

Effect of Hot /Cold Water Therapy on Lower Limb Varicose Vein: Patients' Reported Outcomes

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Abstract:

Background: Varicose veins or varicosities are a common condition caused by weak or damaged of vein walls and valves. It can affect blood flow and cause poor circulation in the legs that lead to feeling of heaviness and fatigue. So treatment options of varicose veins can help improve circulation and alleviate symptoms. **Aim:** Was to investigate the effect of hot/cold water therapy on patients' reported outcomes of lower limb varicose veins. **Design:** A quasi experimental (pre-posttest design) was utilized. **Tools:** I: Patient's demographic and Medical background form. II: Varicose vein symptoms questionnaire (VVSymQ). III: Numerical Pain Rating Scale (NPRS). **Setting:** The study was conducted in the outpatient of the vascular clinic at EL-Manial University Hospitals-Egypt. **Sample:** A purposive sample of sixty adult male & female patients over six consecutive months; who were diagnosed with primary uncomplicated varicose veins (C1& C2 based on CEAP classification) and divided randomly into the study and control groups 30 patient/each. **Results:** There was a highly statistically significant difference in varicose vein symptoms' total mean scores between the study and control groups over the three readings as ANOVA=336.74, P=0.000. There was a highly statistically significant difference in pain level total mean scores between the study and control groups over the three readings as ANOVA=37.41, P=.000. Also there was a highly positive relationship between post1 and post2 readings regarding varicose vein symptoms among the study group ($r = .703$ P=.000). While there was a highly positive relationship between post1 and post2 readings in relation to pain level ($r = .487$ P =.006). **Conclusion:** Hot/cold water therapy reduces varicose veins symptoms and pain level. **Recommendation:** Replication of the study on a large sample size from different geographic areas in Egypt; add hot/cold water therapy in the protocol of care for patients with varicose veins.

Key words: hot/cold water therapy, degree of varicose vein, symptoms of varicose vein, nursing role

Introduction

Varicose Vein (VV) is one of the most common venous diseases worldwide. A varicose vein (varicosity) is a term that commonly refers to the veins on the leg. Although varicose veins can occur elsewhere; it is a disease which commonly manifested by enlargement, distension and engorgement of the lower limb superficial veins due to the backward flow and turbulence in the circulation of the blood (Raetz, Wilson, & Collins, 2019; Raffetto & Khalil, 2021). As well, varicose veins occur when veins are not functioning properly as primary valve incompetence possibly will cause venous reflux and elevate the lower limb venous hydrostatic pressure leading to initial dilation of the vein wall; then causing more distortion in the valves, leading to

progressive increases in venous reflux, venous hydrostatic pressure and vein wall dilation (Raffetto & Khalil, 2021).

The exact etiology of varicose veins is debated, however the cause is multifactorial and may include the following: increased intravenous pressure caused by prolonged standing; increased intra-abdominal pressure arising from the tumor, pregnancy, obesity, or chronic constipation; familial and congenital factors; secondary vascularization caused by deep venous thrombosis; or less commonly, arteriovenous shunting. Risk factors for developing varicose veins are unclear however; hereditary, dietetic, and endocrinal, as well as occupational factors can contribute to the disease. Hereditary factors include valve dysfunction and weakness of the vein wall, or

the increase in superficial venous pressure due to manual labor, chronic cough, constipation, pregnancy, and the like. Therefore, it is easier for women to be affected than men (Selçuk Kapisız, Uzun Kulaoğlu, Fen & Kapisız, 2014; Fukaya, Flores, Lindholm, et al. 2018).

Varicose veins (VVs) of the lower limbs are considered as the most common vascular disorder in humans, creating serious signs and symptoms in patients and leading to surgical treatments and widespread morbidity. Moreover, it can have a significant effect on a patient's quality of life (Chang, et. al., 2021). In some people varicose veins are symptomatic or cause only mild symptoms, but in others they cause a heavy, achy feeling; throbbing; itching or burning; and worsening with prolonged standing which usually causes pain and discomfort (Davies, 2019; Paty, Elash, Turner-Bowker, 2017). Additionally, VVs may lead to serious complications associated with impaired superficial and deep venous systems as a result developing VVs can impair a person's functioning ability and productivity and consequently reduce their quality of life (Alghamdi, Al-Shehri, Al-Qahtani & Mehmood, 2020).

