

Autar Scale Based Nursing Intervention Efficacy on Reducing Incidence of Deep Vein Thrombosis among Orthopedic Surgery Patients

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Abstract

Background: Deep venous thrombosis (DVT) is a major prevalent problem for orthopedic surgery patients. The Autar DVT scale can be used to quantify the risk of developing DVT and reduce post-operative complications. **Aim:** The study aimed to investigate the Autar scale-based nursing intervention efficacy on reducing the incidence of deep vein thrombosis among orthopedic surgery patients. **Design:** This study used a quasi-experimental research design (study and control group). **Sample:** A purposive sample of 100 adult patients with lower extremities orthopedic surgery. **Setting:** The research was conducted at the Mansoura University Hospital's orthopedic inpatient departments. **Tools:** Two tools were used, **Tool I:** Patient's DVT Assessment Sheet and **Tool II:** The Autar scale. **Result:** The DVT incidence rate on the third postoperative day in the study group was lower than that of the control group with a statistically significant difference ($p < 0.05$). **Conclusion:** Nursing intervention based on the Autar scale has a positive effect on reducing the incidence of deep vein thrombosis among orthopedic surgery patients. **Recommendation:** The Autar scale can be used in conjunction with enhanced nursing interventions and preventative measures to obtain the best predictive effects as revealed in this study, increase work efficiency, and reduce the occurrence of DVT.

Keywords: Autar scale, Deep vein thrombosis, Nursing Intervention, Orthopedic surgery patients

Introduction

Deep venous thrombosis (DVT) is thought to be a substantial source of pulmonary embolism, morbidity, and even fatality, particularly in patients who have undergone severe orthopedic surgery or who have experienced trauma (Liu, et al., 2020). Deep venous thrombosis (DVT) and pulmonary embolism (PE) are both significant venous thromboembolism (VTE) clinical symptoms. Particularly, patients undergoing major orthopedic surgery, such as total hip replacement, total knee replacement, and hip fracture surgery, were reported to present with DVT in 19.5-32% of patients preoperatively and up to 56% of patients postoperatively (Khalid, et al., 2021; Niu, et al., 2021).

Venous thromboembolism is venous stasis, blood hypercoagulability, and endothelial dysfunction are three conditions that can lead to the development of a blood clot inside a vein that prevents normal blood flow (Deng, et al., 2021). The prevalence of postoperative venous thromboembolism (VTE) is high, making it crucial for prevention and management to have a thorough awareness of the epidemiologic

features of DVT, particularly the pertinent risk factors. Numerous risk factors, such as advanced age, male gender, obesity, a history of DVT or PE, immobility, smoking, or the actual fracture itself, have been linked to DVT (Huang, Li, & Jiang, 2016; Williams, Little, Kramer & Benirschke, 2016).

The incidence of VTE after orthopedic surgery varies greatly, with published rates ranging from 1-2% to 60% (Deng et al., 2021). This variation is caused by the heterogeneity of the examined populations, various treatment approaches, and diagnostic techniques. The coagulation factor is triggered by surgery or severe trauma to the lower extremities, which upsets the physiological balance between the chemicals that stimulate and causes coagulation delaying and results in a hypercoagulable state. For this, decreased venous flow and reduced endothelial function further enhance the risk of developing deep vein thrombosis and pulmonary embolism.

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, 2015). Diagnostic methods for suspected lower extremities symptomatic deep vein thrombosis are typically non-invasive and include D-dimer levels, clinical probability assessments, and ultrasound (Bernardi & Camporese, 2018).

In thromboprophylactic therapies, patients undergoing major orthopedic surgery must be provided with preventative measures such as educational program, applied basic prevention approaches, physical prevention tactics, and suitable antithrombotic drugs. These interventions should preferably focus on the patient to encourage engagement and adherence (Xu, Zhao, & Chen, 2018). When the molecular weight heparin is low, elastic compression stockings, and pneumatic compression devices are only a few of the successful treatments that have been implemented to improve DVT prophylaxis. However, these prophylaxes are not routinely administered. (Al-Hameed, et al., 2017)

The Autar DVT scale can be used to quantify the risk of developing DVT for nursing assessments, preventing incorrect assessments brought on by varying degrees of clinician competence. The scale was first adopted by Autar in 1996 and is based on Virchow's trinity of DVT risk factors: diminished blood flow velocity, damaged arteries, and coagulation abnormalities (Yin, & Shan, 2015).

