IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 6, Issue 5 Ver. IV. (Sep. -Oct .2017), PP 21-26
www.iosrjournals.org

Incidence and Prevalence of Deep Venous Thrombosis in Surgical Patients: Mixed Research Design

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Abstract
Background: *Deep vein thrombosis (DVT) is a wide spread complication not just only in the surgical department but also in hospitalized medical patients.* *It can also lead to severe illness with low quality of life and even instant death related to pulmonary embolism.*
Objectives: *this study aims to investigate prevalence, incidence and relationship between patients knowledge and incidence and/or prevalence of DVT in surgical ward.*
Design; *mixed research design was utilized that were cross –sectional (point prevalence) and longitudinal study (incidence).*
Method: *Sample of 194 patients from surgical ward at Suez Canal University hospital were included in the study.*
Instrument; *a questionnaire was used to collect study data which comprise three parts; first part include patient socio-demographic characteristics, second part named Autar risk scale which used to assess risk for developing deep vein thrombosis and third part was developed by researcher that covered knowledge regarding DVT. However deep vein thrombosis diagnosed using doppler ultrasound and homans signs test.*
Results *of the study revealed DVT prevalence of 46.6% and incidence was 25%. Moreover, age, and patient at risk for DVT associated significantly with DVT prevalence and incidence. However, marital status and level education are the only factors associated significantly with DVT prevalence.*
Conclusion; *this study concluded that Surgical patients are at high risk for developing of deep vein thrombosis according to Autar scale assessment. Additionally, there is no significant relationship between patients' knowledge and prevalence and/ or incidence of deep vein. On the other hand, Patients education and developing booklet about DVT prevention should be available and distributed for all general surgical patients. Routine assessment of deep vein thrombosis risk is recommended to all hospitalized patients that help for prevention.*

Keywords: *Incidence - Deep vein thrombosis- patients- Prevalence - Risk factors – Surgical.*

Date of Submission: 25-08-2017 Date of acceptance: 25-09-2017

I. Introduction

Venous thrombo-embolism is a complex process and the occurrence of deep vein thrombosis varies in different parts of the world for reasons that are not well understood. Complex pathogenesis of venous thrombosis involves the interaction of acquired risk factors with several genetic predispositions, including anti-thrombin III, protein C, protein S, heparin cofactor II deficiencies, all as a group known as thrombo-philias. Assessment of risk factors starts with a basic assessment of the patient. It continues throughout the interventional procedure and post-surgical patient's recovery until he or she is discharged from care. The process of evaluating patients for DVT or Pulmonary embolism starts with identifying risk factors (Geerts et al., 2004). The risk for VTE in surgical patients is determined by the combination of individual predisposing factors and the specific type of surgery (Guyatt et al. 2012). It has been identified on a number of risk factors in pathological conditions leading to an increase in venous thromboembolism (VTE) rates and lethal diseases. Otherwise, venous thromboembolism is a calm killer (Autar , 1996 a). In addition to that Gad and El-Sheikh, 2013 reported that patients in general surgical department are at risk for occurrence of deep vein thrombosis. Which it can lead to severe illness with bad quality of life and even abrupt death linked to pulmonary embolism (Pandey et al 2009 & Cunningham , 2006).

Furthermore, deep venous thrombosis has been known to be correlated with smoking, great surgical operation, increased age, hospitalization, , obesity, neurological deficit, blood transfusion, malignancy, trauma, inherited hypercoagulable state, bed redden and birth control pill use (Strom et al ., 2013 ,Anderson et

al., 1991 , Geerts et al., 1994) . In spine surgery, venous stagnation factors that are considered to be long horizontal decubitus period, lack of muscle strength, venous and pressure from retractors and rest in bed after surgery. Venous intimal injury may also occur in surgical treatment (Matsumoto et al., 2014).

Deep venous thrombosis risk factors are common in patients with degenerative spine, and without prophylaxis, approximately 15.5% of patients undergoing posterior spinal surgery develop DVT **(**Oda et al., 2000). Moreover, it has been reported that postoperative D-dimer assay can effectively predict DVT occurrence, and D-dimer level more than or equal to 500 μg/L is considered as a risk factor for DVT after spinal surgery (Si et al 2014). Deep vein thrombosis also is an indicator of nursing sensitivity outcome (Schreuders et al. 2013). Therefore, current study aim was to investigate prevalence, incidence and risk factors associated with incidence and prevalence of DVT in surgical ward.