Treatment options for varicose veins include conservative management, external laser treatment, injection sclerotherapy, endovenous interventions, and surgery. The selection of treatment is largely based on the patient's preference, symptoms, locations, severity, cause, cost, potential for iatrogenic complications, and available medical resources (Guo, Cui, & Wen, 2019). Conservative treatment options include avoidance of prolonged standing or sitting and straining, elevation of the affected leg, regular physical activity such as walking and foot flexion exercises, external compression, loosening of restrictive clothing, medical therapy, modification of cardiovascular risk factors, reduction of peripheral edema, and weight loss may improve calf muscle pump function (Atalla, Soliman, & Henedy, 2019). Further, delivery of traditional medical techniques such as hydrotherapy (hot/cold water therapy), balneotherapy and massage for people with chronic venous insufficiency, provide a

significant improvement in varicose vein symptoms (Moraes Silva, et al., 2019).

Hydrotherapy is derivative from a Greek word "hydrotherapia" which exactly means "treatment using water". This technique uses water to maintain health, prevent and cure an ailment by conveying temperature whereby it stimulates the nerve endings and induces a reflex effect. The reflex effect has an impact on blood vessels in terms of producing a change in blood flow and metabolic functions. Hydrotherapy is the alternation between different water temperatures, hot and cold water soaking, and its benefit is involved in the vascular system as low temperature participates in tuning up vascular muscles which results in vasoconstriction. This slows down blood flow and can limit inflammation and swelling. Instead, hot water causes the blood vessels to dilate, bringing fresh oxygenated blood into the area. In addition, it enhances blood flow and improves peripheral arterial disease (Batten, Stevenson, Zimmermann, & Isaacs, 2017; Almassmoum, et.al, 2018; Abdlkarim & Yakout, 2020).

Nurses play an active role in each aspect of care for patients with varicose vein and have an effect in preventing associated complications and improving patients' experience during varicose veins treatment and care needs to be taken to ensure that patient understands and accepts the process of management (Çoban & Dirimeşe, 2019). Therefore, the current study aimed to investigate the effect of hot/cold water therapy on patients' reported outcomes of lower limb varicose veins.

Significance of the study:

Globally, varicose veins (VVs) of the lower limbs considered as the most frequent lifestyle diseases (Atalla, Soliman, & Henedy, 2019). According to Davies review (2019) the prevalence of chronic venous diseases and varicose veins vary mostly by region, however they are highest in Western countries. Varicose vein rates were 51.9 per 1000 women and 39.4 per 1000 men. Besides, Abdel moneim, (2016) and Paty, Turner-Bowker, Elash, & Wright, (2016) reported that, the prevalence of the adults' VVs has been announced to be different,

up to 56% in men and up to 73% in women. In Egypt, **Aly et al. (2020)** conducted a cross-sectional study on women; found that 51.1% of women aged 15-55 years old had varicose veins.

Varicose veins and its' associated complications can be a great financial burden to patients and to society. However, when the disease develops further, the venous dysfunction will continue to deteriorate, so it should be prevented and treated in time (**Chang, et. al., 2021; Batricevic, et.al, 2018; Aber, et.al. 2017**). **Hydrotherapy (hot/cold water therapy)** is useful for relieving the discomfort and pain caused by a variety of symptoms associated with different diseases and injuries. Hot/cold water therapy, unlike conventional treatment, does not have side effects and several studies proved that it is cost-effective as compared to other interventions (**Teng, et.al, 2019**).

Nursing role in caring for patients with varicose veins is directed toward prevention, caring of varicose veins, prevention of its complications and help in following patients' prognosis (**Abdlkarim, & Yakout, 2020; Almassmoum, et.al. 2018**). Obviously, studies related to the effect of hot/cold water therapy on lower limbs varicose veins are lacking in Egypt. So, the current study, investigates the effect of hot/cold water therapy on patients' reported outcomes of lower limb varicose veins. Hence, findings of the current study could provide an evidence based practice information that might help in preventing the progression of the disease, alleviation of symptoms, improving the look of the leg and preventing of complications. Moreover, results could help nurses in establishing a well-designed health education program including hot/cold water therapy in the routine care of such kind of patients.