Most medical professionals typically gauge a patient's DVT risk according to their individual experiences, which is inappropriate for a professional evaluation. Implementing the Autar scale as a standard tool for DVT risk assessment may be advantageous for healthcare providers to help them identify patients with DVT risk objectively and without relying on expertise (Mousa, Mahdy, Mahmoud, & Mohamed, 2022).

In detecting and controlling DVT hazards, the nursing profession can contribute significantly. The best people to conduct daily DVT prophylaxis assessments, according to a Canadian study, are nurses. Patients' unique needs and doctors' expertise can sometimes be incompatible, but nurses whose main duty is to advocate for patients can help. Systematic and consistent patient education provided by nurses in the United States reduced morbidity and mortality rates (Yu-Fen et al., 2018).

Significance of the study:

With an annual incidence of 1.6 per 1000, deep vein thrombosis is a frequent venous thromboembolic (VTE) condition. Recurring thrombosis and "post-thrombotic syndrome" are significant causes of morbidity, even in patients who do not develop pulmonary emboli. The majority of pulmonary embolism instances are caused by DVT, a serious medical issue. The morbidity can only be decreased by early diagnosis and treatment (Schick, 2023).

According to Rahman et al. (2020), DVT incidence rates without prophylaxis are between 40% and 60%, making it most frequent in orthopedic patients than in the general population. Also, Flevas et al., (2018), in about 6% of patients with DVT, mortality occurs within one month of diagnosis and about 12% of patients with pulmonary embolism. DVT is the most common venous thrombosis, with a prevalence of one case per 1000 population (Said, & Abdel-Moneim, 2017).

From the researcher's extensive studying of the literature, deep venous thrombosis affects the majority of orthopedic patients who return to the doctor. This condition can be minimized mechanically by exercising, using elastic stockings, and range-of-motion exercises. So, this study was applied to investigate the effect of nursing intervention based on the Autar scale on reducing the incidence of deep vein thrombosis among orthopedic surgery patients.

Aim of the study:

The study applied to investigate the Autar scale-based nursing intervention efficacy on reducing the incidence of deep vein thrombosis among orthopedic surgery patients.

Research hypothesis:

Orthopedic surgery patients who adhere to nursing intervention based on the Autar scale would experience reduced incidence of deep venous thrombosis.

Subjects and Method:

Research design:

This study used a quasi-experimental research design (study and control group)

Setting:

The research was conducted at the Mansoura University Hospital's orthopedic inpatient departments.

Subject:

A purposive sample of 100 patients who were hospitalized in the orthopedic inpatient departments for lower extremities orthopedic surgery. Patients whose ages ranged from 18 up to 60 years old, from both sexes, were free from any other chronic conditions and agree to participate in the study.

The patients were assigned to study and control groups, 50 patients in each group; the study group received the nursing intervention based on the Autar scale while the control group received routine nursing.

Sample size:

According to the following literature (**Yin, & Shan, 2015**), considering the level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula: $n = [(Z\alpha/2 + Z\beta)^2 \times \{2(SD)^2\}] / (\text{mean difference})^2$, where SD stands for standard deviation; $Z\alpha/2$ is 1.96 and $Z\beta$ is 0.84. Therefore, $n = [(1.96 + 0.84)^2 \times \{2(11.02)^2\}] / (8.0)^2 = 98.9$ accordingly, the sample size required for the study is 100 orthopedic surgery patients.

Sample randomization:

It was achieved by requesting that each patient select a piece of paper. The patient who selects number one in the paper is in the study group and number two in the paper is in the control group.

Data collection tools:

For this study's data gathering, two instruments were used:

Tool I: Patient's DVT Assessment Sheet.

