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Original Article

Frequency of Deep Venous Thrombosis in Hospitalized Patients

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ABSTRACT

Objective: To determine the occurrence of deep vein thrombosis (DVT) among hospitalized patients.
Study Design: Prospective observational study
Place and Duration of Study: Pakistan Emirates Military Hospital Rawalpindi, Pakistan from Jul to Dec 2022.
Methodology: Hospitalized patients, aged 12-70 years with different medical conditions and suspicion for DVT were enrolled in the study. Venous Doppler ultrasonography was used to detect deep vein thrombosis. Patients having recent surgical procedure or trauma within the previous three months were not included. The continuous variables including age, weight and number of days in the hospital, were summarized by calculating means and standard deviations. Statistical comparisons between deep venous thrombosis negative and deep venous thrombosis positive patients were performed using the Chi-Square test.
Results: The study included 275 patients in total, out of which 236(86.0%) were males and 39(14.0%) females. Ultrasound examination was done for the recruitment of deep venous thrombosis-positive 125(45.0%) and negative 150(55.0%) patients. Patients were also divided by clinical presentation. Most of the deep venous thrombosis-positive patients had malignancy/cancer 43(34.4%), nephrotic syndrome 16(12.8%), and paralysis 13(10.4%).
Conclusion: Patients with increased age, prolonged hospital stay, history of malignancy or nephrotic syndrome and prolonged immobilization were found to be at increased risk for deep venous thrombosis, it is recommended that such patients should be considered for deep venous thrombosis prophylaxis with a proper and effective dosage of anticoagulant after weighing risk versus benefit ratio in high risk cases.

Keywords: Deep venous thrombosis, DVT prevalence, venous thromboembolism.

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INTRODUCTION

One of the most prevalent medical conditions in the West is venous thromboembolism (VTE). Clinically confirmed instances of VTE increase by an estimated 900,00 per year, with an additional 300,000 fatalities attributable to pulmonary embolism (PE) per year in the US[1]. According to studies, deep vein thrombosis (DVT) is still the second most common complication among post-operative patients in acute hospital settings in the US[2]. However, VTE is seldom considered a significant health concern in Asia. Therefore, thromboprophylaxis is not given even in high-risk conditions like orthopedic surgery[3]. Several new investigations have lately challenged this paradigm. According to the results of the Surgical Multinational Asian Registry in Thrombosis (SMART) research, the prevalence of DVT in Asian populations is comparable to that seen in western populations, and thromboprophylaxis is thus recommended[4]. In the case of venous thromboembolism (VTE), a clot forms in a vein in 90% or more of patients. It originates in the deep veins of the lower leg, a disease known as deep vein thrombosis. Pulmonary embolism occurs when a thrombus breaks loose and travels to the lungs. Further complications include long-term morbidity from the post-thrombotic syndrome. Therefore, it is a significant burden on the health budget of any nation, and its diagnosis and treatment provide a considerable challenge to medical specialists. In patients with a confirmed diagnosis of DVT, the average annualized cost of care is $16,382 more than it would be for a control group of patients without the condition[5]. VTE, including DVT and PE, is a frequent problem for cancer patients. Previous research has shown that cancer accounts for around 20% of all first-time VTE occurrences[6]. Deep vein thrombosis, renal vein thrombosis, and pulmonary embolism (VTE) are all well-known complications in individuals with nephrotic syndrome. In addition to lowering thrombolytic activity, nephrotic syndrome is associated with increased prothrombotic function[7]. It has been estimated that the incidence of DVT and fatal

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pulmonary embolism in patients following major surgery is between 20%-30% and 0.2-0.9%, respectively[8]. One cause of DVT in the upper limbs is the growing use of central venous catheters for treatments, including dialysis, parenteral nutrition, chemotherapy, and more.

There is a paucity of published epidemiological data depicting the true occurrence of VTE/DVT in Pakistan. Guidelines for diagnosing, managing, and avoiding VTEs still need to be established nationally in Pakistan[9]. In order to optimize the use of local resources and simplify policy concerning diagnosis, treatment, and preventive methods for VTE, such indigenous research is vital. In addition, changes in race and ethnicity have been shown to cause regional variances across research groups[10]. As a result, it is not feasible to base local health policy only on statistics collected in the West.

This research aimed at identifying the frequency of DVT amongst hospitalized patients with the prevalence of clinical features.

METHODOLOGY

This prospective observational study was conducted at Pak Emirates Military Hospital, Rawalpindi Pakistan from July to December 2022, after approval from the hospital's Ethical Committee. (vide letter A/28/229/EC/514/23).

Inclusion Criteria: Patients admitted in general medical wards with a suspected DVT, aged 12-70 years were included in the study.

