

## Impaired Healing Risk Factors among Venous Leg Ulcer Patients: Recommended Protective Measures

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### **Abstract:**

**Background:** Venous leg ulcer (VLU) is the main warning clinical sign of chronic venous insufficiency. It remains worldwide health care problem today.

**Aim:** Was to identify impaired healing risk factors among venous leg ulcer patients, as well to recommend protective measures.

**Research Questions:** What are the impaired healing risk factors among venous leg ulcer patients?

**Design:** A descriptive exploratory design was utilized for conducting the current study.

**Setting:** The study was conducted in the vascular diseases outpatient clinics at a University Hospital; affiliated to Cairo-University -Egypt.

**Subjects:** A convenient sample of 50 adult male & female patients whose leg ulcer did not heal through 4 to 6 weeks and above were recruited in the current study.

**Tools:** I) Personal characteristics sheet divided into 1- Demographic data and 2- Medical data. II) Venous leg ulcer management sheet.

**Results:** The study findings revealed that 80% of the study subjects their age were ranged between 40 and less than 70 years old with a Mean+SD=50.68+14.12 and 42% of them cannot read or write. Also 58 % of the subjects had venous leg ulcer 6 months ago and above with a Mean+SD =2.34 + 1.61 and 78% of them their BMI over 25 kg/m<sup>2</sup> in addition to 76% of them had chronic diseases. In relation to venous leg ulcer management items the study highlight that (94%, 84%, 58% & 56%) of the study subjects did not do leg exercises, did not know healthy diet and daily fluids intake, did not elevate their leg and did not apply compression therapy respectively while smoking represented only 42%. There was a statistical significance difference between type of movement during work with the studied subjects' total score of associated chronic diseases and leg exercise with *t*-test= 3.02 & 2.87 respectively. There was a strong correlation between the total score of venous leg ulcer management with the compression therapy, leg exercise and leg elevation *r*= .833, .605 and .669 respectively.

**Conclusion:** Results identified the following as risk factors for impaired healing of venous leg ulcer: lack of leg exercise, unaware of healthy diet, lack of leg elevation, lack of compression therapy, increased age, BMI, in addition to longer ulcer duration, associated chronic diseases (especially diabetes and hypertension) and smoking.

**Recommendation:** Based on the current study results a thorough understanding of risk factors is required for assessment of non healing leg ulcer in order to promote early healing, improve nursing quality of care and subsequently enhance patient's adherence to venous leg ulcer management.

**Keywords:** Venous leg ulcer, venous ulcer management, factors impaired healing, nursing interventions.

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### I. Introduction

Chronic venous leg ulcers (VLU; also known as varicose or stasis ulcers) is defined as a defect in the skin below the level of knee persisting for more than six weeks and shows no tendency to heal after three or more months. Chronic ulceration of the lower legs is a relatively common condition amongst adults, one that causes pain, social distress and reduces functional status of the patients. The condition affects 1% of the adult population and 3.6% of people older than 65 years (Vinayak Agale, 2013). Venous leg ulcers signify the most prevalent form of difficult-to-heal wounds. The most common cause of lower extremity ulcers is chronic venous insufficiency, which accounts approximately 80% of all venous ulcers. Venous leg ulcers considerable challenges to patients and healthcare systems: They are frequent, costly to manage, recurring, and may persist for months or years (Taradaj, 2012).

Venous leg ulcers develop in consequence of advanced chronic venous insufficiency with dysfunction of the calf muscle pump. The venous hypertension caused by venous valve incompetence, which is common in primary varicose veins and post-thrombotic syndrome and may affect the superficial or deep venous systems in isolation or concurrently (Scotton, Miot & Abbade, 2014). Management of VLUs is complex, and ranges from clinical treatment to surgical therapy of the underlying venous abnormality. Its management is time-consuming and depends on appropriate assessment, which includes examination of the ulcer and the patient (Sinha & Sreedharan, 2014).