Researchers developed it after reviewing the national and international related literature (**D'Alesandro, 2016 & Rahman et al., 2020**), it was made to evaluate the patient's risk factors for developing DVT and divided into two parts:

- Part 1: Included demographic data about the patient's age, sex, and education.
- Part 2: The patient's medical record to evaluate patients' medical data such as having a femoral fracture, tibial fracture, foot

fracture, ankle fracture, hip joint dislocation, and risk factors for deep venous thrombosis among those patients as mobility, trauma risk injury, and body mass index.

Tool II: The Autar scale (Autar, 2003): In 1996, The DVT risk factors listed by Virchow, which included slow blood flow, damaged arteries, and irregular coagulation, served as the basis for Autar's scale. The Autar DVT scale was created to proactively identify persons who are at risk of DVT so that the necessary prophylaxis can be started as soon as is practical. The majority of the time, it is applied to hospitalized surgical patients.

Scoring system:

Overall, 30 points are given. The following seven types of risk variables make up the 41 items: Age in years Physical mobility (ambulant: 0 points; limited with self-assistance: 1 points; very limited with assistance: 2 points; wheelchair-bound: 3 points; bed-bound: 4 points), particular DVT risks (contraceptive pill: 20-35 years old, 1 point; >35 years old, 2 points; pregnancy or puerperium: 3 points), body mass index (16- 19 points; 20-25 points; 26-30 points; 31-35 points; 36-40 points; 41-45 points; 46-50 points; 51-60 points; 61-65 points; 66-70 points; 71-75 points; 76-80 points; 81-85 points; 86-90 points; 91-95 points; 96-100 points): 2 points; spinal: 2 points; pelvic: 3 points; lower limb: 4 points; surgery (minor: 1 point; major: 2 points; emergency major: 3 points; pelvic: 3 points; thoracic: 3 points; abdominal: 3 points; orthopaedic below the waist: 4 points; spinal: 4 points); high-risk illness (ulcerative colitis: 1 point; sickle cell anaemia: 2 points; polycythaemia anaemia: 2 points; haemolytic

The scale comprises four risk levels: no risk (score 6), low risk (DVT probability 10%), moderate risk (DVT probability 10%–40%), and high risk (DVT probability > 41%), which is scored with a point value of 15.

Validity:

A group of three experts in medical-surgical nursing, the faculty of nursing-Mansours University, and two experts in orthopedic surgeries, the faculty of medicine-Mansours University would review the study instruments for clarity, relevance, comprehensiveness, understanding, and applicability to assess the tools' content validity.

Reliability:

To ascertain how closely the tools' components are connected, the tools' dependability was examined. In this investigation, Cronbach's Alpha was discovered to be (0.889) (**Tool I**).

The Autar DVT scale possesses 100% sensitivity, 81% specificity, and a correlation coefficient of 0.98 when studied in trauma and orthopaedic hospitals (Autar, 1998). It is a reliable and reliable measurement.

Pilot Study:

The feasibility, objectivity, and application of the data collection methods & scales were examined in pilot research on 10% (10 patients) of the total sample. The researcher made refinements and alterations in light of the findings of the pilot study. These patients were excluded from the study sample.

Ethical Consideration:

The head of the orthopedic departments and the ethics committee of the faculty of nursing at Mansoura University (**Ref. No. P. 0463**) both gave their approval. Subjects provided oral consent after being informed about the study's purpose and receiving an explanation of it. Through data encryption and protection, each subject's confidentiality and anonymity were guaranteed.

Procedures:

- From March 2023 to June 2023, two days per week, during the morning or evening shift, data collecting for this project was conducted.
- The researchers began by introducing themselves to the patients, outlining the study's overall goal, and asking them to verbally consent to participate.
- Following a review of pertinent literature, the researcher developed an educational booklet.
- Firstly, the researchers gathered demographic and medical information. The data were gathered by the researchers during the initial interview with each patient, which lasted between 15 and 20 minutes and took place in the aforementioned setting.
- Researchers distributed the educational booklet to the study participants as nursing intervention information and training practices for patients undergoing orthopedic surgery which include: A description of deep

vein thrombosis, instructions for putting on elastic stockings, thigh strengthening exercises, and range of motion exercises all given. Instructions also cover the frequency and duration of the workouts that the patients were required to complete.

