

## Effect of Implementing Evidence-Based Nursing Practices Guidelines on Prevention of Deep Venous Thrombosis among Postpartum Women

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### Abstract

**Background:** Postpartum deep venous thrombosis is a leading cause of maternal mortality and can carry significant long-term morbidity. **Aim:** was to investigate effect of implementing evidence-based nursing practices guidelines on prevention of deep venous thrombosis among postpartum women. **Design:** A quasi-experimental research design. **Sample:** A purposive sample of two groups (50 women in study group and 50 women in control group). **Setting:** This study was conducted at antenatal clinic and postpartum unit of Obstetrics and Gynecological Department in Benha University Hospital, Qaluobia, Egypt. **Tools:** Four main tools were utilized. Tool (I): A structured interviewing questionnaire. Tool (II): Deep vein thrombosis risk factors assessment sheet. Tool (III): Women's compliance with the DVT preventive measures. Tool (IV): Deep vein thrombosis assessment sheet. **Results:** There was highly statistically significant difference between study and control groups regarding their knowledge about DVT at post-intervention compared to pre-intervention. Additionally, there was a highly statistical significance difference among both groups post-intervention regarding to their compliance with DVT preventive measures. Moreover, a significant reduction in the occurrence and manifestations of DVT in the study groups compared to control groups with statistically significant difference post-intervention. **Conclusion:** Women who receive the Evidence-Based Nursing Practices Guidelines exhibit a higher level of knowledge regarding DVT and its preventive measures, as well as demonstrate good compliance with deep vein thrombosis preventive measures and had significant decrease in the occurrence of DVT and its associated symptoms in comparison to those who do not receive. **Recommendation:** Increased awareness regarding the risk factors and preventive measures for DVT should be incorporated as a vital component of routine antenatal care during the third trimester of pregnancy.

**Keywords:** Deep venous thrombosis, Evidence based Nursing practice, postpartum women.

### Introduction

Postpartum period refers to the time period immediately following the delivery of the placenta, which lasts for approximately six weeks. Postpartum period can be further divided into three sub periods: Firstly, the immediate postnatal period, which encompasses the first three hours after childbirth and carries a heightened risk of hemorrhage. Secondly, the early postnatal period which spans the first seven days after childbirth and is associated with an increased risk of infections, maternal hypertensive disorders of pregnancy, and deep venous thrombosis (DVT). Lastly, the late postnatal period, occurring between six to eight weeks postpartum (Schrey-Petersen et al., 2021).

Deep venous thrombosis is widely recognized as diffuse complications of pregnancy and postpartum period. DVT referred to abnormal blood coagulation in deep veins, resulting in venous reflux disorder, resulting in deep venous insufficiency. Deep-vein thrombosis and pulmonary embolism (PE) are collectively known as venous thromboembolism (VTE). DVT is becoming more and more common in clinical practice; DVT is a silent killer, which kills more people than human immune deficiency (HIV), breast cancer, prostate cancer and road accidents combined. The majority of DVT and VTE events in women younger than 50 years old is provoked by a major transient risk factor or is hormone related problem (Chen et al., 2022).

Pregnant and postpartum women exhibit a quadruple surge in the likelihood of developing DVT in comparison to the general population. Furthermore, DVT contributes to approximately 9% of maternal deaths within the United States. The risk factors associated with DVT among pregnant and postpartum women are six times greater (with an absolute risk reaching 12.2 per 10,000) when compared with non-pregnant women (with an absolute risk of 2 per 10,000). This risk also increases with the advancement of gestational age. Specifically, the risk is approximately two-fold higher during the first and second trimesters, increases up to nine-fold higher during the third trimester, and reaches the highest risk during the postpartum period. Following a cesarean section surgical procedure, the likelihood of DVT elevates by a factor of five to ten in comparison to other time periods (Bukhari et al., 2022).

A significant transient risk factor of DVT is the presence of one of the following conditions: the use of estrogen-containing contraception, pregnancy, the postpartum period, the use of a plaster cast, or undergoing surgery with general anesthesia for more than 30 minutes. Venous thromboembolism can be considered hormone-related if occurs in a woman who is using estrogen-containing contraception or during pregnancy or postpartum period (up to 3 months after delivery) (De Moreuil et al., 2021). Physiological causes that increase the likelihood of DVT development during pregnancy and postpartum period include thrombocyte activation, reduced fibrinolytic and protein S activities, the relaxing effect of progesterone secretion on venous smooth muscles during pregnancy, and the elevation of procoagulant factors due to estrogen (Dikis & Ulasli, 2022).

Furthermore, the main causes of postpartum DVT encompass a decrease in anticoagulant elements, specifically protein S and antithrombin levels, caused by estrogen. Additionally, the compression effect exerted by the uterus on the iliac vein and inferior vena cava during pregnancy, as well as vascular intimal injury resulting from surgical procedures such as cesarean section, forceps, and vacuum, play a significant role. Stasis due

to immobility throughout pregnancy and postpartum period, genetic factors including deficiencies in protein S, Protein C and antithrombin leading to thrombophilia, maternal age of 35 years and above, a history of VTE prior to pregnancy, obesity (BMI  $\geq$  30 kg/m<sup>2</sup>), heart disease, sickle cell disease, systemic lupus erythematosus, and multiparity along with delivery through cesarean section are also contributing factors (Tanaka et al., 2021).

The main manifestations of deep venous thrombosis encompass discomfort in the lower extremities, edema, discoloration, motor dysfunction and heightened symptoms subsequent to physical exertion. VTE typically arises within the deep veins of the leg and thigh (Kraft & Janis, 2020). Numerous women experiencing postpartum DVT may encounter enduring complications known as post-thrombotic syndrome (PTS), which denotes a medical condition that can manifest as a prolonged consequence of deep vein thrombosis. Moreover, the detachment of a thrombus could result in pulmonary embolism, posing a life-threatening risk (Zhang & Yan, 2022).

Evidence-based clinical practice guidelines (CPG) serve as a highly efficient strategy for optimizing healthcare by implementing valid recommendations tailored to specific medical conditions. These guidelines provide invaluable assistance to healthcare professionals and decision-makers when faced with clinical uncertainties (Cabrera & Pardo, 2019). In terms of delivering therapeutic regimens for the prevention and treatment of DVT, nurses play a crucial role as the primary frontline caregivers. Adhering to the established standards of care and interventions is essential for nurses in order to avert the potentially life-threatening complications associated with DVT (Ramadan et al., 2019).

As a component of the advancement in the field of nursing science, the traditional approach to nursing based on experience is undergoing a transformation into the modern approach of nursing that is grounded in scientific principles. There exist various sources of evidence that can be followed, which have

the potential to offer a more comprehensive and scientifically informed framework for guiding nursing practice (**Chen et al., 2022**). DVT continues to pose a challenge for individuals, primarily due to the insufficient knowledge and inadequate implementation of preventive measures by nurses (**Alyousef, et al., 2022**). The appropriate assessment of risks accomplished by identifying and evaluating all possible risk factors, enables the estimation of the true magnitude of risk for a woman and facilitates the provision suitable recommendations for prophylactic interventions, particularly those that are evidence-based (**Lian et al., 2023**).

The identification and management of DVT risks can be significantly facilitated by the nursing profession. According to a recent Canadian study conducted by **Alyousef et al., (2022)**, nurses are the most suitable candidates for conducting daily assessments of DVT prophylaxis. Currently, there is a body of evidence supporting the implementation of postural interventions for the prevention of DVT in postpartum women with pregnancy-induced hypertension. These interventions have proven to be effective in reducing the incidence of lower extremity swelling and DVT during the postpartum period, thereby promoting recovery. Moreover, in addition to measures such as preaching, holter monitoring, oxygen inhalation therapy, hypertension control, diet care, activity care and specific care modalities are not limited. Early postural interventions, including assuming a recumbent position with the head lower and feet elevated, along with tilting the head to one side, massage of the lower extremities, and early instructions for passive and active activities, are also recommended (**Chen et al., 2021**).

