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Deep Vein Thrombosis, Demographic Characteristics and Risk Factors in Iran

Shokoufeh Hajsadeghi[1], Scott Reza Jafarian Kerman[2]✉, Rashin Joodat[3], Maral Hejrati[4], Helen Vaferi[3], Negin Farsi[4], Khatereh Masoumi[3], Mehrdad Joorgholami[4]

[1]Rasoul-e-Akram Hospital, Iran University of Medical Sciences, Tehran, Iran
[2]Head of Cardiology Field, Students Scienctific Resaerch Center, Tehran University of Medical Sciences, Tehran, Iran
[3]Medical Students Research Committee, Iran University of Medical Sciences, Tehran, Iran
[4]Iran University of Medical Sciences, Tehran, Iran

Abstract

Background: Deep vein thrombosis (DVT) can be an ethnicity related disease and an important health issue for health-care systems. Thus, domestic recognition of risk factors and disease characteristics seem to be inevitable. This study was designed to evaluate the epidemiology, basic characteristics, and risk factors in patients with DVT. **Materials and Methods:** In this descriptive cross-sectional study, all patients with primary or final diagnosis of DVT, confirmed by Doppler ultrasound in a 5-year period were included. Demographic data and prognosis were extracted from medical files. To evaluate the outcome of the patients after discharge, a phone-call follow-up was performed for all available patients. **Results:** Three-hundred seventy-one DVT patients were included with 232/139 male to female ratio. The mean age was 55.72±20.01 years with significant difference between genders (p=0.006). Mean weight was 88.97±10.2 kg with no significant difference between genders (p=0.74). The most common affected veins were common femoral vein (257 cases, 69.2%), followed by Popliteal, iliac, axillary, and subclavian veins. No season preference was seen in DVT occurrence. One-year survival of the patients after discharge was 92.6% and two-year survival was 87.7%. **Conclusion:** By knowing local information about this disease, health-care providers can give accurate warnings and suggestions to prevent the probable thrombosis chances. As Iran lacked information about DVT characteristics, this study can be an epidemiologic guide for health-care systems and an opening path for future studies. **[GMJ. 2013;2(4):135-40]**

Keywords: Deep vein thrombosis; risk factors; survival; Iran

Introduction

Venous thromboembolism (VTE) is a common health problem in most countries. It manifests with pulmonary emboli (PE), and deep venous thrombosis (DVT). The incidence of VTE is about 1.5 per 1000 person-years [1]. About one-third of patients with symptomatic VTE manifest PE, whereas two-thirds manifest DVT alone [2]. PE is clearly the most life threatening complication of acute DVT, which makes it an important health issue. Over 200,000 new cases of VTE occur annually. There are several modifiable risk factors for VTE, including obesity, metabolic syndrome, smoking, hypertension, ab-

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Fax: +98 731 2227091
PO Box 7461686688
Email:info@gmj.ir

✉ **Correspondence to:**
Scott Reza Jafarian Kerman, Head of Cardiology Field, Students Scienctific Resaerch Center, Tehran University of Medical Sciences, Tehran, Iran
Telephone Number: (+98) 9121474563
Email Address :r-jafarian@student.tums.ac.ir

normal lipid profile, etc. However, major risk factors for VTE are not modifiable such as advanced age, arterial disease, recent surgery, immobility and hypercoagulable state [3]. Domestic recognition of DVT risk factors and characteristics seem to be inevitable, as it can affect the health care system outcomes.

It has been stated that DVT can be an ethnicity related disease; as studies have shown there are differences in severity and incidence of VTE between Indians, Caribbeans, and Africans [4,5]. Poor outcome of DVT is influenced by recurrent thrombotic events, the rate of recanalization, the global extent of venous reflux, and the anatomic distribution of reflux and obstruction [6]. According to importance of prevention, diagnosis and treatment of VTE, and poor literatures about prevalence of DVT in Iran, we decided to perform this study to evaluate the epidemiology, basic characteristics, and risk factors in patients with DVT, in Rasoul-e-Akram hospital from 2005 to 2010.