- Following this, the content of the educational booklet was presented to patients for the study group, data collection and training sessions lasted a total of 4-5 sessions depending on the patient's tolerance, each session lasted between 10 and 15 minutes. Each session concluded with discussion and feedback.
- Autar scale-based nursing intervention started after determining a risk level, and thus, preventive measures were implemented in accordance with that level as the following:
 - **No risk**, before surgery, patients received basic instruction from researchers on how to prevent DVT in daily life. As foods with high fat and sugar thicken the blood and slow blood flow, this meant eating a light diet and avoiding them. Patients were instructed not to dress constructively, especially while wearing leggings, and to always stay warm to minimize blood clotting and the vasoconstriction that chilly settings encourage. Additionally, patients were instructed to avoid spending a lot of time sitting or resting flat on their backs and to elevate their legs to a specific height when lying supine to promote blood flow velocity and prevent blood stasis.
 - **Low risk**, in addition to learning DVT prevention techniques, patients with low DVT risk were also given instructions on how to undertake passive or active exercises like stretching, foot rotation, and flexing on their own or with the assistance of their healthcare providers. Low-risk patients were advised to start walking as soon as feasible and were given direction by researchers in accordance with the nursing intervention for lower limb functional activity.
 - **Moderate risk**, patients with a moderate risk of DVT needed to take mechanical, pharmaceutical, or both types of preventative treatments. Additionally, they had to adopt early ambulation and health education. Patients at moderate risk were

given graduated compression stockings, two mechanical prophylactic devices that check the skin and temperature of the lower limbs twice daily at intervals of 20 to 30 minutes. The patients had to become more tolerant of both kinds of gadgets and learn which one was best for them as well as how to use it.

- If a patient had congestive heart failure, pulmonary edema, vascular lesions in the lower limbs, or compromised skin integrity, it was advised that they forgo mechanical prophylaxis. Pharmacological prophylaxis included regular coagulation function monitoring and biochemical tests coupled with the subcutaneous administration of 40 mg/dose of low molecular heparin as prescribed by a physician once a day. If a patient developed problems with blood clotting or bleeding, a low platelet count, or a recent skull injury, pharmaceutical prophylaxis was not permitted.
- **High risk** for individuals with a high risk of developing DVT, both mechanical and pharmaceutical prophylaxes were advised. While molecular heparin (Fraxiparine) was applied twice daily in accordance with a doctor's prescriptions, the intermittent pneumatic compression's duration and frequency were both increased to three times daily from two. Body areas like the skin, mucosa, and gums are particularly vulnerable to bleeding due to the injection of anticoagulant medications. The patients were told to wash their teeth carefully and to avoid running into each other. Additionally, Blood coagulation had to be constantly checked, the period under pressure after injection had to be extended, and the drug had to be stopped entirely or the amount adjusted if an irregularity, like abnormal bleeding, was noticed.
- The control group received conventional nursing care and pharmaceutical prophylactic measures were used, based on clinical experience and fundamental knowledge, the patients were considered to be at high risk for DVT. The control groups were successfully evaluated using the Autar scale; no preventative measures were taken in response to the results of the Autar scale,

which were only used to compare the scores with those of the study group.

- All cases were collected based on Autar scale scores after admission.

Statistical analysis:

Version 20 of the statistical package for social Science (SPSS) was used to analyze the data. Data in numerical form were presented as means and SD. The independent sample *t*-test was used for comparing differences in baseline data and D-dimer levels between the two groups. The continuous correction χ^2 test or chi-square test was used for comparing the differences in DVT incidence between the two groups. Less than 0.01 was regarded as highly significant, while P values under 0.05 were deemed significant.

Results

According to **Table 1**, the current study clarifies that 30% of the study group ranged between 30< and 40 years old, whereas 52% of the control group's patients were between the ages of 40 and < 50. The mean age for the study and control groups was 44.72±11.55 and 40.89±11.33 years old, respectively, while the higher percentage of female patients in the study group was (56%) and the higher percentage of male patients in the control group was (58%). 66% and 68%, respectively, of the control and study groups had secondary education.