The most effective intervention for treatment of VLUs is compression therapy, as it minimizes the effects of venous hypertension on the affected leg. Compression therapy plays a critical role in promoting healing and prolonging the period of ulcer recurrence after complete healing. Compression acts on the macrocirculation by enhancing deep venous return, reducing pathological reflux during walking, and increasing the stroke volume during activation of the calf muscles. Limb compression increases tissue pressure, as a result facilitating resorption of edema and improving lymphatic drainage. Also leg elevation is reducing edema, improving microcirculation, oxygen delivery, and speeding up ulcer healing when the patients raising their lower extremities above the level of the heart. Thus beside compression therapy, leg elevation is considered standard of care (Collins & Seraj, 2010 and Scotton, Miot & Abbade, 2014).

Patients with venous leg ulcers have been reported to be less physically active which is distressing as these patients appear to have an increased risk of disease-related complications. Accordingly, physical activity in combination with compression therapy is recommended, because it reversing the effects of venous hypertension, decreasing wound-healing time, preventing wound recurrence and post-ulcer functional limitations. Leg exercise and walking have effective role in stimulating the calf-muscle pump which supports venous circulation and improve venous return. Physical activity can be a challenging and difficult behavior with known poor adherence (Roaldsen, 2011).

Apparently management must start with a full history and examination to identify risk factors such as age, gender, cardiovascular disease, body mass index, mobility, arthritis, diabetes, and a history of leg injury or deep vein thrombosis. Effective nursing care should be based on a full assessment, ongoing evaluation and treatment, which contain the underlying causes, the control of factors that affect healing and the use of appropriate dressings and healing products. Assessment also includes a consideration of the nutritional requirements of the body change during periods of VLU healing are required. A nutritional assessment, including a calculation of the body mass index (height over weight) is therefore part of the assessment (YLönen, Stolt, Leino-Kilpi, & Suhonen, 2014).

Parker, Finlayson, Shuter, & Edwards (2015), reported that around 70% of venous leg ulcers will heal within a 24 weeks period. The lasting 30% remains unhealed after 24 weeks, often even with evidence-based care. Early prognostic indicators and the ability to identify risk factors of unhealed ulcer would be beneficial for clinicians in providing appropriate information to patients and to accurately assess the healing possible of venous leg ulcers. This in turn would enable the achievement of timely and appropriate strategies for optimal patients' outcomes. For that reason the aim of the current study was to identify the impaired healing risk factors among venous leg ulcer patients, as well to recommend protective measures.

### **Significance of the study:**

The accurate prevalence of chronic venous disease (CVD) remains not easy to determine because of variations in study population, selection criteria, and disease definition between different studies. Many studies reported the prevalence of CVD as a wide ranges; from 2%-56% in men and from 1%-60% in women. Even though the fact that it has a massive impact on health-care budgets and patients' functional status, it is still an underestimated condition. CVD is more common with increasing age, and in recently published studies there were no significant gender differences. Family history, obesity, prolonged standing, and diet have been proposed as risk factors of chronic venous disease (Milic, 2011).

The prevalence of venous leg ulcer (VLU) is increasing, and its prolonged duration is noticeable which give important clue of impaired healing of the wound. Moreover; at present, the health practitioners utilize their clinical judgment, without the "risk assessment tools" to assist them in the detection of the risks of the unhealed venous leg ulcers (Edward, Finalyson & Ogrin, 2014). So it is crucial to focus and direct attention toward assessment of factors that hinder the healing of venous leg ulcer. Identifying of the risk factors that associated to the failure of VLU healing is essential for deciding and developing management strategies that influence VLU healing and enhancement of patients' awareness related to the importance of adherence to the treatment and participate in self management strategies hoped optimizes outcomes as promote early healing and improve nursing quality of care. Thus the aim of the current study was to identify the impaired healing risk factors among venous leg ulcer patients, as well to recommend protective measures.

## **II. Material & Methods**

### **The Aim:**

The aim of the current study was to identify the impaired healing risk factors among venous leg ulcer patients, as well to recommend protective measures.

### **Research Question:**

What are the impaired healing risk factors among venous leg ulcer patients?

**Research Design:**

A descriptive exploratory Non-experimental design was utilized for conducting the current study.

**Setting:**

The study was conducted at the vascular diseases outpatient clinics at a University Hospital; affiliated to Cairo-University -Egypt.

**Subjects:**

A convenient sample of 50 adult male & female patients through consecutive 6 months and whose leg ulcer did not heal through 4 to 6 weeks and above; were recruited in the current study.

