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EFFECT OF BUERGER-ALLEN EXERCISE ON QUALITY OF LIFE AMONG PATIENTS WITH VARICOSE VEINS

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Abstract

Background: Varicose veins disease is a prevalent vascular condition characterized by abnormally dilated, twisted, and elongated veins that cause discomfort, pain, swelling, thrombosis, bleeding, ulcerations and disability that has negative impact on patient's quality of life. Aim: to evaluate the effect of Buerger- Allen Exercise on health-related quality of life among patients with varicose veins. Design: Quasi-experimental pre- posttest nonequivalent control group design was utilized. Setting: This study was conducted in the outpatient clinic of vascular department at Al Kasr El Aini hospital which affiliated to Cairo University Hospital, Egypt. Sample: a convenient sample of 66 adult male and female patients with confirmed diagnosis of varicose veins selected for a period of six consecutive months and divided into study and control groups. Tools: data was collected using Personal and Medical Background Information Form (PMBIF), CEAP Clinical Classification, The Aberdeen Varicose Veins Questionnaire (AVVQ) and Observational checklist of Buerger- Allen Exercise. Results: The study findings revealed that there were significant statistical differences of varicose veins quality of life score between study and control groups after application of Buerger- Allen Exercise. Conclusion and recommendation: Buerger Allen exercises was effective in improving varicose veins patient's quality of life by enhancing circulation, alleviating symptoms and preventing further complication; hence, it is highly recommended to be part of therapeutic regimen of patients with varicose veins.

Keywords: Buerger- Allen Exercise, Quality of Life, Varicose Veins, CEAP (Clinical-Etiology-Anatomy-Pathophysiology) Classification &Aberdeen Varicose Veins Questionnaire.

1. INTRODUCTION

Varicose veins (VVs) represent a common clinical manifestation of chronic venous insufficiency (1). It is a progressive vascular disease characterized by torturous, greater than or equal to three millimeters widened superficial veins (2). It affects an estimated 25% of women and 15% of men over the age of 15 years (3). A combination of venous insufficiency, venous hypertension, venous wall abnormalities, valvular dysfunction, and inflammatory processes characterizes the pathophysiology of varicose veins (4). Age, gender, genetics, pregnancy, and prolonged standing are considered common risk factors for the development of Varicose veins (3).

Symptoms of VVs include aching, heaviness, cramping, restlessness, throbbing and swelling in the legs that get worse at the end of the day, especially after prolonged standing, and usually resolve when patients sit and elevate their legs (2). Moreover, they may also develop thrombophlebitis, venous insufficiency, and venous leg ulcers.

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Consequently, they have a substantial adverse effect on person's quality of life in addition to psychological distress (4).

Exercises has been considered as one of the most effective non-pharmacological managements that help to stimulate peripheral circulation. Buerger-Allen exercise (BAE) is an active postural exercise in which gravity fills and empties blood vessels alternatively and helps in improving blood circulation in the lower limbs and facilitating the drainage of swollen vessels through postural changes (5). It has also been shown to be an effective therapeutic intervention in the treatment of venous insufficiency that can enhance peripheral circulation, relieve symptoms, and prevent serious complications such as venous ulcers and thrombosis (6)

Nurses' active involvement in the care and management of varicose vein patients is crucial in ameliorating overall well-being. Current clinical practice guidelines emphasize the need for comprehensive care of patients with varicose veins and associated chronic venous diseases. These guidelines recommend a holistic approach to management, including lifestyle modifications, compression therapy and appropriate follow-up care (7). Therefore, the aim of the current research is to evaluate the effect of Buerger- Allen Exercise on health-related quality of life among patients with varicose veins.

Significance of the Study

Varicose veins disease is a prevalent vascular condition affecting nearly 40% of the global population (8). The worldwide prevalence ranges from 20 to 60% and women are at two to three times more risk of developing varicose veins than men (9). It afflicts 22 million women and 11 million men their ages ranged from 40–80 years old causes venous ulceration in approximately 2 million of them (10). A study conducted in Egypt denoted that lower limb varicose veins were considered as one of the most common chronic venous problems affecting 47% to 50% of the whole Egyptian population (11).

Varicose veins progressively deteriorate physical, psychological, and social functioning components of quality of life (QOL) (12). Nurses encourage regular physical exercise that targets lower limb muscle strength and ankle mobility to facilitate venous return. Buerger Allen exercise includes gravitational postural changes which help to improve lower limbs' circulation, increase blood flow rate, empty engorged blood vessels, and relieve associated signs and symptoms (13).