Table 2: Showed that the majority of the patients in the control and study groups had tibia fractures as their primary diagnosis. Regarding the risk factors of deep venous thrombosis among those patients, In terms of mobility, the current study reveals that 56% of the control group and 54% of the study group, respectively, experience very limited mobility. Regarding the trauma risk injury, both groups of patients (96% and 98%) experienced lower limb damage. According to the current study's findings on body mass index, 46% of the control group and 40% of the study group, respectively, are obese. In both the study and control groups, 100% of the patients underwent orthopedic operations that fell into the high-risk category.

Table 3 shows the pre-surgery Autar scale scores for the two groups, together with the number of patients in each DVT risk category,

with no statistically significant differences between the control and study groups.

Table 4 demonstrates that there was no statistically significant difference between the mean D-dimer levels in the control and study groups. On postoperative day 3, a statistically significant difference was detected between the two groups ($p < 0.05$) in the D-dimer levels (846 ± 232 mg/L vs. 637 ± 221 mg/L) between the control and study groups.

Figure 1 demonstrates there were statistically significant differences between the incidence of DVT in the two groups. As a result of the different risk levels and appropriate nurse intervention, there were fewer patients with DVT in the intervention group. The study group's DVT incidence rate was 2%, while the control group was 14%. A difference in DVT incidence between the study and control groups was statistically significant ($p < 0.034$).

Table 1: The study and control groups distribution regarding demographic data n= (100)

Items	Study group		Control group		X2	p. value	
	No	%	No	%			
Age by years(mean ± SD)	44.72±11.55		40.89±11.33				
18 < 30yrs	9	18.0	7	14.0	9.49	.089	
30<40yrs	15	30.0	12	24.0			
40<50yrs	12	24.0	26	52.0			
50≤60yrs	14	28.0	5	10.0			
Sex	Male	22	44.0	29	58.0	2.000	.118
	Female	28	56.0	21	42.0		
Educational level	Read and write	5	10.0	7	14.0	.402	.389
	Primary education	11	22.0	10	20.0		
	Secondary education	34	68.0	33	66.0		

X2: Chi square test

Ns= Non-significant difference $P > 0.05$

Table 2: The study and control groups distribution regarding medical data and risk factors for deep venous thrombosis among orthopedic surgical patients n= (100)

Items	Study group		Control group		X2	p. value
	No	%	No	%		
Type of fracture						
Femoral	9	18.0	10	20.0	22.39	.138
Foot	3	6.0	5	10.0		
Ankle	6	12.0	9	18.0		
Tibial	22	44.0	15	30.0		
Hip joint dislocation	10	20.0	11	22.0		
Mobility						
Ambulant	4	8.0	4	8.0	18.37	.001**
Limited	14	28.0	14	28.0		
Very limited	27	54.0	28	56.0		
Complete bed rest	5	10.0	4	8.0		
Trauma risk injury						
Head injury	1	2.0	0	0.0	3.059	.367
Pelvis injury	1	2.0	1	2.0		
Lower limb injury	48	96.0	49	98.0		
Body mass index						
Average 20-25	14	28.0	13	26.0	7.178	.106
Overweight 26-30	15	30.0	11	22.0		
Obese 31-40	20	40.0	23	46.0		
Very obese ≥ 40	1	2.0	3	6.0		
Risk category						
High risk	50	100.0	50	100.0	----	----

X2: Chi square test

**= highly significance * $p \leq 0.01$

Table 3: Autar scale scores and patients at each DVT risk level pre-surgery

Group	No risk	Low risk	Moderate risk	High risk	Autar scale scores (mean \pm SD)
Study	6 (12%)	12(24%)	18(36%)	14(28%)	16.69 \pm 1.97
Control	4(8%)	14(28%)	16(32%)	16(32%)	15.31 \pm 2.22
P. value	0.703	0.705	0.972	0.626	0.128

