

Effect of Educational Program regarding Risk Assessment and preventive Strategies among Orthopedic Surgical Patients with Deep Vein Thrombosis

¹Basma Mohamed Khalil, ²Eman Mohamed Ramadan Farag, ³Amal S. Abu Almakarem, ⁴Shymaa Helmy Ahmed

(1) Assistant Professor in Medical-Surgical Nursing, Faculty of Nursing, Ain Shams University

(2) Lecturer of Medical-Surgical Nursing Department, Faculty of Nursing, Ain Shams University

(3) Department of Basic Medical Sciences, Faculty of Applied Medical Sciences, Al Baha University, Saudi Arabia

(4) Lecturer of Adult Nursing Department, South Valley University, Qena, Egypt

Abstract

Background: Deep Vein thrombosis (DVT) is thrombophlebitis of deep veins and is known to be associated with fatal complications. The use of appropriate measures through risk assessment is of vital importance in preventing DVT-related complications. Well's criteria are a beneficial tool in categorizing the patients and, therefore may guide in using appropriate preventive strategies and promoting the well-being of immobilized patients. **The present study aimed to** evaluate the effect of educational program regarding risk assessment and preventive strategies among orthopedic surgical patients with deep vein thrombosis. **Research design:** This study used a quasi-experimental research design. **Setting:** The study was carried out in the orthopedic department and orthopedic outpatient clinic at Qena General Hospital. **Subjects:** The samples were selected by a convenient sampling technique of all orthopedic surgical patients with deep vein thrombosis admitted to the above-mentioned settings at the time of data collection. **Tools:** Three tools were used for data collection of this study: Tool I: Structure interview Sheet, Tool II: Observational checklist, and Tool III - Observational checklist for preventive strategies were used. **Results:** The findings of the study revealed that there were highly significant improvements in patient's knowledge regarding deep vein thrombosis post-educational program implementation ($P=0.005$). Statistical highly significant differences and reductions were detected between orthopedic surgical patients with deep vein thrombosis post-educational program implementation regarding risk assessment and preventive strategies. **Conclusion:** The educational program implementation had a significant positive effect on reducing risk assessment and preventing deep vein thrombosis among orthopedic surgical patients. **Recommendations:** The educational program regarding deep vein thrombosis prevention should be conducted and integrated into the rehabilitation programs. Provide the patients with booklets and illustrated pamphlets for each to improve their information and reduce their risk for deep vein thrombosis.

Keywords: Deep Vein Thrombosis, risk assessment, Patients with deep vein thrombosis, preventive strategies.

Introduction

Deep Vein thrombosis (DVT) is thrombophlebitis of deep veins and is known to be associated with fatal complications. Deep vein thrombosis is a condition that occurs when a blood clot forms in a vein deep inside the body which mainly affects the large veins in the lower leg and thigh. It is believed to be caused by altered physiologic mechanisms that are likely to occur with decreased mobility, surgery, and traumatic injury. It is most commonly seen in adults above 60 years of age. When a clot breaks off and moves through the bloodstream, it is called an

emboli which can get stuck in the blood vessels in the brain, lungs, heart, or another area leading to severe damage. The risk of developing DVT can be assessed by well's score (Martin, 2017).

Deep Vein thrombosis and venous thromboembolism (VTE) are more common in orthopedic patients than in other types of patients; significant orthopedic procedures can increase the risk of DVT by up to 60%. About 6% of patients with DVT and about 12% of patients with pulmonary embolism pass away within a month of their diagnosis. An important factor in morbidity and mortality is deep vein thrombosis (DVT). Major orthopedic surgery patients, particularly those having hip and knee arthroplasty, are at the highest risk of developing DVT (Fleivas et al.,

2018).

The coagulation cascade is started by major surgery or trauma to the lower extremities, and this disturbs the physiological balance between substances that promote and delay coagulation, leading to a hypercoagulable state. Deep-vein thrombosis risk is significantly elevated in these individuals due to decreased venous flow and compromised endothelial function (**Dahl, 2020**). The majority of DVT symptoms manifest at the clot's location. They consist of skin redness, warmth, pain or tenderness, and swelling. Also possible are asymptomatic cases of deep vein thrombosis (**Thompson, 2020**). Thromboprophylactic therapies, such as health education, correctly implemented basic prevention techniques, physical prevention strategies, and suitable antithrombotic medications, should be given to patients undergoing major orthopedic surgery. To promote patient participation and adherence, these interventions should ideally be patient-centered (**Xu, Zhao, & Chen, 2018**).

