Effect of Nursing Interventions on Health Outcomes of Patients with Lower Limbs Chronic Venous Insufficiency

Rania Ibrahim Ahmed El Gazar, Assistant Lecturer
Medical Surgical Nursing, Faculty of Nursing, Alexandria University

Aida Elsayed El Gamil, Professor
Medical Surgical Nursing, Faculty of Nursing, Alexandria University

Abeer Mohamed Al Shatby, Professor
Medical Surgical Nursing, Faculty of Nursing, Alexandria University

Wael Elsayed Ahmed Shaalan, Professor
Vascular&Endovascular Surgery, Faculty of medicine, Alexandria University

Gehan Mohamed Desoky, Assistant professor
Medical Surgical Nursing, Faculty of Nursing, Alexandria University

Abstract

Background: Chronic venous insufficiency (CVI) is a common progressive condition, which typically involves lower extremity edema, skin trophic changes, and discomfort secondary to venous hypertension. Disability-related to chronic venous insufficiency attributes to diminished quality of life and loss of work productivity. If CVI is left untreated it is usually progressive and leads to the post-phlebitic syndrome and venous ulcers. The use of conservative treatment is considered as the cornerstone of treatment but compliance rates are poor. Objective: Determine the effect of nursing interventions on health outcomes of Patients with lower limbs chronic venous insufficiency. Settings: The present study was conducted at the vascular surgery outpatient clinics of Alexandria Main University Hospital and Alexandria Vascular Center (AVC), Egypt. Subjects: A convenience sample of 70 adult male and female patients with lower limbs chronic venous insufficiency who followed the inclusion criteria were categorized randomly into two equal groups (study group and control group). Each group comprised of 35 patients. Tools: seven tools were used. Tool one: Physical Activity Readiness Questionnaire (PAR-Q). Tool two: Lower limbs chronic venous insufficiency patients' knowledge structured interview schedule. Tool three: Venous Clinical Severity Score (VCSS). Tool four: Assessment of the muscles strength. Tool five: Ankle range of motions assessment. Tool six: SF-36 Short Form Health Survey. Tool seven: Lower limbs chronic venous insufficiency patient's competence and compliance with nursing interventions. Results: The study showed that there was a significant improvement in knowledge level in the study group more than in the control group patients post implementation of nursing interventions (P<0.001*). Furthermore, there was significant improvement in total score of Venous Clinical Severity in study group patients with significant difference between the study and control group after 3 months of implementing the nursing interventions (P=0.002*).Moreover, study group patients had improvement regarding muscles strength assessment, ankle range of motions assessment post implementation the nursing interventions. the study groups exhibited significant improvement in overall QOL than the control group post 3 months of implementing the nursing interventions (p<0.001*).Conclusion: The nursing intervention for patients with lower limbs chronic venous insufficiency showed a positive result in relation to knowledge level health outcomes as evidence by improvement total venous clinical severity, muscles strength assessment, ankle range of motions assessment. As well as, improved overall percent score of health survey. Recommendations: The developed colored illustrated educational booklet should be available and distributed to each patient with lower limbs chronic venous insufficiency. An in-service training program should be carried out for nurses who worked at vascular department about structured exercises programs for CVI patients.

Keywords: Chronic venous insufficiency, Nursing Interventions, Health Outcomes.

Introduction

Chronic venous insufficiency (CVI) is an extensive progressive disease in need of public health attention. This insidious disease is a growing burden on patient quality of life and the health outcomes. CVI has become more pronounced in global populations, especially in regions exhibiting a higher rate of risk factors. It is essential for healthcare professionals to identify patients early and intervene to stop persistent, incapacitating complications (**Azar, Rao, & Oropallo, 2022**).

The incidence of CVI is predisposed by such conditions as a prior family history, advancing age, , prolonged standing, obesity, smoking, sedentary lifestyle, lower extremity trauma, prior venous thrombosis, the presence of an arteriovenous shunt, high estrogen states, and pregnancy(**Morrone D & Morrone V, 2018**).

For the treatment of CVI, a variety of noninvasive, invasive, and medicinal approaches are available. Any form of treatment should aim to reduce symptoms, prevent CVI sequelae and consequences, and improve overall health (**Santler & Goerge, 2017**). Most patients with of CVI should be initially treated with conservative management such as leg elevation, compression stockings, muscle pump exercises, weight reduction in an obese patient, regular walking exercise, and cessation of smoking (**Eberhardt & Raffetto , 2014**).