There are few numbers of research and a lack of evidence concerning the effect of Buerger- Allen Exercise on promoting circulation and improving health related quality of life of patients with varicose veins. The researcher hoped that the findings of the study might help in establishing evidence-based data that can promote nursing practice and research and consequently add to the nursing body of knowledge. Also, the results of this current study might motivate other researchers to conduct studies that help in decreasing patients' complaints. Furthermore, these research findings could be beneficial in maintaining cost-effective patient care as it might protect patients against life threatening complications of varicose veins.

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2. METHODS

2.1 Aim of the Study

The aim of the current study was to evaluate the effect of Buerger- Allen Exercise on health-related quality of life among patients with varicose veins.

2.2 Research Hypothesis

To fulfill the aim of the current study, the following research hypothesis was formulated: H1. The post total mean score of health-related quality of life among patients with varicose veins who will practice Buerger - Allen Exercise will be different from the post total mean score of health- related quality of life among patients with varicose veins who will receive routine hospital care.

2.3 Definition of Terms

The following terms were used in the current study:

Buerger- Allen Exercise

Theoretical: It refers to active postural exercise that helps to fill and empty the lower extremity's blood vessels according to gravity alternatives in three steps (elevation, dependency, horizontal)5.

Operational: In the current study, it refers to an active postural exercise that was performed by study group patients who had varicose veins demonstrated in three steps; the first step is "elevation", the researcher asked the patient to lie down on the bed and elevate his lower extremities 45 to 90 degree angle and supported in this position until the skin blanches, After that "dependency" in which the researcher asked the same patient to sit on bed or chair, so the feet and legs are lowered below the level of the rest of the body until redness appears. Finally, "horizontal" as the legs are placed flat on the bed in a horizontal position. Each step takes 3-5 minutes (14). Exercise was performed two to three times per day for eight weeks under the researcher supervision as measured by a performance observation checklist.

Health Related Quality of Life

Theoretical: it is a multidimensional concept that includes subjective reports of symptoms, side effects, functioning in multiple life domains, and general perceptions of life satisfaction and quality (15).

Operational: In the current study, it refers to patients quantitative scores as obtained by using the Aberdeen Varicose Veins Questionnaire that has a score from zero to 100, where zero represents a patient with no evidence of varicose veins and 100 represents the most severe problems associated with varicose veins.

2.4 Research Design

Quasi-experimental pre-posttest nonequivalent control group design was utilized in the current research study.

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Schematic Representation of Research Design

Group	Pre-test (baseline)	Intervention	Post-test 1 (At the end of 2nd week after intervention)	Post-test 2 (At the end of 4th week after intervention)	Post-test 3 (At the end of 8th week after intervention)
Study group	O_1	(Buerger- Allen Exercise)	O_2	O_3	O_4
Control group	O_1	(Routine hospital care)	O_2	O_3	O_4

2.5 Sample

A convenient sample of adult male and female patients with confirmed diagnosis of varicose veins was selected for a period of six consecutive months not less than 60 patients according to the following inclusion criteria: patients who had varicose veins grade C2s (varicose veins with symptoms such as pain, heaviness, muscle cramps), C2r (recurrent varicose veins) and C3 (varicose veins with edema),willing to participate in the study, able to communicate and able to perform leg exercises and didn't receive any lower limb exercises before.

2.6 Setting

This study was conducted in the outpatient clinic of vascular department at Al Kasr El Aini hospital which affiliated to Cairo University Hospital, Egypt.

2.7 Tool of Data Collection:

Data of this Study was Collected Using:

1. Personal and Medical Background Information Form (PMBIF).

This tool was developed by the researcher. It is consisted of two parts: (a) Personal data: It covered data related to patients′ characteristics as, age, gender, place of residence, educational level, occupation, etc.... (b) Medical data: It covered data related to disease onset, duration, medical treatment, past history, body mass index (BMI), etc.

2. CEAP Clinical Classification.

The CEAP (Clinical-Etiology-Anatomy-Pathophysiology) classification is an adapted internationally accepted standard tool used for describing patients with chronic venous disorders that has been developed to classify varicose veins according to its clinical severity. The revised CEAP 2020 classification as follows: C0- No visible or palpable signs of venous disease. C1- Telangiectasias or reticular veins. C2- Varicose veins (> 3 mm in diameter) either asymptomatic (C2a) or symptomatic(C2s). C2r- recurrent varicose veins. C3- Oedema. C4a- Pigmentation or eczema. C4b- Lipodermatosclerosis (inflammation of the layer of fat under the epidermis) or atrophie blanche. C4c- corona phlebectatica. C5- Healed venous ulcer. C6- Active venous ulcer. C6r- recurrent active venous ulcer. The scale has been validated in studies that show a significant relationship

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between classification on the scale and both clinical symptoms (16) and considered as a reliable method with good intra-rater reliability (0.54-0.86) (17).

