Effect of Mechanical Measures on Prevention of Deep Vein Thrombosis among General Surgical Patients

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Abstract

**Aim of the Study:** To examine the effect of mechanical measures on prevention of deep vein thrombosis among general surgical patients.

**Setting:** The study was carried out in General Surgical Department of Menoufia University Hospital.

**Subjects:** A random sample of 120 general surgical patients. They were assigned randomly and divided alternatively into two equal groups, 60 patients for each groups.

**Tools:** 3 tools were used for data collection. I: An interviewing questionnaire of deep vein thrombosis II: Deep vein thrombosis risk factors assessment sheet (scale) III: Deep vein thrombosis clinical assessment sheet (physiological measurement).

**Results:** There was significant improvement in the knowledge about DVT after intervention among study group as compared to control group. The minority of the study and control group (13.3%) and (10%) respectively suffered from leg calf pain on admission, while after 3 weeks (6.7%) of the study group and (16.7%) of the control group suffered from leg calf pain. Regarding leg edema (13.3%) of the study group and (10%) of the control group suffered from leg edema on admission, while after 3 weeks the study group improved to become (6.7%) and control group (23.3%). Both study and control groups had a negative sign of homan’s test and Doppler result on admission, while after three weeks the study group still had negative sign of homan’s test and Doppler result compared to control group (6.31%) had positive sign of homan’s test and Doppler result.

**Conclusions:** General surgical patients who exposed to mechanical measures were not exposed to deep vein thrombosis than those who exposed to routine hospital care only from general surgical department.

**Recommendations:** A booklet about DVT prevention should be available and distributed for all general surgical patients in every ward.

**Key Words:** Mechanical measures – Deep vein thrombosis – General surgical patients.

Introduction

VENOUS thromboembolism (VTE) is the term that describes two clinical conditions: Deep vein thrombosis (DVT) and pulmonary embolism (PE). Deep vein thrombosis occurs when a blood clot or thrombus forms in a deep vein, usually restricting blood flow. Pulmonary embolism occurs if the thrombus is dislodges and travels to the lungs. VTE is considered to be the most common preventable cause of hospital related death [1].

The House of Commons Health Committee reported in 2005 that an estimated 25,000 people die from preventable hospital-acquired venous thromboembolism every year in the United States. This includes patients admitted to hospital for medical care and surgical interventions [2].

Risk for developing DVT increase with age, individual or family history of DVT, smoking, dehydration, cancer, varicose veins, surgery or other hospitalization, certain heart or respiratory disease, obesity and pregnancy. The hormones found in birth control pills or hormone replacement therapy, especially estrogen, is assumed to increase the risk of clot formation by 3 to 4 times [3].

Deep venous thrombosis results from three factors: Stasis of venous blood flow, damage to the endothelial lining of the vein wall and changes in the coagulation mechanism of the blood. These factors are still believed to be of primary importance in thrombus formation, and they contribute to the major predisposing risk factors of venous thromboembolism [4].

Warning signs for DVT can evolve over several days or develop rapidly over a few hours. These may include warmth, tenderness, redness or discoloration in the affected area usually in one calf.
The calf may feel tight, heavy or pulled. Sometimes, only slight discomfort or severe pain increasing upon standing or walking is experienced. Also it may have no signs or symptoms [5].

The morbidity associated with DVT is often under recognized and includes serious long term complications such as pulmonary embolism, chronic venous insufficiency, chronic edema, chronic pain and recurrent venous ulceration, collectively known as the post-thrombotic syndrome [6].

Prevention of venous thromboembolism (VTE), a combination of DVT and PE, is more effective than treatment and is an important aspect of patient care before, during, and after surgery. Identification of risk factors should be used as a basis to determine if pharmacological and/or mechanical thromboprophylaxis should be initiated [7].

Pharmacological measures when used early in combination with mechanical measures are effective in preventing DVT. Pharmacological measures include anticoagulant drugs as low dose heparin. Low molecular weight heparin, warfarin and dextran. It is important to start anticoagulant drugs quickly in patients at risk because thrombi can propagate in a matter of hours. Mechanical measures for DVT prevention include exercises, early ambulation, stockings, pneumatic compression devices, adequate hydration and diet. Each improve venous return and reduces venous stasis in the leg veins [8].

Perioperative nurses should be knowledgeable about venous stasis and should participate in multidisciplinary teams to develop policies, procedures, and protocols to reduce the risk of venous stasis. Preoperative nurses play an important role in assessment, prevention, and early recognition of deep vein thrombosis. Preoperative teaching is an important component of the nursing role, and can relieve patient anxiety, help prevent complications, and improve outcomes [9].

