

Effect of Compression Therapy and Burger's Exercise on Varicose Veins During Pregnancy

Fahima M. Okeel, PT.D., and Amel M. Youssef, PT.D.

Department of Physical Therapy for Gynecology and Obstetrics, Faculty of Physical Therapy, Cairo University.

ABSTRACT

This study had been carried out on 30 volunteer pregnant women between 28 to 32 weeks of gestation in an attempt for determining the effect of compression therapy and Burger's exercise on varicose veins during pregnancy. Their age ranged between 25 to 35 years and were randomly divided equally into two treatment groups: group (A) received compression therapy just above the toes until the level of the knee joint, and group (B) performed the first and the second progressions of Burger's exercise. All subjects in both groups (A and B) received the previous treatment for 12 sessions (three times per week) and worn an elastic stocking on the affected leg. Evaluation was done, for the diameter, the cross sectional area and the velocity of venous blood flow in the short and long saphenous veins (S.S.V. and L.S.V.) of the affected leg and pain associated with varicose veins before and after the 12 sessions. Results showed a significant improvement in the quantitative values of S.S.V. and L.S.V. and significant decrease in the associated pain in both groups (A and B). Also, there was a detectable significant difference between both groups (A and B) after treatment (12 sessions), which presented that compression therapy is more effective in treating varicose veins during pregnancy than Burger's exercise.

INTRODUCTION

Varicose veins represented only one end of the spectrum of venous disease which extends through increasing the degrees of venous insufficiency and leg ulceration may result in the most severe cases¹.

Many women attribute the onset of varicose veins to pregnancy². Pregnancy is associated with several changes in venous physiology, these include relaxation of venous wall tone and increased lower extremities venous pressure, as a result of these changes, varicose veins may develop¹⁹.

During pregnancy, the treatment of varicose veins is conservative, aiming for supporting varicose veins to abolish venous congestion, through preventing flow, from deep to superficial vessels, keeping the dilated veins empty and this could be achieved by firm elastic support⁵, intermittent pneumatic compression⁸, raising the leg above the horizontal line to empty the superficial veins⁶ and exercises¹⁶.

Intermittent pneumatic compression is used to improve the venous function⁴, through increasing the venous flow velocity¹² and decreasing the cross sectional area of the main venous channels¹⁸. Also, compression therapy

has a good value in decreasing pain and reducing swelling, through improving venous return²¹.

Venous blood flow was improved by elevating the leg with dorsi and planter flexion of the foot, which is the most effective measure against circulatory stasis in the lower limbs⁷.

Elastic support shows a significant improvement of venous emptying, combined with a decrease of varicose veins problems such as swelling, tiredness and pain¹⁵.

SUBJECTS, MATERIALS AND METHODS

Subjects:

Thirty volunteer women between 28 to 32 weeks of gestation and their age ranged between 25 to 35, were recruited in this study from the Obstetric department of Ghamra Military Hospital [Table (1)]. They were assigned randomly into two equal groups number: group (A) received compression therapy and group (B) performed Burger's exercise. Both groups (A and B) worn an elastic stocking on the affected leg and received treatment for 12 sessions. All subjects were suffering from unilateral varicose veins and patient has any other vascular diseases were excluded from the study. Informed consent was obtained from each woman before starting the study.

Table (1): Physical characteristics of both groups (A and B)

Parameter	Group (A)	Group (B)	P value
Age (years)	31.53±2.88	30.6±2.69	0.90
Weight (kg)	78.93±6.63	78.4±5.73	0.88
Height (cm)	161.33±5.43	161.07±4.32	0.88

Instrumentation:

- a) Doppler flowmeter, for the diagnosis of varicose veins for both groups.
- b) Duplex scanning, for the quantitative assessment of the S.S.V. and L.S.V. for both groups.
- c) C585 Auto pulse compression machine, for the application of compression for group (A).
- d) Stop watch, for adjusting the time of performing Burger's exercise for group (B).
- e) Present pain intensity scale (PPi) for quantitative assessment of the pain intensity for both groups.

Methods:

A. Evaluation

Initially Doppler flowmeter was used in outpatient clinic as a screening test, to detect the sites of incompetence (varicose veins) at the sapheno-femoral (S.S.V.) and sapheno-popliteal junctions (L.S.V.), while the patient was in relaxed standing position with slight flexion in the affected leg. This followed by Duplex scanning to obtain automatically the diameter, cross sectional area and the velocity of venous blood flow in the affected leg. After that, pain was evaluated for each patient by selecting a word which describe her pain intensity which replaced by a number from zero through five according to PPi scale.

Post treatment, Duplex scanning and PPi were repeated for both groups.