3. The Aberdeen Varicose Veins Questionnaire (AVVQ).

It is an adopted tool that measures Health Related Quality of Life (HRQL) for patients with varicose veins. The questionnaire has a section in which the patients can indicate diagrammatically the distribution of their varicose veins of the lower limbs showing the location of the varicose veins. It has four important health-related subscales, namely pain and dysfunction, cosmetic appearance, degree of varicosity, and complications. The questionnaire is scored from zero to 100, where zero represents a patient with no evidence of varicose veins and 100 represents the most severe problems associated with varicose veins which is classified to 0 (no problem with varicose veins), mild from 1 - 33, moderate from 34 – 67 and severe from 68 up to 100. The reliability of the questionnaire was analyzed using Cronbach′s alpha values; its internal consistency is appropriate (Cronbach-alpha = 0.890), and the correlation coefficient between classes (test - retest reliability) was 1.000(18).

4. Observational Checklist of Buerger- Allen Exercise:

It was developed by the researcher to evaluate patients' performance of Buerger- Allen exercise. It includes three main steps of exercise (elevation, dependency and horizontal). Scoring system as follows: One mark was given for performing each step in the exercise correctly. A zero mark was given for performing each step in the exercise incorrectly or if it is not done. If the score of the checklist is 100%, it indicates acceptable performance. If the score is less than 100%, it indicates not acceptable performance.

2.8 Procedure

First phase was the preparatory and assessment phase: In this phase, patients were selected according to the eligibility criteria using CEAP clinical classification, then the researcher obtained written informed consent from patients who were willing to participate in the study. After that individualized structured interview sessions and baseline assessment were conducted with each patient to collect Personal and Medical Background Information Form (PMBIF), then the researcher assessed Health related Quality of Life using the Aberdeen Varicose Veins Questionnaire (AVVQ). Second phase was implementation phase, Buerger- Allen Exercise was demonstrated in one session that lasted for about 20 to 30 minutes and patients were supplemented with illustrated instructional flyer which include information about the disease and steps of the Buerger-Allen Exercise in Arabic with colorful pictures. Buerger- Allen Exercise was demonstrated in three steps and patients' performance was assessed using observation checklist; the first step is "elevation", the researcher asked the patient to lie down on the bed and elevate his lower extremities 45-to-90-degree angle and supported in this position until the skin blanches, for about three to five minutes.

After that "dependency" in which the researcher asked the same patient to sit on bed or chair, so the feet and legs were lowered below the level of the rest of the body until

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redness appears (care should be taken that there is no pressure against the back of the knees); for about three to five minutes. Finally, “horizontal” as the legs were placed flat on the bed in a horizontal position for 3-5 minutes. The overall duration for each position varied with the patient's tolerance and the speed with which color change occured which took about 12 -15 minutes. The patients of the study group were asked to perform Buerger Allen Exercise at a fixed time for a frequency of two to three times a day for eight weeks. While the control group received routine hospital care such as compression stockings, analgesics and lifestyle modification during the study.

The researcher followed up patients by phone and organized meetings with them during their follow up visits in the vascular outpatient clinic after confirming their attendance via phone calls. Third phase was evaluation phase: health related quality of life of the study group as well as the control group were assessed at three time points.

The first point of time for data collection was done at the end of two weeks after performing Buerger Allen Exercise. The second point of time was at the end of 4 weeks after intervention. The third point of time was at the end of 8 weeks after intervention.

If a patient missed intervention at any time, he was dropped and excluded from the study. At the end of data collection, patients in the control group were supplemented with illustrated instructional flyer which include information about the disease and steps of the Buerger- Allen Exercise in Arabic.

3. RESULTS

3.1 Personal Characteristics and Medical Data of the Study and Control Groups

Table (1) presented that about half of the study group (48.5%) and (51.5%) of the control group, their ages ranged from 40- 50 years old, mean and standard deviation of their age were (39.09± 5.456) & (40.76±5.006) respectively. In relation to gender, 60.6% of study and 57.6% of control group were females.

According to marital status, 75.8% and 87.8% of study and control groups respectively were married. About half of the study group (48.5%) and (60.6%) of the control group had secondary education. About one third of the study group (36.4%) were workers while 36.4% of the control group worked in official work. About two thirds (78.8%) and (63.6%) of both study and control groups respectively stand more than 6 hours daily.

The majority of both study and control groups (81.8%) and (87.9%) respectively reside in urban areas. There was no significant statistical difference between the study and control groups in relation to personal characteristics.