Research objectives

1. Assess incidence of DVT in surgical ward.
2. Determine factors associated with development of DVT in surgical ward.
3. Assess prevalence of DVT in surgical ward.
4. Determine factors associated with prevalence of DVT in surgical ward.

Research questions

1. Is their relation between development of DVT and patient knowledge?
2. Is their relation between prevalence of DVT and patient knowledge?

II. Materials And Methods

Design

Mixed research design was used cross-sectional (point prevalence) and longitudinal (incidence) study

Sample

A consecutive total sample of 194 patients was included in the current study from surgical ward at Suez Canal university hospital.

Study Setting

The study was conducted at the General Surgical Department of Suez canal University Hospital.

Instruments

Data was collected using questionnaire that consists of three parts; first part covered socio-demographic data of the patients e.g. age, gender, marital status, level of education and occupations. Second part is the Autar risk scale (Autar, 1994) which used to assess risk for developing deep vein thrombosis. The scale consisting of seven distinct categories named age, mobility, body mass index, special risk, trauma risk, surgical intervention and high-risk diseases. The score of the Autar scale is ranged from zero to 30. Autar risk scale classified into four levels; ≤ 6 indicate to no risk, 7-10 at low risk, 11-14 at moderate risk and ≥15 were at high risk for deep vein thrombosis development. The Validity and Reliability of Autar risk scale was tested through correlation coefficient alpha which was 0.98 (Autar, 1994). The Most of patients assessed for DVT risk fell in the high risk category and choosing a cut-off score of 16, the DVT scale achieved 100% sensitivity and 81% specificity Autar, (2003). Most patients assessed for DVT risk fell in the high risk category and choosing a cut-off score of 16, the DVT scale achieved 100% sensitivity and 81% specificity (Autar, (2003).

Third part was developed by researcher based on recent and relevant related literature that covered knowledge regarding DVT causes, risk factors, signs and symptoms, preventive measures, treatment and complications. The total score of patient knowledge was ranged from zero to 12. The third part validity was tested using expert panel of six experts in the field of medical surgical nursing four from Port Said University and two fro Suez Canal University. However deep vein thrombosis was diagnosed using Doppler ultrasound and homans signs test. A pilot study was done before starting data collection on 10% of patients to evaluate the tentative developed tools for clarity and applicability and to estimate the time needed to collect data then necessary modification were carried out before actual data collection. Patients included in the pilot study were excluded from the study sample.

Data collection

The data was collected by the researcher two times at patient admission and at patient discharge using the study tool that described previously for a period of six months.

Ethical consideration

An approval to conduct the study was obtained from the dean of the Faculty of Nursing, as well as the Director of general surgical department, Suez Canal University Hospitals. Oral informed consent after brief

explanation of the study aim and process was obtained from the patients before data collection. The patients informed about their right to withdraw from the study without rationalization and assuring them about the confidentiality of their data throughout the study.

Data analysis

Data were analyzed using the statistical package for social science version 20. The prevalence was calculated according to the following formula: Prevalence (P) = all deep vein thrombosis/patients at risk × 100. The incidence was calculated according to the following formula: Incidence = new deep vein thrombosis/patients at risk × 100. Univariate analysis was used to describe the sample characteristics. In addition, linear regression was used to identify the factors associated incidence and prevalence of deep vein thrombosis. That was collected at patient admission and at patient discharge to assess the incidence of deep vein thrombosis while the prevalence was collected only one time.