Deep Vein thrombosis rates in major orthopedic procedures range from 40% to 60%, which is higher than the general population average. Death occurs within a month of diagnosis in about 6% of DVT patients and about 12% of pulmonary embolism patients (**Fleivas et al., 2018**). Without prophylaxis, DVT incidence rates have been seen to range from 40% to 60% (**Rahman et al., 2020**). Pulmonary embolism (PE) is mostly caused by deep vein thrombosis (DVT) (**Schellack et al., 2016**).

The post-thrombotic syndrome, which includes symptoms like extremities pain, venous dilation, edema, pigmentation, and venous ulcers, affects 50% of persons who have had a DVT. The majority of orthopedic patients return with deep venous thrombosis, which can be decreased mechanically through a range of motion exercises and using elastic stockings, according to the researcher's study of the literature. Therefore, by using the nursing educational protocol for those patients, this study will be carried out to decrease deep venous thrombosis

among orthopedic surgery patients (**D'Alesandro, 2016**).

The following complications need to be watched after and taken care of: Bleeding. The main side effect of anticoagulant treatment is spontaneous bleeding, which can be identified by microscopic inspection of the urine. Thrombocytopenia, heparin-induced thrombocytopenia, or HIT, is a potential side effect of heparin medication and is characterized by a sharp drop in platelet count of at least 30% below baseline, and substance interactions. Close monitoring of the patient's treatment regimen is required due to oral anticoagulants' interactions with many other drugs, herbal remedies, and dietary supplements (**Rahman et al., 2020**).

Patients with low risk of DVT (e.g., those undergoing minor surgery but without clinical risk factors for DVT; those who must temporarily be inactive for long periods, as during a lengthy > 6 hour airplane flight) should be prompted to move their legs every so often; no medical attention is required. Ten times per hour of dorsiflexion is likely enough (**Thompson, 2020**).

Patients at higher risk of DVT include those having minor surgery if they have clinical risk factors for DVT, those having major surgery, particularly orthopedic surgery, even without risk factors, and bedridden patients with serious illnesses (e.g., the majority of patients in critical care units, other patients with heart failure, chronic obstructive pulmonary disease [COPD], chronic liver disease, stroke) (**Patel et al., 2019**).

Critically ill patients appeared to be at high risk of developing deep vein thrombosis during their ICU stay because they combined both general risk factors with specific ICU risk factors of deep vein thrombosis, like sedation, immobilization, vasopressors, or central venous catheter. Well's criteria for DVT is a reliable clinical tool to assess the risk of DVT in ICU patients after 48 hours of admission. The Well's tool enables us to reliably stratify patients into high DVT risk (>3), moderate DVT risk (1-2), and low DVT risk (< 1) (**Morgan & Knipe, 2021**).

Both mechanical measures, such as the use of compression stockings, and pharmaceutical therapies, such as the use of anticoagulants, can prevent deep vein thrombosis. By accelerating blood flow, intermittent pneumatic compression devices are thought to lessen or even eliminate

stasis. They may also avoid coagulation by increasing fibrinolytic activity. Staff nurses who are caring for patients must do risk assessments and administer prophylaxis through mechanical devices to avoid DVT because it is a life-threatening condition (Elavally et al., 2015).

Deep vein thrombosis can be avoided, especially if high-risk patients are recognized and immediate preventive steps are taken. Compression socks that are graduated the thrombus is kept in place by compression stockings and compression tool using pneumatics. Blood flow is increased intermittently by pneumatic compression devices beyond what is achieved by wearing stockings. Workouts for your legs to maintain the blood flowing properly encourage early mobilization and leg exercises (Rahman et al., 2020).