Aim of the study:
The aim of this study is to examine the effect of mechanical measures on prevention of deep vein thrombosis among general surgical patients.

Operational definition:
A mechanical measure for DVT prevention includes turning and positioning at least every 1 to 2 hours, exercises (foot and ankle exercises and deep breathing exercise), early ambulation, stockings and adequate hydration.

Research hypothesis:
The following research hypothesis is formulated in an attempt to achieve the aim of the study:
- There will be a decrease in the incidence of DVT in patient’s who receive DVT prophylaxis (mechanical measures) study group as compared to patient’s who did not receive control group.

Subjects and Methods

Research design:
An experimental design was utilized to achieve the aim of this study.

Setting:
The study was carried out in General Surgical Department of Menoufia University Hospital. Data were collected from 9/2012 to 1/2013.

Subjects:
A random sample of 120 general surgical patients. They were assigned randomly and divided alternatively into two equal groups, 60 patients for each groups:

A- Study group (I): Exposed to mechanical measure (turning and positioning at least every 1 to 2 hours, exercises (foot and ankle exercises and deep breathing exercise), early ambulation, stockings, and adequate hydration) along with routine hospital care.

B- Control group (II): Exposed only to routine hospital care.

The patients had been selected according to the following criteria:
- Age range from 21 to 60 years old.
- Both sexes.
- Conscious and willing to participate in the study.

Tools:
Three tools were utilized for data collection.

These tools are:
Tool I: An interviewing questionnaire of deep vein thrombosis.

It was developed and used by the researcher based on review of the related literature, to assess patient’s knowledge about deep vein thrombosis. It comprised of three parts:

Part one: Sociodemographic data.
- It included information about patient’s age, sex, marital status, level of education and occupation.
Part two: Clinical data.

It was composed of questions about causes of hospital admission; take any medication, previous hospitalization and previous surgery.

Part three: Patient’s knowledge.

It was comprised of questions related to patient’s knowledge regarding deep vein thrombosis causes, risk factors, signs and symptoms, method for prevention, treatment and complication.

Tool II: Deep vein thrombosis risk factors assessment sheet (scale).

It was developed by Autar, (1996) [10] and utilized by the researcher to identify patient at risk and classified them into groups according to predisposing factors. The scale consisting of seven distinct categories identified as age, mobility, body mass index, special risk, trauma risk, surgical intervention and high-risk diseases. A score of < 10 indicate low risk, while a score rang from 11-14 had indicated moderate risk and a score of ≥15 indicate high risk.

Tool III: Deep vein thrombosis clinical assessment sheet (physiological measurement):

It was developed and used by the researcher based on review of the related literature except part one it was developed by Hirsh and Lee, (2002) [11]. The objective of this tool was to evaluate the patient's sign and symptoms of DVT. It was comprised of 3parts:

Part one: Clinical assessment.

It was comprised of items to examine the patient’s signs and symptoms of DVT as presented by:

• Pain in the calf.
• Leg edema or swelling.
• Erythema or cyanosis, warmth, dilated superficial vein.
• Localized redness, pallor and a loss of the dorsalis pedis pulse.
• Tenderness along the distribution of the affected deep leg veins.

Part two: Homan’s test:

It is an active and subjective test in which the patient is asked to dorsiflex his or her foot. If pain in the calf, it was indicative of positive result and presence of deep vein thrombosis, negative human’s test does not exclude DVT.

Part three: Duplex ultrasound:

Presence of clot it was indicative of positive result and presence of deep vein thrombosis, while absence of clot it was indicative of negative result and absence of deep vein thrombosis.

Methods:

- An official permission: To carry out the study was obtained from the hospital director of Menoufia University Hospital prior to data collection and after explaining the significance of the study and its purpose.

- Tools development: Tool I was developed by the researcher while tool II was developed by Autar, (1996) [10] and tool III was developed by the researcher except part one was developed by Hirsh and Lee, (2002) [11]. All tools were submitted to jury of 3 experts in nursing field, Faculty of Nursing, Menoufia University and 2 experts in surgical field, Faculty of Medicine, Menoufia University to obtain its content validity. Modifications were done accordingly.

- Reliability: A test retest method was used to test tool reliability. This comparison is expressed through correlation coefficient alpha for tool I it was 0.93, for tools II it was 0.92 and for tool III it was 0.92.