III. Results

The current study revealed that prevalence of deep vein thrombosis was 46.6% while the incidence was 25%. On the other hand 84.5% of study patient were at risk for deep vein thrombosis. The study results found that 58.8% of patients included in the study were male. Additionally 65.4% of patients theirs age ranged from 41 to 60 years old and 23.7% their age 40 years younger however only 10.8% were more than 60 years old. Otherwise 69.1% of the sample was illiterate and 74.1% were married. On the other hand 32.5% of the study sample their body mass index ranged from 20 to 25 and 35.6% ranged from 26 to 30 however 20.6% their body mass index over 30 and only 11.3% was lower than 20. Moreover, 78.9% of the studied patients have a job or working. Additionally, a significant relationship between risk level and both incidence and prevalence of deep vein thrombosis was founded with P-Value of 0.001 and 0.000 respectively.

Table 1. Factors Associated With Incidence of Deep Vein Thrombosis

Factors	DVT incidence	P- Value
• Gender		
Male	24 (58.5%)	0.555
Female	17 (41.5%)	
• Age		
10 – 30	4 (9.8%)	
31 – 40	10 (24.4%)	0.067
41- 50	20 (48.8%)	
51 – 60	7 (17.1%)	
• Education		
Illiterate	33 (80.5%)	
Read and write	6 (14.6%)	0.166
Secondary	2 (4.9%)	
• Marital status		
Single	4 (9.8%)	
Married	34 (82.9%)	0.381
Divorced	1 (4.2%)	
Widwo	2 (4.9%)	
• Work/Job		
Yes	26 (63.4%)	0.008*
No	15 (36.6%)	
• Body mass index (BMI)		
16 - 18	3 (7.3%)	
20 - 25	15 (36.6%)	0.201
26 - 30	10 (24.4%)	
31- 40	9 (22%)	
>40	4 (9.8%)	
• At risk for deep vein thrombosis (DVT)	40 (97.5%)	
• No risk deep vein thrombosis (DVT)	1 (2.4%)	0.004*
Total	41 (100%)	

* **mean significant level considered when p-value < 0.05**

The current study revealed that patients working or have a job and at risk for deep vein thrombosis was associated significantly with incidence of DVT with P-Value of 0.008 and 0.004 respectively (see table 1).

Table 2. Factors associated with Prevalence of deep vein thrombosis (DVT)

Factors	DVT prevalence	P- Value
• Gender		
Male	46 (59.7%)	
Female	31 (40.3%)	0.471
• Age		
10 – 30	6 (7.8%)	
31 – 40	15 (19.5%)	
41- 50	42 (54.5%)	0.000*
51 – 60	14 (18.2%)	
• Education		
Illiterate	61 (79.2%)	
Read and write	11 (14.3%)	
Primary	2 (2.6%)	0.023 *
Secondary	2 (2.6%)	
University	1 (1.3%)	
• Marital status		
Single	4 (5.3%)	
Married	67 (88.2%)	0.004*
Divorced	1 (1.3%)	
Widwo	4 (5.3%)	
• Work		
Yes	58 (75.3%)	0.327
No	19 (24.7%)	
• Body mass index (BMI)		
16 – 18	6 (7.8%)	
20 – 25	22 (28.6%)	
26 – 30	29 (37.7%)	0.397
31 – 40	14 (18.2%)	
>40	6 (7.8%)	
• At risk for deep vein thrombosis (DVT)	74 (96.1%)	
• No risk deep vein thrombosis (DVT)	3 (3.9%)	0.000 *
Total	77 (100%)	

* **mean significant level considered when p-value < 0.05**

However, there is a significant relationship between prevalence of deep vein thrombosis and age, level of education, marital status and risk for deep vein thrombosis with P-Value of 0.000, 0.023, 0.004 and 0.000 respectively (see table 2).

Table 3. Best Fitting Multiple Linear Regression Model for Incidence of Deep Vein Thrombosis

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig
Constant	.159	. 038		4.235	.000*
Total Patients knowledge about DVT at admission	-.045-	.021	-.167-	-2.082-	.039*
Total Patients knowledge about DVT at discharge	.041	.014	.242	3.020	.003*

* **mean significant level considered when p-value < 0.05**

According to linear regression there is a significant relationship between total knowledge of patient regarding deep vein thrombosis at admission and at discharge and incidence of deep vein thrombosis (see table 3).