These individuals need further preventive care. In-hospital thrombosis may be the cause of more than 50,000 fatalities each year in the US; the majority of these individuals can be recognized and should undergo DVT prophylaxis. Inpatients who do not fall into one of these groups do not need routine DVT prophylaxis (Flevas et al., 2018).

Nurses tending to patients at risk for DVT should take into account their medical history, family history, any current illnesses, current medications, and results of physical examinations. Nurses must recognize and promptly report any abnormal physical exam findings to successfully advocate for patients and prevent DVT. They also must assess the patient's risk factors (D'Alesandro, 2016).

Significance of study:

Deep vein thrombosis rates in major orthopedic procedures range from 40% to 60%, which is higher than the general population average. Death occurs within a month of diagnosis in about 6% of DVT patients and about 12% of pulmonary embolism patients (Flevas et al., 2018). Without prophylaxis, DVT incidence rates have been seen to range from 40% to 60% (Rahman et al., 2020). Also, 50% of those

who have a DVT will experience long-term side effects (post-thrombotic syndrome) including leg pain, venous enlargement, edema, pigmentation, and venous ulcers (D'Alesandro, 2016).

The use of appropriate measures through risk assessment is of vital importance in preventing DVT-related complications. So, the investigators therefore felt the need to undertake this study to evaluate the effect of educational program regarding risk assessment and preventive strategies among orthopedic surgical patients with deep vein thrombosis (Rahman et al., 2020).

Aim of the study:

To evaluate the effect of educational program regarding risk assessment and preventive strategies among orthopedic surgical patients with deep vein thrombosis through:

- Assessing patients' knowledge regarding deep vein thrombosis.
- Analyzing patients' risk assessment for deep vein thrombosis.
- Analyzing patients' preventive strategies for deep vein thrombosis.
- Designing and implementing educational programs according to patients' needs.
- Determining the effect of educational program regarding risk assessment and preventive strategies among orthopedic surgical patients with deep vein thrombosis.

Research hypothesis:

Patients with deep vein thrombosis who will receive the teaching program regarding risk assessment and preventive strategies will experience reduced occurrence of deep venous thrombosis post-educational program implementation than pre-program implementation.

Subjects and Method:

Research design:

To achieve the goal of this study, a quasi-experimental research methodology was used.

Setting:

The study was carried out in the orthopedic department and orthopedic outpatient clinic at

Qena General Hospital

Subjects:

The samples were selected by a convenient sampling technique of all orthopedic surgical patients with deep vein thrombosis admitted to the above-mentioned settings at the time of data collection. It composed of 100 adult patients their ages ranged from 18-60 years old.

Data collection tools:

Three tools were used for data collection in this study:

Tool I: Structure interview Sheet: It was created by the researchers after reviewing pertinent literature (Rahman et al., 2020, Flevas et al., 2018, D'Alesandro, 2016), and it consisted of two parts:-

- **Part 1:** Patient's demographic data: It included items related to the demographic variables such as age, gender, occupation, residence, and educational status.

- **Part 2:** It includes **the patient's knowledge regarding deep venous thrombosis:** it was used to assess patient knowledge that included 20 items (multiple choice questions), such as an Overview of deep venous thrombosis, definition, risk factors, causes, complications of deep venous thrombosis, information about sources of information, post-discharge medications, and ways to prevent postoperative problems after surgery.

Scoring system:

If the patient's response was correct, they received a score of 1, and if not, they received a score of 0. Unsatisfactory knowledge was defined as a patient with a score between 1 and less than 12 (< 60%), and those who scored from 12 to 20 were considered to have satisfactory knowledge (≥60%).

Tool II: Observational checklist: it was adopted from Morgan, M, & Knipe H. (2021) using Well's score for DVT risk assessment. Well's score is a standardized tool that is interpreted through scoring such as 3 or more scores- higher risk of DVT, 1 or 2- moderate risk, and 0 as low risk of DVT.

Tool III - Observational checklist for preventive strategies used: Such as

stockings with graded compression. Wearing compression stockings helps keep the thrombus in place. Device for pneumatic compression, intermittent pneumatic compression devices improve blood velocity. Leg workouts, encourage early mobilization and leg exercises to maintain proper blood flow. It was created by the researchers after reviewing pertinent literature (Rahman et al., 2020 Patel et al., 2019).