**Tools:**

In order to achieve the purpose of the study two tools were developed by the researcher as follows:

**Tool I:** Personal data which consisted of two parts: **Part I:** Patient's demographic data which covers items related to age, gender, marital status, level of education, type of movement during work. **Part II:** Medical data pertinent to medical diagnosis, duration of disease, body mass index, associated chronic diseases, smoking history, past surgical history, current medication .....etc. **Tool II:** Venous leg ulcer management sheet that consists of four main perspectives in order to explore patient's application of venous leg ulcer management as follows: A- Nutritional status: which includes questions related to diet and daily fluid intake with total score=2. B- Compression therapy contain questions pertinent to use of compression, importance, appropriate time, how clean it ....etc. with total score= 8, while C- Leg exercises cover questions about performance of leg exercises, importance, appropriate time..... etc. with total score=6, and D- Elevation of leg that includes questions as "did you elevate your leg?", importance, appropriate time and level.....etc. with total score=6. For each question "zero" indicate "no" answer that mean the patient did not apply this related item while (score 1) indicates "yes" that mean applying the related item; the higher score indicate low risk factor while low score indicate there is a risk factor. The researcher tested the tool reliability and it had adequate internal consistency as (Cronbach's alpha= 0.737).

**Ethical consideration:**

An official permission was taken from the hospital administrators. Each subject was informed about the nature, purpose and benefit of the study. The researchers emphasized that participation in the study is entirely voluntary; anonymity and confidentiality are assured through coding the data. Then consent was obtained from all subjects.

**Pilot study:**

A pilot study was carried out before starting data collection on 10 patients who met the criteria of selection to test the feasibility, clarity and applicability of the tools as well as estimate the time needed to collect data. To achieve tools validity panel of three experts of medical-surgical nursing reviewed the utilized tools and added "one question about the medical data as patient's compliance to current medication to be comprehensive and fulfill" the aim of the study. Data which obtained from the pilot study was excluded from the study results. Recommended tool modification was prepared before proceed in data collection.

**Procedure:**

Once official permission was approved from the hospital administrators, the researcher initiated data collection through (April 2015 to September 2015). Based on the researcher initial assessment (pilot study) a few number of patients about 1 or 2 only were inpatient at one department of the hospital as they had a chronic disease, therefore each subject was interviewed individually at the out-patient surgical clinic in order to be aware of the nature and purpose of the study followed by demographic and medical data collection through fulfillment of **tool I** in addition to the observation of the patient's leg to spot the accurate site of ulcer then measurement of weight and height was taking to calculate the BMI and its interpretation according to classification of (WHO, 2004). After that every patient had been asked about his/her leg ulcer management using **tool II** venous leg ulcer management sheet. This interview took place within (25 to 35) minute for each patient.

**Statistical analysis:**

The data was coded and tabulated using a personal computer. Statistical Package for Social Science (SPSS) version 18 was used. Data was presented using descriptive statistics in the form of frequencies and percentage, mean and standard deviation. Inferential statistics as correlations, mean of difference was performed. Statistical significance was considered at p-value  $\leq 0.05$ .

### III. Results

The results of this study will be presented into two sections: **The first section** explored the demographic and medical data. **Table 1** revealed that 68% of the studied subjects were male while 32% of them were female and their mean of age ( $\bar{x}$ +SD= 50.68+14.12). Regarding marital status 80% of the subjects were married and 64% was from urban area. Related to level of education 48% of subjects cannot read and write followed by 24% read and write while secondary and college level represent approximately the same percent (12% & 10%) respectively. Also this table illustrated that, in relation to occupation 44% of the studied subjects were worker, 28% of them were house wife and employee or does not work represented (14% & 12%) respectively. Concerning the type of movement during work (38% & 34%) of the studied subjects sitting and standing most of time respectively while 28% of them movement most of the time during working hours.

According to the medical data, it was noticed from **Table 2** that, 42% of the studied subjects had venous leg ulcer since < 6 months and (22% & 20%) of them had venous ulcer from (6-> 1year & 1 ->2years) respectively while (2% & 4%) from (2 ->3years & 3 ->4years) respectively with a Mean+SD=2.34+1.61 and (50% & 44%) of them their venous ulcer located between foot and above medial malleolus respectively. As regards body mass index (BMI) only 20% of the studied subjects had normal weight, while (48%, 18%, 2% & 10%) of them categorized as overweight, obese class 1, obese class 2 and morbid obese respectively with a Mean+SD=28.90+7.20.