Aim of the study:

The aim of the current study was to investigate the effect of hot/cold water therapy on patients' reported outcomes of lower limb varicose veins.

Research hypotheses:

To fulfill the aim of the current study, the following hypotheses were postulated:

H1: Patients who are enrolled in hot/cold water therapy will have less total mean score of VVSymQ than those who receive routine hospital care.

H2: Patients who are enrolled in hot/cold water therapy will have less total mean score of pain than those who receive routine hospital care.

Operational Definition:

Hot/cold water therapy: hot/cold water therapy, also called hydrotherapy, contrast bath hydrotherapy, or water cure is the use of water (hot, cold, steam, or ice) to relieve discomfort and physical well-being; in the current study hot/cold water therapy is an alternate between hot and cold baths to stimulate circulation in the legs through soaking feet and legs in the hot water for 2 to 3 minutes. Then immerse them immediately in the cold water for about 30 seconds and repeated three times a day for one month. Its effect will be measured by Varicose Vein Symptoms Questionnaire (VVSymQ) (**Paty, 2014**).

Patients' Reported Outcomes: It is related to a direct report from the patient's perspective of varicose vein symptoms and pain measured by Varicose Vein Symptoms Questionnaires (VVSymQ) (Paty, 2014) and Numerical Pain Rating scale (NPRS) (McCaffery & Beebe, et al., 1989).

Methods:

Research Design:

A quasi experimental (pre-posttest design) was utilized to meet the aim of the present study.

Setting:

The current study was carried out in the out-patient of vascular clinic at EL-Manial University Hospitals-Egypt.

Sample:

A purposive sample of 60 adult male and female patients over 6 consecutive months divided into two equal groups (30 patients each) 1- the study group who received hot/cold water therapy sessions in addition to the routine hospital care and 2- the control group who received routine hospital care were constituted the study sample. The inclusion criteria were as follows: age between 18-60; diagnosed as primary uncomplicated varicose veins (C1& C2 (mild chronic venous insufficiency (CVI)) based on CEAP classification; controlled

diabetes and hypertension, not suffering from inflammatory disorders, peripheral disorders, deep venous thrombosis, localized wound and local hematoma.

Tools

Data pertinent to the current study was collected using the following tools:

a) Patient's demographic and Medical background information form was developed by the researcher and it consists of questions regarding gender, age, marital status, level of education, smoking history, family history, stage of varicose vein using CEAP classification and treatment.

- CEAP Classification which is the standard clinical score utilized to classify the severity of the varicose vein and ranges from C0 which means absolutely no venous disease that can be seen or felt in the legs to C6 which means an open and active venous leg ulcer. It was accepted in 1991 in the Venous Forum of America in order to create an international language in defining and staging the disease. The stages are as follows: C0: No visible venous disease; C1: Reticular varices or telangiectasias smaller than 4 mm in diameter; C2: Varicose veins with a diameter greater than 4 mm; C3: Swelling and edema of the ankle; C4: Brown color changes in the skin; C5: Skin changes with healed ulceration; C6: Skin changes with active ulceration (**Kistner & Eklof, 2009**). CEAP scores were grouped into two categories; mild chronic venous insufficiency (CVI) (C1–C2) and severe CVI (C3–C6) (**Yilmaz, Peköz, Dincer, Deniz & Oğuzkurt, 2021**).

b) Varicose vein symptoms questionnaire (VVSymQ) which is considered a novel five-item patient reported outcomes (PROs) instrument specifically developed to evaluate varicose vein symptoms from the patient's perspective in clinical trials. These five important symptoms includes: heaviness, achiness, swelling, throbbing and itching. According to the VVSymQ instrument, the patient was asked the following question: "Since waking up today, how often had you had the following problem in your leg to be treated?"