Nurses are consistently regarded as the primary force in the management of postpartum related problems, by implementing preventative measures, monitoring therapeutic regimens, and providing treatment for DVT. Nurses have the ability to employ various strategies for the prevention of DVT in the high-risk women. These strategies encompass planned physical activity, exercises targeting the limbs and breathing exercises, the use of compression

stockings or intermittent compression of the calf muscles, and ensuring adequate hydration as non-pharmacological interventions. Moreover, pharmacological interventions in the form of anticoagulant or anti-thrombotic medications can be administered as protective measures (**Nabil et al., 2022**).

### Significance of the study

Deep venous thrombosis remains a significant contributor to maternal morbidity and mortality in developed countries (**Devis & Knuttinen, 2017 ; Merriam et al., 2018** ). In the context of Egypt, the estimated incidence is one in every 5.000 pregnant women experiencing DVT during both pregnancy and postpartum period annually (**Egyptian Demographic and Health Survey, 2019**). The likelihood of developing DVT during pregnancy is five times higher for women, with the greatest risk being postpartum (**Devis & Knuttinen, 2017**). The incidence of pregnancy-related VTE ranges from 0.5–2 cases per 1,000 pregnancies. In recent years, due to the increased prevalence of advanced maternal age, obesity, and pregnancy complications among pregnant women, the incidence of pregnancy-related venous thromboembolism has gradually risen, making DVT a significant contributor to maternal mortality worldwide (**Sha & Chen, 2023**)

There are limited studies that have investigated the prevention of DVT among high risk pregnant and postpartum women. Thus, it is essential to establish and execute a practice grounded in empirical evidence, aimed at enhancing the knowledge and behaviors of pregnant and postpartum women in relation to preventive measures for DVT. The postpartum period is of utmost importance, as mothers are susceptible to various hazards and a majority of sudden emergencies and life-threatening complications arise during this time. By providing effective care to mothers, their mortality and complications can be reduced. Consequently, the education and awareness of mothers regarding postpartum complications and means of prevention prior to childbirth are significant. So, the researchers conducted the present study to evaluate the effect of

implementing evidence-based nursing practices guidelines on prevention of deep venous thrombosis among postpartum women.

### **Aim of the study**

The aim of the present study was to evaluate the effect of evidence-based nursing practices guidelines on prevention of deep venous thrombosis among postpartum women.

#### **Research hypothesis:**

**H1:** Women who receive evidence-based nursing practices guidelines will exhibit improved knowledge regarding DVT and DVT preventive measures after implementation of guidelines than those who don't.

**H2** Women who receive evidence-based nursing practices guidelines will exhibit good compliance with deep vein thrombosis preventive measures after implementation of guidelines than those who don't.

**H3** Women who receive evidence-based nursing practices guidelines will have significant reduction in the occurrence of DVT and its manifestations after implementation of guidelines than those who don't

#### **Operational definitions**

**Deep vein thrombosis (DVT)** is a medical condition that occurs when a blood clot forms in a deep vein. These clots usually develop in the lower leg, thigh, or pelvis, but they can also occur in the arm.

**Evidence-based nursing (EBN)** is an approach to making quality decisions and providing nursing care based upon personal clinical expertise in combination with the most current, relevant research available on the topic.

#### **Subjects & Method**

##### **Research design:**

A research design utilizing a quasi-experimental approach, incorporating both a study and control group was employed for this study. The purpose of this design is to establish a causal relationship between an independent variable and a dependent variable, similar to that of a true experiment. However, unlike a

true experiment, a quasi-experiment does not depend on random assignment. Instead, subjects are divided into groups based on predetermined parameters that are non-random (**Iowa State University of Science and Technology, 2020**).

##### **Setting of the study:**

This study was carried out at antenatal clinic and postnatal unit of Obstetrics and Gynecological Department in Benha University Hospital, Egypt, The University Hospital plays a crucial part in the education of healthcare professionals at the undergraduate level. In addition, offers a range of complimentary and fee-based services encompassing pregnancy, labor, postpartum care, and miscarriage. Moreover, offers fertility treatment as well as gynecological care and counseling pertaining to family planning.

##### **Sampling:**

**Sample type:** A purposive sample was used in the study according to the following **inclusion criteria:** Pregnant women at third trimester, and agree to participate in the study.

**Exclusion criteria:** Women without any complications during delivery and postpartum period

##### **Sample Size and technique:**

According to the Statistical Center of Benha University Hospital (2022), the flow rate of pregnant women was 1050 women during the preceding six-month period. A subset of this flow rate, comprising ten percent (105 women) was selected; five women refused to participate in the study. Consequently, the final total sample became 100 women.

**Sample technique:** All included women were randomly assigned into two main groups. 50 women for each.

- First group was control group who received routine hospital care.

- Second group was study group who received evidence-based nursing practices guidelines regarding prevention of DVT

- Randomization was performed through the pregnant women who admitted to antenatal clinic during first three months and attaining selection criteria from beginning of data collection were recruited at the control group (n=50), and other pregnant women with same criteria, who admitted during the second three months of data collection were recruited at the study group (n=50).

#### **Tools of data collection:**

**Four main tools were used for data collection.**

**First tool: A structured interviewing questionnaire:** This tool was designed by the researchers after reviewing of related literature and written in a simple Arabic language. It comprised four main parts:

**Part 1:** which include data related to general characteristics of studied women such as age, educational level, occupation, residence, weight, height and BMI).

**Part 2:** Past and present obstetric history such as gravidity, parity, number- of abortions, gestational age /weeks, follow up during pregnancy, complications of current pregnancy, mode of delivery, and history of contraceptive methods used before.

**Part 3:** Medical history such as chronic disease (hypertension and diabetes)

**Part 4:** Assessment of women's knowledge about DVT: This part was developed by the researcher based on current, national and international literature. (Alyousef et al., 2022) to assess women's' knowledge regarding DVT as (meaning of DVT, causes, risk factors, signs and symptoms, diagnosis, complications, treatment and prevention of DVT).

**Knowledge scoring system:** The overall degree of knowledge attained was 10. A score of (1) was assigned for each correct answer while incorrect answers or I don't know received a score of (0). The sum of the scores for each section's items was used to determine the section's overall score. Furthermore, the sum of the scores obtained from all the sections was

added to determine the participant's overall knowledge score. This score was then subjected to calculation in order to determine the mean and standard deviation. The tool employed for this purpose was utilized both before and after the intervention. Total knowledge score was classified into three categories:-

- Good knowledge  $\geq 75\%$  ( $\geq 6$  score)
- Average knowledge  $50 < 75\%$  ( $4 < 6$  score)
- Poor knowledge  $< 50\%$  ( $< 4$  score)

**Second Tool: Deep vein thrombosis risk factors assessment sheet:** this tool was designed by the researchers after reviewing of related literatures (Hafiz et al., 2021) to assess the **preexisting risk factor of DVT** as (family history of DVT, Previous attack of VTE, number of having deep vein thrombosis, complications from deep vein thrombosis, obesity, prolonged immobilization, passive smoking and blood transfusion. **Obstetric risk factors of DVT** as high parity, pre-eclampsia, ante-partum hemorrhage, multiple pregnancy, prolonged labor  $>24$  hours, preterm birth  $<37$  weeks and caesarean section.

**Third Tool: Women's compliance with the DVT preventive measures:** This tool was developed by the researchers after reviewing of relevant literature from international sources (Bouchard-Fortier, 2014). Tool was used to assess women's compliance with DVT preventive measures. These measures included early mobilization, general exercise, elevating the foot and leg while setting, foot and leg exercise, deep-breathing exercises, wearing elastic stockings, wear loose clothing for lower of the body, maintaining hydration, healthy food intake, and following anticoagulant preventive measures. The tool was used pre and post intervention.