Materials and Methods

Subjects

This descriptive cross-sectional study was conducted in Rasoul-e-Akram hospital (a University-ruled referral hospital in west of Tehran, covering near 5 million people), from March 2005 to March 2010. All patients with primary or final diagnosis of DVT, confirmed by compressive Doppler's ultrasound, were included in this study. Details of the patients were obtained by their medical files. We made a checklist and collected the information, which included demographic data, medical history, laboratory results, and other relative information. For evaluating the risk factors, patients with incomplete hospital discharge data were excluded from the study. Prognosis was evaluated by PE strike, fatal embolism or any type of complication, length of hospitalization and patient discharge status. To evaluate the outcome of the patients after discharge, a phone-call follow-up was performed for all available patients, which were divided into 3 groups afterwards: alive and healthy, alive with complication and expired individuals.

All information was kept privately and the results were published anonymously. The study was performed in accordance with the Declaration of Helsinki and subsequent revisions. Furthermore, ethics committee at Tehran University of Medical Sciences approved the protocol before initiating the study.

Data Analysis

Statistical analysis of data has been done by SPSS (version 16.0). Quantitative data are expressed as Mean ± SD and qualitative data as percentages. For further analysis between variants, we have used Chi-square test, independent sample t-test and One-way ANOVA test. A P-value less than 0.05 is considered as significant.

Results

Baseline characteristics

We have included 371 DVT patients in our survey, consisting of 232 (62.6%) male and 139 (37.4%) female subjects. The mean age was 55.72 ± 20.01 with the range of 20 to 88 (54.52± 19.87 for males and 60.41± 19.77 for females) years old. There was significant difference in mean age between genders (p=0.006). Mean weight was 88.97±10.2 kg (BMI: 28.39±2.43 kg/m2) for men and 76.63±12.85 kg (BMI: 28.14± 2.52 kg/m2) for females. No significant difference was found in BMI between genders (P=0.74). Diabetes mellitus was present in 93 (17%) of the patients, also 109 (29.4%) suffered from hypertension; furthermore, 145 (42.6%) patients had a history of at least 10 pack-years smoking.

In a one-month period prior to DVT diagnosis, 131 (35.3%) individuals had history of prolonged immobilization due to traveling for more than 4 hours, and 231 (62.3%) had history of hospitalization. The most common causes of hospitalization include lower respiratory tract infection (72 patients, 19.4%), cardiac illnesses such as myocardial infarction or congestive heart failure (29 patients, 7.8%), cancer and chemotherapy (20 patients, 5.4%) and urinary tract infection (14 patients, 3.8%). In addition, 133 (35.8%) patients had history of recent surgery due to trauma or general operations such as cholecystectomy and colorectal abnormalities, 81 (21.8%) were pregnant at

the time of admission.

All laboratory biochemical and complete blood count results are demonstrated in Table-1. As shown, we found significant difference in first PT (P=0.02), first INR (p=0.002) and WBC counts (P=0.02) between male and female subjects.

According to the information collected from their medical files, four patients suffered from anti-phospholipid syndrome, four others had C-protein deficiency and two had S-protein deficiency. None of the patients had Leiden Factor–V or Anti-thrombin-3 deficiencies.

Table 1. Studying the Demographic Characteristics and Risk Factors of Deep Vein Thrombosis (DVT) in Iran; Basic Laboratory Data of Our DVT Population; All Units Are Shown in Parenthesis and Bold P-Values Are Significant.