Table 4. Best Fitting Multiple Linear Regression Model for Prevalence of Deep Vein Thrombosis

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig
Constant	.359	.046		7.813	.000*
Total Patients knowledge about DVT at admission	-.023-	.026	-.070-	-.862-	.390
Total Patients knowledge about DVT at discharge	.027	.017	.131	1.607	.110

* mean significant level considered when p-value < 0.05

While there is no significant relationship between total knowledge of patient regarding deep vein thrombosis at admission and at discharge and prevalence of deep vein thrombosis using also the linear regression test (see table 4)

IV. Discussion

The current study conducted on surgical ward which included 194 patients, more than half of them were male. Additionally, less than half of the studied patients (41.2%) their age ranged from 51 to 60 years old. The study results revealed a deep vein thrombosis prevalence of 46.6% while the incidence was 25%. Moreover, the majority of study sample were at risk for developing deep vein thrombosis. This results was consistent with the study of Okuhara et al., 2015 which found that the incidence of deep venous thrombosis in patients admitted to the hospital in order to conduct vascular surgery, venous was high (Okuhara et al., 2015).

Concerning gender, the results of the present study revealed that more than half of the studied patients (58.8%) were male. This result was consistent with Abd El-Salam (2009) who reported that more than two thirds of the sample was males while one third were females. Additionally, this result agree with (Dirimese et al., 2012) that found 32.5% of their study patients were female while, 67.2 % were male. According to level of education, the present study found that approximately two third of the studied patient were illiterate (69.1%). This inconsistent with (Dirimese et al., 2012) which found nearly half of deep vein thrombosis patients finished their primary school.

Moreover, there was a significant relationship between risk level and both incidence and prevalence of deep vein thrombosis using Autar scale. This study result was in agreement with (OKUHARA et al., 2014) which reported that the majority of hospitalized patients is considered at high risk for deep vein thrombosis with significant proportion. Furthermore, Sathiya et al., 2016 illustrated that assessment DVT risk using Autar scale among surgical orthopedic patients after operation shows that 50% of patients at high risk for deep venous thrombosis.

Other result of the present study was the non significant association between incidence of deep vein thrombosis and patients age. This result was in disagreement with Chew et al., 2006 which reported that age was associated with the incidence of deep vein thrombosis. Furthermore, Marissa, 2016 found that the incidence of venous thrombosis is more than 10-fold higher in age 80 to 89 years old than in middle-aged individuals (40-50 years). Also Yang et al., (2015) agree with current study which reported that increasing age was a risk factor for postoperative DVT after spine surgery.

On the other hand, the present study found that, age, education, marital status and patient at risk for deep vein thrombosis (DVT) were associated significantly with prevalence of deep vein thrombosis. This result was in agreement with Dirimese et al., 2012 which stated that a consensus that nearly a quarter of patients who have in the past suffered from deep vein thrombosis would later in life develop debilitating case of venous leg ulcers. Moreover, the study of Enga et al. 2013 reported that Educational level is associated strongly with development of deep vein thrombosis.

As regard to incidence of DVT and total patients knowledge regarding DVT at admission and discharge from surgical ward, the present study revealed a significant relationship between incidence of deep vein thrombosis and total knowledge at admission and discharge from surgical ward. This result is consistent with Yang and kang, 2013 which reported low score of patients' knowledge related to venous thrombosis in a study conducted to examine the relationship between patients' knowledge related to venous thrombo-embolism (VTE), health belief, and preventative behavioral in patients suffer from lower-limb musculoskeletal disorders. However, the present study revealed no significant relationship between patients' knowledge regarding deep vein thrombosis at admission and discharge from surgical ward and prevalence of DVT.

V. Conclusion

The current study concluded that surgical patients are at high risk for developing of deep vein thrombosis according to Autar scale assessment. Additionally, there is no significant relationship between patients' knowledge and prevalence and/ or incidence of deep vein. On the other hand, Patients education and developing booklet about DVT prevention should be available and distributed for all general surgical patients. Routine assessment of deep vein thrombosis risk is recommended to all hospitalized patients that help for prevention.

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Eman Saleh M Shahin. "Incidence and Prevalence of Deep Venous Thrombosis in Surgical Patients: Mixed Research Design." IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 6, no. 5, 2017, pp. 21–26.