**Scoring system:** The response based on a three point likert scale; never scored (0), sometimes scored (1), and always scored (2). The overall score is classified as either Good compliance ( $>70\%$ , with a score ranging from 14-20) or Poor compliance ( $<70\%$ , when the score is less than 14).

**Forth Tool: Deep vein thrombosis**

**assessment sheet:** it was adopted from (O'Shaughnessy, et al., 2019) to assess the signs and symptoms of DVT. The tool was consisted of two parts:

**Part (1): Clinical assessment:** encompassed various items design to examine the manifestations of DVT. These included: (Calf pain, leg edema, discoloration, warmth, localized redness, tenderness, the inability to feel the pulse of the dorsalis pedis and palpable thrombosed superficial veins).

**Part (2): The Homan's test:** is an active and subjective test in which the woman asked to perform dorsiflexion of her foot. The presence of pain in the calf region is considered indicative of a positive outcome and suggests the existence of deep vein thrombosis. Conversely, a negative Homan's test does not necessarily exclude the possibility of DVT.

#### **Tools Validity:**

The tools utilized for the collection of data underwent a comprehensive evaluation by a committee consisting of three experts in the field of obstetrics and gynecological nursing, affiliated with the faculty of nursing at Benha University. The purpose of this evaluation was to assess the content validity of the tools. Based on the feedback provided by these experts, necessary modifications were made to the questionnaire in order to enhance the clarity of the sentences and ensure the appropriateness of the content.

#### **Tools Reliability:**

Reliability of tools was tested by using Cronbach's Alpha coefficient test. The results of this test indicated that the tools consisted of items that were relatively homogeneous, as evidenced by the moderate to high reliability of each tool. For instance, the reliability of the knowledge questionnaire was found to be 0.710, while the reliability of women's compliance with DVT preventive measures was 0.87. Additionally, the internal consistency of the deep vein thrombosis assessment sheet was reported to be 0.83. These findings provide evidence that the tools used in the study are reliable instruments.

#### **Ethical considerations:**

Before commencing the study, ethical considerations were taken into account. These considerations encompassed obtaining approval from the Scientific Research Ethical Committee of the faculty of nursing at Benha University. Additionally, letters of approval were sent to the director of Benha University Hospital, outlining the objectives and context of the study. The researcher provided a clear explanation of the study's objectives to each woman involved prior to data collection, ensuring to establish a sense of confidence and trust. Furthermore, oral consent was obtained from each woman prior to their participation in the study. The study instruments were implemented with the aim of safeguarding the integrity, cultural, customary, and religious values of the participants, while simultaneously ensuring that no harm befell any participant throughout the process of data collection. Furthermore, the study instruments refrained from incorporating any unethical assertions and upheld the principles of human rights. In order to preserve the confidentiality of the study, all data collection instruments were destroyed subsequent to statistical analysis.

#### **Pilot study:**

A pilot study was carried out on 10 % of the total sample (10 women) in order to evaluate the comprehensibility, accuracy, consistency, and applicability of the research tools, as well as to determine the duration required for data collection. Based on the findings from the pilot study no modifications were made. Consequently, the women who participated in the pilot study were subsequently included in the main study.

#### **Field work:**

The study was carried out from the beginning of March, 2023 to the end of August, 2023 covering 6 months. The researchers was visited the previously mentioned study setting three days/week (Saturday, Tuesday and Thursday) from 9.00 Am to 12.00 Pm. The study was conducted at the previously mentioned study setting through four phases included preparatory, interviewing and assessment phase, implementation and evaluation phases.

**Preparatory phase:**

The researchers conducted a comprehensive review of the advanced national and international literature that is relevant to the current study. Following this, they developed data collection tools. Lastly, the researchers performed a pilot study in order to assess the content validity of the tools utilized.

**Interviewing and Assessment phase:**

At the onset of the interview, the researchers greeted the women, explained the purpose of the study, study phases, duration of the study preventive measures and obtained verbal consent for to participate in the study. Following the participants' assent, each woman underwent an interview to assess general characteristics, obtain anthropometric measurements, and elicit information regarding obstetric and medical history and employ DVT risk factor assessment sheet to evaluate the women's susceptibility to deep vein thrombosis and their awareness and compliance with preventive measures. The average duration of the questionnaire interview was approximately 20-30 minutes per participant. The number of women interviewed per week ranged from 4 to 5.

**Implementation phase**

During this phase, the selected women who were recruited in the study were randomly allocated into two equal groups (with 50 women in each group). The first group, consisting of 50 women served as the control group and received antenatal follow-ups in the outpatient clinics. While the study group, also consisting of 50 women underwent individual interviews conducted by the researchers during the third trimester of pregnancy at the ante-natal clinics. The researchers then proceeded to implement the intervention through three scheduled sessions. **The initial session:** involved providing an overview of deep venous thrombosis (DVT) and pulmonary embolism (PE), including their meanings, causes, risk factors, signs and symptoms, and potential complications. This session lasted for duration of 30 to 45 minutes. **The second session** encompassed the implementation of preventive measures, which should commence promptly 2 hours postpartum and every day for one week .

These measures consist of early ambulation, adequate hydration as prescribed, accurate utilization of elastic stockings in cases of high-risk to avert the occurrence of blood clotting. Additionally, pharmaceutical prophylaxis involving the administration of anticoagulant medications as prescribed by medical practitioners, along with adherence to the recommended **exercise regimen**, are imperative components of preventive care:

- Positioning and rotation should occur at regular intervals, preferably every 1 to 2 hours.
- One form of leg exercise involves assuming a semi Fowler's position, followed by bending the knee and lifting the foot. This position should be held for a brief duration before extending the leg and slowly lowering it back onto the bed. This exercise should be repeated five times with one leg, and then repeated with the other leg.
- Another exercise for the feet involves tracing circles with the feet. This is achieved by bending the feet downwards, inwards towards each other, upwards, and then outwards. This circular motion should be repeated five times.
- To turn to the side, one should lie on one side with the uppermost leg flexed and supported on a pillow. It is recommended to hold onto the side rail for stability. While on one side, practicing diaphragmatic breathing and coughing exercises is encouraged.
- When getting out of bed, the individual should first turn onto one side. Then, using one hand to push up, they should swing their legs out of bed. This maneuver allows for a safe and controlled exit from the bed.
- To engage in deep breathing, one must inhale deeply and slowly through the nostrils, thereby expanding the lower rib cage while allowing the abdomen to move forward. This inhalation should be held for duration of 3 to 5 counts, followed by a slow and complete exhalation through pursed lips. It is important not to forcefully expel

the breath. It is recommended to rest and repeat this exercise 10 times per hour.

- Coughing exercise: it is necessary to inhale deeply and then cough with firmness.
- Periodically, woman advised to elevate the lower limb above the level of the heart.
- To accomplish this phase the researchers using demonstration and re-demonstration using some illustrating pictures, and video films about this exercise and how to do it until acknowledge women understanding. Furthermore, guidelines were distributed among women of the study group to reinforce their understanding. This session had a duration ranging from 45 minutes to 1 hour.

#### The evaluation phase:

This phase focused on examining the impact of evidence-based nursing practice guidelines on the level of knowledge immediately intervention as post test, while compliance with DVT preventive measures, and occurrence of DVT and its manifestations was evaluated immediately after childbirth; at the end of the first week and up to second week follow up with the women was conducted through outpatient clinic visits and telephone communication. Both groups were asked about any signs and symptoms related to DVT. Proper referral to the vascular outpatient clinic was done by help of the attendant obstetricians and the hospital policy for women who had any suspicious complains indicating DVT symptoms.