Also **Table 2** shows that, 76% of the studied subjects was suffering from different chronic diseases and (42% & 36%) of them had diabetes and hypertension respectively while liver disease, deep venous thrombosis (DVT) and varicose vein represented the same percent 8% followed by 6% for heart and muscle/joint diseases. Additionally, 36% of them had past surgical history as: artery bypass, hip replacement, skin graft and surgical debridement represented (9%, 3%, 2% & 1%) respectively.

**Table 3** indicated that, 42% of the studied subjects were smoker and only 10% of them stop smoking. According to the venous ulcer medications it was observed that, 92% of the studied subjects received medications as antibiotics, antifungal, anticoagulant and anti-inflammatory with the percent of (88%, 22%, 14% & 42%) respectively and 88% of them compliance of taking medications.

**The second Section** illustrated the answer of the current study question which related to the risk factors that impaired venous leg ulcer healing as **Figure 1** clarified that, 80% of the studied subjects their age was over 40 years and 78% of them their BMI was over 25 kg/m<sup>2</sup>, in addition to 76% of them had chronic diseases. In relation to venous leg ulcer management items (94%, 84%, 58% & 56%) of the subjects did not do leg exercises, did not know healthy diet & daily fluid intake, did not elevate their leg and did not apply compression therapy respectively while smoking represented only 42%.

**Table 4** displays that, there was a statistical significance mean of difference between type of movement with the studied subjects' total score of associated chronic diseases and leg exercise with t-test= 3.02 & 2.87 respectively, while there was no statistical significance difference with total score of healthy diet & daily fluid intake, compression therapy, leg elevation and venous leg ulcer management as t-test = 1.52, 0.29, 0.14 and 1.06 respectively. Concerning the education level and smoking there was no significance difference with total score of associated chronic diseases, total and subtotal score of venous leg ulcer management items.

As regards the correlation between the study subjects selected demographic and medical data with (Total score of: associated chronic diseases & total and subtotal score of venous Leg Ulcer management) **Table 5** clarified that, there was a weak correlation between the total score of associated chronic diseases with age r= .27 and moderate correlation with since when had venous leg ulcer r= .359. Also there was a weak correlation between leg exercise and compression therapy r= .286. Additionally, it was a moderate correlation between the total score of venous leg ulcer management and healthy diet r= .342. While there was a strong correlation between the total score of venous leg ulcer management with the compression therapy, leg exercise and leg elevation r= .833, .605 and .669 respectively. According to the correlation between leg elevation with the compression therapy and leg exercise there was a weak correlation r= .275 & .279 respectively.

#### Section I:

**Table 1: Description of the study subjects' demographic data (n=50).**

Background data	No.	%
<b>Age:</b>	Mean+SD=50.68+14.12	
< 20	2	4%
20 ->30	1	2%
30 ->40	7	14%
40 ->50	13	26%
50 ->60	8	16%
60 ->70	19	38%
<b>Gender:</b>		
-Male	34	68 %
-Female	16	32 %

<b>Marital Status:</b>		
-Single	5	10 %
-Married	40	80 %
-Widowed	5	10 %
<b>Residence:</b>		
-Rural	18	36 %
-Urban	32	64 %
<b>Educational level:</b>		
-Cannot read or write	24	48 %
-Read & write	12	24 %
-Primary	1	2 %
-Preparatory	2	4 %
-Secondary	6	12 %
-College	5	10 %
<b>Occupation:</b>		
-Does not work	6	12 %
-House wife	14	28 %
-Employee	7	14 %
-Worker	22	44 %
-Student	1	2 %
<b>Movement during work:</b>		
-Movement most of time	14	28 %
-Sitting most of time	19	38 %
-Standing most of time	17	34 %