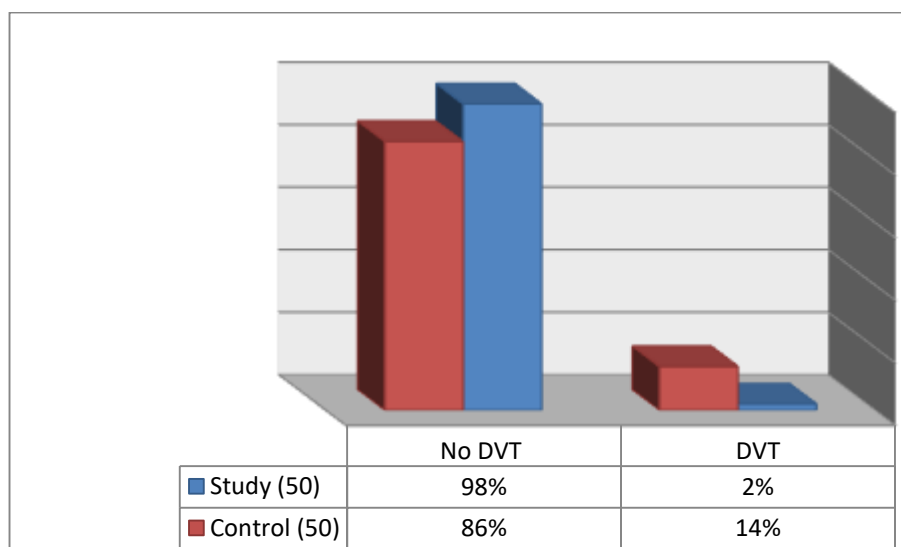
Ns= Non-significant difference $P>0.05$

Table 4: D-dimer levels of the two groups (mg/L; mean \pm SD).

Group (n)	Preoperative	3rd Day postoperative
Study (50)	316 \pm 155	637 \pm 221
Control (50)	334 \pm 178	846 \pm 232
T	0.566	8.289
P. value	0.072	0.000**

T (t test) **= highly significance $*p\leq 0.01$

Ns= Non significant difference $P>0.05$



*= significance $*p\leq 0.05$

Figure 1: DVT incidence in the two groups

Discussion

Deep venous thrombosis (DVT) is a problem that may be lethal. It is to blame for the majority of venous thromboembolism instances. Patients who undertake high-risk orthopedic procedures like total hip, total knee, and hip fracture repair surgery run a substantially higher risk without the correct prophylaxis (Kamerkar et al., 2016). When a blood clot develops in a vein deep within the body, it can lead to a dangerous illness known as deep vein thrombosis (DVT). A blood clot is

a collection of blood that has solidified. Although they can occur anywhere in the body, deep vein blood clots commonly develop in the thigh or lower leg. Thromboembolism, post-thrombotic syndrome, and postphlebotic syndrome are possible alternate names for this illness (Delgado, & Holland, 2019).

The current study shows that the mean age for the study and control groups was 44.72 ± 11.55 and 40.89 ± 11.33 years old, respectively, more than half of the study group patients are female, whereas more than half of

the control group patients are male. In contrast to the findings of the present study, (Mohamed, Othman, El Alphy, & Sheble., 2017) claimed that "more than half of the participants aged the same years with mean age 47.3 and the majority of study participants were female.

According to the current study, the majority of patients in the control and study groups had tibia fractures as their primary diagnosis. The results of the most recent study, according to Hussein, Mohammad, Elkady, & Ghanem (2020), showed that "Concerning surgically treated joint, the right hip was the most common."

According to the current study, more than a quarter of the study group's participants were aged between thirty and forty, compared to fifty percent of the patients in the control group who were between forty and fifty. The findings of the current study showed that patient age had a significant impact on the likelihood of developing DVT, with the risk increasing with older age. Anderson et al. (2019) noted that "the present study results reported that" in agreement with the findings of the current study. According to a Turkish study, patients' ages were a significant factor that increased the risk of DVT among those undergoing orthopedic surgery.

In terms of mobility, the current study reveals that more than half of the study group and the control group had very limited and limited mobility and almost all both groups of patients experienced lower limb damage. From the researchers' point of view, it may be related to the pain associated with DVT. The findings of the study were corroborated by Gould et al., (2012), who stated that "The risk of DVT linked with immobilization in surgical patients is well known. It is difficult to separate the proportional contributions of the surgery because postoperative immobility is a normal outcome of the procedure itself and immobility. After all, these two factors are not strictly independent. The majority of the patients in both groups who had trauma-risk injuries had lower limb injuries.

