

## Original Research Article

# Frequency of venous thromboembolism during hajj sessions 2017-2019 in Makkah, Saudi Arabia

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## ABSTRACT

**Background:** Venous thromboembolism (VTE) includes deep vein thrombosis (DVT) and pulmonary embolism (PE), both are serious health risks. In western countries, VTE affects about 114 to 184 people per 100,000. Asian populations have a significantly lower incidence than western populations. The true incidence of VTE is still not well documented in Saudi Arabia (KSA). There are different major risk factors especially in hajj season that predispose a person to thrombosis. The mortality rate of autopsy-based pulmonary embolism reaches up to 30%.

**Methods:** This single-centered retrospective descriptive study was done in security forces hospital Makkah, Saudi Arabia during hajj period (30 days) for consecutive three-year. All admitted confirmed DVT and PE patients (N=32) of both genders with age >14 years were included. Patients' data were extracted from the electronic medical record. Data were analysed by SPSS version 23.

**Results:** Deep venous thrombosis (DVT) was developed in 67.7% while 19.3% of patients suffered from pulmonary embolism (PE) out of a total of 32 subjects. Females were more affected by 18 (56.3%) than males by 14 (43.8%). The mean age of patients was 51.78 years (SD ±16.21). A statistically significant association (p<0.005) between provoked VTE status and age, immobility, and history of surgery was seen. There was no mortality documented in this study.

**Conclusions:** This study provides insights into hajj period hospital admitted patients' frequency of VTE, changing patient profiles, management strategies, and subsequent outcomes in patients with venous thromboembolism. There is a need for greater awareness of VTE prophylaxis about its prevention, especially in hajj season.

**Keywords:** Makkah, Saudi Arabia, Venous thrombosis

## INTRODUCTION

VTE is characterized by deep vein thrombosis (DVT) or pulmonary embolism (PE). Deep Vein Thrombosis (DVT) is a disease that refers to blood clots inside a deep vein in the body, most commonly in the lower extremities (usually calf or thigh).<sup>1</sup> VTE events ranging from asymptomatic distal deep venous thrombosis to life-threatening DVT and fatal PE. In addition to myocardial

infarction and stroke, it is the third leading cause of cardiovascular disease and death.<sup>2</sup> A common vascular disorder, VTE is more prevalent among older adults with comorbidities. It is associated with lower survival and a high rate of recurrence.<sup>3,4</sup> In the United States, VTE prevalence varies widely, with an annual incidence ranging between 114 and 184 cases per 100,000 individuals.<sup>5</sup> Asian populations have a significantly lower incidence of VTE than Western populations. However,

VTE incidence is in increasing trend in recent years.<sup>6</sup> DVT manifests in about two-thirds of episodes, and one-third of presentations are with pulmonary embolism.<sup>7</sup> Mortality rate of DVT within one month is about 6% and 10% for PE. It is estimated to be high as 30% in the autopsy-based diagnosis of PE.<sup>8</sup> Venous thromboembolism (VTE) put a considerable economic burden on society. Patients with idiopathic venous thrombosis have a lower mortality rate as compared to those having cancer. The key complications of venous thrombosis are recurrence, post-thrombotic syndrome, post-drug major bleeding, and impaired quality of life. There are different risk factors that predispose a person to thromboses, like age, gender, race, obesity, family history, personal history of VTE, surgery, long travel, malignancy, and drugs. The incidence of VTE is rising rapidly after the age of 45 years.<sup>9</sup> Increasing trend of mortality and morbidity in elder patients with VTE is multifactorial but not clearly understood.<sup>10</sup> Ethnicity is another important risk factor for VTE incidence that might be related to thrombophilic disorders like factor V Leiden and prothrombin gene mutation. The incidence of diagnosed venous thrombosis is lower, in the United States, in Asians, Pacific islanders, and Hispanics as compared to whites.<sup>11,12</sup> VTE risk factors (modifiable/non-modifiable) understanding is the basic crucial step for the management and prevention of this disease in high-risk individuals.<sup>13</sup>

The major non-modifiable risk factors for thrombosis are age, gender, race, homocysteinemia, or genetic factors while modifiable triggering factors are surgery, trauma, infection, obesity, immobility, or pregnancy. It is thought that all these factors play an additive role in triggering congenital thrombotic disorders.<sup>14</sup> Thrombotic disorders can be categorized into loss-of-coagulation function disorders and gain-of-coagulation function disorders. Diseases characterized by loss of function include deficiencies of antithrombin, protein C, and protein S. They disorders are more potent risk factors for thrombosis but less common than another group.<sup>15</sup> post-thrombotic syndrome develops in 20-50% of patients after a first episode of DVT. Post-thrombotic syndrome is defined by swelling, pain and skin discoloration, and venous ulcer development during DVT in the affected limb. The application of elastic compression stockings has been reported to be effective in the prevention of post-thrombotic syndrome.<sup>16</sup>

So, enriched understanding of the epidemiology, risk factors, early diagnosis and appropriate treatment of venous thrombosis can reflect better clinical outcomes.