According to European Society for Vascular Surgery (ESVS) 2022 clinical practice guidelines on the management of chronic venous disease of the lower limbs, Physical exercises that targeting lower limb muscle strength and ankle mobility has been documented as the greatest importance to drive blood flow from superficial into deep vein due to generating highest pressure during muscle contraction. This process reduces ambulatory venous hypertension and is likely to induce wound healing as a consequence of a diminished systematic inflammatory process, additionally, improve general mobility, strengthen the calf muscle pump, and increase the range of ankle movements. (**Araujo et al., 2016; Caggiati, De Maeseneer, Cavezzi, Mosti & Morrison, 2018; Gurdal Karakelle, Ipek, Tulin & Alpagut, 2021**).

Nursing intervention is an opportunity not only to educate, but also to provide proper continuity of care and ensure best patient centered outcomes. Nurses are on the frontline of CVI management by playing an essential role in risk assessment, diagnosis, applying conservative treatments and providing vital educational and psychological support for patients. Therefore, nurses have a major role in developing effective nursing intervention for CVI patients to provide positive health outcomes. Hence, this study will be conducted to determine the effect of nursing intervention on health outcomes of patients with lower limbs chronic venous insufficiency.

Aims of the Study

This study aims to determine the effect of nursing interventions on health outcomes of Patients with lower limbs chronic venous insufficiency.

Research hypotheses

- Patients with lower limbs chronic venous insufficiency who receive nursing interventions exhibit higher knowledge than those patients who do not receive it.

- Patients with lower limbs chronic venous insufficiency who receive nursing interventions display more positive health outcomes than those patients who do not receive it.

Materials and Method

Materials

<u>**Design:**</u>   A quasi-experimental research design was utilized for this study.

<u>**Settings:**</u> The present study was conducted at the vascular surgery outpatient clinics of Alexandria Main University Hospital and Alexandria Vascular Center (AVC).

<u>**Subjects:**</u> A convenience sample of 70 adult male and female patients with lower limbs chronic venous insufficiency, admitted to the above mentioned settings categorized randomly into two equal groups (study group and control group). Each group comprised of 35 patients. The study sample was selected based on Epi info -7 program which used to estimate the sample size using the following parameters: population size = 300/12months, expected frequency =50%, maximum error =5%, confidence coefficient =95%. C0 to C4, primary, superficial, venous reflux classes of CVI patients were included in the study.

<u>**Tools:**</u> In order to collect the necessary data for the study seven tools were used:

Tool one: Physical Activity Readiness Questionnaire (PAR-Q): This tool was adopted from **Warburton, Jamnik, Bredin, Shephard & Gledhill, (2018)**. It was used as a screening tool which designed to determine if physical activity was safe for individuals or if they may need medical clearance from a physician. It was consisted of 7 closed-ended questions that assess an individual's ability to engage in the structured exercises.

Additionally: Socio-demographic and clinical data interview schedule: This tool was developed by the researcher in Arabic language based on a review of relevant literature to collect baseline data

Tool two: Lower limbs chronic venous insufficiency patients' knowledge structured interview schedule: This tool

was developed by the researcher in Arabic language based on a review of relevant literature **(Van Hecke et al., 2013; Carpentieret al., 2014 ; Sutzkoet al., 2018)**. It was composed of twenty two questions with fixed alternatives that was used to assess baseline knowledge of patients with lower limbs chronic venous insufficiency in relation to nature of the disease, medical and surgical treatment and knowledge related to health practices and exercises.

Tool three: Venous Clinical Severity Score (VCSS): It was adopted from Passman et al., (2011) &The American Venous Forum committee (2000), it was used to characterize the severity of the patients' chronic venous insufficiency and to monitor any progression made. The VCSS system includes 10 clinical descriptors (pain, varicose veins, venous edema, skin pigmentation, inflammation, induration, number of active ulcers, duration of active ulceration, size of ulcer, and compressive therapy use) that was used to assess changes in response to therapy, each descriptors scored from 0 to 3.