According to medical data, 36% of the study group had obesity class 1 while 39% of control group were overweight. 51% and 64% of study and control group respectively had no family history of varicose veins. More than two thirds of both study group (76%) and control group (82%) had C3 (varicose veins with edema) according to the clinical classification as shown in figures (1,2,3).

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Table 1: Frequency and percentage distribution of personal characteristics among study and control groups (n=66).

Variable	Study group (n= 33)		Control group (n= 33)		X^2	P
	No.	%	No.	%		
Age 20 < 30	3	(9.1)	0	0	3.164	0.206
30 < 40	14	(42.4)	16	(48.5)		
40 – 50	16	(48.5)	17	(51.5)		
Mean ± SD	(39.09± 5.456)		(40.76±5.006)			
Gender						
Male	13	(39.4)	14	(42.4)	0.063	0.802
Female	20	(60.6)	19	(57.6)		
Marital status						
Married	25	(75.8)	29	(87.8)	2.963	0.397
Single	2	(6.1)	0	0		
Widow	2	(6.1)	2	(6.1)		
Divorced	4	(12)	2	(6.1)		
Education level						
Cannot read and write	1	(3)	1	(3)	1.944	0.746
Can read and write	5	(15.2)	3	(9.1)		
Basic	3	(9.1)	1	(3)		
Secondary	16	(48.5)	20	(60.6)		
University	8	(24.2)	8	(24.2)		
Occupation						
Housewife	9	(27.3)	9	(27.3)	0.559	0.906
Official work	11	(33.3)	12	(36.4)		
Worker	12	(36.4)	10	(30.3)		
Retired	1	(3)	2	(6.1)		
Hours of standing						
<6 hours	7	(21.2)	12	(36.4)	1.848	0.174
> 6 hours	26	(78.8)	21	(63.6)		
Place of residence						
Rural	6	(18.2)	4	(12.1)	0.471	0.492
Urban	27	(81.8)	29	(87.9)		

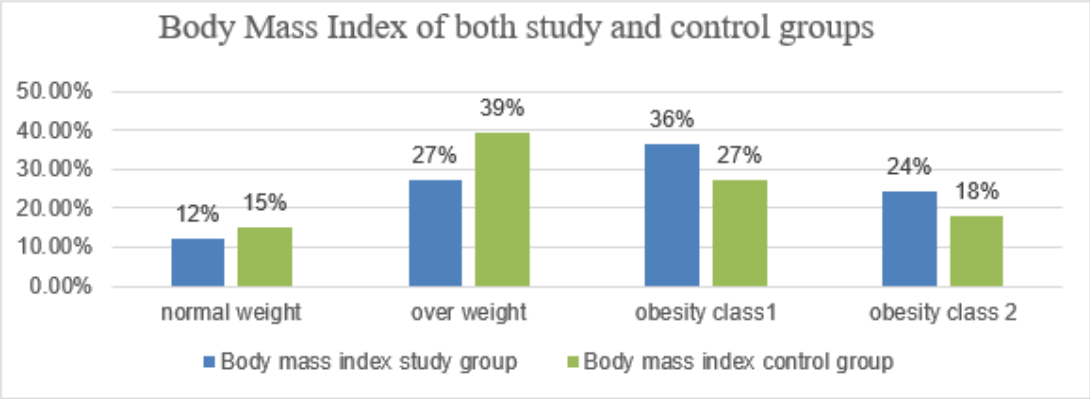

Figure 1: Percentage distribution of BMI of both study and control groups (n=66)

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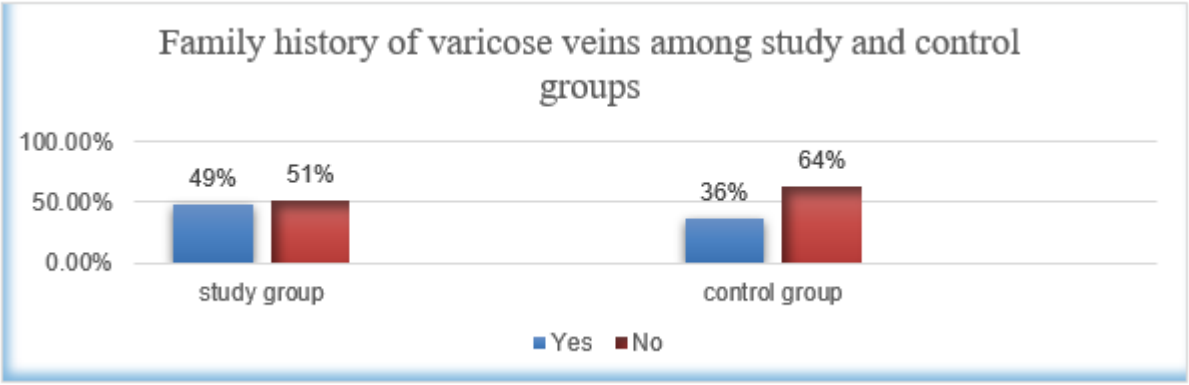

Figure 2: Percentage distribution of family history of varicose veins among both study and control groups (n=66).