Exclusion Criteria: Patients admitted in medical wards and are not suspected for DVT and patients who have history of trauma or major surgery in last three months were excluded.

Patient demographic information, including age, gender, BMI, history of smoking and hospitalization history, were all collected after informed consent. The clinical records of medical wards were extracted for the reason of admission at hospital.

During the hospitalization, venous ultrasonography was used to diagnose deep vein thrombosis (DVT) in legs by looking for blood clots in the veins (including the common popliteal vein, femoral vein, peroneal vein, posterior tibial vein, soleus vein, gastrocnemius vein, and others). In our research, we used the ultrasound scanner (EPIQ 7C, Philips Medical Systems, Andover, MA, equipped with an L12-5/S5-1 probe). Ultrasounds were performed by consultant radiologists with minimum 15 years of experience. The clinical presentation of recruited patients included paralysis secondary to stroke, diabetes mellitus, nephrotic syndrome, liver disease, arrhythmia, angina pictoris, myocardial infarction, cancer, bone fracture, asthma, and hypertension. Patients were recruited from different medical wards.

Data was analyzed by using Statistical Package for Social Sciences (SPSS) 22.00. Quantitative data was represented using mean ± standard deviation and qualitative data was represented by using percentage and frequency.

RESULTS

There was a total of 275 patients, with 236(86.0%) males and 39(14.0%) females. Table-I displays the patient's presentation, including BMI, the number of days admitted in the hospital, and any smoking history. The data were separated according to the DVT results. DVT (+) smokers are more frequent than DVT (-) patients. 125(45.0%) of patients were DVT (+) while 150(55.0%) were DVT (-) ultrasound examination.

Table-I: Demographic Details of Patients (n=275)

Variable(s)	DVT (-) n(%)	DVT (+) n(%)
Age (years)	49.8 (11.7)	50.4 (11.5)
Female	15 (9.9)	24 (19.2)
Male	135 (89.4)	101 (80.8)
Body Mass Index (kg/m2)	20.5 (5.4)	21.64 (5.0)
Duration of stay in hospital (days)	51.4 (14.9)	52.2(14.8)
Smoking	21 (13.9)	108 (86.4)

DVT: Deep Vein Thrombosis

Patients from different clinical features and diseases were separated according to the patient's history and clinical examination. In Table-II, the highest frequency of DVT-positive patients with cancer was 34.4%, the second nephrotic syndrome was 12.8%, and 10.4% were paralyzed.

Table-II: Comparison of DVT (-) and DVT (+) Patients Based on Clinical Presentation (n=275)

Clinical presentation	DVT (-) n(%)	DVT (+) n(%)
Paralysis	20(13.2)	13(10.4)
Diabetes Mellitus	30(19.9)	6(4.8)
Nephrotic syndrome	41(27.2)	16(12.8)
Liver disease	22(14.6)	12(9.6)
Arrhythmia	25(16.6)	7(5.6)
Angina pectoris	4(2.6)	4(3.2)
Myocardial infarction	13(8.6)	7(5.6)
Cancer	47(31.1)	43(34.4)

syndrome was 12.8%, and 10.4% were paralyzed. Of 275 patients, 150(55%) were DVT negative; amongst them, cancer patients were found to be at risk for DVT.

DISCUSSION

Patients with a broad range of medical disorders, including diabetes, hypertension, cancer and cardiovascular disease, were included in the current research. DVT was diagnosed in 34.4% of cancer patients enrolled in the study. Limited subject numbers per cancer location made it challenging to conclude which tumors were associated with a greater risk of DVT. Kidney, pancreas and abdominal/other malignancies were indicated as high risks for DVT in three retrospective trials of cancer patients by Kakkos *et al*.[11] Sebuhyan et al found that more significant risks for DVT were associated with brain tumors and lung cancer12. MacDougall et al found hematological, lung, and gastrointestinal cancers as significant hazards for DVT in a case-control study comparing patients with DVT and the general population[13]. According to the research findings by Blix et al, patients with tumors of the stomach, pancreatic, primary brain cancer and renal disorder are at extremely high risk after chemotherapeutics treatment with VTE[14]. These findings are consistent with findings of our study in which venous thromboembolism risk was found to be greater in cancer patients. Kerlin et al recognized multiple risk factors, including cancer stage, cancer histology, time after diagnosis (most significant in first 3 to 6 months), chemotherapy, antiangiogenic agents (e.g. thalidomide, lenalidomide), hormonal therapy, erythropoiesis-stimulating agents, transfusions, indwelling venous access devices, radiation therapy, lengthy surgery (>60 minutes), and age, have been identified in cancer patients who have experienced venous thromboembolism[15]. These findings are consistent with findings of our study in which increased thromboembolism risk was associated with increasing age and was significantly higher in cancer patients. Despite this, the risk of VTE in patients with medical disorders is equivalent to that of patients hospitalized for major surgery, as shown by recent research in the UK and the US and by significant randomized control trials like Endorse Medenox. Patients undergoing surgery were more likely to be at high risk (68%) and very high risk (58.8%) of getting VTE than medical patients (19.6%) and 2%, respectively. Surgical patients were at a much greater risk of developing VTE than the general population because of variables such as anesthesia, trauma, limited mobility after surgery, and obesity[16]. These findings are in coherence with findings of our study in which increased venous thromboembolism risk was found in patients with increased hospital stay and with prolonged bed rest.