Validity of the tools:

Five nursing professionals with expertise in medical-surgical care evaluated the tools' content validity, clarity, comprehensiveness, appropriateness, and relevance. To guarantee sentence clarity and content appropriateness, no changes were made by the panel's Judgment.

Reliability of the tools:

Pearson correlation coefficients of (0.94) were used to assess the reliability of the first tool by test-retest, and the inter-observation method was used to determine the reliability of the second tool. (R= 0.865) was the reliability of the coefficient.

Methods of data collection:

Fieldwork:

The patients, who visited the previously chosen settings, provided the researchers with the data. Between May 2023's first day and October 2023's last, data were gathered during six months. Each interview questionnaire was filled out in about 30 to 35 minutes.

The preparatory, implementation, and evaluation phases made up the three stages of the current study.

A-Preparatory phase:

The researchers analyzed the recent and older literature that was available, including books, journals, magazines, and internet searches. The researchers will initiate data collection by firstly collecting demographics.

A pilot study

A pilot study was conducted on 10% (10 patients with deep vein thrombosis) of the total sample to test the clarity and feasibility of the research process. No modifications were carried out to develop the

final form of the tools. Patients who were in the pilot study were included in the research study.

Ethical considerations:

The research was granted the ethics committee's approval. The study's goal was explained to the medical and nursing directors of the chosen setting, and their agreement was obtained. To secure the patients' cooperation, written consent was acquired from them. This letter asking for permission to gather data highlighted the study's purpose as well as the anticipated results from its implementation. The study's goal was disclosed to the patients. The trial was voluntary, and patients were free to decline to participate, the researchers told them. Patients had the right to leave the study at any time and without explanation. It was guaranteed to patients that their data. Patients were assured that their information would be confidential and used for research purposes only.

Administrative design:

To complete this study, administrative approval was sought through a letter from the dean of the nursing faculty at Qena University to the director of the previously chosen setting linked with the hospital.

B- Implementation phase:

The researchers met patients with deep vein thrombosis individually at waiting areas present at previously selected settings and explained the aim of the study after introducing themselves to patients. The data collection tools were distributed to the studied adult patients twice; (1) pre-test to assess their knowledge, risk assessment, and preventive strategies among orthopedic surgical patients with deep vein thrombosis before implementing the educational program. (2) Post-test to assess adult patients' knowledge, risk assessment, and preventive strategies among orthopedic surgical patients with deep vein thrombosis after one month of educational program implementation.

Informed consent was obtained from the patients who were selected by a convenient sampling technique. The knowledge was

assessed and the risk score was assessed based on Wells criteria and patients were categorized under mild, moderate, or severe risk. The preventive strategies used were also identified.

The patient was introduced to the researcher, who then went on to describe the study's overall goal and request their oral consent for participation. The data was gathered by the researcher during the initial interview with each patient, which lasted between 5 and 10 minutes and took place in the aforementioned settings. Following this, they explained the program's content through the teaching brochure.

Plan of the session: The study sample's data were collected in the inpatient orthopedic department during their hospital stay (which ranged from one to five days), and then in the outpatient clinic for follow-up. The study group participated in 3–4 sessions in total for data collection and training. Each session lasted between 10 and 15 minutes, depending on the patient's tolerance. Each session concluded with a discussion and an opportunity for feedback. The researcher provided study participants with a handout (a photo brochure) as educational material after the session. The handout was created by the researcher after evaluating pertinent literature.

After reviewing the pertinent literature based on the evaluation of the actual needs of the studied patients, a simplified booklet was used as a supporting material and given to patients in the Arabic language to cover all items regarding knowledge, risk assessment, and preventive strategies among orthopedic surgical patients with deep vein thrombosis. Various instructional techniques were employed, including lectures, group discussions, photographs, and posters.

The educational program was created and put into action by the researchers as a combination of theoretical and practical components (preventive techniques). Deep vein thrombosis knowledge of patients was part of the theoretical component. It was put into practice via lectures, posters, instructional movies, play scenarios, and role-plays. Patients were provided an informational pamphlet about deep vein thrombosis that was written in easy Arabic language and illustrated with pictures.

