

## Acute Lower Limb Deep Venous Thrombosis Diagnosed by Doppler Ultrasound among Bedridden Patients

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### ABSTRACT

**Background:** Acute lower limb deep venous thrombosis (DVT) is a serious condition that could lead to venous thromboembolism (VTE). Up to our knowledge, little is known about the risk factors for developing acute lower limb DVT in bedridden patients across Saudi Arabia. So we conducted this study **aiming** to determine the incidence and medical conditions that increase the risk for developing acute lower limb DVT in suspected cases of bedridden patients admitted in or referred to Radiology Department, King Abdul-Aziz University Hospital for lower limb Doppler ultrasound examination. **Method:** A cross sectional study of 83 patients admitted in or referred to KAU hospital during the year 2016 and underwent lower limb Doppler examination. **Result:** The reported incidence of lower limb DVT, after undergoing lower limb Doppler examination, in the suspected cases reviewed by Radiology Department, King Abdul-Aziz University Hospital in Jeddah was 13 (15.7%). The cases of DVT was 76.9% women. Elderly was the highest risk factor of acute limb DVT as 53.8% were elderly patients, followed by diabetes 30.8%, hypertension 15.4% and cancer 7.7%, The effect of the studied risk factors on DVT was insignificant (P value >0.05). **Conclusion & recommendations:** Lower Limb DVT has high prevalence (15.7%) in bedridden patients in Jeddah, KSA. Thrombophilia screening should be reserved for elderly, diabetics, hypertensive, and those with cancers or patients with other risk factors. Knowing the most common risk factors and their significance in developing DVT is essential for early detection of DVT to prevent the unwanted complications.

**Keywords:** Acute Lower limb DVT, Doppler Ultrasound, Cross Sectional Study.

### INTRODUCTION

Deep vein thrombosis (DVT) and pulmonary embolism (PE) are responsible for significant morbidity and mortality in hospitalized patients, especially after surgery<sup>[1]</sup>. The National Institutes of Health Consensus Conference estimated that as many as 50000 people die annually from PE in the USA, and 450 000 hospitalizations each year are associated with DVT<sup>[2]</sup>.

Several medical conditions increase the risk for DVT, including cancer, trauma, and antiphospholipid syndrome. Other risk factors include older age, surgery, immobilization (as with bed rest, orthopedic casts, and sitting on long flights), combined oral contraceptives, pregnancy, the postnatal period, and genetic factors. Those genetic factors include deficiencies with anti-thrombin, protein C, and protein S, the mutation of factor V Leiden, and the property of having a non-O blood type<sup>[3]</sup>. Multiple pharmacological therapies for DVT were introduced in the 20th century: oral anticoagulants in the 1940s, subcutaneous low-dose unfractionated heparin (LDUH) in 1962 and subcutaneous low molecular weight heparin (LMWH) in 1982<sup>[4]</sup>. Depending upon the risk for DVT, different preventive measures are recommended. Walking and calf exercises reduce venous stasis because leg muscle contractions compress the veins and pump blood up towards the heart<sup>[5]</sup>. In immobile individuals, physical

compression methods improve blood flow. Anticoagulation, which increases the risk of bleeding, might be used in high-risk scenarios<sup>[6]</sup>. It is estimated that 20 million cases of lower extremity DVT occur in the USA alone<sup>[7]</sup>. Routine postoperative venography has shown an incidence of 60% in patients undergoing orthopedic surgery<sup>[8]</sup>. A study was conducted in King Abdul Aziz hospital, KSA found that total of 75 patients were diagnosed to have deep vein thrombosis with mean age of  $44.16 \pm 14.5$  years and male: female ratio of 1:2. Doppler ultrasound was used for the diagnosis in 75% patients. Pulmonary embolism as a complication of deep vein thrombosis developed in 32% of patients. Prolonged immobilization was found to be the most common risk factor (23%)<sup>[9]</sup>.

Another study in India showed that acute DVT without PE, acute DVT with PE, and PE alone were reported in 64%, 23%, and 13% of patients, respectively. Mean age was 47 ( $\pm 16$ ) years, and 70% were males. Previous history of DVT (34%), surgery including orthopedic surgery (28%), trauma (16%), and immobilization >3 days (14%) were the most common risk factors for VTE. Hypertension (25%), diabetes (19%), and neurological disease (other than stroke) (8%) were the most common. The annual incidence of DVT ( $\pm$ PE) increased from 2006 to 2010<sup>[10]</sup>.

Up to our knowledge, little is known about the risk factors for developing acute lower limb DVT

across Saudi Arabia. This study was aiming to determine the incidence and medical conditions that increase the risk for developing acute lower limb DVT in suspected cases of bedridden patients admitted in or referred to Radiology Department, King Abdul-Aziz university hospital for lower limb Doppler ultrasound examination.