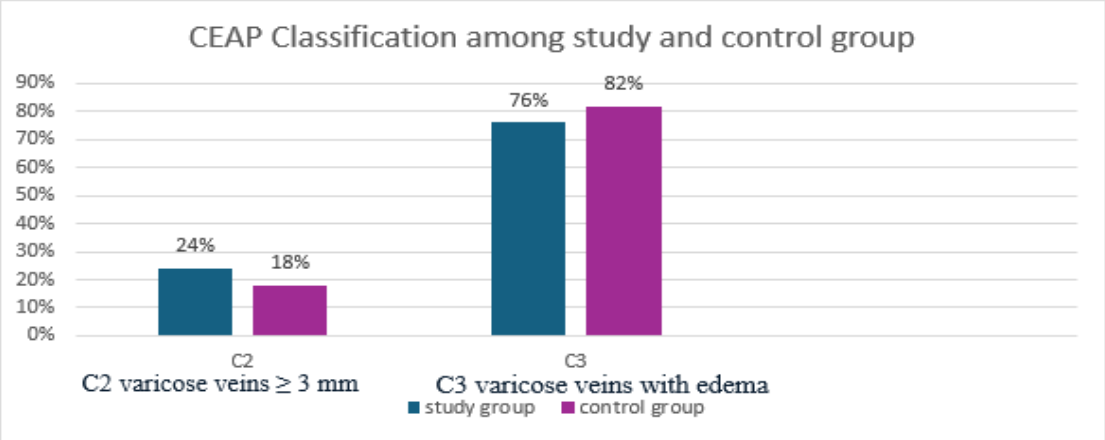

Figure 3: Percentage distribution of Clinical-Etiology-Anatomy-Pathophysiology (CEAP) classification among study and control groups (n=66).

3.2 Delineates hypothesis testing for being supported or not supported among study and control groups

Table (2) shows that 55% and 73% of the study and control groups respectively had moderate problems on varicose veins quality of life at baseline assessment. There were no significant statistical differences between study and control group in quality-of-life baseline assessment score (X^2= 2.357at p 0.125). While in quality-of-life 1st assessment, study group 61% had mild score on varicose veins quality of life compared with 70% of control group had moderate varicose veins quality of life score. In the 2nd assessment, 73% of the study group had a mild score compared to 64% of the control group had moderate score on varicose veins quality of life. Moreover, the varicose veins quality of life score in 3rd assessment showed that 79% of the study group had mild score, while 58% of the control group had moderate score. There was significant statistical difference between study and control groups in 1st assessment (X^2= 6.111 at p 0.013) 2nd assessment (X^2= 8.800 at p 0.003) and 3rd assessment (X^2= 9.138 at p 0.003).

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Table 2: Frequency and percentage distribution of Aberdeen varicose veins quality of life score at four time points of both study and control groups (n=66).

Quality of life		Study group (n= 33)		Control group (n= 33)		X^2	P value
		No.	%	No.	%		
Baseline assessment	Mild Moderate	15 18	(45) (55)	9 24	(27) (73)	2.357	0.125
1st assessment (After 2 weeks)	Mild Moderate	20 13	(61) (39)	10 23	(30) (70)	6.111	0.013*
2nd assessment (After 4 weeks)	Mild Moderate	24 9	(73) (27)	12 21	(36) (64)	8.800	0.003**
3rd assessment (After 8 weeks)	Mild Moderate	26 7	(79) (21)	14 19	(42) (58)	9.138	0.003**

*Significant at P ≤ 0.05 at (2- tailed).

**Highly significant at P ≤ 0.00.

Table 3: Comparison of mean scores of Aberdeen quality of life subscales at four time points of both study and control groups (n=66).