Tool four: Assessment of the muscles strength: It was adopted from Paternostroet al. (2008) & Medical Research Council (MRC) scale or Oxford scale for muscle strength (2012), to assess muscles strength and the motor ability of the lower limbs chronic venous insufficiency patients. The score of muscles strength assessment scored from 0 to 5.

Tool five: Ankle range of motions assessment: This tool was adopted from Clarkson, H. (2020) , it was used to assess range of motion (ROM) for patient`s ankles as dorsiflexion, Planter flexion, inversion and eversion of the affected limb using Myrin goniometer. The measurement of joint range of motion was compared against the normal value of each range of motion.

Tool six: SF-36 Short Form Health Survey: This tool was adopted from Laucis N (2015), which was utilized to evaluate an

individual's quality of life through patient self-reporting monitoring and assessment of interventions outcomes in adult patients.

Tool seven: Lower limbs chronic venous insufficiency patient's competence and compliance with nursing interventions:

This tool was developed by the researcher based on a review of related literature (Yim et al., 2014; Thakrar, Thakrar& Khatri, 2019). It was used for two purposes: to assess lower limbs chronic venous insufficiency patient's competence to do exercises alone at home, as well as, to assess lower limbs chronic venous insufficiency patients compliance to exercises.

Method

An approval from The Research Ethics Committee, Faculty of Nursing, Alexandria University was obtained. An official letter was issued from the Faculty of Nursing, Alexandria University to the study setting to obtain their permission to collect necessary data. An official permission was obtained from the directors and head of the department of the selected hospital setting after explanation the aim of the study. The study tools were submitted to five experts in the field of chest diseases, and medical surgical nursing for content validity and the necessary modifications were carried out accordingly. A pilot study was conducted on 7 patients, for testing clarity and applicability of the developed study tools and necessary modifications was done. Those patients were excluded from the actual study sample. The reliability of the tools was tested using appropriate test. The reliability of tools was tested by means of Cronbach's alpha. coefficient Reliability for tool II was (0.808), tool VII was (0.999), while tool I, III, IV, V and VI were adopted, which means all tools were reliable. The data collection was started, and continued from a period of 8 months from March 2022 to December 2022.

The data was collected from control group patients first, then the study group patients to prevent data contamination

The study was conducted in four phases: Phase I: assessment phase: Initial assessment was carried out of all patients (control and study groups) individually for approximately 30-60 minutes after explaining the purpose of the study using all tools except tool seven to collect baseline patients' data, health history (past and present), assess physical activity readiness, assessing the patients' knowledge about lower limbs CVI, clinical status of affected lower limb, lower limbs muscles strength and ankle range of motions assessment as well as health survey was applied.

Phase II: Planning phase: A booklet containing the content of the nursing interventions was developed by the researcher. It was written in a simple Arabic language and supplemented by photos and illustrations to help the patient's understanding of the content.

Phase III: Implementation phase: Nursing interventions for lower limb chronic venous insufficiency was implemented individually for each patient in the above mentioned settings in 3 sessions per one to two day(s). The sessions arranged in separated times convenient to the patient during waiting time for medical consultations and follow up.
During the sessions the booklet was provided to each patient, information was explained through interactive discussions, given knowledge about lower limbs chronic venous insufficiency, as well as physical exercises demonstrations by researcher and re-demonstrations by patient. Patients also were asked to bring one of the family members to attend the demonstration.

The first session: Patients were provided the theoretical information about lower limbs CVI related to nature of the disease such as definition, causes, risk factor, diagnostic procedures, and different method of treatment

modalities for lower limb CVI. Medical treatment knowledge as medication received action, side effects, tests and precautions that followed during treatment to prevent complications of medications. Knowledge related to different types of surgery in relation to lower limb CVI. Conservative treatment knowledge as health practices related to lower limbs chronic venous insufficiency, leg elevation, compression stocking, as well as exercises types and advantages.

The second session: In this session the researcher teach patient about eight structured exercises for warming-up, ankle joint range of motion, lower limbs muscle stretching exercises and Buerger's exercise.

The third session: This session aimed to perform three structured exercises that intended to promote circulation to lower limbs through improve calf muscle pump function, included three sets of strengthening exercises for calf and quadriceps muscles. During the second and third sessions, researcher demonstrates the exercises and patient re-demonstrate it until the patient mastering exercises. After that, the patient was asked to carry out the structured exercises at home (5 to7) days weekly for 12 weeks using the booklet as a guide. In addition to teach the patient about the warning signs to stop exercises.