- Verbal consent: The researcher obtained a verbal consent for participation in the study from all participants, explaining the purpose of the study, and assuring that the confidentiality would be maintained throughout the study.

- Pilot study: A pilot study was carried out before starting data collection on 10 patients to evaluate the tentative developed tools for clarity and applicability and to estimate the time needed to collect data then necessary modification were carried out before actual study. Data obtained from pilot study were excluded from the study.

- Data collection:

• The subjects who fulfill the inclusion criteria were selected randomly and divided alternatively into two equal groups, study group (I) and control group (II) 60 patients for each group.

• All participants of both group were interviewed individually on admission at general surgical department to collect data about sociodemographic and clinical characteristics using tool I, knowledge assessment by using tool (I) part three, risk factors for DVT were assessed by using tool (II) and clinical assessment of DVT by using tool (III).

• Patients of the control group (II) were exposed to routine hospital care.

• Patients of the study group (I) were exposed to routine hospital care and to intervention as the following:
Preoperative care:
Health instruction was given to each patient in the study group individually before surgery by the researcher. Teaching was done in 3 sessions (2 session for teaching exercise program and early ambulation and one session about elastic stockings, and adequate hydration) using demonstration and redemonstration until the patient master the skills.

1- The exercise that was followed involved the following:
- Turning and positioning at least every 1 to 2 hours and performing foot and ankle exercises. The exercises are flexion, extension, and rotation of the ankle and foot. Demonstrate all exercises to the patient and have the patient perform a return demonstration to acknowledge understanding.
- Deep breathing exercise is beneficial because they produce increased negative pressure in the thorax, which assists in emploting the large vein.
- Elevate the lower limb above the level of the heart periodically.
- Early ambulation.

2- Also health instruction was given to patients of the study group about:
- Correct application of elastic stockings.
- Adequate hydration at the prescribed rate.

A booklet was distributed among patients of the study group for reinforcement.

Intraoperative care:
- The researcher assured that elastic stockings were not twisted or turned during the procedure, and keep the patient’s extremities at, but never below, the level of the operating room table.
- Remind operating room team members not to place pressure on the anesthetized patient to avoid circulatory compromise. Use extra padding on pressure points to prevent tissue damage and circulatory impairment.
- Confirm that straps to secure the patient on the table aren’t too tight.
- Instruct the surgical assistant or scrub nurse to avoid extreme degrees of flexion and internal rotation of hip and knee.
- Be aware that unnecessarily high tourniquet pressures and prolonged periods of inflation should be avoided, if possible, when a tourniquet is used.

Immediate postoperative care: Immediately after surgery the researcher carry out the following:
- Be sure that elastic stockings aren’t twisted or turned.
- Elevating the foot of the bed (unless contraindicated) to promotes venous return.
- Avoid placing pillows under the patient’s knees to prevent compressing the popliteal veins.
- Increase fluid intake according physician prescription.
- Encourage the patient to do all health instruction that was given before surgery.

After three weeks of surgery (after intervention) all participants of both group were interviewed individually for knowledge assessment by using tool (I) part three, and clinical assessment of DVT by using tool (III).

Statistical analysis:
Data was collected, tabulated and statistically analyzed using SPSS version II statistical program. Descriptive statistics were first applied (e.g., frequency, percentage, mean and standard deviation). Chi square test was used for comparison between 2 groups with qualitative data. While McNamara test was used for comparison between the same group before and after. \( p \)-values, which were less than 0.05, were considered as statistically significant.

Results
Table (1) revealed that, the mean age for study group was \( 42.03 \pm 13.58 \) and for the control group was \( 41.76 \pm 13.72 \) years. More than half of both groups (53.3%) were male. The majority of study group (83.3%) and control group (80%) were married. About half of study group (46.7%) and control group (50%) had secondary education.

Table (2) the findings revealed that about (56.7%) of study group and (46.7%) of control group admitted to hospital for abdominal surgery. The majority of the study group (83.3%) and control group (80%) did not take any medication. As regards the previous surgery, about (16.7%) of study group and (20%) of control group had cesarean section. There were no statistical significant differences between control and study groups regarding clinical data.

Table (3) showed that about two third of both groups (63.3%) of the study group and (66.7%) of control groups were at moderate risk for developing DVT. There were no statistical significant differences between control and study groups regarding risk factor of DVT.
Figures (1,2) it is clear from these figures that there was significant improvement in the knowledge of DVT after intervention among study group as compared to control group.