Quality of life (subscales)		Study group (n= 33)	Control group (n= 33)	t- test	P value
		Mean ±SD	Mean ±SD		
Baseline assessment	Pain and dysfunction	11.48±3.08	12.57±2.35	1.617	0.111
	Cosmetic appearance	6.20±1.84	6.40±1.94	0.429	0.670
	Degree of varicosity	12.04±2.71	12.83±2.76	0.083	0.934
	Complications	5.08±1.25	5.05±1.41	0.077	0.938
1st assessment (After 2 weeks)	Pain and dysfunction	9.11±3.13	12.14±2.82	2.769	0.007**
	Cosmetic appearance	4.097±1.26	5.74±1.91	3.632	0.001**
	Degree of varicosity	12.04±2.71	12.83±2.76	0.083	0.934
	Complications	3.96±0.72	4.54±1.457	2.036	0.046*
2nd assessment (After 4 weeks)	Pain and dysfunction	8.39±3.03	11.87±3.02	3.329	0.001**
	Cosmetic appearance	3.95±1.21	5.57±1.85	3.679	0.000***
	Degree of varicosity	12.04±2.71	12.83±2.76	0.083	0.934
	Complications	3.04±0.81	4.47±1.53	2.059	0.044*
3rd assessment (After 8 weeks)	Pain and dysfunction	7.93±3.20	11.74±3.18	3.565	0.001**
	Cosmetic appearance	3.78±1.30	5.25±1.96	3.593	0.001**
	Degree of varicosity	12.04±2.71	12.83±2.76	0.083	0.934
	Complications	2.86±0.92	4.45±1.53	2.465	0.016*

*Significant at P ≤ 0.05 at (2- tailed).

**Highly significant at P ≤ 0.00.

Table (3) revealed that there was no statistically significant difference in varicose vein quality of life subscales mean scores between study and control groups at baseline assessment (pre intervention). While there was a statistically significant difference in varicose vein quality of life subscales mean scores; pain and dysfunction, cosmetic appearance and complications respectively among study group when compared to control group at 1st assessment (t test: 2.769, p-value: 0.007), (t test: 3.632, p-value:

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0.001), (t test: 2.036, p-value: 0.046), 2nd assessment (t test: 3.329, p-value: 0.001), (t test: 3.679, p-value: 0.000), (t test: 2.059, p-value: 0.044) and 3rd assessment of intervention (t test: 3.565, p-value: 0.001), (t test: 3.593, p-value: 0.001), (t test: 2.465, p-value: 0.016).

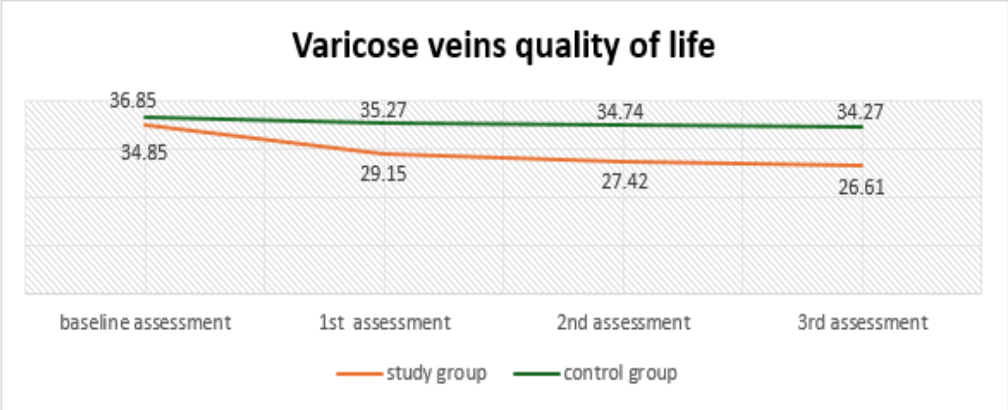

Figure 4: Comparison between varicose veins quality of life total mean score at four time points of both study and control groups (n=66).

Figure (4) showed that there was no statistically significant difference between study and control group before intervention (t test: 0.762, p-value: 0.449). There was a statistically significant difference in quality-of-life score among study group when compared to control group (t test: 2.515, p-value: 0.014), (t test: 3.178, p-value: 0.002) and (t test: 3.356, p-value: 0.001) in the 1st, 2nd and 3rd assessment of intervention respectively. In addition (ANOVA test: 51.343, p-value:0.000) during the study period.

3.3 Correlational Findings

Table 4: Correlation between age, body mass index (BMI) and CEAP classification with varicose veins quality of life score.

Variable	Varicose veins quality of life score
Age	Correlation: 0.433 P- value: 0.000***
Body mass index (BMI)	Correlation: 0.083 P- value: 0.506
CEAP classification	Correlation: 0.650 P- value: 0.000***

***Significant at P≤ 0.000.

Table (4) clarified that there was a significant statistical positive correlation between age and CEAP classification with varicose veins quality of life score.