The instructional program regarding deep vein thrombosis was introduced at the outset of the first session, and each subsequent session began with a summary of the feedback from the one before.

The educational program included knowledge regarding deep vein thrombosis as follows:

- Overview of deep vein thrombosis
- Definition of deep vein thrombosis
- Risk factor of deep vein thrombosis
- Causes of deep vein thrombosis
- Complications of deep vein thrombosis
- Information about how to reduce or prevent postoperative complications after surgery
- Medications post-discharge

The practical part contained information regarding preventive strategies for deep vein thrombosis. It was implemented through lectures, posters, and educational films.

The educational program included practices of preventive strategies regarding deep vein thrombosis as follows:

- Weight control
- Overview of deep vein thrombosis
- Steps of application of elastic stocking
- types of exercise
- types of range
- Compression stockings.
- Intermittent pneumatic compression devices increase blood velocity
- Leg exercises.
- Encourage early mobilization and leg exercises to keep the blood circulating adequately.
- Nursing guidelines for weight control

Evaluation of the program:-

Immediately after the implementation of the training program, each patient was assessed using the study tools used pre-program. The evaluation of the patients included in the study was carried out after one month of post-program implementation in the outpatient clinic when patients came for the follow-up.

Statistical analysis:

The researchers used Microsoft Excel software to code, process, and analyze data obtained from earlier tools and outcome measurements. For data analysis and graphical presentation, data were imported into SPSS version 25 (the Statistical Package for the Social Sciences). Quantitative variables were described by mean and standard deviation (SD), while qualitative categorical variables were described by frequencies and percentages. **Chi-squared test** of independence was used for categorical variables. The correlation by Pearson's correlation **linear correlation coefficient (r)** was used for the detection of correlation between two quantitative variables in one group. The significance (p-value) was considered Non-significant (NS) P-value < 0.05, Significant (S) P-value ≤ 0.05, and Highly significant (HS) P-value ≤ 0.001.

Results:

The average age of the patients under study was 41.77 5.67 years, according to **Table 1**. 58% of the patients in the study were female, 40% of whom had higher education, 60% of whom were employed, and 65% of whom lived in rural areas.

Figure (1) showed that 75% of the patients who participated in the study said that doctors were their primary source of information on deep vein thrombosis.

Table 2: Displayed that a significant portion of the study's participants had more knowledge of deep vein thrombosis after the implementation of the educational programme than before. Before and after the educational program's execution, there was a highly statistically significant difference between the studied patients' knowledge of deep vein thrombosis (P<0.001).

Figure (2) showed that, when compared to before the educational program was implemented, there was an improvement in the overall knowledge level of the patients who were the subject of the study about deep vein thrombosis. After one month of the educational program's implementation, there was a very statistically significant difference between the level of all knowledge (P-value 0.001).

Table (3): Displayed that the risk assessment score for deep vein thrombosis in 30% of the patients

under study was high but had decreased to 7% after educational program implementation from 23% before to program implementation. Between the risk assessment scores of the analyzed patients for deep vein thrombosis before and after the execution of the educational program, a highly statistically significant difference was found ($P < 0.001$).

Table (4): Illustrated that the use of preventive strategies in the current study

showed that two-fifths of patients were on mechanical modalities and half of them on pharmacological modalities had moderate DVT risk. The table compared patients with Well's scores and preventive strategies used regarding deep venous thrombosis.

Table (5): In the current investigation, it was shown that patients who were working women and over the age of 50 had a statistically significant increased risk of developing deep vein thrombosis (DVT), with a p-value of 0.02 for each.