Phase IV: Evaluation phase: The lower limbs chronic venous insufficiency patients was re-evaluated by the researcher after implementation of the nursing interventions after 6weeks and 3months

Ethical considerations:

Written informed consent was obtained from patient after explaining the aim of the study and the right to refuse to participate in the study and/ or withdraw at any time. Patient's privacy was respected. Data confidentiality was during implementation of the study.

Statistical Analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. The Shapiro-Wilk test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation, median. Significance of the obtained results was judged at the 5% level.

Results

Table 1 shows the frequency distribution of patients with lower limbs chronic venous insufficiency of both control and study group according to socio-demographic characteristics. There were no statistically significant differences between patients of both studied groups in sociodemographic characteristics (p > 0.05).

Table 2 comparison between both study and control group patients with lower limbs chronic venous insufficiency regarding to overall percent score of patient's knowledge level pre and post implementations of the nursing interventions. The study group patients showed improvement in their knowledge level post implementation of nursing interventions with significant difference (P<0.001*). Furthermore, it was observed that there was significant difference between control and study group patients post implementation of nursing interventions (P<0.001*).

Table 3 reveals the comparison between both control and study group patients with lower limbs chronic venous insufficiency regarding their venous clinical severity score (VCSS), muscles strength assessment and ankle range of motions assessment pre and post implementation of the nursing interventions. There was no significant difference between the study and control groups pre implementation of the nursing interventions and post 6 weeks but there was

significant difference between the study and control group after 3 months of implementing the nursing interventions (P=0.002*).

Table 4 reveals comparison between both study and control group patients with lower limbs chronic venous insufficiency regarding their ankle range of motions assessment pre and post implementations of the nursing interventions. The total ankle range of motions assessment reveals that there was statistically significant difference in right and left sides (P<0.019*, P<0.001*) between controlled and studied patients post 3 months of implementation of nursing interventions

Discussion

Chronic venous insufficiency (CVI) is a condition that progresses rapidly, which typically includes lower extremity edoema, changes in the trophic changes of the skin, and venous hypertension. Chronic venous insufficiency-related disabilities lead to a decline in both quality of life and productivity at work. If CVI is not treated, it frequently causes venous ulcers and postphlebitic syndrome. The cornerstone of treatment is regarded to be conservative management, however adherence rates are poor **(Patel& Surowiec2017)**.

The findings of the present study showed that, as regards to socio-demographic and clinical data, concerning gender and marital status, the present study revealed that, the majority of patients of both studied groups were females and married. Due to use of birth control pills or significant physiological changes during pregnancy, including an increase in blood volume, weight growth, an increase in intra-abdominal pressure, and a decrease in venous return lead to increase the possibility for CVI occurrence. This result was supported by **Kılınç, Akbaş, Şener, Hayran & Aktaş (2022)** who found more than half of patients were women and married. Moreover, **Soydan, Yılmaz& Baydur (2017)** who stated that the majority

of the patients participating in the study were females and there were 2.4 times women than men. Also, several studies done by **Lozano Sa´nchez , Marinel Roura, Carrasco Carrasco, et al., 2014; Homs-Romero& Romero-Collado, 2019** have reported that being female constitutes a risk for CVI.

In relation to patient's age, the present study showed that, the highest percentage of both groups was among the age group of 50 to 60 years old. This finding may be due to CVI is more prevalent in older ages related to vascular wall smooth muscle atrophy and degeneration caused venous dilatation. This result is in agreement with **Kılınç, Akbaş, Şener, Hayran& Aktaş (2022)** stated that the majority of CVI sample the average age was over 50 years old. Also, matches with **Homs-Romero& Romero-Collado (2019)** stated that the elder age has more risk factors for CVI.

Additionally, the findings of the present study revealed that there was a high statistically significant improvement in the study group patient's knowledge level immediately post implementation of the nursing interventions. The current result in agreement with **González (2014)**, who stated that An improvement in knowledge value that was statistically significant was the result of the educational intervention. In addition, half of patients who completed the educational intervention remained free of disease recurrence. From the researcher point of view, the observed improvement of study group patient's knowledge level in study might be due to the sessions that done by the researcher to our patients, which included knowledge and health instructions about CVI, and managements using different teaching strategies using different educational methods as discussion, colored booklet and telephone contact.