B. Treatment

1 - Compression therapy (Group A):

After taking off elastic stocking, the woman lied in a relaxed comfortable supine lying

position with the head of bed raised for 15°. The sleeve fit to the affected leg just above the toes to the level of the knee joint, while all knobs of the auto pulse compression machine were in zero position. Then, compression session started with 30 second of inflation exerting pressure on the vein about 60 mm Hg, which was followed by 20 second of rapid deflation at pressure of 20 mm Hg. The machine was automatically switch off when the session time ended (20 minutes) and the patient sit to wear her elastic stocking before standing.

2 - Burger's exercise (Group B):

Woman performed first and second progressions of Burger's exercise from the supine lying position.

First progression, performed by elevating the affected leg to 45° to the horizontal line and supported in this position by cushions, until the foot blench completely, then drop the limb to the bed level for 5 minutes, followed that the second progression was done.

Second progression, the affected leg was raised as in the first progression plus performing active dorsi and planter flexion of the ankle joint until the foot blench completely, then drop the limb to the bed level for 5 minutes. Repetition of this progression was 5 times. Following that, patient sit to wear her elastic stocking before standing.

C. Statistical analysis

Data were collected and statistically analyzed using the arithmetic mean, standard deviation, paired t-test and chi-square test at level of significance 0.05.

RESULTS

The results of this study showed that there was statistically significant decrease in the diameter of S.S.V. and L.S.V. in group (A), whereas the decrease was statistically highly significant either in S.S.V. or L.S.V. in group (B) from pre to post treatment [Table (2) and Fig. (1)].

Table (2): Diameter of S.S.V. and L.S.V. for both groups.

Variables	Group (A)			Group (B)		
	pre ttt	post ttt	P value	pre ttt	post ttt	P value
Diameter of S.S.V. (cm)	1.81±0.29	1.48±0.32	P<0.01	1.81±0.17	1.51±0.17	P<0.0001
Diameter of L.S.V. (cm)	1.67±0.33	1.37±0.35	P<0.02	1.84±0.15	1.57±0.14	P<0.0001

ttt : treatment

S.S.V. : short saphenous vein

L.S.V. : long saphenous vein

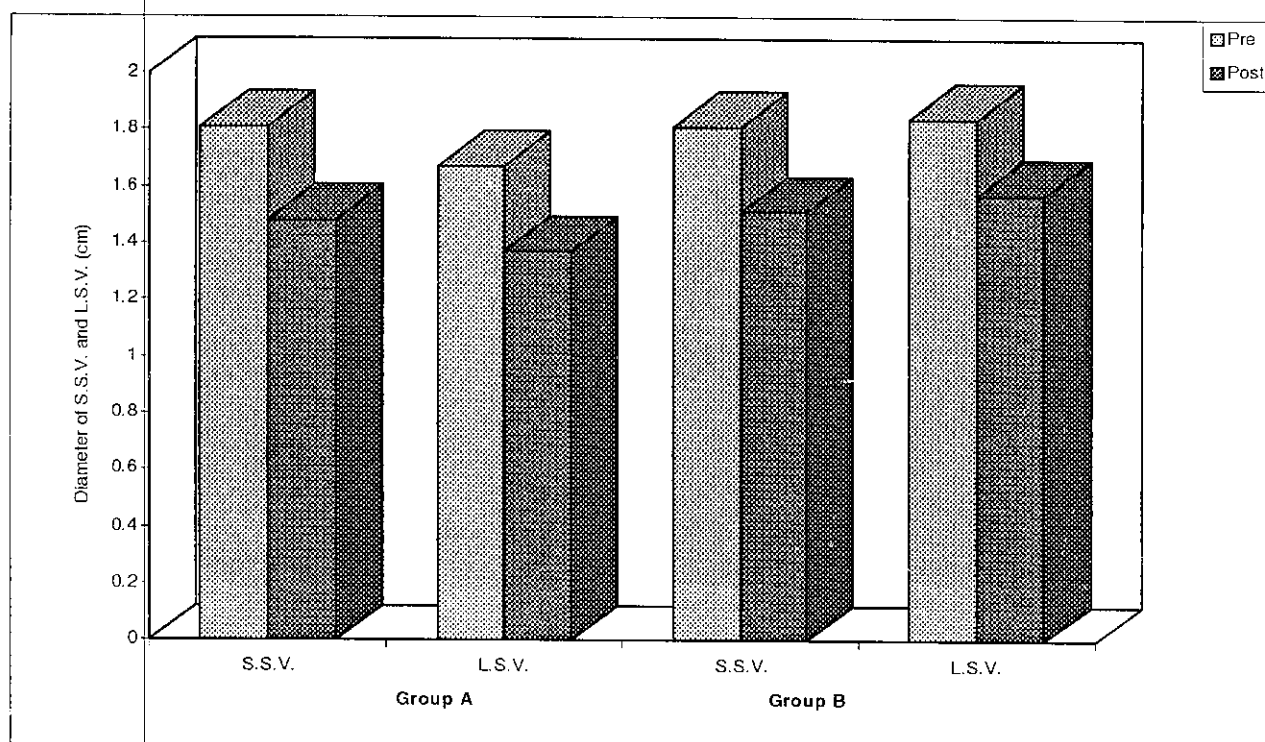


Fig. (1): Changes in mean diameter of S.S.V. and L.S.V. pre and post treatment for both groups.