**Table 2: Description of the study subjects' medical related data (n= 50).**

Medical data	No.	%
	<b>Mean+SD =2.34 + 1.61</b>	
<b>Since when had venous leg ulcer:</b>		
- < 6 months	21	42 %
- 6 months - >1 year	11	22 %
- 1 - >2 years	10	20 %
- 2 - >3 years	1	2 %
- 3 - >4 years	2	4 %
- >4 years	5	10 %
<b>Venous ulcer location:</b>		
- Foot	25	50 %
- Above medial malleolus	22	44 %
- Cuff muscle	3	6 %
<b>Body mass index:</b>	<b>Mean+SD =28.90 + 7.20</b>	
- Underweight	1	2 %
- Normal	10	20 %
- Overweight	24	48 %
- Obese class 1	9	18 %
- Obese class 2	1	2 %
- Morbid obese	5	10 %
<b>Associated chronic disease:</b>		
- Yes	38	76 %
- No	12	24 %
<b>*Types of chronic disease: for yes: no= 38</b>	<b>Mean+SD =1.14+1.01</b>	
- Heart	3	6 %
- Liver	4	8 %
- DVT	4	8 %
- Varicose vein	4	8 %
- Muscle/joint	3	6 %
- Hypertension	18	36 %
- Diabetes	21	42 %
<b>Past surgery:</b>		
-Yes	18	36 %
- No	32	64 %
<b>Type of surgery: for yes: no=18</b>		
- Skin graft	2	4 %
- Artery bypass	9	18 %
- Hip replacement	3	6 %
- Surgical debridement	1	2 %
- Others	3	6 %

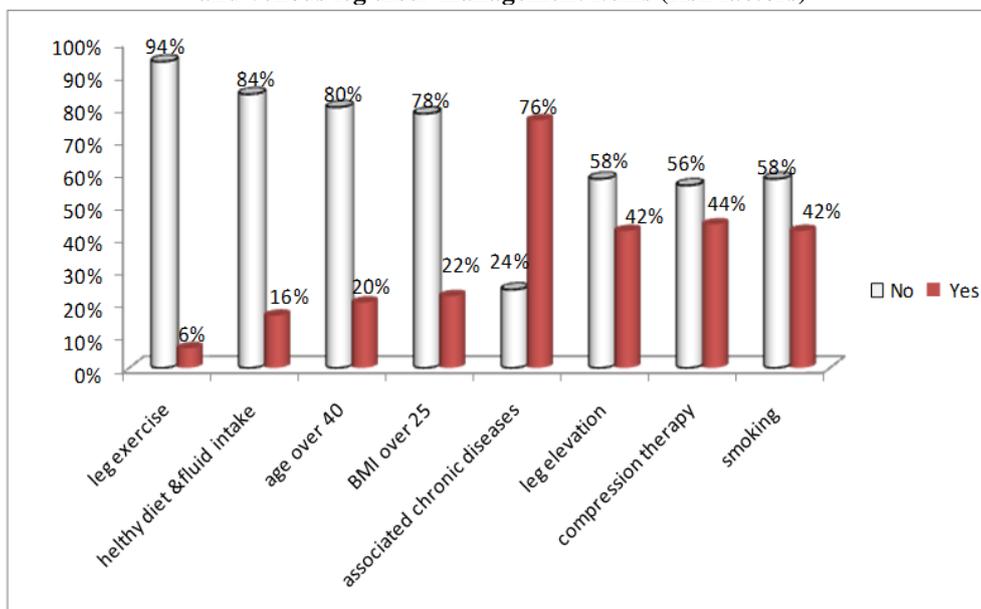
*\*Total of chronic disease types not mutually exclusive "some patients had more than one disease".*

**Table 3: Description of the study subjects' smoking and current medication data (n= 50).**

Item	No.	%
<b>Smoking history:</b>		
- Yes	21	42 %
- No	29	58 %
<b>Stop smoking: for yes: no=21</b>		
- Yes	5	10 %
- No	16	32 %
<b>Did you receive medication of venous ulcer:</b>		
- Yes	46	92 %
- No	4	8 %
<b>Type of medication: for yes answer: Total Patients' No=46</b>		
- Antibiotics	44	88 %
- Antifungal	11	22 %
- Anticoagulant	7	14 %
- Anti inflammatory	21	42 %
<b>Compliance of medication: for yes answer: Total Patients' No=46</b>		
- Yes	44	88 %
- No	2	4 %

**Section II:**

**Figure 1: Percentage distribution of the study subjects' regarding age, BMI, associated chronic diseases and venous leg ulcer management items (risk factors)**