This question was asked for each of the following five symptoms: heaviness, achiness, swelling, throbbing, and itching. Response to the question will be: "none of the time" (0); "A little of the time" (1); "some of the time" (2) "A good bit of the time" (3); "Most of the time" (4) "All of the time" (5). A total score is calculated from the sum scores across all five items. The overall score ranges from 0 to 25, higher scores indicate greater symptom duration (**Paty, Turner-Bowker, Elash & Wright, 2016**). The VVSymQ instrument was valid and reliable as test–retest reliability was high (intraclass correlation coefficient 0.96); internal consistency was good (**Cronbach's alpha C0.76**) (**Wright, Paty, Turner-Bowker and Bradbury, 2016**).

c) Numerical Pain Rating Scale (NPRS). It consists of a straight line with the endpoints defining extreme limits such as 'no pain at all' and 'pain as bad as it could be'. The patient was asked to mark his pain level on the line between the two endpoints. The scores of the Numerical Pain Rating scale ranged from 0 up to 10; 0=no pain, 1-3= mild pain, 4-6=moderate pain, 7-9=severe pain while 10= worst pain (**McCaffery & Beebe... et al, 1989**). Its reliability was conducted by **Ferraz, Quaresma, Aquino, Atra & Tugwell, (1990)** with a high test–retest reliability ($r = 0.96$ and 0.95 , respectively).

Ethical consideration:

Official approval was obtained from the Research Ethics Committee at the Faculty of Nursing, Cairo University (IRB 2019041701). All participants were provided with information forms detailing the aim; significance; and process of the study. They were also be given the opportunity to ask questions about the research; and were fully assured that they can withdraw from the study at any time without any negative consequences. Participant's informed consent was obtained prior to the commencement of data collection. Anonymity and confidentiality of the collected data were assured through coding as well as keeping the documents in a safe locked place.

Procedure:

Once official permission was granted to proceed with the study, the researchers identified the potential subjects who met the study inclusion criteria. Data were collected through three phases as follows: in the first phase, the researchers explained the nature and purpose of the study and written informed consent was obtained from the participants, then the demographic & medical data were gathered using tool (I). In addition, baseline data of VVSymQ and the Numerical Pain Rating scale were collected using tool (II&III). In the second phase, the researchers implemented the procedure for each patient of the study group after physician visit and was as follow: firstly researchers prepared all the needed equipment before the treatment session (chair, two large buckets: one for hot water, the other for cold water, water thermometer, watch, towels) in a quiet, private, closed place in the outpatient vascular clinic. Then each patient in the study group was asked to test both the hot water and the cold water temperature to be at the tolerance level and within the following range (35-40°C) for hot water and (16-21°C) for cold water based on **An, Lee and Yi, (2019)**.

Every patient in the study group was asked to immerse the two exposed legs in hot water for 2-3 minutes to promote vasodilatation of the veins and relaxation of muscle and nerve then remove the two legs from the hot water and place them in the cold water for 30 seconds to produce vasoconstriction, to relieve pain and reduce swelling. This step was repeated for consecutive three times, finishing with cold soak. The legs were dried with a towel after finishing while the control group receives the hospital routine care. Then each patient was asked to repeat the procedure once a day at home for a complete one month. The third phase was the evaluation phase, every patient was observed weekly during the follow up clinic visits and each time researchers repeated the procedure for each patient of the study group again. Thus, the procedure was done for four consecutive weeks. Researchers then, completed the two tools: the VVSymQ and the Numerical Pain Rating scale for the study and control group at the second and the fourth week.

Furthermore, patients in the study group were followed up by the researchers during the week through phone call to ensure that they adhered to the steps of the procedure.

Statistical analysis:

The collected data were tabulated, computed, and analyzed using the new version of Statistical Package for Social Science (SPSS) version 20 (**Social Science, IBM, USA, 2020**). Data were presented using descriptive statistics in the form of frequencies, percentages, etc. As well inferential tests were utilized such as t test, χ^2 test ...etc. Statistical significance was considered at a P value less than or equal to 0.05.