**Expected outcome:** The primary research outcome for this study was preventing of DVT in study group. Secondary outcome included increased women's knowledge about DVT and following application of evidence based nursing practice about the preventive measures of DVT.

#### Statistical design:

Data analysis was conducted utilizing the SPSS software (version 25). The Kolmogorov-Smirnov test was employed to

determine the normal distribution of quantitative variables. In order to compare nominal variables in the two groups, Chi-square tests were utilized. In instances where the frequency count is less than 5 for more than 20% of cells, Fisher's exact test was employed as an alternative to the Chi-square test, particularly for smaller sample sizes. To compare the mean scores between the two groups, independent t-tests were employed. Linear regression was utilized for multivariate analyses to examine the presence of DVT as the dependent factor. A p-value < 0.05 was considered significant, and <0.001 was considered highly significant.

#### Results:

**Table 1:** Shows that 42% of studied women's age were between 20 <25 years with a mean age of ( $24.36 \pm 1.01$ ,  $24.62 \pm 1.02$ ) years of the study and control group respectively. Also, (40.0% & 42.0%) of women respectively had secondary education.(78.0% & 76.0%) of studied women respectively were housewives. Besides, (54.0% & 64.0%) of women respectively lived in rural areas. With insignificant differences between study and control group regarding general characteristics.

**Table 2:** Clarifies that the mean height, weight, and body mass index among women in study and control groups respectively were ( $158.40 \pm 7.79$  &  $157.70 \pm 7.89$  cm), ( $73.44 \pm 8.32$  &  $71.74 \pm 9.11$  kg) and ( $29.26 \pm 2.51$  &  $28.76 \pm 2.06$  kg/cm<sup>2</sup>). Increasingly (80%, 88%) of women respectively were overweight. There was insignificant differences between study and control group related to anthropometric items ( $P > 0.05$ ).

**Table 3:** Denotes that (56.0% & 50.0%) of women in the study & control group respectively were primigravida and primipara. Mean of gestational age of the current pregnancy was ( $34.16 \pm 3.52$ ,  $34.72 \pm 3.22$  weeks) respectively. While (56.0% & 68.0%) of women respectively had regular follow up during pregnancy. Also indicated that (60.0% & 54.0%) of women respectively have no history of abortion. Also, (78.0 & 82.0%) of women respectively delivered by CS. Moreover,



related to history of contraception methods used before (62.0% & 32.0%) of women respectively used hormonal method of contraception. Related to complications of current pregnancy (76.0% & 72.0%) of women respectively had pregnancy complication among them (65.8% & 58.3%) respectively complained of pregnancy induce hypertension with insignificant differences between the two groups regarding all items of obstetric history ( $p$ -value  $>0.05$ ).

**Figure 1:** Illustrates that medical history of the study and control group respectively were (22.0% & 20.0%) had a previous history of hypertension, (18.0% & 24.0%) had history of renal disease and (4.0% & 12.0%) had previous history of deep venous thrombosis, with no statistically significant difference between two groups.

**Table 4:** Shows deep vein thrombosis risk factors of the studied women. It clear that pre-existing risk factors of DVT among studied women of study and control group respectively (80% & 72%) were passive smoking, (54% & 68%) had blood clotting disorders. Moreover, related to obstetric risk factors (78.0% & 74.0%) had preeclampsia (42.0% & 54.0%) had antepartum hemorrhage, (78.0% & 82.0%) had previous caesarean section with no statistical significant differences between study and control group respectively.

**Table 5:** Shows that there was no statistical significant differences observed between the study and control group regarding DVT knowledge at pre-intervention phase ( $P>0.05$ ), while there were a highly statistical significance differences between two groups at post-intervention phase ( $P \leq 0.001$ ).

**Figure 2:** Illustrates that the total knowledge level about DVT among study and control group respectively were (90% & 84%) had poor total knowledge at pre-intervention phases, while (94% & 4%) had good knowledge at post-intervention phase with highly statistically significant differences between two groups respectively.

**Figure 3:** Illustrates that the source of information of women in study and control group respectively at pre-intervention phase were (26.0%

and 12.0%) from doctor, while (32.0% and 44%) from family, (22% and 10%) from nurses.

**Table 6:** Shows that there was no statistical significant differences regarding compliance with DVT preventive measures between the study and control group respectively at pre-intervention phase ( $P>0.05$ ), while there were highly statistical significance differences found at post-intervention phase between two groups respectively ( $P \leq 0.001$ ).

**Figure 4:** Illustrates that the total compliance level with DVT preventive measures among studied women, 100% had a poor total compliance level with preventive measures among study and control groups respectively at pre-intervention guidelines, while (62% & 2%) respectively had a good compliance level with preventive measures among study and control groups respectively at post-intervention guideline with highly statistically significant differences between them.

**Table 7:** Shows clinical manifestations of deep vein thrombosis at post-intervention guidelines, 100% absent manifestation; warmness, Discoloration, and Can't feel pulse, (92.0% 84.0%, 82.0%, 82.0% and 78.0%) absent localized redness, absent swelling, absent calf pain, absent Palpable thrombosed superficial veins and absent tenderness in the study groups compared to control groups with statistically significant difference between both groups post-intervention

**Figure 5:** Illustrates that Homan's test of the studied postpartum women 82.0% negative feeling of calf pain in the study group post intervention guideline compared with 52.0% of the control group negative feeling calf pain with statistically significant difference between two groups.

**Table 8:** Illustrates Multiple linear regression analysis for predictor variables of presence of DVT among postpartum women, this table reveals that presence of DVT among postpartum women was best predicted by complications during current pregnancy, total knowledge and compliance levels post guidelines ( $p= 0.035, 0.031, \text{ and } 0.043$ ) respectively, accounting for 42.2% of the variance of DVT presence.

**Table 1. Distribution of studied women according to their general characteristics, study group (n= 50), and control group (n=50).**

General characteristics	Study group (n.=50)		Control group (n.=50)		X <sup>2</sup>	p-value
	(No.)	%	(No.)	%		
<b>Age (in years)</b>						
- < 20	10	20.0	6	12.0	2.140	0.544 <sup>n.s</sup>
- 20- < 25	21	42.0	21	42.0		
- 25-<30	10	20.0	9	18.0		
- ≥ 30	9	18.0	14	28.0		
<b>Mean ± SD</b>	24.36 ± 1.01		24.62 ± 1.02			t-test= (- 1.279) p value = (0.204 <sup>n.s</sup> )
<b>Education level</b>						
- Read and write	10	20.0	6	12.0	2.311	0.510 <sup>n.s</sup>
-Basic education	11	22.0	9	18.0		
-Secondary education	20	40.0	21	42.0		
-University	9	18.0	14	28.0		
<b>Occupation</b>						
- House wife	39	78.0	38	76.0	0.056	FE 1.000 <sup>n.s</sup>
-Working	11	22.0	12	24.0		
<b>Residence</b>						
- Rural	27	54.0	32	64.0	1.033	FE 0.416 <sup>n.s</sup>
- Urban	23	46.0	18	36.0		
FE fisher's exact test	Not Significant (P>0.05)				t: independent t test	

**Table 2. Distribution of studied women according to anthropometric measurements, study group (n= 50), and control group (n=50).**

Anthropometric measurements	Study group (n=50)		Control group (n=50)		Test	p-value
	Mean ± SD		Mean ± SD			
<b>Height</b>	158.40 ± 7.79		157.70 ± 7.89		t-test (0.446)	(0.656 <sup>n.s</sup> )
<b>Weight</b>	73.44 ± 8.32		71.74 ± 9.11		t-test (0.974)	(0.332 <sup>n.s</sup> )
<b>BMI (kg/cm<sup>2</sup>)</b>	<b>No. (%)</b>		<b>No. (%)</b>			
Overweight (25–29.9)	40 (80.0)		44(88.0)		X <sup>2</sup> = 4.973	(0.837 <sup>n.s</sup> )
Obese calss I (30 -34.9)	10 (20.0)		6(12.0)			
<b>Mean ± SD</b>	29.26 ± 2.51		28.76 ± 2.06		t-test (1.074)	(0.285 <sup>n.s</sup> )
BMI: Body mass index	(n.s) Not Significant (P>0.05)				t: independent t test	

Table 3. Distribution of studied women according to their Past and present obstetric history, study group (n= 50), and control group (n=50).