*N.B. Total number is not mutually exclusive*

**Table 4: Compare of means between the study subjects' level of education, type of movement during work, smoking & (Total score of associated chronic diseases & total and subtotal score of venous Leg Ulcer management items).**

Variables	Total Scores of					
	Associated chronic diseases	Healthy diet & fluid amount	Compression therapy	Leg Exercise	Leg Elevation	Venous leg ulcer management
	"Independent t-test"					
Education	1.13	0.36	1.87	1.14	0.77	1.08
P value	0.26	0.72	0.07	0.27	0.445	0.29
Type of movement	3.02**	1.52	0.29	2.87**	0.14	1.06
P value	0.004	0.14	0.78	.006	0.90	0.30
Smoking	0.55	1.05	0.03	1.44	0.87	0.19
P value	0.59	0.30	0.97	0.16	0.39	0.85

\*P ≤0.05

**Table 5: Correlation between the study subjects selected demographic and medical data with (Total score of associated chronic diseases & total and subtotal score of venous Leg Ulcer management).**

Variables	Total Scores of					
	Associated chronic diseases	Healthy diet & fluid	Compression therapy	Leg Exercise	Leg Elevation	Venous leg ulcer management
	<b>r-test</b>					
Age	.27*	.37	.22	.16	.018	.172
P value	0.05	0.79	0.12	0.25	0.90	0.23
BMI	.080	.061	.044	.065	.032	.039
P value	0.58	0.67	0.76	0.65	0.82	0.78
Since when had venous leg ulcer	.359*	.025	.193	.058	.025	.143
P value	0.01	0.86	0.17	0.69	0.86	0.32
Healthy diet & fluid	.048		.206	.25	.074	
P value	0.74		0.15	0.07	0.61	
Compression therapy	.041	.20				
P value	0.77	0.15				
Leg Exercise	.16	.25	.286*			
P value	0.25	0.79	0.04			
Leg Elevation	.13	.074	.275*	.279*		
P value	0.36	0.61	0.05	0.05		
Venous leg ulcer management	.013	.342*	.833**	.605**	.669**	
P value	0.93	0.01	0.000	0.000	0.000	

\*P ≤0.05

#### IV. Discussion

Many factors lead to VLU, a systematic assessment of the patient is required, in order to determine the suitable treatment strategies. A correct assessment is necessary to avoid wrong treatment that might cause deterioration of the wound, delay wound healing, or harm the patient (Agale, 2013). So the discussion was presented into two sections: **Section I:** Shed the light on the demographic and medical data; while **Part II:** Focused on the impaired healing risk factors among venous leg ulcer patients.

**The first section** revealed that around one third of the studied subjects their age was ranged between forty to less than fifty years old while more than one third of them their age ranged between sixty to less than seventy, and more than two third of them were male, while the majority of the subjects were married and around the two third of them was living at urban area. The researcher also reported that merely half of the subject cannot read or write. In the delight of these findings (Milic, 2011), who studied the risk factors related to the failure of venous leg ulcers for healing with compression treatment assessed 189 patients with venous leg ulcers (101 women, 88 men; with mean of age 61 years). And (Adeyi, Muzerengi & Gupta, 2009) who conduct a systemic review of venous ulcer management reported an increase in prevalence of leg ulcers with age and in women. Also (Karanikolic, Karanikolic, Petrovic & Stanojevic, 2015) who studied the prognostic factors related to delayed healing of venous leg ulcer treated with compression therapy mentioned that a total of 100 patients with chronic venous ulceration were tested 58 (58%) were female and 42 (42%) were male. The average age of patients was  $62.7 \pm 6.53$  years, where the male population was older which support the current study findings related to the age. According to the gender the three studies explored the occurrence of venous leg ulcer most common in women which not matching with the current findings but from the researcher's point of view this was probably due to most of male studied subjects were worker and their work keep them most of time between standing or sitting position as the current study findings mentioned more than one third of them were worker, followed by more than one third of the studied subjects was either at sitting or standing position most of the time.

