal among them being that VTE resulting in PE is mainly asymptomatic and usually, there is little time for any intervention even if these patients arrived at the clinic earlier. This study has also showed that VTE is commonly misdiagnosed as other respiratory disorders and infectious diseases. This suggests that PE is usually elusive and clinicians often confuse it with symptoms of respiratory disorders, hence the consistent misdiagnosis by clinicians who usually diagnose PE as pneumonia, as shown by this study.

Moreover, despite the paucity of empirical national literature for VTE in Ghana, there is consistent and strong evidence that the global incidence of VTE increases with increasing age and is especially high in people older than 30years of age. Accordingly, Stein et al¹⁵ in their study of the yearly trend of diagnosed deep venous thrombosis (DVT) and pulmonary embolism (PE) for a 21-year period showed that diagnosis in elderly patients (≥ 70 years) was higher than for younger patients (20–69 years). This further confirms aging as a risk factor for developing VTE. Aging may lead to physical inactivity because of age-related morbidity, and increasing incidence of cardiovascular risk factors. All these may contribute to the increased risk of VTE.

As shown in Figure 3, the yearly trend of the prevalence of pulmonary embolism and the incidence rates were relatively high between the year 2008 and 2011 to a lowest point in 2013. There is however a sharp rise again from 2013 and is projected to increase further based on antemortem data on hospitalized patients in the subsequent years. Several factors may explain the complex pattern of changes in the incidence of pulmonary embolism over time but one thing is obvious; the number of deaths from the condition against the number of appropriate diagnoses is very unbalanced, which again suggests the elusive nature of the condition. Even after diagnosis, the chances of survival are usually low due to too little time for any intervention. The diagnosis system of PE and DVT using the Well's scoring criterion is not subjective but depend on clinicians' judgment¹⁶ unlike the revised Geneva system which is rather subjective and devoid of the clinician's judgment and have several limitations which affirms that VTE and PE are very difficult to pinpoint. The Well's system however, have been found to be more accurate in the diagnosis of PE than the revised Geneva system¹⁷ but often under-utilized. According to Jaff et al,¹⁸ even after accurate diagnosis,

Table 2. Detailed distribution of clinical diagnosis.

DIAGNOSIS	SEX		TOTAL (%)	CUM (%)
	FEMALE	MALE		
BID	27	47	74 (47.7)	47.7
Respiratory disorders	20	18	38 (24.5)	72.2
Pneumonia	11	13	24 (15.5)	
Pulmonary embolism	5	0	5 (3.2)	
ARDS	1	2	3 (1.9)	
Pulmonary tuberculosis	1	2	3 (1.9)	
Pulmonary edema	1	1	2 (1.3)	
Asthma	1	0	1 (0.6)	
Cardiovascular disorders	5	6	11 (7.1)	79.3
Heart failure	3	4	7 (4.5)	
Myocardial infarction	2	2	4 (2.6)	
Brain disorders	1	7	8 (5.2)	84.5
Meningitis	0	2	2 (1.3)	
CVA	0	2	2 (1.3)	
ICH	0	1	1 (0.6)	
SDH	0	1	1 (0.6)	
ICSOL	1	0	1 (0.6)	
Epilepticus	0	1	1 (0.6)	
Infections	6	8	14 (9.0)	93.5
Sepsis	3	4	7 (4.5)	
Retroviral	2	1	3 (1.9)	
Gastrointestinal	0	2	2 (1.3)	
Hepatitis	0	1	1 (0.6)	
Other	4	6	10 (6.5)	100
Anemia	3	3	6 (3.9)	
Renal failure	0	1	1 (0.6)	
Abortion complication	1	0	1 (0.6)	
Yellow fever	0	1	1 (0.6)	
Fall	0	1	1 (0.6)	
Total	63	92	155	

Abbreviations: ARDS; Acute respiratory distress syndrome; BID, Brought in dead; CVA, Cerebrovascular accident, DCM, Dilated cardiomyopathy; ICH, Intracerebral hemorrhage; ICSOL, Intra-cranial space occupying lesion; SDH, subdural hematoma.

intervention by way of administering a fibrinolytic agent in addition to anticoagulation requires individualized assessment of the balance of benefits versus risks of bleeding; with potential risks like disabling or fatal hemorrhage (intracerebral hemorrhage and minor hemorrhage). This result in prolongation of

hospitalization with need for blood product replacement far outweighing benefits such as more rapid resolution of symptoms (dyspnea, chest pain, and psychological distress), stabilization of respiratory and cardiovascular function, prevention of PE recurrence, and increased probability of survival.

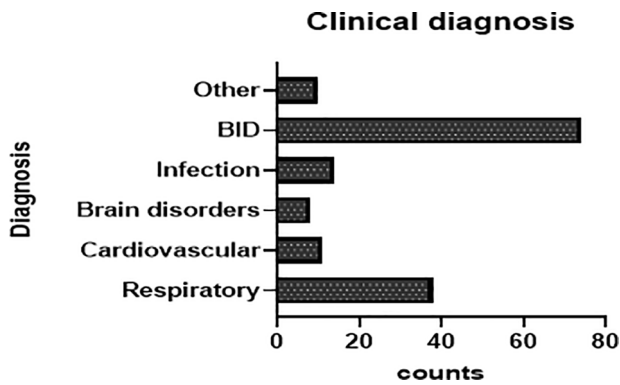


Figure 2. Summary of the commonly made clinical diagnoses of pulmonary embolism.