Results:

Table (1) illustrate that (60%) and (56.7%) of the study and control groups respectively their age ranged between 30 to less than 40 year. Female represents (80%) and (73.3%) of the study and control groups respectively. According to place of residence (86.7%) of the study group and (56.7%) of the control group were from urban areas. In relation to education level (36.7%) of the study and control groups can't read or write. Concerning occupation, (46.7%) of the study group were housewife, and (43.4%) of the control group were not work. Regarding history of smoking (87.7%) of the study group and (80%) of the control group had no history of smoking. There were no significant statistical differences between study and control groups in relation to demographic characteristics.

Table (2) clarifies that (70%) and (56.7%) of the study and control groups respectively had second degree of varicose vein in addition, (40.7%) and (40%) of the study and control groups respectively their varicose veins located in both the right and left legs. Regarding co-diseases (66.7%) of the study group and (63.3) of the control group had no any diseases. concerning family history (83.3%) of the study group and (96.7%) of the control group had no family history of varicose vein. According to body mass index (43.3%) and (46.7%) of the study and control groups had class I obesity

with Mean \pm SD (30.54 \pm 4.34) and (29.31 \pm 3.17) respectively. Moreover, (100%) of the study group and (93.3%) of the control group takes anti-Inflammatory and Vaso-Prophylaxis medication. There were no significant statistical differences between study and control groups in relation to medical background data.

Table (3) displays that there was noticeable differences in symptoms mean score between the study and the control groups in the third reading respectively as the following, in relation to heaviness (2.23 \pm .81 and 3.40 \pm .93); Achiness (2.26 \pm .90 and 3.60 \pm 1.1). Swelling (2.06 \pm 1.0 and 3.66 \pm 1.0); while throbbing (1.66 \pm .84 and 4.66 \pm 5.4). Lastly, mean score of itching (2.50 \pm 4.1 and 3.56 \pm .93).

According varicose vein symptoms Table (4) enlightens that there was a highly statistically significant difference in varicose vein symptoms total mean scores between the study and control groups over the three readings as ANOVA=336.74, P=0.000. The most highly significant was observed at post 2 as t=8.63, P=.000.

Table (5) shows that 96.7% of the study and control groups at the base line reading had

severe pain level while in post1 reading 73.4% and 40% of study and control groups respectively had moderate pain level followed by 66.7% of the study group and 10% of the control group had mild pain level at post 2 reading.

Regarding pain level table (6) point out that there was a highly statistically significant difference in pain level total mean scores between the study and control groups over the three readings as ANOVA=37.41, P=0.000. The most highly significant was observed at post 2 as t=6.13, P=.000

Table (7) explains that there was a highly positive relationship between post1 and post2 readings regarding varicose vein symptoms among the study group (r = .703 P= .000).

Table (8) describes that among the study group there was a highly negative relationship between baseline and post 2 readings in relation to pain level (r = -.555 P = .001). While there was a highly positive relationship between post1 and post2 readings in relation to pain level (r = .487 P = .006).

Table (1): Frequencies and Percentages of demographic characteristics among the study and control groups (n= 60) (30/each).

Variables	Study group		Control group		χ^2	P-value
	No.	%	No.	%		
Age:						
- 18 < 30 yr.	6	20	7	23.3	.105	.949
- 30 < 40 yr.	18	60	17	56.7		
- 40 \geq 50 yr.	6	20	6	20		
Gender:						
- Male	6	20	8	26.7	.373	.542
- Female	24	80	22	73.3		
Place of residence						
- Rural	11	13.3	13	43.3	.278	.598
- Urban	19	86.7	17	56.7		
Education Level:						
- Can't read or write	11	36.7	11	36.7	2.139	.710
- Primary School	0	0.00	2	6.6		
- Preparatory School	6	20	5	16.7		
- Secondary School	11	36.7	10	33.4		
- University	2	6.6	2	6.6		
Marital status						
- Married	28	93.4	24	80	3.508	.320
- Divorced	0	0.00	2	6.7		
- Widow	0	0.00	1	3.3		
- Single	2	6.6	3	10		
Occupation:						
- Employee	0	0.00	1	3.3	4.481	.345
- Student	0	0.00	1	3.3		
- House wife	14	46.7	12	40		
- Worker	7	23.3	3	10		
- Not work	9	30	13	43.4		
Smoking						
- Yes	4	13.3	6	20	.480	.488
- No	26	87.7	24	80		

* Significant ≤ 0.05

Table (2): Frequencies and Percentages of Medical background among the study and control groups (n= 60) (30/each).