Regarding the medical data findings, the researcher observed that around half of the studied subjects their duration of unhealed venous leg ulcer ranged between 6 months to less than 2 years ago while only few of them suffered from VLU between two up to four years; which exceeded the normal duration of venous ulcer healing that is between fourth and sixth week. Oien & Forssell (2013) their findings go well together when they studied ulcer healing time reported that, the median ulcer duration was 12 weeks (mean 117 weeks), ranging from 1 week to 46 years. Added to that (Chaby, et-al, 2013) analyzed 94 patients to determine the Prognostic factors associated with healing of venous leg ulcers and explored that the mean venous leg ulcer duration were  $24.8 \pm 45.7$  months. It was noticed from the previous studies that, duration of VLU was prolonged even though all subjects under compression therapy and antibiotics which highlighted the ineffective or in appropriate patient's attempt at therapy might result from lack of patients understanding the importance, how to use or adhere to the management that by consequently the main responsibility of the nurse to be in active role toward the patients.

In Relation to VLU location, half of the studied subject located in foot and merely half of them were above the medial malleolus. As (Scotton, Miot & Abbade, 2014) recorded that the Location of venous leg ulcer

is variable, although the distal region of the legs - particularly over the medial malleolus - is most commonly site affected. And according the Body Mass Index (BMI) calculation the researcher founded that merely half of the studied subjects categorized as overweight and nearly one third of them were obese. In the same line (Milic, Zivic, Bogdanovic, Karanovic & Golubovic, 2009) assessed the Factors associated with poor healing and recurrence of venous ulceration as they mentioned that the majority of subjects their BMI over 25 kg/m<sup>2</sup>. From the researcher own opinion, this is might be because obesity became the main problem and its prevalence increased all over the world.

At the same time it was found that more than one third of the studied subject was smoker and the majority of them was suffering from different chronic diseases especially diabetes and hypertension which represented more than one third near the half of subjects. While only few of them had other different diseases as, Deep Venous Thrombosis (DVT), varicose vein, heart & muscle/joint diseases. Moreover, more than one third of them had past surgical history as: artery bypass, hip replacement, skin graft and only few of them experience surgical debridement. Based on that finding the researcher could say that the critical chronic disease as diabetes is a vital factor in delaying leg ulcer healing; it lead to poor circulation beside the reduction of sensation among VLU patients result in delaying wound healing and be susceptible to infection especially uncontrolled diabetic patients. A research conducted by (Agale, 2013) reported that the incidence of ulceration is rising as a result of increasing the risk factors for atherosclerotic occlusion such as, smoking, obesity, and diabetes. Moreover (Dogra & Sarangal, 2014) reported about one center in India which explored that, leprosy (40%), diabetes (23%), venous disease (11%), and trauma (13%) are causes of lower extremities ulcer.

In addition the researcher reported that most of the studied sample was undertaking antibiotics while more than the two third of them was taking anti-inflammatory medications. Del Rio Sola & Antonio (2012) reported that administration of 300 mg of aspirin a day is not recommended as it is shortened the healing time. on the other hand (Dogra & Sarangal, 2014 and Dogra & Rai, 2014) found that, the routine use of systemic antibiotics is ineffective, costly, and will only facilitate the emergence of yet more drug-resistant bacteria. While using of topical antibiotics may be justified.

**The second Section:** This section focused on the related risk factors that impaired venous leg ulcer healing: The current study findings clarified that, most of the studied subjects their age was over 40 years, the majority of the subjects their BMI was above 25 kg/m<sup>2</sup>, and also the majority of them had chronic diseases especially diabetes and hypertension. From the researcher point of view all these founded factors had the major effect on the delaying of VLU healing starting by the age; as much as the person becomes older and/or obese as much as the blood circulation is affected, in addition that those subjects were suffering from chronic illness; specially diabetes which a usual shared factors in bad healing and aggravating the incidence of infection occurrence. Study conducted by (Edwards, Finlayson, Courtney, Graves, Gibb & Parker, 2013) congruent with the current findings as it reported that 30% had osteoarthritis, 17% suffered from diabetes, 16% diagnosed with peripheral artery diseases. 72% of them were aged. Additionally (Vasudevan, 2014) mentioned that excessively deposited around capillary beds leading to elevated intravascular pressure. The "fibrin cuff" which surrounds the capillaries in the dermis decreases oxygen permeability. This permeability barrier inhibits diffusion of oxygen and other nutrients, leading to tissue hypoxia causing impaired wound healing.