	Available Cases	Total		Male		Female		P-Value
		Mean	SD	Mean	SD	Mean	SD	
Age (years)	371	55.72	20.01	54.52	19.87	60.41	19.77	< 0.001
Length in hospital (days)	371	11.14	8.83	10	7.18	13.04	10.82	< 0.001
First[1] PT (s)	367	16.41	5.43	20.5	15.64	15.64	5.99	0.03
Second[2] PT (s)	362	19.14	11.82	33	20.23	20.23	4.42	0.16
First PTT (s)	355	42.50	21.55	43.24	41.75	41.75	21.92	0.6
Second PTT (s)	340	42.91	16.25	43.33	42.43	42.43	16.38	0.68
First INR	367	1.52	1.07	11.10	1.3	1.3	1.27	< 0.001
Second INR	359	1.83	0.87	7.8	1.8	1.8	0.87	0.56
WBC counts (10^3/mm^3)	341	9.3	6.53	36.9	10.34	10.34	4.06	0.02
RBC counts (10^6/mm^3)	341	4.18	0.85	14.4	4	4	0.98	< 0.001
Hemoglobin (mg/dl)	341	11.83	2.67	43.1	11.38	11.38	3.05	0.01
Hematocrite (%)	340	39.26	27.9	283	34.94	34.94	34.91	0.02
Platelet count (10^3/mm^3)	238	224.83	107.24	564.63	219.87	219.87	111.02	0.58
ESR (mm/h)	98	47.34	41.27	188.34	37.39	37.39	46.19	0.08
sodium (meq/dl)	311	139.09	11.58	169.89	137.51	137.51	5.09	0.05
Potassium (meq/dl)	311	5.73	7.42	36.42	6.81	6.81	4.56	0.04
Blood Urea (mg/dl)	325	20.77	14.77	103.72	18.56	18.56	16.86	0.03
Creatinine (mg/dl)	322	1.46	1.42	9.90	1.23	1.23	1.53	0.02
Fasting serum Glucose (mg/dl)	203	115.03	48.58	286.78	114.77	114.77	50.74	0.95

PT: Prothrombin time, **PTT:** Partial thromboplastin time, **INR:** International normalized ratio, **WBC:** White blood cell, **RBC:** Red blood cells, **ESR:** Erythrocyte sedimentation rate

1- The first couaguability tests in the first hour of admission before treatment.

2- The second couaguability tests in the third hour of admission after treatment

3- Independent sample's t-test

Table 2. Studying the demographic characteristics and risk factors of deep vein thrombosis (DVT) in Iran; the Prevalence of DVT in four Extremities; p value by chi-square test (Fisher exact).

Extremities	Total	Male	Female
Total	371	232	139
Left lower	240	134	106
Right Lower	91	65	26
Both lower	26	22	4
Left Upper	11	8	3
Right Upper	1	1	0
No data	2	2	0
P-value		< 0.01	

DVT characteristics

All patients who were included in our study were suffering from DVT at the time of admission; 22 (5.9%) had previous history of this disease. However, 69 (18.6%) presented with PTE, that 4 (1.2%) of them expired at the same admission directly due to complications. Only 4 patients had Family history of DVT.

We have demonstrated the frequency of DVT location in Table-2. The most common affected veins were common femoral vein (257 cases, 69.2%), popliteal vein (198 cases, 53.3%), iliac veins (18 cases, 4.8%), axillary and subclavian veins (11 cases, 2.9%). Other veins such as tibial, dorsalis-pedis, proneal and radial vein were affected in less than 1%. We found significant difference in DVT locations between genders, but no significant difference was found in progression to PTE. In addition, no season preference was seen in DVT occurrence (spring: 82, summer: 94, autumn: 99 and winter: 93; P=0.1).

After dividing the subjects into 3 age groups, we found significant difference in location of DVT (Table-3). Furthermore, analysis showed PTE is significantly more prevalent in elderly subjects (P<0.001).

Patients' survival

From all the patients included in our study, 305 (82.2%) discharged from the hospital healthy and without any complications, 48 left the hospital with complications due to DVT or their underlying illnesses such as heart failure or surgery failures and 18 patients expired due to advanced cancer (10 patients, 2.6%), PTE (4 patients, 1.2%) or other critical illnesses. All remained patients (353 individuals) underwent phone follow-up at the end of the data collection. However, we could reach only 229 patients and the rest were lost to follow-up due to incomplete registration forms. The time distance between the discharge and follow-up was at least 2 years. One-hundred and one (44.1%) patients were still healthy without any need of medical treatment, 90 (39.3%) were still alive but with underlying disease complications and 28 (16.6%) were expired due to underlying illnesses. One-year survival of the admitted DVT patients after discharge was 92.6% and two-year survival was 87.7%.

Discussion and Conclusion

Our study demonstrated demographic data of patients admitted to our referral hospital. Almost all results were comparable with similar studies and no major deviation was seen.