Table (1): Demographic characteristics of the studied patients with deep venous thrombosis (n=100)

Items	No.	%
Age in years	M±SD	41.77 ± 5.67
Gender		
Male	42	42.0
Female	58	58.0
Education level		
Illiterate	15	15.0
Read and write	17	17.0
Secondary education	28	28.0
Higher education	40	40.0
Occupation		
Working	60	60.0
Not working	40	40.0
Residence		
Rural	65	65.0
Urban	35	35.0

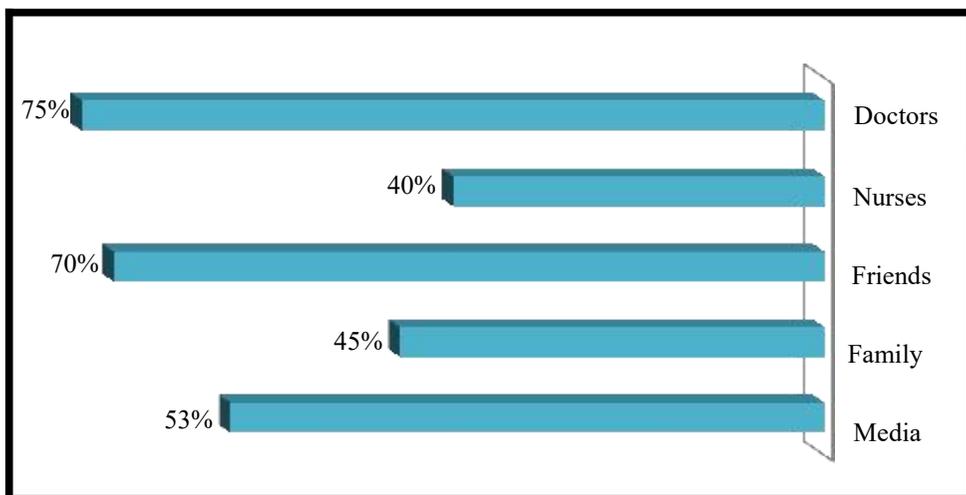


Figure (1): Source of knowledge among the studied patients about deep venous thrombosis (n=100)

Table (2): Comparison of patients' knowledge regarding deep venous thrombosis pre and post-

Patients' knowledge	Pre educational program Implementation (No/%)	Post educational program Implementation (No/%)	P-value
Overview of deep venous thrombosis	30 (30)	76 (76)	<0.001*
Definition of deep venous thrombosis	17(17)	70(70)	<0.001*
Risk factor of deep venous thrombosis	25 (25)	82(82)	<0.001*
Causes of deep venous thrombosis	18(18)	75 (75)	<0.001*
Complications of deep venous thrombosis	27 (27)	92 (92)	<0.001*
Medications post-discharge	23 (23)	87 (87)	<0.001*
Information about how to reduce or prevent postoperative complications after surgery	32 (32)	80(80)	<0.001*

*highly significance at <0.001levels

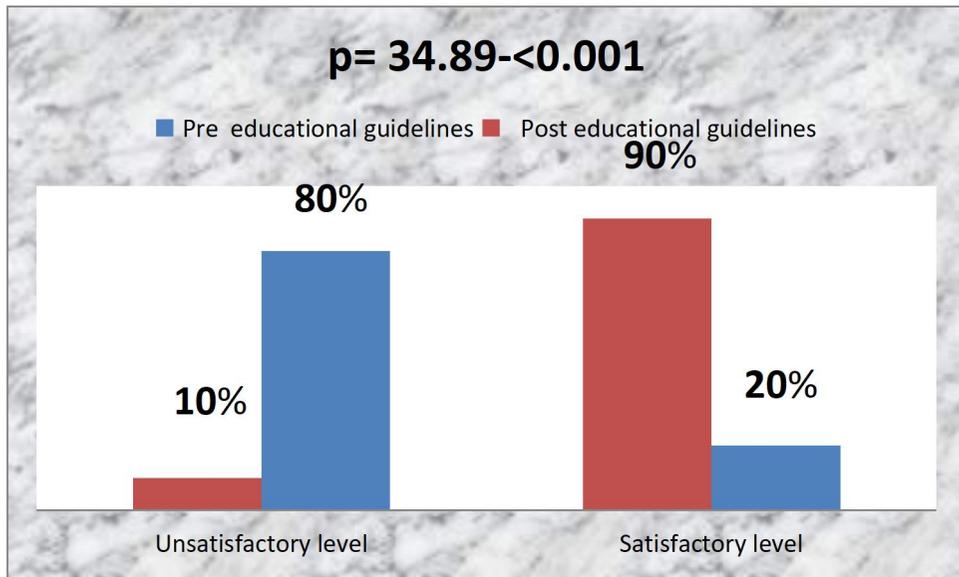


Figure (2): Total knowledge level of the studied patients regarding deep vein thrombosis pre and post-educational program implementation