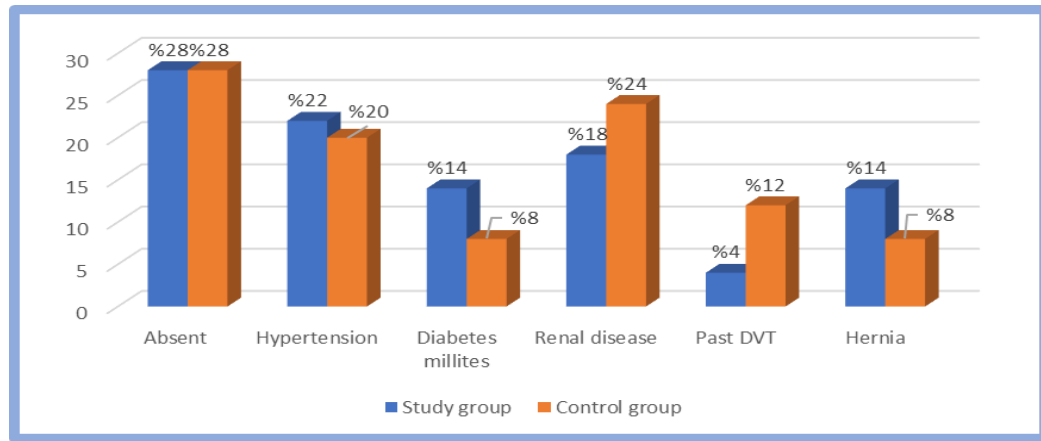
Past and present obstetric history	Study group (n=50)		Control group (n=50)		$\chi^2$	p-value
	(No.)	%	(No.)	%		
<b>Number of gravidity</b>						
- Primigravida	28	56.0	25	50.0	3.936	0.140 <sup>n.s</sup>
- Multi gravida	18	36.0	14	28.0		
- Grand multigravida	4	8.0	11	22.0		
<b>Duration of current pregnancy (in weeks)</b>	34.16 ± 3.52		34.72 ± 3.22		t=-0.829	0.409 <sup>n.s</sup>
<b>Follow up during pregnancy</b>						
-Regular	28	56.0	34	68.0	1.528	FE 0.303 <sup>n.s</sup>
- Irregular	22	44.0	16	32.0		
<b>parity</b>						
Primipara	28	56.0	25	50.0	3.936	0.140 <sup>n.s</sup>
Multipara	18	36.0	14	28.0		
Grand multipara	4	8.0	11	22.0		
<b>Mode of delivery</b>						
- Cesarean section	39	78.0	41	82.0	0.250	FE 0.803 <sup>n.s</sup>
- Vaginal delivery	11	22.0	9	18.0		
<b>Number of abortions</b>						
No	30	60.0	27	54.0		
Once	18	36.0	17	34.0	2.186	0.335 <sup>n.s</sup>
2-3	2	4.0	6	12.0		
<b>History of contraception methods used before</b>						
Hormonal method	13	26.0	16	32.0	2.584	0.460 <sup>n.s</sup>
IUD	7	14.0	4	8.0		
Natural method	2	4.0	5	19.0		
Not used before	28	56.0	25	50.0		
<b>Duration of contraception</b>	(n=22)		(n=25)			
< one year	2	9.1	5	20.0		
1-2 years	18	81.8	15	60.0	3.014	0.389 <sup>n.s</sup>
More than two years	2	9.1	5	20.0		
<b>Complications of current pregnancy</b>						
Yes	38	76.0	36	72.0		
No	12	24.0	14	28.0	0.208	FE 0.820 <sup>n.s</sup>
<b>If yes, the complication is</b>	(n=38)		(n=36)			
-Pregnancy induce hypertension	25	65.8	21	58.3	3.431	0.488 <sup>n.s</sup>
-Gestational Diabetes	7	18.4	4	11.1		
- Urinary tract infection	2	5.3	6	16.7		
-Anemia	4	10.5	5	13.9		

IUD Intrauterine device

FE fisher's exact test

(n.s) Not Significant (P&gt;0.05)

**Figure (1) Distribution of studied women according to presence of chronic disease, study group (n= 50), and control group (n=50) .**



**Table (4). Distribution of studied women according to their deep vein thrombosis history risk factors, study group (n= 50), and control group (n=50).**

DVT risk factors	Responses	Study group (n=50)		Control group (n=50)		$\chi^2$	p-value
		(No.)	%	(No.)	%		
<b>Preexisting risk factors</b>							
Family history of DVT	Yes	6	12.0	8	16.0	0.332	FE 0.774 <sup>n.s</sup>
	No	44	88.0	42	84.0		
Previous attack of VTE	Yes	2	4.0	4	8.0	0.709	FE 0.678 <sup>n.s</sup>
	No	48	96.0	46	92.0		
Number of times having DVT	No	48	96.0	44	88.0	4.754	0.093 <sup>n.s</sup>
	Once	1	2.0	6	12.0		
	Twice	1	2.0	0	0.0		
Complications from DVT	No	48	96.0	44	88.0	0.154	0.926 <sup>n.s</sup>
	Post phlebitis	1	2.0	4	8.0		
	Heart palpitation	1	2.0	2	4.0		
Prolonged immobilization	Yes	4	8.0	5	10.0	0.122	0.727 <sup>n.s</sup>
	No	46	92.0	45	90.0		
Passive smoking	Yes	40	80.0	36	72.0	0.877	FE 0.483 <sup>n.s</sup>
	No	10	20.0	14	28.0		
Blood clotting disorders	Yes	27	54.0	34	68.0	2.060	FE 0. 218 <sup>n.s</sup>
	No	23	46.0	16	32.0		
<b>Obstetric history risk factors</b>							
Preeclampsia	Yes	39	78.0	37	74.0	0.219	FE 0. 815 <sup>n.s</sup>
	No	11	22.0	13	26.0		
Antepartum hemorrhage	Yes	21	42.0	27	54.0	1.442	FE 0. 317 <sup>n.s</sup>
	No	29	58.0	23	46.0		
Multiple pregnancy	Yes	6	12.0	8	16.0	0.332	FE 0. 774 <sup>n.s</sup>
	No	44	88.0	42	84.0		
Prolonged labor > 24hrs	Yes	8	16.0	5	10.0	0.372	FE 0. 554 <sup>n.s</sup>
	No	42	84.0	45	90.0		
Preterm birth < 37 weeks	Yes	11	22.0	9	18.0	0.250	FE 0. 803 <sup>n.s</sup>
	No	39	78.0	41	82.0		
Cesarean section	Yes	39	78.0	41	82.0	0.250	FE 0. 803 <sup>n.s</sup>
	No	11	22.0	9	18.0		