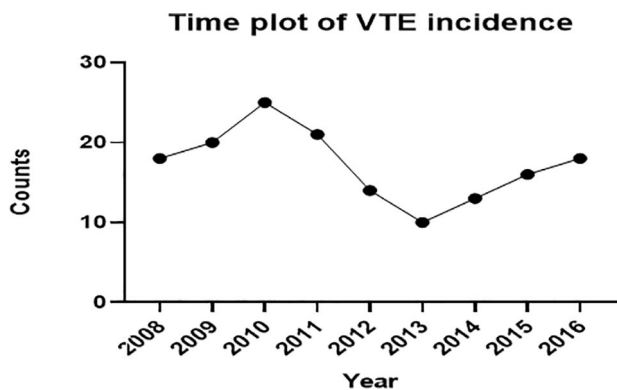


Figure 3. Yearly trend of the prevalence of pulmonary embolism.

The main limitation of this study was the fact that post-mortem data was obtained retrospectively. Apart from the BID patients who needed a mandatory autopsy, all the other patients had autopsies at the discretion of their attending clinicians. Therefore it is more likely that some cases of VTE could have been missed. This means that even with the current report, our data may be an underestimation of VTE prevalence at KATH, Kumasi.

Conclusion

In conclusion, VTE is a major health problem especially among the elderly, but unfortunately, the clinical diagnosis is usually missed by clinicians.

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Author Contributions

PPSO contributed to the design, performed the literature review, acquisition of data, interpretation of data, and wrote the manuscript. IKO contributed to design, performed the literature review, acquisition of data, interpretation of data, and wrote the paper. FAK and GOA contributed to the design, data interpretation and drafting the paper. WGA and NN contributed to the design, analysis of data, interpretation of data, and wrote the paper.

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REFERENCES

- Sevitt S, Gallagher N. Venous thrombosis and pulmonary embolism. A clinico-pathological study in injured and burned patients. *Br J Surg.* 1961;48: 475-489.
- Tapson VF. Acute pulmonary embolism. *N Engl J Med.* 2008;358:1037-1052.
- Raskob GE, Angchaisuksiri P, Blanco AN, et al. Thrombosis: a major contributor to global disease burden. *Arterioscler Thromb Vasc Biol.* 2014;34:2363-2371.
- Sandler DA, Martin JF. Autopsy proven pulmonary embolism in hospital patients: are we detecting enough deep vein thrombosis? *J R Soc Med.* 1989;82: 203-205.
- Buchwald H, Rohde TD, Schneider PD, Varco RL, Blackshear PJ. Long-term, continuous intravenous heparin administration by an implantable infusion pump in ambulatory patients with recurrent venous thrombosis. *Surgery.* 1980;88:507-516.
- Patel NH, Stookey KR, Ketcham DB, Cragg AH. Endovascular management of acute extensive iliofemoral deep venous thrombosis caused by May-Thurner syndrome. *J Vasc Interv Radiol.* 2000;11:1297-1302.
- Elliott CG. Pulmonary physiology during pulmonary embolism. *Chest.* 1992;101(suppl 1):63S-171S.
- Kreit JW. The impact of right ventricular dysfunction on the prognosis and therapy of normotensive patients with pulmonary embolism. *Chest.* 2004;125: 1539-1545.
- Stein PD, Henry JW. Prevalence of acute pulmonary embolism among patients in a general hospital and at autopsy. *Chest.* 1995;108:978-981.
- Pineda LA, Hathwar VS, Grant BJ. Clinical suspicion of fatal pulmonary embolism. *Chest.* 2001;120(3):791-795.
- Heit JA, Silverstein MD, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ. Predictors of survival after deep vein thrombosis and pulmonary embolism: a population-based, cohort study. *Arch Intern Med.* 1999;159:445-453.
- Cohen AT, Agnelli G, Anderson FA, et al. Venous thromboembolism (VTE) in Europe. *Thromb haemost.* 2007;98:756-764.
- Khorana AA, Kuderer NM, Culakova E, Lyman GH, Francis CW. Development and validation of a predictive model for chemotherapy-associated thrombosis. *Blood.* 2008;111:4902-4907.
- Sanfilippo KM, Wang TF, Gage BF, Luo S, Riedell P, Carson KR. Incidence of venous thromboembolism in patients with non-Hodgkin lymphoma. *Thromb Res.* 2016;143:86-90.
- Stein PD, Hull RD, Kayali F, Ghali WA, Alshab AK, Olson RE. Venous thromboembolism according to age: the impact of an aging population. *Arch Intern Med.* 2004;164:2260-2265.
- Klok FA, Kruisman E, Spaan J, et al. Comparison of the revised Geneva score with the Wells rule for assessing clinical probability of pulmonary embolism. *J Thromb Haemost.* 2008;6:40-44.
- Penalzo A, Melot C, Motte S, et al. (2011). Comparison of the Wells score with the simplified revised Geneva score for assessing pretest probability of pulmonary embolism. *Thromb Res.* 2011;127:81-84.
- Jaff MR, McMurtry MS, Archer SL, et al. Management of massive and submassive pulmonary embolism, iliofemoral deep vein thrombosis, and chronic thromboembolic pulmonary hypertension: a scientific statement from the American Heart Association. *Circulation.* 2011;123:1788-1830.