Table (4) the findings revealed that, the minority of the study and control group (13.3%) and (10%) respectively suffered from leg calf pain on admission, while after 3 weeks (6.7%) of the study group and (16.7%) of the control group suffered from leg calf pain. Regarding leg edema (13.3%) of the study group and (10%) of the control group suffered from leg edema on admission, while after 3 weeks the study group improved to become (6.7%) and control group (23.3%). As regards cyanosis in the leg (100%) of the study and control did not suffered from cyanosis in leg on admission, while after 3 weeks the control group become (10%) suffered from cyanosis in leg. Regarding to tenderness in leg the minority of the study and control group (10%) suffered from tenderness in leg on admission, while after 3 weeks the study group improved and (20%) of the control group suffered from tenderness in leg.

Figure (3) illustrated that all of both study and control groups had a negative sign of homan’s test and Doppler result on admission, while after three weeks the study group still had negative sign of homan’s test and Doppler result while (6.31%) of control group had positive sign of homan’s test and Doppler result.

Table (1): Distributions of patients of the both groups according to their socio-demographic data.

<table>
<thead>
<tr>
<th>Socio-demographic data</th>
<th>Study group No=60</th>
<th>Control group No=60</th>
<th>X²</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>t-test</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>42.03±13.58</td>
<td>41.76±13.72</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32 53.3</td>
<td>32 53.3</td>
<td>0</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Female</td>
<td>28 46.7</td>
<td>28 46.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>24 40</td>
<td>18 30</td>
<td>1.72</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Secondary</td>
<td>28 46.7</td>
<td>30 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>8 13.3</td>
<td>12 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>10 16.7</td>
<td>12 20</td>
<td>0.22</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Married</td>
<td>50 83.3</td>
<td>48 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>8 13.3</td>
<td>18 30</td>
<td>6.36</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Manual work</td>
<td>36 60</td>
<td>24 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housewife</td>
<td>16 26.7</td>
<td>18 30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (2): Distributions of patients of the both groups according to their clinical data.

<table>
<thead>
<tr>
<th>Clinical data</th>
<th>Study group No=60</th>
<th>Control group No=60</th>
<th>X²</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes of hospital admission:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal surgery</td>
<td>34 56.7</td>
<td>28 46.7</td>
<td>3.88</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Hyperthyroidism</td>
<td>20 33.3</td>
<td>18 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hernia</td>
<td>6 10</td>
<td>14 23.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take any medication:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 16.7</td>
<td>14 23.3</td>
<td>0.83</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>No</td>
<td>50 83.3</td>
<td>46 76.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Causes of previous hospitalization:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>36 60</td>
<td>24 40</td>
<td>3.36</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Surgery</td>
<td>22 36.7</td>
<td>30 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical problem</td>
<td>2 3.3</td>
<td>6 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past previous surgery:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cesarean section</td>
<td>10 16.7</td>
<td>12 20</td>
<td>2.40</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Tonsillectomy</td>
<td>6 10</td>
<td>10 16.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast surgery</td>
<td>6 10</td>
<td>8 13.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No previous surgery</td>
<td>38 63.3</td>
<td>30 50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table (3): Distributions of risk factors of DVT for both study and control groups.

<table>
<thead>
<tr>
<th>Risk factors assessment of DVT:</th>
<th>Study group (No=60)</th>
<th>Control group (No=60)</th>
<th>X²</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate risk 11-14</td>
<td>38 63.3</td>
<td>40 66.7</td>
<td>0.22</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>High risk &gt; 15</td>
<td>22 36.7</td>
<td>20 33.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (4): Comparisons between patients of both groups regarding to clinical manifestation of DVT at two different intervals (on admission and after 3 weeks of surgery).

<table>
<thead>
<tr>
<th>Clinical manifestation of DVT</th>
<th>On admission</th>
<th>After three weeks of surgery (after intervention)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study group</td>
<td>Control group</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Calf pain:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>8</td>
<td>13.3</td>
</tr>
<tr>
<td>Not present</td>
<td>52</td>
<td>86.7</td>
</tr>
<tr>
<td>Leg edema:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>8</td>
<td>13.3</td>
</tr>
<tr>
<td>Not present</td>
<td>52</td>
<td>86.7</td>
</tr>
<tr>
<td>Cyanosis in the leg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not present</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Warm leg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Not present</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>Redness in the leg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not present</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Can’t feel leg pulse:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not present</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Tenderness in the leg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Not present</td>
<td>54</td>
<td>90</td>
</tr>
</tbody>
</table>

N.B.: (100%) of both groups did not suffer from dilated superficial vein on admission and after 3 weeks of surgery.