Table 3. Studying the Demographic Characteristics and Risk Factors of Deep Vein Thrombosis (DVT) in Iran; Distribution of DVT Among Age Groups; P-Value from Chi-Square Test (Fisher Exact)

	Total	Left lower	Right lower	Left upper	Right upper	Both lower
Young (under 45 years)	127	82	37	4	1	3
Middle aged (between 45 and 65 years)	105	79	18	4	0	4
Elderly (more than 65 years)	137	79	36	3	0	19
Total	369			P- value: < 0.001		

In this study, weight, BMI and risk of progression to PTE was similar in both genders, but initial PT, PTT, INR, WBC count were significantly higher in male subjects, which can originate from the difference in mean age within genders or underlying cause of admission. Furthermore, the risk of progression to PTE estimated as 18.6% and 1.2% died directly due to PTE, which was similar to Heit's study [7].

Virchow proposed a classic triad, local trauma to the vessel wall, hypercoagulability, and stasis, as causes of venous thromboembolism. We found hypertension, smoking, obesity, recent hospitalization or immobilization as major risk factors for DVT, which are all directly related to Virchow's thesis and are similar to previous studies [8,9]. In a study by Silverstein *et al.* 25-year survey between 1966 and 1990, the incidence of DVT in males remained constant in all age groups, decreased for females younger than 55 years and increased for women over 60 [10] While Cushman showed that incidence of DTV increases dramatically after age of 45 and this rise is slightly higher in men than women [11]. However, in our study, the incidence of DVT among men was approximately twice than women, unlike some studies which reported a similar incidence in both sexes [12,13]. In addition, mean age of female cases was significantly higher (P=0.006); which can demonstrate an additive risk in older female subjects for DVT.

Not many studies were done on the location of thrombosis formation and the affected vein in DVT. While, in our study, the most common affected limb in all age groups was lower extremity and the most common veins affected by DVT in patients in our center were femoral and popliteal veins, respectively. This is somewhat similar to the study of Ismail et al, which reported that the most common DVT site in lower extremity is combined ilio-femoral-popliteal thrombus, followed by popliteal vein thrombi [14]. No other study has directly indicated the exact affected veins, which makes our study unique.

Lower limb involvement was highest in the middle aged group. Co-involvement of both legs was seen in 19 out of 137 elderly patients. In the upper extremity, involvement of left arm was much more common (Table-3). We suggest further investigations on the underlying causes of this difference. In a study by Prandoni et al the one-year survival of 355 patients with first-time DVT was reported 83.3%, with cancer as the most frequent cause of death [15]. Similarly, in our study the one-year survival and two-year survival of patients was 92.6% and 87.7%. Most deaths were associated with the higher risk factors or more terminal illnesses, particularly, presence of malignancy [16]. However, PE has also high mortality in DVT patients and generally, PE is increasingly prevalent among elderly patients which is also demonstrated by almost all studies [1, 15,16].

Near 58% of women with DVT in this study had been pregnant in the last 6 months or were pregnant at the time of admission. Based on a meta-analysis by Ray et al, they estimated the relative distribution of 100 patients with DVT during pregnancy and the puerperium which was 0.23 per day during pregnancy, and 0.82 per day in the postpartum period [17]. This demonstrates that pregnancy is a non-modifiable risk factor in individuals. Increased venous capacity, due to high estrogen levels, increased plasma volume, compression of the inferior vena cava by the enlarged uterus, are mentioned as the possible causes of venous stasis in pregnancy [18-22]. Risk of PE is not affected by the site of DVT, because PE can occur from any site of DVT formation [23]. However, some reports have described a higher incidence of fatal PE during winter months [22-24]. Bounameaux et al observed no such seasonal variations in the incidence of DVT [25]. Boulay et al found a variation of 10-15% between cold and warm seasons, demonstrating that occurrence of DVT is higher in winters [26], However, we found no seasonal variation in the incidence of DVT.

Conclusively, By knowing the risk factors of development of DVT and its common locations, we can give at risk population warnings and suggestions to prevent the probable thrombosis.

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