4. DISCUSSION

4.1 Findings Related to Personal and Medical Background Information

The study findings revealed that, about half of both study and control groups' ages ranged from 40- 50 years old, mean and standard deviation of their age were (39.09± 5.456) and (40.76±5.006) respectively. These findings are almost consistent with a study titled

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“Differences in risk profile associated with varicose veins and chronic venous insufficiency” (19). They reported that about half of the study participants′ ages ranged between 30- 50 years old, developed varicose veins C2 and C3 and denoted that the severity of varicose veins increases with age. These findings can be explained with the fact that advanced age is associated with reduced venous wall elasticity and valvular dysfunction which could be a factor behind the advancement of varicose veins disease. While in another study the mean and standard deviation of their study participants′ age were 53.5 ± 12.9 years old and developed varicose veins C2 to C6 (20). This could be attributed to the fact that the current study included only C2 and C3 varicose veins, which are common in middle aged adults before disease progression and complications development. Regarding gender, the current study denoted that about two thirds of the participants were females. This finding is congruent with the findings of the studies (21&22), they affirmed that the majority of their study participants were females. These findings could be explained in the light of the fact that varicose veins affecting women three to four times more likely than men to have a primary VVs with occurrence rates generally ranging from 29.5 to 39.0% in women and from 10.4 to 23.0% in men (23). This fact could be due to estrogen-related hormonal changes which may result in stretching the walls and valves of the veins as well as their role in water retention. In addition, taking contraceptive pills can aggravate this process. According to marital status, the majority of study participants were married which is consistent with a study (21). Regarding patients' educational level, it was found that about half of the study participants had secondary education. According to the occupation, more than one third of study participants worked as a worker or in official work. The findings were consistent with a study (24) where the majority of their study participants were employees in a private sector or self-employed workers. The findings could be attributed to the fact that study participants lied on the middle-aged adults which represent the higher productive phase and functional abilities that seek to satisfy their socioeconomic requirements. About two thirds of the current study participants stand more than 6 hours daily. These findings were supported by a study titled "Epidemiological, lifestyle, and occupational factors associated with lower limb varicose veins" (25). They reported that prolonged standing for more than 4 hours found to be independent predictor of developing lower limb varicose veins. The study findings could be interpreted in the light of the fact that prolonged and frequent standing causes blood to pool in the legs and feet and subsequently increases venous pressure leading to development of varicose veins. The majority of study participants resided in urban areas which is consistent with a study who reported that the majority of studied patients were residing in urban areas (21). These findings could be attributed to geographical location of Al Kasr Al Aini Hospital that lies in urban area and facilitate access to its services. Also, it could be due to availability of jobs in urban areas that workers reside it to modify their socioeconomic life. Another possible explanation could be that the proportion of occupations that require longer standing hours which contribute to development of varicose veins was significantly higher in the city compared to the rural areas. As regard to body mass index, the current study findings showed that more than one third of the study group′ participants had obesity class 1 and the control group′

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participants were overweight. These findings could be attributed to the fact that obesity is a well-known risk factor for varicose veins incidence, progression, and disability. An increased body mass index (BMI) is linked to heightened venous system pressure, possibly leading to the formation and recurrence of varicosities. Moreover, obesity not only markedly elevates the risk of lower extremity varicose veins but also escalates the incidence of related complications. Furthermore, obesity may mask the symptoms of varicose veins, thereby delaying treatment seeking. The current study findings are consistent with studies (11&25) who reported that most of studied patients were overweight and obese. Another study titled “Varicose veins, obesity, and preventive measures” (26) is congruent with the current study findings; their study findings highlighted the correlation between varicose veins and obesity, underscoring the importance of addressing obesity in the prevention and management of varicose veins. These results disagree with a study titled "Demographic and clinical characteristics of patients with varicose veins in Albania"(21) revealed that more than half of studied patients had normal body weight. As regard to family history of varicose veins, the current study findings clarified that more than half of study participants had no family history of varicose veins. This result is partially similar to a study which found that about three quarter of participants with varicose veins did not have family history of lower limbs’ varicose veins (27). While the study finding was contradicted with a study that stated that family history was more prevalent in their study and revealed that hereditary variables played a greater role in the etiology of varicose veins, especially in young persons (28). The finding of the current study could be attributed to the fact that not only family history plays a strong role in developing varicose veins, but development of varicose veins could be due to other multiple factors that affect its progression other than family history like age, obesity, occupation, sedentary lifestyle…etc. The majority of study participants had C3 (varicose veins with edema) according to CEAP classification. The finding is consistent with a study which stated that the majority of study participants had C3 varicose veins (29). While another study denoted that the majority of their study participants had C2 varicose veins which highlights its clinical relevance, particularly among middle-aged individuals (21). The current study findings could be attributed to the fact that C3 varicose veins require medical attention because of symptoms severity like pain, swelling, and heaviness that limit their performance of daily living activities rather than C2 varicose veins that has mild symptoms.