As regards venous leg ulcer management items it was recorded that most of the subjects did not do any leg exercise or did not know any information about the healthy diet and more than half of them did not elevate their leg or apply compression therapy even the other subjects who apply compression therapy did not know the purpose or the importance of it, how to use, how to clean or when replace it. The researcher observed during asking the subjects they know just they wear at day and remove at night only. These findings are in line with (Simka, 2014) who reported that lack of general mobility have been shown to be significant risk factors for delayed healing in venous leg ulcers.

In addition the current study findings clarified that there was a significance difference between type of movement with the studied subjects' total score of associated chronic diseases and leg exercise. And it was reported that there was a correlation between the study subjects' selected demographic and medical data with (Total score of associated chronic diseases & total and subtotal score of venous Leg Ulcer management) and a moderate correlation between the total score of associated chronic diseases with duration of venous leg ulcer. Also there was a moderate correlation between the total score of venous leg ulcer management and healthy diet. While, there was a strong correlation between the total score of venous leg ulcer management with the compression therapy. Shenoy, (2014) emphasized that elevation of the limbs when sitting and avoidance of standing for prolonged periods may assists in reducing edema. Apart from reducing edema, it may also improve venous return and it is a simple exercise and practical. Also (Gottrup & Karlsmark, 2009 and Fife, Carter & Walker, 2010) added that, the skills of VLU management, such as applying compression, leg exercise and leg elevation require extensive training and experience to maintain its application.

Accordingly, by this findings the researcher could concluded that there was a real significance difference and relations between factors as the chronic diseases (diabetes, hypertension...etc), poor or unhealthy diet, the ignorance of applying the compression therapy, neglecting of leg exercise or leg elevation in addition to duration of having the leg ulcer and the impaired healing of VLU. So it is clear that more than one factor affected the leg ulcer healing of the studied subjects which verify the idea of that research and emphasized the importance of a well structured Nursing Guideline to be utilized by those subjects in order to enhance healing process.

**Recommended protective measures: (Head lines).**

- 1- Wearing compression therapy bandages or stockings will help in healing of venous leg ulcer and if already healed will help prevent another one occurring.
- 2- Compression bandages or stockings work best in addition to leg exercise regularly, as walking. If you are less mobile, exercise the leg muscles by moving foot up and down at the ankle.
- 3- During sitting position, keep your legs raised by putting feet above billow on a chair. Try to avoid standing up for a long time.
- 4- If you smoke, you should stop.
- 5- You should have a healthy balanced diet to promote healing.
- 6- Follow the instructions carefully when clean your stockings or bandages. Washing them at the wrong temperatures can damage the elastic.
- 7- You need to make sure they are replaced every 3-6 months because over time they lose their stretch.
- 8- If you put on your stockings yourself, avoid turning over the tops and don't pull them too high up your leg (British association of dermatologists, 2014).

**V. Conclusion**

Results identified the following as risk factors for impaired healing of venous leg ulcer: lack of leg exercise, unaware of healthy diet, lack of leg elevation, lack of compression, increased age, BMI, in addition to longer ulcer duration, associated chronic diseases (especially diabetes and hypertension) and smoking.

**VI. Recommendation**

Based on the highlighted findings the current study recommended that:

- 1- More attention should be given to venous leg ulcer patients in order to improve self care quality and enhance patients' adherence to venous leg ulcer management through:
  - 1.1- Developing educational program for training both patients/nurses of venous leg ulcer care.
  - 1.2- Provide nurses with continuous educational training to improve their knowledge and practice related to factors hinder the healing of venous leg ulcer and the protective measures.
  - 1.3- Written instructions about protective measures for patients with venous leg ulcer
- 2- Further studies should be conducted with the purpose of:
  - 2.1- Assess other factors such as psychological and social factors that may delayed venous wound healing.
  - 2.2- Investigate the effect of the application of protective measures on the patients' venous leg ulcer healing.
  - 2.3- Replication of the study on large number of patients.

**Nursing implications:**

Nurses have a responsibility to assist the patients to receive appropriate nursing care and treatment, In order to achieve this role, VLU-related guidelines and recommendations should be well known by the nursing staff to rise up the patients' awareness about the importance of follow the instruction and enhance their ulcer healing condition.

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