Regarding **total percent score of patient's health survey,** the results of the present study found that the both groups had poor QoL pre implementation of nursing interventions. Regarding general health

scores, there were more significantly improved among the studied patients post nursing interventions implementation, indicating a significant difference between the control and study groups regarding general health post 3 months of implementing the nursing interventions. (p<0.001*). These findings agree with **Keser, Özdemir, Erer, Onurlu & Bezgin (2020)**, who explained that Physical activity is known to improve health and QoL in chronic diseases and is associated with a remarkable decrease in cardiovascular mortality.

Furthermore, the current study showed that there was marked improvement of studied patient in relation to overall ankle range of motion exercises and overall muscle strengthening exercises competence and compliance level immediately after the sessions, post 6 weeks and 3 months of implementing the nursing interventions. This was congruent with the findings of **Gürdal Karakelle, Ipek, Tulin & Alpagut (2021)** who reported that the strength of calf muscles in CVI is one of the important factors in the return of venous blood to the heart. Therefore, studies on exercise training in CVI have been planned on strengthening exercises. There was a significant increase in the strength of calf muscles after exercise training, as in other studies using objective assessment method.

According to the results of the current study, the proposed hypothesis has been fulfilled in patients with lower limbs CVI who received the nursing interventions and exhibited improvement in health outcomes. Therefore, continuous nursing interventions should be provided for those patients on regular basis and increase adherence to the follow-up treatment. In addition, the nursing interventions should be considered as an integral part in the hospital routine care of patients with lower limbs chronic venous insufficiency to help them to cope successfully with new life situation.

Conclusion

The nursing intervention for patients with lower limbs chronic venous insufficiency showed a positive result in relation to knowledge level health outcomes as evidence by improvement total venous clinical severity, muscles strength assessment, ankle range of motions assessment. As well as, improved overall percent score of health survey.

Recommendations

In line with the findings of the study, the following recommendations are made:

- The developed colored illustrated educational booklet should be available and distributed to each patients with lower limbs chronic venous insufficiency.

- Application of educational sessions for patients to improve their knowledge about CVI, treatment methods, health practices and structured exercises that support disease management.

- An in-service training program should be carried out for nurses who worked at vascular department about structured exercises programs for CVI patients.

- Develop of a standard program for nurses about management of patients with lower limbs chronic venous insufficiency.

Table (1): Frequency distribution of patients with lower limbs chronic venous insufficiency of both control and study groups according to socio-demographic characteristics:

Socio-demographic characteristics	Control (n = 35)		Study (n = 35)		Test of Sig.	P
	No.	%	No.	%		
Sex						
▪ Male	12	34.3	14	40.0	$\chi^2=$ 0.245	0.621
▪ Female	23	65.7	21	60.0		
Age						
▪ 20-	3	8.6	2	5.7		
▪ 30–	7	20.0	7	20.0	$\chi^2=$ 0.807	MCp= 0.906
▪ 40–	11	31.4	9	25.7		
▪ 50–60	14	40.0	17	48.6		
Level of education						
▪ Illiterate	2	5.7	3	8.6		
▪ Read and write	3	8.6	5	14.3	$\chi^2=$ 2.294	MCp= 0.723
▪ Basic education	6	17.1	5	14.3		
▪ Secondary	18	51.4	13	37.1		
▪ University	6	17.1	9	25.7		
Occupation						
▪ Manual	13	37.1	14	40.0		
▪ Cleric work	16	45.7	17	48.6	$\chi^2=$ 0.467	0.792
▪ House wife	6	17.1	4	11.4		
▪ Retirement	0	0.0	0	0.0		
▪ Not work	0	0.0	0	0.0		
Marital status						
▪ Single	6	17.1	5	14.3		
▪ Married	26	74.3	27	77.1	$\chi^2=$ 1.349	MCp= 1.000
▪ Divorced	1	2.9	0	0.0		
▪ Widow	2	5.7	3	8.6		
Area of residence						
▪ Urban	23	65.7	24	68.6	$\chi^2=$ 0.065	0.799
▪ Rural	12	34.3	11	31.4		
Monthly income (From the patient's point of view):						
▪ Enough	20	57.1	20	57.1	$\chi^2=$ 0.000	1.000
▪ Not enough	15	42.9	15	42.9		
Treatment System						
▪ Health insurance	0	0	0	0.0		
▪ Private	4	11.4	6	17.1	$\chi^2=$ 0.467	0.495
▪ University free hospital	31	88.6	29	82.9		