4.2 Findings Related to Effectiveness of Buerger- Allen Exercise on Health-Related Quality of Life

The findings of the current study revealed that about half and more than two thirds of the study and control groups respectively had moderate problems on varicose veins quality of life at baseline assessment. The study finding could be attributed to the inclusion criteria which included C2 to C3 varicose veins according to CEAP classifications and excluded C4 to C6 which includes hyperpigmentation, induration and venous leg ulcers that represents more severe forms of venous insufficiency and interferes with patients’ performance of activities of daily living as well as their body image and interaction in social activities leading to worsening of their quality of life. The current study findings revealed

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that there was a statistically significant difference in varicose veins quality of life score among study and control groups after implementing Buerger -Allen exercises. The finding of the current study could be attributed to the fact that Buerger -Allen exercises alleviate symptoms by improving blood flow and reducing capillary refill time so it helps in enhancing their quality of life. On the same stream, there was a study concluded that Buerguer-Allen exercises have been shown to be an effective therapeutic intervention in the treatment of venous insufficiency that can improve peripheral circulation, relieve symptoms, and prevent serious complications such as venous ulcers and thrombosis…etc (6).Similarly, another study highlighted the beneficial effect of Buerger Allen exercise on lower limb perfusion and peripheral neuropathy among patients with peripheral vascular diseases (13). One of Buerger Allen exercises steps includes calf muscle training which play a major role in compressing the deep intramuscular veins that direct blood flow from the veins to the heart by performing dorsal and planter flexion of the ankle that aim to improve calf muscle strength and functionality. In a comparative study that analyze the effectiveness of Aerobic Exercise versus Buerger's Exercise in varicose veins, dedicated that Buerger's exercise is more effective on reducing varicose veins (30). The role of physical activity and lifestyle changes in managing varicose veins and chronic venous disease was highlighted in another study (31). On the same stream, there was a study reported that exercise has been shown to improve venous blood pumping in lower extremity, reduce lower limb edema and improve quality of life of patients with varicose veins (32).

4.3 Correlational Findings

There was a significant statistical positive correlation between age and CEAP classification with varicose veins quality of life score. One possible explanation is that advanced age is associated with reduced venous wall elasticity and valvular dysfunction.Besides that, there are comorbidities associated with aging that could worsen varicose veins and exacerbate complications that affects disease severity, pain and subsequently quality of life. In addition, C3 to C6 varicose veins on CEAP classification is associated with worse pain, edema, complications and further decline in quality of life. Based upon the previous discussions, it could be concluded that Buerger Allen exercises was effective in improving quality of life of patients with varicose veins by enhancing circulation, alleviating symptoms and preventing further complication; hence, it is highly recommended to be a part of the therapeutic regimen of patients with varicose veins.

5. IMPLICATIONS

For Nursing Practice:

- Clinical implications of the present study revealed that Buerger Allen exercises is useful to be a component of holistic patients care for symptoms management of patients with varicose veins. The current study provides nursing practice with evidence-based practice that increases the attention to the importance of incorporating Buerger Allen exercises in the plan of care for this group of patients with varicose veins.

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For Nursing Education:

- Organizing educational programs based on evidence-based practice for students and staff nurses working at inpatient and outpatient departments regarding proper implementation of Buerger Allen's exercise as a preventive and therapeutic measures to improve health of patients at risk to develop varicose veins.

6. RECOMMENDATIONS FOR FURTHER STUDIES

- Replication of the study using a larger probability sample selected from different geographical areas and clinical settings in Egypt.
- Comparative studies should be conducted to compare between the effect of Buerger- Allen exercise with other types of exercises on patients with varicose veins.
- Replication of the study using a qualitative research design should be conducted to understand in depth the lived experiences of patients with varicose veins implementing Buerger- Allen exercise.
- Replication of the study implementing Buerger- Allen exercise on different types of venous diseases.

DECLARATIONS

Ethical Considerations

Written initial approval was obtained from the Ethics Research Committee of the Faculty of Nursing, Cairo University (Ethics Code: RHDIRB2019041701). Also, official permission was obtained from hospital administrators to conduct the study. The purpose and nature of the study as well as the importance were explained to the potential participants who met the eligibility criteria. Signed informed consent was obtained from the patients who chose to participate in the study. Also, anonymity and confidentiality were assured through coding the data.

Conflict of Interest: The Authors Declare That There Is No Conflict of Interest.

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