## METHODOLOGY

**Type of the Study:** A cross sectional study.

**Study sitting:** Radiology Department, King Abdul-Aziz University Hospital (KAU, Jeddah, Saudi Arabia during the year 2016.

**Study population:** 83 bedridden patients admitted in or referred to KAU hospital and underwent lower limb Doppler examination. Data including age, sex, being elderly, D.M, hypertension, ischemic heart disease (IHD), presence of cancers (primary or metastasis), history of previous DVT, orthopedic casting and other risk factors were collected. We followed, up to a maximum of 3 years to determine the significance of risk factors.

### Ethical considerations

Data collector gave a brief introduction to the participants by explaining the aims and benefits of the study. Informed written consent was obtained from all participants. Anonymity and confidentiality of data were maintained throughout the study. There was no conflict of interest. **The study was done after approval of ethical board of King Fahad university.**

### Statistical analysis

We utilized the statistical package for social sciences, version 16 (SPSS Inc., Chicago, Illinois, USA) to analyze the study data. The results were displayed as counts and percentages. The  $X^2$  test was used as a test of significance, and differences were considered significant at P value less than 0.05.

## RESULTS

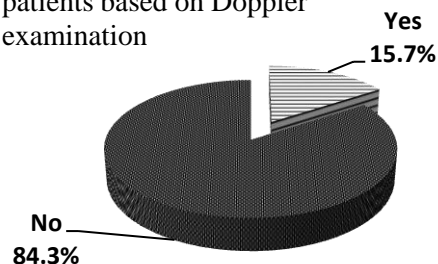
Table (1) illustrates the sex, age group, presence of DVT, patient's department and site of the radiologic examination in all of the studied cases. From the table it is clear that, male/female ratio was 38.8/60.2. The majority of patients (43.4%) were elderly, with a mean age ( $\pm$ SD) of ( $54.78 \pm 19.8$ ). Only 13 (15.7%) patients were diagnosed with acute lower limb DVT. So the reported incidence of lower limb DVT (after undergoing lower limb Doppler examination) in the suspected cases reviewed by Radiology Department, King Abdul-Aziz University Hospital in Jeddah was 15.7%. Table (2) illustrates the suspected risk factors in all of the studied bedridden patients. Being elderly 43.4%, D.M 24.1%, hypertension 22.9%, ischemic heart disease (IHD) 4.8%, presence of cancers

(primary or metastasis) 2.4%, history of previous DVT 1.2%, orthopedic casting 3.6% and other risk factors was 9.6%. Figure (1) illustrates the prevalence of lower limb deep venous thrombosis (DVT) among the studied bedridden patients based on Doppler examination. From the figure it was clear that the reported incidence of lower limb DVT (after undergoing lower limb Doppler examination) in the suspected cases reviewed by Radiology Department, King Abdul-Aziz University Hospital in Jeddah is 15.7%. Table (4): The relationship between presences of DVT and suspected risk factors in the studied cases in KAU hospital. Cases without acute lower limb DVT ( $n = 70$ ) and cases with acute lower limb DVT ( $n = 13$ ; 10 females and 3 males). The cases of DVT was 76.9% females and 23.1% males. Elderly is the highest risk factor of acute limb DVT as 53.8% were elderly patients, followed by diabetes 30.8%, hypertension 15.4% and cancer 7.7%, The effect of the studied risk factors on DVT was insignificant (P value  $>0.05$ ).

**Table (1):** Sex, age group, patient's department and site of Doppler examination of the studied patients, KAU Hospital, Jeddah, 2016. ( $n=83$ )

	No.	%
<b>Sex</b>		
Female	50	60.2
Male	33	39.8
<b>Age (Mean <math>\pm</math> SD <math>54.78 \pm 19.8</math>)</b>		
<b>Patient's department</b>		
Emergency	35	42.2
Inpatient	39	47.0
Out patient	9	10.8
<b>Site of the Doppler examination</b>		
Bilateral	2	2.4
Left	43	51.8
Right	38	45.8
<b>DVT diagnosed by Doppler examination</b>		
• Negative	70	84.3
• Positive	13	15.7

Figure (1): Prevalence of Lower Limb Deep Venous Thrombosis (DVT) among the studied bedridden patients based on Doppler examination



**Table (2):** Distribution of the studied bedridden patients regarding suspected risk factors, KAU hospital, Jeddah, 2016 (n=83).