Fig. (1): Patient's knowledge about DVT of the study group at two different intervals pre and post intervention assessment.
Deep vein thrombosis (DVT) is the primary cause of fatal and nonfatal pulmonary embolism. It is imperative for preoperative nurse to identify the risks factors for DVT and/or PE in their nursing assessments. Assessment of risk factors begins with the initial patient assessment. It continues throughout the patient’s surgical/interventional procedure and postoperative recovery until he or she is discharged from care. The process of assessing patients for DVT or PE begins with the identification of risk factors [9].

**Sociodemographic characteristic of the studied sample:**

As regard to age, the results of the present study revealed that the mean age for study group was 42.03±13.58 and for the control group was 41.76±13.72 years. This result was in line with Hitos et al., [12] who stated that deep vein thrombosis usually affect individuals older than 40 year and they added that any patient over the age of 40 years should be considered to be at significant high risk of surgical developing thromboembolism.

Concerning sex, the results of the present study revealed that more than half of both groups were male. This result was consistent with Abd El-Salam (2009) [13] who reported that more than two thirds of the sample were males while one third were females in both study and control groups.

**Risk factors assessment for deep vein thrombosis:**

Concerning risk factors assessment for deep vein thrombosis, it was noticed from the present study that about two thirds of both study and control group had moderate risk for deep vein thrombosis. The assessment allow the researcher to rate the patient's risk as low, moderate or high. The researcher should focus on prevention by the early recognition and adequate prophylaxis of those at...
increased risk. This result was in line with Abd El-Salam [13] who stated that more than three fourth of the study and control groups were at high risk for developing DVT.

**Patient’s knowledge about deep vein thrombosis:**

It was noticed from the present study that there was significant improvement in the knowledge of DVT after intervention among study group as compared to control group. This finding was in congruence with Abd El-Salam [13] who stated that after intervention there was a significant improvement in total knowledge score of the study group as compared to control group. Bader [14] found that patients of the study group had a significant difference in their knowledge from preoperative to the discharge time as compared to the control group. Also Bonner [15] stated that patients need information about DVT, anticoagulation, compression stockings, and the possible complications of these. They also need to be aware of how and when to access help. The diagnosis of DVT may also mean a change in lifestyle and this information should be given verbally and reinforced with written information to increase concordance with treatment.

**Regarding clinical assessment of DVT:**

As regard to the clinical assessment it was noticed that after intervention the patients of study group had an improvement of clinical assessment as evident by absences of warm leg and tenderness in the leg than patients of control group who follow the routine care only. This may be due to improvement of knowledge and applying the instruction of mechanical measures. This finding of the study was in line with El-Sheikh [16] who stated that the patient who received the protocol of care on congestive heart failure would have an improvement of physical responses as evident by changes in vital signs, dyspnea, edema, fatigue, skin condition, laboratory finding than patient who did not receive the protocol of care.

According to the current study findings, the study group who received intervention did not have DVT compared of the control group who follow the routine care only, the risk for DVT is prevented this due to giving instruction to the patient about mechanical measures by the researcher. This was supported by Abd El-Salam [13] who stated that the study group who received intervention about lower limb exercises and diet had lower percentage of DVT occurrence than control group. Roderick et al., [17] stated that mechanical compression methods reduced the risk of DVT by about two-thirds when used as monotherapy and by about half when added to a pharmacological method. Also Geerts et al., [9] stated that without prophylaxis, the incidence of objectively confirmed, hospital-acquired DVT is approximately 10% to 40% among medical or general surgical patients and 40% to 60% following major orthopedic surgery.

The present study was also consistent with Amaragiri and Lees [18] who conducted a systematic literature review of randomized controlled trials evaluating the effectiveness of graduated compression stockings for preventing DVT in various groups of hospitalized patients. The analysis demonstrated a statistically significant reduction in DVT incidence with graduated compression stockings compared with control both among the nine trials in which stockings were used alone and among the seven trials in which stockings were used in addition to another method of thromboprophylaxis.

**Conclusion:**

General surgical patients who exposed to mechanical measures were not exposed to deep vein thrombosis compared with those who exposed to routine hospital care only from general surgical department.

**Recommendations:**

- A booklet should be available and distributed for all general surgical patients in every ward about DVT prevention
- Replication of the study with large probability sampling for generalizing the results.

**References**


14- BADR M.E.S.: Rehabilitation of the post cardiac surgery patient. Review Article. Faculty of Nursing, Cairo University, p. 25, 2002.