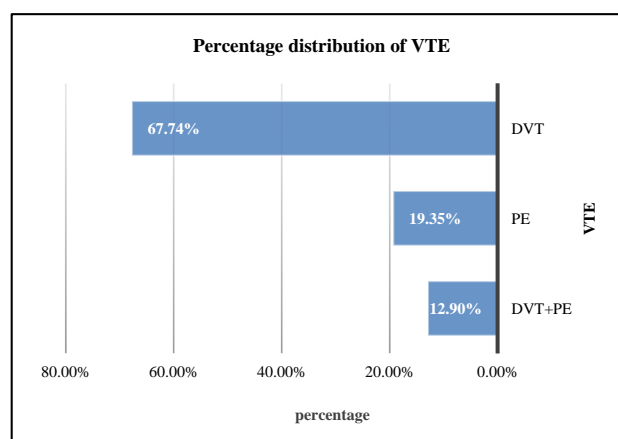
## METHODS

This was a retrospective descriptive study conducted in Security Forces Makkah, Saudi Arabia during 30 days of Hajj (10<sup>th</sup> July to 10<sup>th</sup> August) for a consecutive three-year period (2017 to 2019). All confirmed patients of VTE (N=32) of either gender with age >14 years were

included in the study using a random sampling technique. Patients age less than 14 years was the only exclusion criteria. All included patients' (N=32) diagnosis was confirmed by imaging; DVT by compressive ultrasonography and PE by Computed tomography pulmonary angiography (CTPA) after the patient's clinical pretest probability approach. Each patient's complete data was extracted through the electronic medical record. Patients' clinical, laboratory and imaging detail was documented according to performa. Data were analysed using a Microsoft Excel sheet and the Statistical Package for Social Sciences (SPSS) version 23. Categorical variables were presented as counts and percentages, where means with standard deviations were extracted for continuous variables. The correlation of independent risk factors with dependent factors (provoked and unprovoked VTE) is assessed by the chi-square test.

## RESULTS

A total of 32 subjects were enrolled with validated venous thromboembolism in the hospital during this study period. All patients received anticoagulant prophylaxis according to their risks before their venous thromboembolism. More than half of patients (67.7%) developed deep venous thrombosis (DVT) while 19.3% of patients suffered from pulmonary embolism (PE). Detailed frequencies are mentioned in Figure 1. The frequency of VTE was seen more in females 18 (56.3%) than in males (43.8%). Predominantly (59.4%) 35-65 years old group patients were affected with a mean age of 51.78 years (SD ±16.21). Detailed data with other demographics are mentioned in Table 1. The presentation of VTE and other preexisting medical characteristics for venous thromboembolism are elaborated in Table 1.



**Figure 1: Percentage distribution of VTE.**

VTE: Venous thromboembolism. DVT: Deep venous thrombosis. PE: Pulmonary embolism.

Table 1 also shows the distribution of provoked and unprovoked VTE according to demographics and risk factors. The results suggest that risk factors for provoked VTE were more common among females, those with no

history of VTE, family history of VTE, with comorbidities, immobility, history of cancer, history of

surgery, traveling, oral contraceptive pills (OCP), and history of infection.

**Table 1: Demographic and preexisting characteristics and their association with VTE (N=32).**

Demographics	N (%)	Provoked VTE	Unprovoked VTE	P value
<b>Age (years)</b>				
<35	5 (15.6)	25	7	0.021
35-65	19 (59.4)			
>65	8 (25)			
<b>Sex</b>				
Male	14 (43.8)	10	4	0.419
Female	18 (56.3)	15	3	
<b>Co morbidities.</b>				
DM	5 (15.6)	15	5	0.129
HTN	4 (12.5)			
others	4 (12.5)			
no	12(37.5)			
DM + HTN	7 (21.9)			
<b>Past history of VTE</b>	8 (25)	6	2	0.805
<b>Presentations</b>				
leg swelling	21 (65.6)			
sob and cough	6 (18.8)			
<b>Family history of VTE</b>	1 (3.1)	1	0	0.591
<b>History of immobility</b>	25 (78.1)	23	2	0.000
<b>History of cancer</b>	2 (6.2)	2	0	0.441
<b>History of surgery</b>	15 (46.9)	15	0	0.005
<b>History of prolong travelling</b>	8 (25)	8	0	0.084
<b>History of OCP</b>	3 (9.4)	3	0	0.336
<b>History of infection</b>	9 (28.1)	5	4	0.053

There was a statistically significant association ( $p < 0.005$ ) between provoked VTE status and age, immobility, and history of surgery (Table 1).