Table (3): Differences in patients' risk assessment score regarding deep venous thrombosis pre and post-educational program implementation (n=100)

Risk assessment score criteria (well's score)	Pre educational program Implementation (/%)	Post educational program Implementation (No/%)	P-value
Low DVT risk	0.0	43.0	<0.001*
Moderate DVT risk	70.0	50.0	
High DVT risk	30.0	7.0	

*highly significance at <0.001levels

Table (4): Comparison of patients with Well's score and preventive strategies used regarding deep

venous thrombosis (n=100)

(well's score)	Mechanical modalities				Pharmacological modalities	
	Pneumatic compression devices		Crepe bandages		LMWH	
	No	%	No	%	No	%
Low DVT risk	30	30.0	10	10.0	20	20.0
Moderate DVT risk	40	40.0	25	25.0	50	50.0
High DVT risk	30	30.0	65	65.0	30	30.0

*highly significance at <0.001levels

Table 5: Association between risk assessment and selected baseline variables (n = 100)

Baseline variables	Well's score		χ^2	p-value
	Moderate risk	High risk		
Age in years				
≤ 50	48	7	4.78	0.02*
>50	46	19		
Gender				
Male	51	15	6.02	0.02*
Female	43	11		
Occupation				
Working	67	25	7.25	0.02*
Not working	27	1		

*p<0.05 (significant)

Discussion

A potentially fatal consequence is deep venous thrombosis (DVT). The majority of venous thromboembolism instances are caused by it. Without the proper prophylaxis, patients undergoing high-risk orthopedic procedures—specifically, total hip arthroplasty, total knee arthroplasty, and hip fracture repair surgery—are at a greatly elevated risk (Kamerkar et al., 2016).

A blood clot that forms in a deep bodily vein causes a dangerous illness known as deep vein thrombosis (DVT). A blood clot is an accumulation of blood that has solidified. Although they can happen anywhere in the body, deep vein blood clots commonly occur in the thigh or lower leg. Thromboembolism, post-thrombotic syndrome, and postphlebotic syndrome are some additional terms for this illness that may be used (Delgado, 2019).

The current study's findings showed that the patients who were evaluated had an average age of 41.77 + 5.67 years. More than half of the patients in the study were female, and two-thirds of them lived in rural areas.

These findings concur with those of Shalu et al. (2022), who investigated "Risk assessment and preventive strategies of Deep Vein Thrombosis

among patients admitted in Intensive Care Units of a selected hospital in Mangaluru" and discovered that the individuals were selected with a mean age of 54.69 17.74 .

This outcome is in line with the findings of a study by Mohammed et al. (2017), who investigated the "Effect of Implementing Nursing Care Guidelines on the Occurrence of Deep Vein Thrombosis among Orthopaedic Patients." They noted that "more than half of the participants were female.

The results of the current study are comparable to those of Shalu et al., (2022), which found that less than two-thirds of the sample as a whole resided in rural areas. According to the experts, it can be explained that girls are more likely than males to suffer from diseases like obesity, smoking, and decreased activity. Additionally, it illustrated the root of knowledge gaps caused by a lack of resources to access enough deep venous thrombosis information.

The results of the current study's inquiry into the investigated patients' primary sources of knowledge regarding deep venous thrombosis revealed that three-quarters of them said that their primary sources of knowledge regarding deep venous thrombosis were physicians. According to the researchers, this

demonstrated how patients are properly led when seeking therapies and support from such a trained person. The relevance of medical personnel in providing patients with correct information about their conditions is also highlighted by this outcome.

A highly statistically significant difference between the analyzed patients' knowledge of deep vein thrombosis before and after the execution of the educational program was found, according to the study's findings. From the researchers' point of view, this confirmed the positive effects of educational program in improving patients' knowledge.