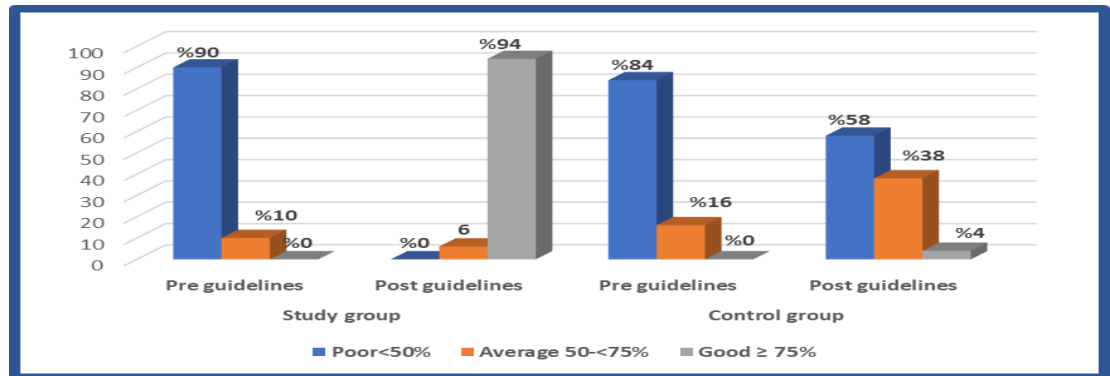
DVT Deep vein thrombosis number not exclusive FE fisher's exact test  
(n.s) Not Significant (P>0.05)

**Table (5): Comparison of studied women's knowledge about deep vein thrombosis pre and post guidelines, study group (n= 50), and control group (n=50)**

Study periods	Responses	Pre guidelines		χ <sup>2</sup> test P value	Post guidelines		χ <sup>2</sup> test P value
		Study group (n=50)	Control group (n=50)		Study group (n=50)	Control group (n=50)	
knowledge about DVT		No (%)	No (%)		No (%)	No (%)	
Meaning of DVT	Correct	11(22.0)	7(14.0)	1.084 FE	35 (70.0)	13(26.0)	19.391 FE
	Incorrect	39(78.0)	43(86.0)	0.436 n.s	15(30.0)	37(74.0)	<0.001**
Causes	Correct	8(16.0)	15(30.0)	2.767 FE	46(92.0)	25(50.0)	21.418 FE
	Incorrect	42(84.0)	35(70.0)	0.153 n.s	4(8.0)	25(50.0)	<0.001**
Risk factors	Correct	4(8.0)	2(4.0)	0.709 FE	46(92.0)	9(18.0)	55.313 FE
	Incorrect	46(92.0)	48(96.0)	0.678 n.s	4(8.0)	41(82.0)	<0.001**
Signs and symptoms	Correct	15(30.0)	11(22.0)	0.832 FE	50(100.0)	14(28.0)	56.250 FE
	Incorrect	35(70.0)	39(78.0)	0.495 n.s	0(0.0)	36(72.0)	<0.001**
Diagnosis	Correct	23(46.0)	24(48.0)	0.040 FE	43(86.0)	24(48.0)	16.327 FE
	Incorrect	27(54.0)	26(52.0)	1.000 n.s	7(14.0)	26(52.0)	<0.001**
Complications	Correct	0(0.0)	0(0.0)	.a	46(92.0)	24(48.0)	23.048 FE
	Incorrect	50(100.0)	50(100.0)	NA	4(8.0)	26(52.0)	<0.001**
Treatment	Correct	24(48.0)	17(34.0)	2.026 FE	47(94.0)	29(58.0)	17.763 FE
	Incorrect	26(52.0)	33(66.0)	0.222 n.s	3(6.0)	21(42.0)	<0.001**
Prevention of DVT	Correct	6(12.0)	8(16.0)	0.332 FE	41(82.0)	30(60.0)	5.877 FE
	Incorrect	44(88.0)	42(84.0)	0.774 n.s	9(18.0)	20(40.0)	0.027*

NA Not applicable n.s not Significant at >0.05 \*\* highly statistically significant at ≤0.001 FE: Fisher exact for chi square

**Figure 2. Comparison of studied women's total knowledge level about deep vein thrombosis pre, and post guidelines, study group (n= 50), and control group (n=50).**



FE: Fisher exact (Not significant (p > 0.05) \*\* Highly significant (p ≤ 0.001)

Figure 3. Distribution of studied women according to source of information about DVT, study group (n= 50), and control group (n=50).

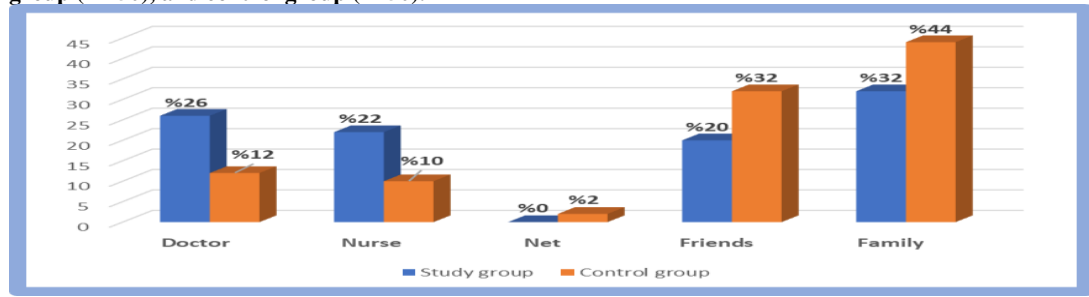
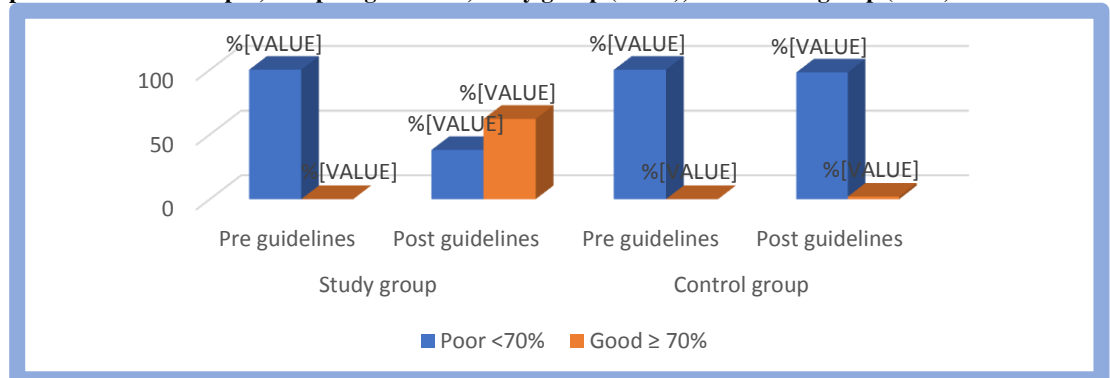


Table (6): Comparison of studied women’s compliance with deep vein thrombosis preventive measures pre and post guidelines, study group (n= 50), and control group (n=50).