Variables	Study group		Control group		χ^2	P-value
	No.	%	No.	%		
Degree of varicose vein						
- First degree (C1)	9	30	13	43.3	1.148	.284
- Second degree (C2)	21	70	17	56.7		
Site of lower limb varicose vein						
- Right	10	33.3	12	40	.336	.845
- Left	6	20	6	20		
- Both	14	46.7	12	40		
Co-diseases						
- No	20	66.7	19	63.3	.073	.787
- Diabetes & Hypertension	10	33.3	11	36.7		
Family history of varicose vein						
- Yes	5	16.7	1	3.3	2.963	.085
- No	25	83.3	29	96.7		
BMI						
- Underweight	0	0.00	0	0.00		
- Normal	2	6.7	3	10		
- Overweight	10	33.4	12	40	3.219	.522
- class I obesity	13	43.3	14	46.7		
- class II obesity	4	13.3	1	3.3		
- Morbid obesity	1	3.3	0	0.00		
Mean \pm SD		30.54 \pm 4.34		29.31 \pm 3.17		
Current medication						
- No medication	0	0.00	2	6.7	2.069	.150
- Anti-Inflammatory & Vaso-Prophylaxis	30	100	28	93.3		

* Significant ≤ 0.05 **Table (3):** Symptoms mean score among the study and control groups over the three reading (n=60) (30/each)

Varicose vein symptoms	Study group						Control group					
	Baseline reading		Post1 reading		Post 2 reading		Baseline reading		Post1 reading		Post 2 reading	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Heaviness	3.33	.60	2.76	.72	2.23	.81	3.66	.60	3.5	.67	3.40	.93
Achiness	3.43	.89	2.70	.83	2.26	.90	3.40	.67	3.70	.74	3.60	1.1
Swelling	3.53	.86	2.66	.84	2.06	1.0	3.40	.89	3.56	.77	3.66	1.0
Throbbing	3.76	.81	2.60	.67	1.66	.84	3.30	.79	4.46	5.4	4.66	5.4
Itching	3.36	.92	2.20	.66	2.50	4.1	3.20	.80	3.33	.75	3.56	.93

Table (4) Comparison of varicose vein symptoms total mean scores between the study and control groups over the three reading (n=60) (30/each).

Readings	Varicose vein symptoms		t-test	P-Value
	Study Group	Control Group		
	Mean±SD	Mean±SD		
- Baseline (1 st reading)	17.26 ±3.10	17.00 ± 2.87	1.01	.314
- Post 1 (2nd reading)	13.10±2.42	17.73± 3.13	6.39	.000**
- Post 2 (3rd reading)	9.73± 3.53	17.83± 3.73	8.63	.000**
ANOVA= 336.74 P= .000**				

* Significant ≤ 0.05 **high Significant ≤ 0.01

Table (5) Frequency and percentages of pain level among the study and control groups over the three reading (n=60) (30/each).

Pain levels	Study group				Control group							
	Baseline reading		Post1 reading		Post 2 reading		Baseline reading		Post1 reading		Post 2 reading	
	N	%	N	%	N	%	N	%	N	%	N	%
Mild	0	0.00	1	3.3	20	66.7	0	0.00	0	0.00	3	10.0
Moderate	1	3.3	22	73.4	9	30.0	1	3.3	12	40.0	14	46.7
Severe	29	96.7	7	23.3	1	3.3	29	96.7	18	60.0	13	43.3

Table (6) Comparison of pain level total mean scores between the study and control groups over the three reading (n=60) (30/each).