Table (2): Comparison between both study and control group patients with lower limbs chronic venous insufficiency regarding to overall percent score of patient's knowledge level pre and post implementations of the nursing interventions:

Overall percent score of patient's knowledge level	Control (n = 35)				Study (n = 35)				Test of Sig (p₁)	Test of Sig (p₂)
	Pre Interventions		Post Interventions		Pre Interventions		Post Interventions			
	No.	%	No.	%	No.	%	No.	%		
Poor <50%	35	100.0	35	100.0	35	100.0	0	0.0	–	$\chi^2=70.00^*$ $(<0.001^*)$
Fair 50%-<75%	0	0.0	0	0.0	0	0.0	13	37.1		
Good =>75%	0	0.0	0	0.0	0	0.0	22	62.9		
Total score										
Min. – Max.	4.0 – 15.0		4.0 – 15.0		4.0 – 15.0		28.0 – 40.0			
Mean ± SD.	9.09 ± 2.82		9.34 ± 2.63		9.46 ± 2.93		33.54 ± 3.58			
Median	10.0		10.0		10.0		34.0		U=558.00 (0.519)	U=0.0* (<0.001*)
% score										
Min. – Max.	9.09 – 34.09		9.09 – 34.09		9.09 – 34.09		63.64 – 90.91			
Mean ± SD.	20.65 ± 6.41		21.23 ± 5.99		21.49 ± 6.67		76.23 ± 8.13			
Median	22.73		22.73		22.73		77.27			
Z (p₀)	**1.826 (0.068)**				**5.166*(<0.001*)**					

Table (3): Comparison between both study and control group patients with lower limbs chronic venous insufficiency regarding their Venous Clinical Severity Score (VCSS) pre and post implementations of the nursing interventions:

Tool III : Venous Clinical Severity Score (VCSS)	Control(n = 35)						Study(n = 35)						$\chi^2(p_1)$	$\chi^2(p_2)$	$\chi^2(p_3)$
	Initial assessment before the sessions		After 6 weeks		After 3months		Initial assessment before the sessions		After 6 weeks		After 3months				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Pain															
Absent	0	0.0	0	0.0	7	20.0	0	0.0	0	0.0	21	60.0	0.062 (0.803)	1.556 (0.212)	20.034* (<0.001*)
Mild	13	37.1	20	57.1	15	42.9	12	34.3	25	71.4	14	40.0			
Moderate	22	62.9	15	42.9	13	37.1	23	65.7	10	28.6	0	0.0			
Severe	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0			
Venous edema															
Absent	18	51.4	20	57.1	22	62.9	15	42.9	16	45.7	22	62.9	0.047 (0.803)	1.236 (0.212)	23.203* (<0.001*)
Mild	16	45.7	15	42.9	13	37.1	12	34.3	14	40.0	10	28.6			
Moderate	1	2.9	0	0.0	0	0.0	7	20.0	5	14.3	3	8.6			
Severe	0	0.0	0	0.0	0	0.0	1	2.9	0	0.0	0	0.0			
Total score															
Min. – Max.	1.0 – 7.0		1.0 – 7.0		0.0 – 7.0		1.0 – 9.0		1.0 – 7.0		0.0 – 7.0				
Mean ± SD.	4.09 ± 1.31		3.83 ± 1.27		3.54 ± 1.46		4.14 ± 1.67		3.63 ± 1.40		2.51 ± 1.50				
Median	4.0		4.0		4.0		4.0		4.0		3.0		U=598.50 (0.866)	U=566.0 (0.567)	U=356.5* (0.002*)
% score															
Min. – Max.	6.67 –46.67		6.67 – 46.67		0.0 – 46.67		6.67 – 60.0		6.67 – 46.67		0.0 – 46.67				
Mean ± SD.	27.24 ±8.76		25.52 ±8.48		23.62 ±9.75		27.62±11.10		24.19 ± 9.30		16.76±10.02				
Median	26.67		26.67		26.67		26.67		26.67		20.0				
Fr(p)	**6.899* (0.032*)**						**52.439* (<0.001*)**								