**Table 2: Drugs/modality used to treat VTE.**

Drugs/modality used	Number	Percentage
<b>Enoxaparin</b>	2	6.3
<b>warfarin</b>	7	21.9
<b>Apixaban</b>	18	56.3
<b>Dabigatran</b>	4	12.5
<b>IVC filter</b>	1	3.1

VTE: Venous thromboembolism; IVC: inferior vena cava filter

As for treatment modalities, thrombolytic therapy and catheter-directed thrombolysis were not used for any patient. Only 1 (3.1%) patient was offered inferior vena cava (IVC) filter because of bleeding risk (Table 2). Patients were administered anticoagulation therapy followed by maintenance therapy. Annual relative prescription rates of warfarin and LMWH decreased with the introduction of Novel anticoagulants (NOACS). Novel anticoagulant (NOAC) apixaban was offered to 18 (56.3%) patients, 4 (12.5%) cases took dabigatran, 7

(21.9%) patients received warfarin, 2 (6.3%) cases received enoxaparin. There was no mortality documented in this period of hospital stay.

## DISCUSSION

The results of this study provide an important perspective on the increasing frequency of VTE on hajj occasions which has an increasing impact on patient morbidity and mortality along with socioeconomic burden. This research study was aimed to elaborate on the epidemiology of thromboembolism among hospital-admitted patients in all subspecialties. The prophylactic measures used to prevent venous thrombotic disorders in the admitted patients were fairly optimal for the prophylactic management of such disorders.

In our study, 78.1% had provoked VTE, with the majority being diagnosed with DVT alone (67.7%). Also, both VTE were more common among women and old age.

A recent meta-analysis showed that the incidence of unprovoked VTE was higher in men and older patients than in those with provoked VTE.<sup>17</sup> This can be reasoned through the possible increase in coagulability with age.<sup>18</sup>

Potential explanations for the higher incidence rate of VTE among females include the higher proportion of women enrolled in the current study, especially those with provoked VTE, and the possibility of estrogen use. DVT was the most prevalent type of VTE among all patients; however, it was the most frequent in patients with provoked VTE.

A local recent study enrolled a total of 1,008 patients from an outdoor patient and patients. Females were affected by 73.2%, and more than 58% of patients had unprovoked VTE. In provoked cases, surgery was the most frequent cause (29.8%), followed by hospitalization (24.2%). There was a significant statistical association between provoked status and sex, family history of VTE, smoking, recent hospitalization for a medical condition, the site of VTE, and underlying peripheral vascular disease and varicose veins (all  $p < 0.05$ ).<sup>19</sup>

Another local multicenter study in Saudi Arabia had 58.3% DVT, 21.7% PE, and 20% both DVT and PE. Surgical patients had 21.4% of and medical floor patients documented 78.6% of VTE cases. The mortality rate was 14.3%.<sup>20</sup>

The results of the above studies are somewhat congruent with our study except more provoked VTE frequency in our study that be justified by more old age group, all hospitals admitted more immobilized, and mostly post-operative cases.

Internationally the annual incidence of VTE in the general Asian population is still significantly lower than in Western populations. There is an almost fivefold increase in the number of patients annually in the Asian population between 1997 and 2008.<sup>21</sup> There are clear genetic and racial differences between Western and Asian populations, in terms of inherited thrombophilia.

As for treatment modalities in our study, only 1 (3.1%) patient was offered inferior vena cava (IVC) filter because of bleeding risk. The remaining patients received apixaban in 18 (56.3%) patients, 4 (12.5%) cases took dabigatran, 7 (21.9%) received warfarin, and 2 (6.3%) cases received enoxaparin. Reports on mortality after VT are scarce, and the estimates vary considerably.<sup>22</sup> There was no mortality documented in this period of hospital stay.

Our majority of patients were post-operative and less critical with more frequency (67.7%) of DVT. That is why the modality of therapy in our study was orally NOACS and found to have much less morality than local and international data.

So, our study showed that provoked VTE was more prevalent than unprovoked VTE. This can be explained by genetic susceptibility and frequency of provoking factors that should be checked to decrease VTE incidence, especially in hospital patients.

Single center and small sample size was limitations of this study.

## CONCLUSION

VTE related burden of disease is considerable. Despite identification of VTE risk factors, prophylaxis regimens, and new management options, the occurrence of VTE is increasing. There is a need for greater awareness of VTE regarding its prevention, especially in hajj season and during hospital stay. Further multicenter studies are required in hajj season to evaluate more about demographics and outcome of VTE patients.

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