Readings	Study Group		Control Group		t-test	P-Value
	Level of pain		Level of pain			
	Mean+SD	Mean+SD	Mean+SD	Mean+SD		
- Baseline (1 st reading)	2.96± .18	2.96± .18	2.96± .18	2.96± .18	.000	1.000
- Post 1 (2nd reading)	2.20± .48	2.20± .48	2.60+ .49	2.60+ .49	3.15	.003**
- Post 2 (3rd reading)	1.36± .55	1.36± .55	2.33± .66	2.33± .66	6.13	.000**
ANOVA= 37.41 P= .000**						

* Significant ≤ 0.05 **high Significant ≤ 0.01

Table (7): Correlation between three reading and varicose vein symptoms among the study group (n=30)

Readings	Total Score	
	Post 1 reading	Post 2 reading
	R	R
Baseline reading	.037 P= .845	.081 P=.670
Post-1- reading		.703 P=.000**

* Significant ≤ 0.05 **high Significant ≤ 0.01

Table (8): Correlation between three reading and pain level among the study group (n=30)

Readings	Total Score	
	Post 1 reading	Post 2 reading
	R	R
Baseline reading	.078 P= .682	-.555 P= .001**
Post-1- reading		.487 P= .006**

* Significant ≤ 0.05 **high Significant ≤ 0.01

Discussion:

Varicose veins are recurrently medical condition that leads to significant morbidity and long-term costs for the patient. Therefore, it needs great consideration. In this study, we aimed to investigate the effect of hot/cold water therapy on patients' reported outcomes of lower limb varicose veins.

Even though different reports displayed that the prevalence of VVs increased with age which results from weakness of the lower leg muscles and detraction of the flexibility of venous valves. The present study revealed that more than half of the patients their age ranged from thirty to forty year among both study and control groups while the other 2 quarters of both groups their age group ranged between teenagers and middle adults which is in the same line with **Aslam, et.al (2022)** who mentioned that VVs disease is one of the most commonly observed medical condition influencing teenagers, adults, and elders around the globe and concluded that VVs disease usually affects the peoples of the middle ages both men and women. However, this finding is not consistent with several studies that revealed older age as the most significant risk factor for varicose veins (**Wittens, et.al. 2020**). The result is also not similar to **Abdlkarim, & Yakout, (2020)** study which illustrated that the majority of patient's age ranged from (40-60) years old.

Related to gender, female patients as well were married and housewife constituted the majority of both groups in the present study which is similar to **Wittens, et.al. (2020)** that addressed VVs disease is more common in female adults than male adults. And interpreted by **Aslam, et.al (2022)** as most of the research showed that the female gender is more prone

toward VVs as compared to men. Varicose veins in females are attributed to hormonal changes and pregnancy. In addition, obesity and lack of physical activity were strongly associated with VVs in women, more than in men. Also it remains controversial who has more risk of developing VVs. On the other hand in **Abdlkarim, & Yakout, (2020)** study males constituted a higher percentage than females. From the researchers' points of view, the different findings might be results from different sample size, personal characteristics, or different criteria of the disease.

Consistent with that obesity is one of the risk factors for developing varicose veins as compresses the veins and increases the pressure and strains the walls and valves. The current study finding illustrated that half of the sample had class I obesity among both the study and control groups besides the rest of them between overweight and class II obesity. This is in agreement with **Wittens, et.al. (2020)** and **Abdlkarim, & Yakout, (2020)** studies clarified that a body mass index (BMI) greater than 30 increases the risk for VVs significantly, for men and women. The finding also close to **Aslam, et.al (2022)** suggested that females with higher BMI are at higher risk of developing VVs and being overweight might also be an influential factor in the occurrence of VVs disease and its worsening. However **Elamrawy, et.al (2021)** reported that overweight or obesity (BMI ≥ 25) was not a predictor of LLVV in the study and added that, in the literature review, the data on the correlation between obesity and varicose veins is controversial; and whether it has an independent or an aggravating effect on the development of varicose veins is still debatable.