Table (4): Comparison between both study and control group patients with lower limbs chronic venous insufficiency regarding their ankle range of motions assessment pre and post implementations of the nursing interventions

Tool V: Ankle range of motions	Control (n = 35)						Study (n = 35)						Test of sig. (p_1)	Test of sig. (p_2)	Test of sig. (p_3)
	Initial assessment		Post 6 weeks		Post 12 weeks		Initial assessment		Post 6 weeks		Post 12 weeks				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.				
Right															
Total score															
Min. – Max.	4.0 – 8.0		4.0 – 8.0		4.0 – 8.0		4.0 – 8.0		4.0 – 8.0		6.0 – 8.0		U= 557.500 (0.463)	U= 529.000 (0.251)	U= 459.000* (0.019*)
Mean ± SD.	7.0 ± 1.57		7.09 ± 1.34		7.23 ± 1.24		6.57 ± 1.77		7.09 ± 1.34		7.83 ± 0.45				
Median	8.0		8.0		8.0		8.0		8.0		8.0				
% score															
Min. – Max.	50.0–100.0		50.0–100.0		50.0–100.0		50.0–100.0		62.5–100.0		75.0–100.0				
Mean ± SD.	87.50 ±19.65		88.57 ±16.71		90.36 ±15.48		82.14 ±22.13		92.14 ±13.92		97.86 ±5.66				
Median	100.0		100.0		100.0		100.0		100.0		100.0				
Fr (p_0)	**3.161 (0.206)**						**26.462* (<0.01*)**								
Left															
Total score															
Min. – Max.	4.0 – 8.0		4.0 – 8.0		4.0 – 8.0		4.0 – 8.0		5.0 – 8.0		5.0 – 8.0		U= 600.500 (0.884)	U= 495.50 (0.157)	U= 274.50* (<0.001*)
Mean ± SD.	6.91 ± 1.56		7.06 ± 1.39		7.03 ± 1.40		6.60 ± 1.70		7.34 ± 1.14		7.77 ± 0.65				
Median	8.0		8.0		8.0		8.0		8.0		8.0				
% score															
Min. – Max.	50.0– 100.0		50.0 – 100.0		50.0 –100.0		50.0 –100.0		62.50 –100.0		62.50– 100.0				
Mean ± SD.	86.43±19.50		88.21 ±17.40		87.86±17.54		82.50±21.27		91.79 ±14.20		97.14 ± 8.07				
Median	100.0		100.0		100.0		100.0		100.0		100.0				
Fr (p_0)	**2.600 (0.273)**						**28.00* (<0.001*)**								

χ^2: **Chi square test** FE**: Fisher Exact** **U: Mann Whitney test** Fr: **Friedman test**

p_1: p value for comparing between the two studied groups in **Initial assessment**
p_2: p value for comparing between the two studied groups in **Post 6 weeks**
p_3: p value for comparing between the two studied groups in **Post 12 weeks**

References

- Araujo DN, Ribeiro CT, Maciel AC, Bruno SS, Fregonezi GA, Dias FA. Physical exercise for the treatment of non-ulcerated chronic venous insufficiency. Cochrane Database Syst Rev 2016;12:CD010637.

- Azar, J., Rao, A., & Oropallo, A. (2022). Chronic venous insufficiency: a comprehensive review of management. Journal of Wound Care, 31(6), 510-519.

- Carpentier, P. H., Blaise, S., Satger, B., Genty, C., Rolland, C., Roques, C., &Bosson, J. L. (2014). A multicenter randomized controlled trial evaluating balneotherapy in patients with advanced chronic venous insufficiency. Journal of vascular surgery, 59(2), 447-454.

- Clarkson, H. (2020). Musculoskeletal assessment: joint range of motion, muscle testing, and function. Lippincott Williams & Wilkins.

- Eberhardt RT, Raffetto JD. Chronic venous insufficiency. Circulation. 2014;130:333–346.

- González, A. (2014). Education project to improve venous stasis self-management knowledge. Journal of Wound Ostomy & Continence Nursing, 41(6), 556-559.