	Frequency	Percent
<b>Being elderly</b>		
Yes	36	43.4
No	47	56.6
<b>Diabetes Mellitus</b>		
Yes	20	24.1
No	63	75.9
<b>Hypertensive</b>		
Yes	19	22.9
No	64	77.1
<b>Ischemic heart disease (IHD)</b>		
Yes	4	4.8
No	79	95.2
<b>Cancers (primary or metastasis)</b>		
Yes	2	2.4
No	81	97.6
<b>Previous DVT</b>		
Yes	1	1.2
No	82	98.8
<b>Orthopedic casting</b>		
Yes	3	3.6
No	80	96.4
<b>Other risk factors</b>		
Yes	8	9.6
No	75	90.4

**Table (3):** The relationship between presences lower limb DVT and suspected risk factors in the studied bedridden patients (n=83)

Suspected risk factors	Deep venous thrombosis (DVT)		Total (n=83)	Chi-square	P-value
	Negative (n=70)	Positive (n=13)			
	No. (%)	No. (%)			
Gender - female - male	40(57.1) 30 (42.9)	10(76.9) 3 (23.1)	50(60.2) 33 (39.8)	1.79	0.181
Being elderly	29(41.4)	7(53.8)	36(43.4)	0.68	0.298
DM	16 (22.9)	4(30.8)	20(24.1)	0.37	0.383
Hyper-tension	17(24.3)	2(15.4)	19(22.9)	0.492	0.383
Cancers	1(1.4)	1(7.7)	2(2.4)	1.82	0.29
Others	7(10.0)	1(7.7)	8(9.6)	0.06	0.634

## DISCUSSION

Deep vein thrombosis (DVT) and pulmonary embolism (PE) are responsible for significant morbidity and mortality in hospitalized bedridden patients, especially after surgery [1]. The National Institutes of Health Consensus Conference estimated that as many as 50 000 people die annually from PE in the USA, and 450 000 hospitalizations each year are associated with DVT [2]. It has nonspecific signs that may include pain, swelling, redness, warmth, and engorged superficial veins [3].

The main objective of this study is to determine the incidence and medical conditions that increase the risk for developing acute lower limb DVT in suspected cases of bedridden patients admitted in or referred to Radiology Department, King Abdul-Aziz university hospital for lower limb Doppler ultrasound examination.

During the study period, 83 patients were admitted in or referred to the hospital suspected of acute lower limb DVT. 13 (15.7%) patients were diagnosed with acute lower limb DVT after undergoing lower limb Doppler examination, with mean age ( $\pm$ SD) was (54.78  $\pm$  (19.8)), which is a big percent if compared to the finding of other studies around the world, which was about 1 in 1000 adults per year has DVT [3]. A study in Hong Kong showed that 20.7 per 10000 inpatients, 17.1 per 100000 Chinese had DVT [10]. Anderson *et al.*, reported an incidence of first-time DVT of 48 per 100,000 [11]. But in India [12] the results showed that acute DVT without PE, acute DVT with PE, and PE alone were reported in 64%, 23% and 13% of patients, respectively. Mean age was 47 ( $\pm$ 16) years, and 70% were males.

In our study, 76.9% of the cases of DVT were women. Elderly is the highest risk factor of acute limb DVT as 53.8% were elderly patients, followed by diabetes 30.8%, hypertension 15.4% and cancer 7.7%. In Alanazi *et al.*, based on the results of Doppler examination, DVT was detected in 18.0% of the studied elderly population. There were no significant differences in gender, other comorbidities as diabetes, IHD and hypertension were significantly associated with the occurrence of DVT among the participants, and the other investigated factors such as being bed ridden, cancer, orthopedic cast and previous DVT were not significantly associated with the development of DVT among the studied elderly patients [11]. Anderson *et al.*, observed an incidence of first-time plus recurrent DVT of 62 per 100,000 for patients in this same age range [12]. In the study reported by Hansson *et al.*, the observed incidence was 132 per 100,000 population age 50–59 [13]. While in the Indian study history of DVT (34%), surgery including orthopedic surgery (28%), trauma

(16%), and immobilization >3 days (14%) were the most common risk factors <sup>[14]</sup>. Another study conducted on Asian population showed that major risk factors were prior DVT (15.7%), malignancy (21.6%), serious neurologic disease (17.2%), major trauma (7.5%), and undergoing major surgery in the 3 months preceding the DVT hospitalization (37.8%) while patients with vena cava thrombosis had a very high percentage (52.8%) of concomitant malignant neoplasm <sup>[15]</sup>. While the Indian study <sup>[9]</sup> found that the prior history of DVT was the most common (34%) risk factor in patients who had only DVT. Major lower limb surgery as a risk factor in 3% patients, appears to be consistent with those reported in the ENDORSE study, which reported DVT in 4.4% of patients undergoing major lower limb surgery <sup>[16]</sup>.

### CONCLUSION & RECOMMENDATIONS

Lower Limb DVT has high prevalence (15.7%) in bedridden patients in Jeddah, KSA Thrombophilia screening should be reserved for elderly, diabetics, hypertensive, and those with cancers or patients with other risk factors. Knowing the most common risk factors and their significance in developing DVT is essential for early detection of DVT to prevent the unwanted complications.

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