Study periods	Pre guidelines		t- test P value	Post guidelines		t- test P value
	Study group (n=50)	Control group (n=50)		Study group (n=50)	Control group (n=50)	
Women’s compliance	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Early ambulation	0.44 ± 0.70	0.60 ± 0.86	-1.020 0.310 n.s	1.42 ± 0.70	0.82 ± 0.92	3.668 <0.001 **
General exercise	0.22 ± 0.42	0.42 ± 0.70	-1.730 0.087 n.s	1.50 ± 0.68	0.86 ± 0.93	3.944 <0.001 **
Raise the foot and leg while setting	0.56± 0.76	0.34 ± 0.56	1.650 0.102 n.s	1.70 ± 0.46	1.10 ± 0.58	5.715 <0.001 **
Foot and Leg exercise	0.44 ± 0.70	0.44 ± 0.61	0.000 1.000 n.s	1.52 ± 0.65	0.56 ± 0.76	6.802 <0.001 **
Deep-breathing exercises for 10 sec at least /2 hours throughout day	0.30 ± 0.46	0.20 ± 0.40	1.151 0.253 n.s	1.60 ± 0.61	0.78 ± 0.82	5.707 <0.001 **
Wear loose clothing especially lower of the body	1.26 ± 0.72	0.98 ± 0.82	1.810 0.073 n.s	1.62 ± 0.49	1.42 ± 0.49	2.022 0.046 *
Elastic stocking use	1.26 ± 0.72	0.98 ± 0.82	1.068 0.288 n.s	1.84 ± 0.37	1.70 ± 0.46	3.877 <0.001 **
Taking enough fluid by mouth	0.60 ± 0.73	0.76 ± 0.77	-1.067 0.289 n.s	1.66 ± 0.56	1.22 ± 0.93	2.865 0.005 *
Healthy diet to prevent obesity	0.50 ± 0.51	0.34 ± 0.48	1.626 0.107 n.s	1.64 ± 0.59	0.92 ± 0.78	5.187 <0.001 **
Anticoagulant preventive measures	0.28 ± 0.70	0.16 ± 0.55	0.954 0.343 n.s	0.32 ± 0.55	0.72 ± 0.97	-2.536 0.013 *

t test. independent t test n.s not Significant at >0.05 \*statistically significant at ≤0.05 \*\* highly statistically significant at ≤0.001

**Figure 4. Comparison of studied women's total compliance level with deep vein thrombosis preventive measures pre, and post guidelines, study group (n= 50), and control group (n=50).**



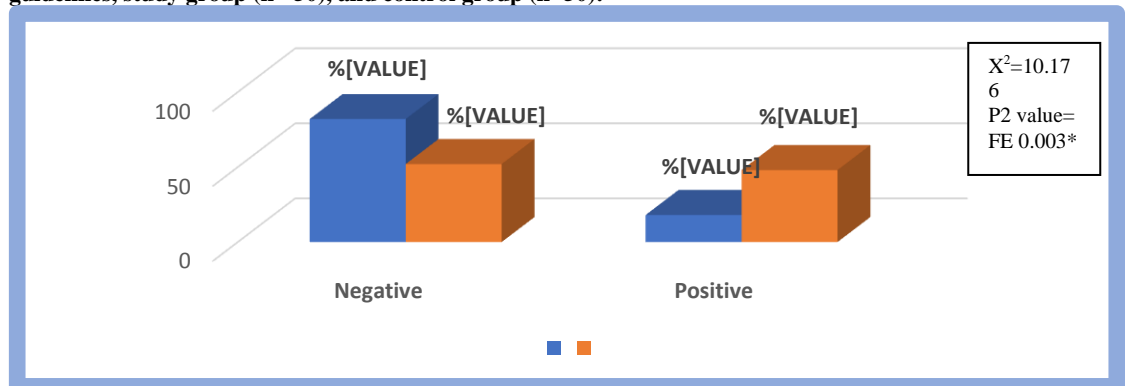
NA not applicable \*\* highly significant (p ≤ 0.001)

**Table (7): Comparison of studied women according to clinical manifestations of deep vein thrombosis pre and post guidelines, study group (n= 50), and control group (n=50).**

Clinical manifestations	Study periods	Post guidelines				X <sup>2</sup> test P value	
		Responses	Study group (n=50)		Control group (n=50)		
			No	%	No (%)		No (%)
Calf pain	Present	9	18.0	24	48.0	10.176 FE 0.003*	
Tenderness	Present	11	22.0	21	42.0	4.596 0.032*	
Swelling	Present	8	16.0	18	36.0	5.198 FE 0.039*	
Warmness	Present	0	0.0	8	16.0	8.696 FE 0.006*	
Discoloration	Present	0	0.0	9	18.0	9.890 FE 0.003*	
Palpable thrombosed superficial veins	Present	9	18.0	21	42.0	6.857 FE 0.016*	
Localized redness	Present	4	8.0	12	24.0	4.762 0.029*	
Can't feel pulse (dorsalis pedis pulse)	Present	0	0.0	5	10.0	5.263 0.022*	

\*\* highly statistically significant at ≤0.001 FE: Fisher exact for chi square

**Figure 5. Comparison of Homan's test results as presented by both studied groups post guidelines, study group (n= 50), and control group (n=50).**



**Table (8): Multiple linear regression analysis for predictor variables of presence of DVT among post partum women, study group (n= 50), and control group (n=50).**

Predictor Variable of presence of DVT	Standardized Coefficients	Unstandardized Coefficients		t test	Sig.
	Beta	B	Std. Error		
(Constant)	1.425	.831		1.715	.090
Age	-.023	.049	-.050	-.474	.637
BMI	.010	.022	.046	.441	.660
Follow up during pregnancy	-.144	.100	-.148	-1.434	.155
Complications during current pregnancy	-.233	.109	-.218	2.137	<b>.035</b>
Prolonged immobilization	-.074	.163	-.045	.457	.649
Duration of hormonal methods used.	.002	.045	.004	.041	.967
Smoking	.066	.111	.060	.590	.556
Total knowledge post guidelines	.015	.032	.069	-2.187	<b>.031</b>
Compliance level post guidelines	.043	.021	.298	2.051	<b>.043</b>
<b>Adjusted R<sup>2</sup> = 0.422 P = 0.032*</b>					

(B) Beta Co-Efficient (SEB) Standard Error

## Discussion

Deep venous thrombosis is ranked as the third most common cardiovascular disorder, affecting up to 5% of the population and increased incidence during postpartum period. Deep vein thrombosis in the lower extremities or pulmonary embolism is typical symptoms of VTE. Pregnancy and the postpartum period are temporary risk factors for half of these events, and prophylaxis may be used to prevent them. (Duffett, 2022). Deep venous thrombosis, a condition that can be both prevented and treated, poses a significant health concern that contributes to morbidity and mortality in women. Therefore, the application of evidence-based practices can help decrease the occurrence of DVT among postpartum women (Yohannes et al., 2022). The current study aimed to investigate the effect of implementing evidence-based nursing practices guidelines on prevention of deep venous thrombosis among postpartum.

Regarding general characteristics, the finding of the present study showed that less than half of women in study and control group respectively were age between 20-<25 years with the mean age of (24.36 ± 1.01, 24.62 ± 1.02) years, less than half of them had secondary education, more than one quarter of

them were housewives. Finally, more than half of both groups lived in rural areas. No statistically difference was detected among both groups related to general characteristics (P>0.05), which mean that the two groups under study were homogenous. From the researchers' point of view, as the studied women taken from population with same culture and characteristics that reflected in group homogeneity. This result is supported by Hashemzadeh et al., (2021) who revealed that there was no statistically significant difference between participants in both groups regarding their age, occupation, residence, and educational level. Slightly more than half of women in study and control group respectively were age between 20-<25 years with the mean age of (23.39 ± 1.01, 24.89± 1.02) years, half of them had secondary education, more than one quarter of them not work..

Regarding anthropometric measurements, the result the current study clarified that the mean BMI among studied women in both study and control groups were (29.26±2.51, 28.76±2.06) respectively. There was no statistically significant difference both groups regarding BMI (P>0.05). Majority of women in study and control groups were overweight, which reflects the conception that overweight is a common problem among



Egyptian women particularly pregnant women. From the researcher's point of view as women with DVT are overweight as obesity and weight gain one of the main preexisting risk factors for DVT. This result came in the same harmony with **Wu et al., (2022)** who found that no statistically significant difference between intervention and control group in related to BMI. Also, most of studied women were overweight and obese with mean BMI ( $28.24 \pm 2.06$ ,  $31.76 \pm 2.51$ ).