As regards family history and smoking habits many studies displayed positive relationship between family history of varicose veins or venous disease, smoking and the risk of varicose veins (**Manerikar, et.al, 2018; Wittens, et.al. 2020; Elamrawy, et.al 2021**). However, the current study presented that the majority of both groups were having no family history of VVs, and not smoking. From the researchers opinion this is due to the fact that, the majority of the studied participants were female and from an urban area where smoking is culturally not allowed and also may be interpreted as there are other factors that plays an essential role in developing LLVVs as: type of occupation, life style, exercises, pregnancy, type of diet and age. Most of the studies indicate that a significantly higher prevalence of varicose veins was found in people working in a prolonged standing or sitting posture which reflect the nature of female in the current study as they are housewife spent most of their time to do the house works. In addition, **Ken Tsai, et.al (2023)** reported that people who followed a vegetarian diet were at greater risk for developing varicose veins.

In relation to varicose vein symptoms, the current study results highlighted a remarkable and significant effect of hot/cold therapy in reducing VVs symptoms which answers the first hypothesis. Finding illustrated a highly significant difference between the study and control groups after two weeks and four weeks of intervention. Apparently, the study group expressed fewer symptoms after the intervention compared with the control group. This result is in consistent with the study of **Abdlkarim & Yakout, (2020)** which showed significant improvement in varicose veins symptoms and pain among the study group after hydrotherapy application. Results are also supported by de Moraes **Silva, Nakano, Cisneros & Miranda, (2023)** revealed that balneotherapy (water therapy) possibly results in improved disease severity signs and symptoms among patients with chronic venous insufficiency. Instead, these findings are in agreement with **Almassmoum, et al., (2018)** who conduct a current clinical status of hydrotherapy; an evidence based retrospective six-years (2012-2017) systemic review

described that “people are using hydrotherapy as a treatment for various health conditions as osteoarthritis, ulcer, varicose veins and its use in particular with the conventional system makes the outcome more effective and considerable”.

Concerning pain assessment, the present study finding presented that pain total mean scores before intervention were similar among both groups. Fortunately, this reflected that any changes that happened were due to the intervention. After two weeks of hot/cold water therapy application, findings revealed that, there was an improvement in pain among the study group compared to the control group. However, results showed a highly significant difference between both groups after 4 weeks of intervention for the study group compared to the control group. It is noticed that the majority of patients reported severe level of pain before intervention among both groups. After intervention, findings revealed that the majority of the study group reported lesser and moderate level of pain, while the majority of the control group still expressed a severe level of pain. After all, the study group reported mild level and lesser pain in the third assessment compared to the control group which showed a slight improvement in almost only half of them. The slight improvement in the control group could be due to the prescribed medications. Consequently, the present results point toward hot /cold therapy being effective in alleviating pain which supported the second hypothesis that was postulated in the current study. This is due to the fact that using alternating hot and cold water stimulate blood circulation, enhance venous return and relieve congestion which decrease pain as mentioned by **Almassmoum, et.al, (2018)** based on a thorough search of scanty previous trial has examined the effects of a hot/cold therapy on pain among the same study sample. Yet, the improvements in pain observed in our study with the implementation of hot /cold therapy are similar and consistent with the findings of previous clinical trials. Moreover, the present finding are in agreement with **Shah and Sadhu, (2022)** who explained that, for reduction of leg pain, a contrast bath was used for alternate immersion in hot and cold baths causes alternate vasoconstriction and vasodilation of the vessels by the modality and

hence improves circulation and this in turn, helps to reduce pain in case of varicosities. It is noticed that pain improvement is increased by time among the study group. From the researchers view, this could be due to the fact that the obvious moderate improving of pain in the first two weeks could encourage the patient to be more adhering to the intervention steps. So, the level of pain became less and mild by the fourth week.

Conclusion:

Hot/cold water therapy has an obvious effect in reducing varicose veins symptoms severity and pain level among the study group. Thus, it can be considered as an additional measure to compression therapy and other conventional treatments.

Implication of the study: This study displays that, nurses can apply hot/cold therapy in nursing intervention to reduce patient's varicose vein symptoms and pain level and enhance patient quality of care which in turn improve patient's life.

Recommendation:

1- Replication of the study on a large sample size from different geographic areas in

Egypt.

2- Add hot/cold water therapy in the protocol of care of patients with varicose veins.

3- Future research should evaluate whether the effects of hydrotherapy observed in this trial remain over a longer period of time.

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