The current study found that, in terms of body mass index, more than two-fifths of the study group and two-fifths of the control group

are overweight or obese, respectively. Lorenzet, Napoleone, Cutrone, & Donati, (2012) concurred with the findings of the study when they stated that "Obesity is associated with inactivity, increased intraabdominal pressure and decreased blood velocity in the legs, as well as with pro-inflammatory and prothrombotic states." Additionally, it was discovered by Klovaite, Benn, & Nordestgaard (2015) that "associations of BMI and waist circumference were about twice as strong with VTE compared to CHD and somewhat stronger with PE compared to DVT. From the researchers' point of view, these findings imply that efforts to address all forms of obesity and overweight should have significant positive effects on DVT prevention."

The current study findings revealed that the pre-surgery Autar scale scores for the two groups with no statistically significant differences between the control and study groups. From the researchers' point of view, it reflected the need for using the Autar scale-based nursing intervention on reducing the incidence of deep vein thrombosis among orthopedic surgery patients.

According to Wang et al., (2021), an interview of 50 orthopedics nurses from various institutions revealed utilized for preventing DVT in the clinic. Since most clinical indications of DVT are asymptomatic, objective and quantitative evaluation of a surgical patient can quickly stop the emergence of illness. Individuals with a high DVT risk may be simple to recognize due to clinical experience, however, individuals with low and moderate risk are not as simple to identify. The Autar DVT risk assessment scale consider a thorough and reliable tool that demonstrates the consistency of nurse assessments and serves as a guide for nursing practice in preventing DVT (Rahiminejad, et al., 2014). To standardize nursing assessment techniques and provide quantitative data for high-quality research, the Autar scale was utilized as an objective risk assessment instrument (Zhang, et al., 2019).

The current study demonstrates that there was a statistically significant difference between the mean D-dimer levels in the control and study groups. Early mobilization,

mechanical prophylaxis, and pharmaceutical prophylaxis are the basic components of DVT prevention. Early mobilization speeds up velocity of the blood flow in the lower limbs and is appropriate for patients with minimal risk, however, patients frequently display low pain and compliance when the surgical site was accidentally touched (Mullins et al., 2013). Mechanical prophylaxis is typically utilized for patients with varying risk levels and is primarily applicable for patients with low compliance and immobility, speeding blood flow velocity and stimulating anticoagulant production (Tan, et al., 2006). From the researchers' points of view, These indicators are efficient for enhancing patient satisfaction and lower hospitalization costs when paired with equivalent nursing interventions.

After using the nursing intervention, there were statistically significant differences between the study and control groups in terms of the incidence of DVT. From the researchers' point of view, it is reflected that applying the Autar assessment scale considered one of the most significant ways to avoid DVT, especially in high-risk patients According to the researchers, these findings are valid because they gave the study population a valuable nurse education regimen that had a definite positive impact on fewer patients developing DVT than in the control group. Also, a study by Mohamed, Othman, El Alphy, & Sheble., (2017), the research findings about the "Effect of Implementing Nursing Care Guidelines on the Occurrence of Deep Vein Thrombosis Among Orthopaedic Patients" were in line with the study's findings in that they demonstrated 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 distinct risk levels and corresponding nursing intervention"

Conclusions:

Nursing intervention based on the Autar scale has a significant effect on reducing the

incidence of deep vein thrombosis among orthopedic surgery patients.

Recommendations:

The Autar scale can be used in conjunction with enhanced nursing interventions and preventative measures to obtain the best-expected effects such as revealed in the current study, increase work efficiency, and reduce the occurrence of DVT.

Nurses should continuously and gradually examine the risk of deep vein thrombosis in orthopedic surgery patients.

Orthopedic surgery patients and their carers should get written Arabic simple booklets, brochures, and posters with post-orthopedic surgery discharge instructions from healthcare facilities.

The current study should be replicated with a bigger probability sample from other geographic locations to get conclusions that can be generalized.

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