Concerning past and present obstetric history, the current study results showed that more than half and half of women in study & control groups respectively were primigravida, more than one third and less than one third respectively were multigravida. The mean of gestational age of the current pregnancy was ( $34.16 \pm 3.52$ ,  $34.72 \pm 3.22$  weeks) respectively, less than three fifths and more than two thirds had regular follow up during pregnancy. Also, more than three quarters and majority of women in both group respectively were delivered by CS. Related to history of contraceptive methods used before, more than three fifths, slightly less than one third of women in both group respectively used hormonal methods of contraception. Moreover, slightly more than three quarters, and less than three quarters of them respectively had complications of pregnancy, in addition, two thirds and slightly less than three fifths of them respectively complained of pregnancy induce hypertension with no statistically significant difference detected between the both groups respectively regarding all items of obstetric history. Current data reflected the current risk factors of DVT as pregnancy with PIH, third trimester pregnancy, CS delivery and previous use of hormonal contraception.

This finding was consistent with the study done by **Hosny et al., (2022)** who revealed that more than half of studied women were primigravida, and less than three quarters of them delivered by CS. That reflected homogeneity as two studies carried-out and implemented on Egyptian population. In addition, this result was in accordance with **Li et al., (2022)** who showed that the gestational age of women in study and control groups

respectively were ( $35.22 \pm 3.15$  and  $35.43 \pm 2.21$ ) weeks and most women in study and control group respectively were primipara. That explained from researchers view point as the risk of DVT increases as gestational age increase.

Increasingly present study supported by **Hafiz et al., (2021)** who showed that most of studied women were in third trimester and more than three quarters of them were primigravida and two thirds delivered by CS, regarding pregnancy complications two quarters and two thirds of women respectively had PIH and GDM. This can be explained as CS delivery, PIH and GDM increase the risk of DVT during pregnancy and postpartum period.

Regarding preexisting risk factors, majority of women in study and control groups respectively had no previous family history of DVT, most of women in study group and majority of control group had no previous attacks and complications of DVT, and most of women in both groups respectively not experience prolonged immobilization, more than half and more than two thirds of women in both groups respectively diagnosed with blood clotting disorder. As illustrated the recruited women had minimal preexisting risk factors as our study core concerned on pregnancy and postpartum related risk factors for DVT.

This study nearly similar to **Siddig et al., (2019)** who clarified that most women in study and control groups had negative family history of DVT respectively, majority of women in both group had negative history of DVT respectively. That support present study as it concerned on pregnancy and postpartum risk factors, both studies reflected same inclusion criteria.

Increasingly in related to obstetric risk factors more than three quarters, and less than three quarters of women in study and control groups had history of pre-eclampsia respectively, approximately two fifths, and more than half of both group had ante partum hemorrhage, more than three quarters, and majority of women had cesarean section, less than one quarter and less than one fifth had

preterm birth respectively with no statistically significant difference between both groups.

This result was in accordance with **Morris et al., (2018)** who revealed that less than one fifth and less than tenth of women respectively in postpartum pulmonary embolism and crude postpartum pulmonary embolism group were smokers, more than fifth and one quarter of women had pregnancy induced hypertension respectively, less than three fifths and more than one quarter had caesarean section delivery respectively. In addition, one fifth and less than tenth of women had ante partum haemorrhage respectively.

Moreover, this finding come in same lines with **Zhou et al., (2021)** who clarified that less than one quarter and less than one fifth of women in deep venous thrombosis group and control group had preterm birth respectively, most of women in both groups had cesarean section delivery, less than one fifth and nearly tenth of women had pre-eclampsia, and more than one fifth and less than one fifth of women had preterm birth respectively.

Concerning total knowledge level about DVT among studied women, most of women in study group and majority of women in control group had poor knowledge at pre-intervention phase, while most women in study group, and less than tenth of women in control group had good knowledge at post-intervention with highly statistically significant differences between two groups respectively. Study hypothesis supported by high knowledge level among study group when compared with control group.

This result is nearly similar to **Mohamed et al., (2022)** who found that most women in study and control group had poor knowledge regarding DVT at pre-intervention phase respectively, while more than two thirds of study group and less than one fifth of control group had good knowledge at post-intervention phase. From the researchers' point of view, as evidence-based nursing guidelines had positive effect on recruited women knowledge regarding DVT.

Concerning total compliance level with deep vein thrombosis preventive measures among studied women, all women in study and control groups had poor total compliance level with preventive measures at pre-intervention, while more than three fifths of study group and less than five percentage of control group had a good compliance with preventive measures post-intervention with highly statistically significant differences. This result might be due to the implementation of the intervention and women's desire to attain remission without complications.

This finding is in agreement with **Arnaoutakis et al., (2016)** who stated that the provision of personalized clinical efficacy feedback, which includes data and peer-to-peer coaching, enhances the performance of residents and leads to a notable decrease in harm to patients. Additionally, it was mentioned by **Michtalik et al., (2015)** that the utilization of dashboards for direct feedback on venous thromboembolism prophylaxis resulted in a significantly improved compliance.

Regarding clinical manifestations of deep vein thrombosis post-intervention among study group all women had absent manifestation as; warmness, discoloration, and can't feel pulse, most women had absent localized redness while majority of women had absent welling, absent calf pain, absent palpable thrombosed superficial veins and more than three quarters had absent tenderness .on other hand women in control group had all symptoms with highly statistically significant difference between study and control group respectively, This is might be due to the knowledge and skills obtained through the intervention particularly among those women who possess a strong desire to acquire the necessary skills and knowledge that may potentially serve as a preventive measure against Deep Vein Thrombosis (DVT) and its associated symptoms.

This finding was congruent with the study conducted by **Mohamed et al., (2017)** who revealed that the implementation of nursing guidelines specifically designed for the prevention of deep vein thrombosis (DVT) resulted in a decrease in the incidence of DVT

among the group that adhered to the guidelines. Similarly, **Youness, et al., (2016)** reported that the number of new cases of post-partum venous thromboembolism in Egypt was significantly lower among women who received educational intervention on venous thromboembolism prevention compared to those who received routine post-partum care in the hospital. Additionally, **El-Sayed et al., (2017)** supported current study findings when indicated that a decrease in various clinical signs and symptoms of DVT in the study group compared to the control group during and after one month from discharge. These differences were statistically significant ( $P < 0.05$ ) when assessing the impact of nursing care standards in the prevention of deep vein thrombosis.

Concerning Homan's test, the results of the present study illustrated that majority of women in the study group had negative feeling of calf pain post intervention guideline compare with slightly more than half of the control group had negative feeling of calf pain with a statistically significant difference between two groups. This result is nearly similar to **Elhefnawy & Elsabagh, (2019)** who clarified that all participant in study and control groups had a negative signs of Homan's test at pre intervention, while after 1<sup>st</sup> week of intervention, the study group still had a negative signs of Homan's test, while (4.0%) of the control group had positive signs of Homan's test.

### Conclusion:

According to the findings of the present study, it could be concluded that women who received evidence-based nursing practices guidelines were improved their knowledge regarding DVT and its preventive measures, as well as demonstrate good compliance with deep vein thrombosis preventive measures, in comparison to those who don't receive such guidelines. And this proved the first and second research hypothesis. Additionally, the current study concluded that women who received evidence-based nursing practices guidelines experienced a significant reduction in the occurrence of deep venous thrombosis and its manifestations, in comparison to those who

don't receive such guidelines. This finding supports the third research hypothesis.

### Recommendation:

In light of the study findings, the following recommendations are proposed:

- Increased awareness regarding the risk factors and preventive measures for DVT should be incorporated as a vital component of routine antenatal care during the third trimester of pregnancy.
- Strict monitoring of women at high risk for DVT is imperative during pregnancy, labor, and the postpartum period.
- Enhance the role of nurses in providing comprehensive health education about DVT as a preventable condition and how to prevent it.
- A health education booklet aimed at preventing DVT should be made readily available and distributed to women at high risk.
- **Future research:** additional studies are required to be conducted including large sample size and in different geographic location to generalize the results of the study.

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