- Gürdal Karakelle, S., Ipek, Y., Tulin, O., & Alpagut, İ. U. (2021). The efficiency of exercise training in patients with venous insufficiency: a double blinded, randomized controlled trial. Phlebology, 36(6), 440-449.

- Homs-Romero, E., & Romero-Collado, A. (2019). Development of a minimum data set registry for chronic venous insufficiency of the

lower limbs. Journal of Clinical Medicine, 8(11), 1779.

• Keser, İ., Özdemir, K., Erer, D., Onurlu, İ., & Bezgin, S. (2020). Differences in pain, fatigue, and quality of life in patients with chronic venous insufficiency based on physical activity level. Turkish Journal of Thoracic and Cardiovascular Surgery, 28(1), 76.

• Kılınç, F., Akbaş, A., Şener, S., Hayran, Y., & Aktaş, A. (2022). Cutaneous findings in patients with chronic venous insufficiency. Journal of Cosmetic Dermatology, 21(5), 2106-2112.

• Laucis N, Hays R, Bhattacharyya T. Scoring the SF-36 in Orthopaedics: A Brief Guide. J Bone Joint Surg Am. 2015 Oct 7; 97(19): 1628–1634. Published online 2015 Oct 7. doi: 10.2106/JBJS.O.00030. Accessed 15 January 2020.

• Lozano Sa´nchez FS, Marinel lo Roura J, Carrasco Carrasco E, et al. Venous leg ulcer in the context of chronic venous disease. Phlebology 2014; 29: 220–226.

• Morrone D, Morrone V. Acute pulmonary embolism: focus on the clinical picture. Korean Circ J. 2018;48:365–381.

• Passman, M. A., McLafferty, R. B., Lentz, M. F., Nagre, S. B., Iafrati, M. D., Bohannon, W. T., ... & Caprini, J. A. (2011). Validation of venous clinical severity score (VCSS) with other venous severity assessment tools from the American venous forum, national venous screening program. Journal of vascular surgery, 54(6), 2S-9S.

• Patel, S. K., & Surowiec, S. M. (2017). Venous insufficiency.

• Paternostro-Sluga, T., Grim-Stieger, M., Posch, M., Schuhfried, O., Vacariu, G., Mittermaier, C., ...&Fialka-Moser, V. (2008). Reliability and validity of the Medical Research Council (MRC) scale and a modified scale for testing muscle strength in patients with radial palsy. Journal of rehabilitation medicine, 40(8), 665-671.

• Santler, B., & Goerge, T. (2017). Chronic venous insufficiency–a review of pathophysiology, diagnosis, and treatment.

JDDG: Journal der Deutschen Dermatologischen Gesellschaft, 15(5), 538-556.

• Soydan, E., Yılmaz, E., & Baydur, H. (2017). Effect of socio-demographic characteristics and clinical findings on the quality of life of patients with chronic venous insufficiency. Vascular, 25(4), 382-389.

• Sutzko, D. C., Obi, A. T., Kimball, A. S., Smith, M. E., Wakefield, T. W., & Osborne, N. H. (2018). Clinical outcomes after varicose vein procedures in octogenarians within the Vascular Quality Initiative Varicose Vein Registry. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 6(4), 464-470.

• Thakrar, J. V., Thakrar, S., &Khatri, S. M. (2019).Effectiveness of Acupressure, Acupuncture and Buerger's Exercises in Varicose Veins: A Case Study.

• Van Hecke, A., Beeckman, D., Grypdonck, M., Meuleneire, F., Hermie, L., &Verhaeghe, S. (2013). Knowledge deficits and information-seeking behavior in leg ulcer patients: an exploratory qualitative study. Journal of Wound Ostomy& Continence Nursing, 40(4), 381-387.

• Warburton, D. E., Jamnik, V., Bredin, S. S., Shephard, R. J., & Gledhill, N. (2018). The 2019 physical activity readiness questionnaire for everyone (PAR-Q+) and electronic physical activity readiness medical examination (ePARmed-X+). The Health & Fitness Journal of Canada, 11(4), 80-83.

• Yim, E., Richmond, N. A., Baquerizo, K., Van Driessche, F., Slade, H. B., Pieper, B., &Kirsner, R. S. (2014). The effect of ankle range of motion on venous ulcer healing rates. Wound Repair and Regeneration, 22(4), 492-496.