Ohmori *et al* found that patients with heart failure in New York Heart Association classes from two to five had cumulative rates of DVT of 4.4%, 4.8%, and 25.5%. They also found that thirty four percent of patients with congestive heart failure had DVT while 34.8% of patients with severe motor and intellectual impairments had DVT[17]. According to a study by Nakagawa et al, immobility increases the risk of deep vein thrombosis (DVT) because blood flow is decreased in the calf veins[18]. Similar findings were found in our study in which patients with increased hospital stay had higher incidence of DVT.

Cardio vascular disease (14.6%), pulmonary illness (13.1%), infection (15.5%), and inflammatory disease (20.7%) were all observed to increase the risk of DVT in non-surgical patients in the West, where the overall cumulative incidence of DVT was 14.9%, as shown by Lin *et al*. Congestive heart failure, pulmonary illness, infection, and inflammatory disease patients as a whole had a cumulative incidence of DVT of 10.5%[19]. Research conducted on Pakistani populations has shown that a sizeable percentage of hospitalized, non-surgical patients are at risk for developing deep vein thrombosis. To further illustrate this point, the Japanese preventative guideline lists malignancy as a moderate risk for VTE as shown by Dou *et al*.[20] Kraaijpoel et al found an increased risk of venous and arterial thromboembolism in patients with nephrotic syndrome, with estimates ranging from 20% to 40%, depending on the severity and etiology of the condition[21]. Similar results were found in our study in which increased rates of venous thromboembolism occurred in nephrotic syndrome patients.

The yearly incidence of venous Thromboembolism (VTE) is 100 per 100,000 in the United States, DVT ranks third in frequency among CVDs, behind ACS and stroke. VTE affects people of all ages, especially those over the age of 14, and it causes between 5 and 10 percent of hospital fatalities[22]. The frequency of genetic factors predisposing to VTE, such as factor V Leiden, is lower in Asian communities (0.5%) compared with Caucasian populations (5%), which may explain why the incidence of VTE is greater in Caucasians and African Americans and relatively low in Asians and Hispanics[23]. Has *et al*.

found that immobility was the leading cause of complications after surgery, especially for the elderly[24]. Age is an independent risk factor in 70 individuals; this was more prevalent among medical patients and men than females, consistent with prior VTE investigations in hospitalized patients. Also, men were more likely to suffer from immobility and fractures of the pelvis or long bones[24].

Both sexes are at greater risk of developing VTE if their body mass index (BMI) is considered obese or overweight. But in our study, the BMI mean (20 kg/m^2) was not the risk of DVT-positive patients. More study is needed, especially into the pathophysiology of VTE in obese people, since there is little evidence that obesity is a risk factor for VTE. Risk factors for venous Thromboembolism include the presence of cancer as the operative diagnosis, an abdominal or thoracic surgical procedure, an operative time of more than 45 minutes, general anesthesia lasting longer than 90 minutes, a history of venous Thromboembolism, advanced age, and obesity[24].

According to research by Ghashi *et al*, on healthcare providers revealed that 98.8 percent of doctors considered DVT prophylaxis clinically relevant. However, only 63.3 percent prescribed it, and 10.3 percent did it frequently. Despite the high proportion of at-risk inpatients, only 3.52%, or 6 out of 170 patients, underwent thromboprophylaxis in this research[25]. This is in coherence with findings of our study in which DVT prevalence was significantly higher in hospitalized patients.

CONCLUSION

Patients with increased age, prolonged hospital stay, history of malignancy or nephrotic syndrome and prolonged immobilization were found to be at increased risk for deep venous thrombosis. Based on the findings of this research, DVT preventive interventions, as indicated by the DVT prevention recommendations, may be warranted for hospitalized nonsurgical patients, particularly those with a history of long-term hospitalization or cancer surgery and prolonged immobilization.

LIMITATION OF STUDY

The current study is a single hospital based study with a smaller number of admitted cases. For better results we need multi-centered studies at different hospitals in different parts of country with a greater number of patients.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

WA & WA: Data acquisition, data analysis, critical review, approval of the final version to be published.

AR & ARAD: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

BAK & AZ: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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