The results of the present study showed that, when compared to before the implementation of the training program, there was an improvement in the overall knowledge level of the investigated patients about deep vein thrombosis. After one month of the educational program's implementation, there was a very statistically significant difference between the level of all knowledge (P-value 0.001). From the standpoint of the researchers, these findings are acceptable because they significantly lowered the number of patients who got DVT compared to the control group by offering a valuable nursing teaching program to the study group of patients .

Similar outcomes were reported by (Shalu et al., 2022). Additionally, the findings are consistent with those of (Mohamed et al., 2017) who conducted a study titled "Effect of Implementing Nursing Care Guidelines on the Occurrence of Deep Vein Thrombosis Among Orthopaedic Patients". They found that "The intervention is also beneficial in terms of patient outcomes, with significantly lower DVT risk grade and score compared with the control group patients."

Furthermore, according to (Yin & Shan, 2015), "there was a statistically significant difference between DVT incidence in the two groups, where the number of patients with DVT in the intervention group was lower due to the different risk levels and corresponding nursing intervention." According to the researchers, this outcome illustrates the beneficial effects of educational program implementations that cater to patients' needs and give them the information they need to maintain their health and lower risk.

According to the study's findings, less than one-third of the patients under study had a high-risk assessment score for deep vein thrombosis, which had decreased to less than ten percent after the execution of the training program. Pre and post-implementation of the teaching program, a highly statistically significant difference in the risk assessment score for deep vein thrombosis among the study patients was found. This progress highlights the fact that most patients want to learn more about their ailments and demonstrate the program's effectiveness.

The study's results showed that when patients with Well's scores and preventive strategies used for deep vein thrombosis were compared, the use of preventive strategies in the present study revealed that two-fifths of patients were using mechanical modalities and half were using pharmacological modalities, both of which had moderate DVT risk. This demonstrated the positive effects of employed preventive measures. This finding is backed by (Shalu et al., 2022) who also discovered similar findings.

Nekoonam et al. (2016) did a study on the assessment of deep vein thrombosis prophylaxis in the ICU in Iran. The study's goal was to determine how deep vein thrombosis (DVT) prophylaxis should be administered in the ICU of an Iranian teaching hospital. A total of 52 patients were included in the study, most of whom needed DVT prophylaxis. Of them, slightly more than ten percent underwent mechanical prophylaxis, while the rest underwent pharmaceutical prophylaxis. Enoxaparin was given to two-thirds of the subjects receiving pharmacological prophylaxis, whereas heparin was given to the other patients.

The results of the current study showed that, statistically significantly, patients who were female, over 50, and employed were more likely to experience high-risk DVT development. This can be explained by the fact that older people are more susceptible to a variety of ailments, DVT included. The current study is comparable to (Shalu et al., 2022) which found that participants over the age of 55 and those who had a diagnosis upon admission were more likely to acquire high risk

for DVT as statistically significant.

When they stated that "the present study results reported that the risk of development of DVT had a significant association with patient's age, with the risk increasing with older age," **Anderson et al. (2019)** followed in the same vein. In agreement with this, a study conducted in Turkey found that patients' ages were a crucial factor that raised the risk of DVT among those undergoing orthopedic surgery. The notion was confirmed by the research's results. The application of educational procedures was beneficial in minimizing DVT among orthopedic surgical patients, according to **Ahmed et al., (2021)**.

Conclusion:

According to the study's findings, the study concluded that the educational program implementation had a significant positive effect on reducing risk assessment and preventing deep vein thrombosis among orthopedic surgical patients. The findings of the study showed that there is a significant association between age, gender, and occupation with the risk of developing DVT.

Recommendations:

The following recommendations were drawn from the study's conclusions based on its findings:

- The educational program regarding deep vein thrombosis prevention should be conducted and integrated into the rehabilitation programs.
- There should be a strict risk assessment of Deep Vein Thrombosis and the implementation of preventive strategies accordingly among all orthopedic surgical patients.
- Provide the patients with a booklet and illustrated pamphlets for each one to improve their information and reduce their risk for deep vein thrombosis
- Replication of the current study with a larger sample of patients with deep vein thrombosis in different settings is required for generalizing the results.

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