Cross sectional area showed statistically significant decrease of S.S.V. and L.S.V. in group (A) and (B), whereas in group (A) the

decrease was highly significant in L.S.V. from pre to post treatment [Table (3) and Fig. (2)].

Table (3): Cross sectional area of S.S.V. and L.S.V. for both groups.

Variables	Group (A)			Group (B)		
	pre tt	post tt	P value	pre tt	post tt	P value
Cross sectional area of S.S.V. (cm ²)	1.71±0.41	1.07±0.39	P<0.002	1.72±0.30	1.38±0.29	P<0.004
Cross sectional area of L.S.V. (cm ²)	1.73±0.40	1.05±0.36	P<0.0002	1.73±0.31	1.36±0.30	P<0.004

ttt : treatment

S.S.V. : short saphenous vein

L.S.V. : long saphenous vein

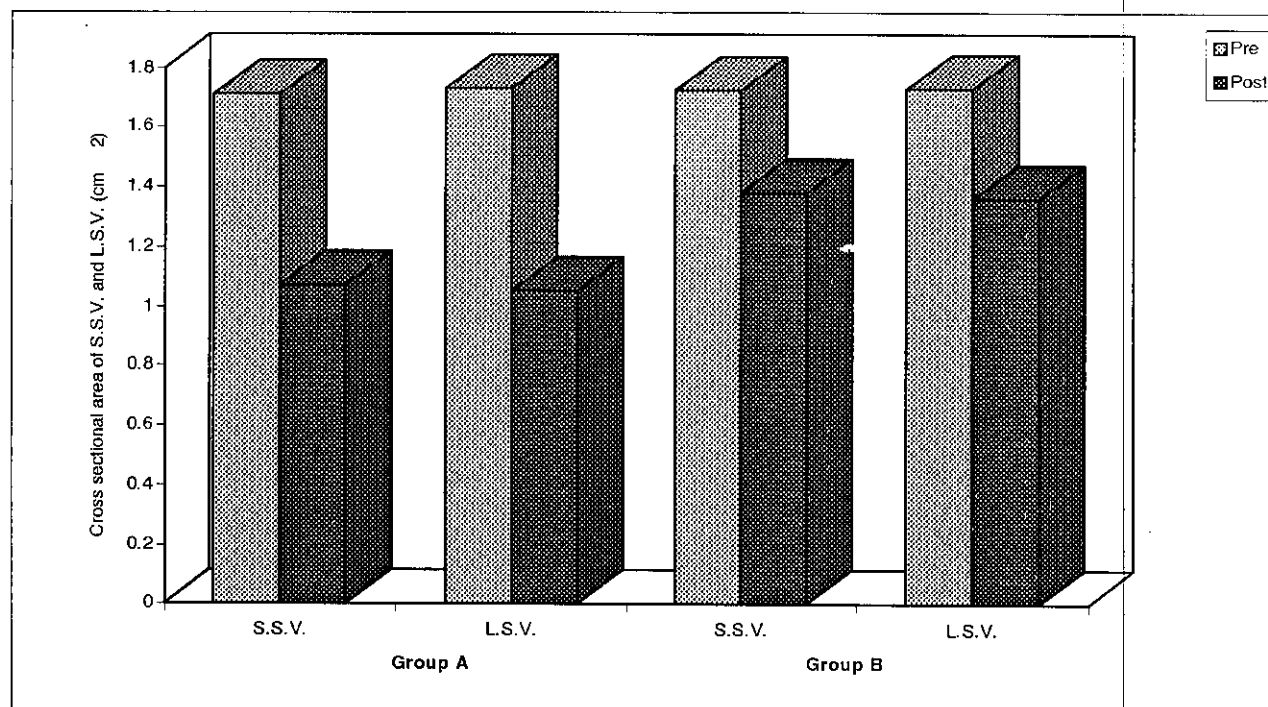


Fig. (2): Changes in mean cross sectional area of S.S.V. and L.S.V. pre and post treatment for both groups.

Velocity of venous blood flow in S.S.V. and L.S.V. showed that there was a statistically significant increase from pre to post treatment

in both groups (A) and (B), except in L.S.V. of group (A) the increase in velocity was highly significant [Table (4) and Fig. (3)].

Table (4): Velocity of venous blood flow in S.S.V. and L.S.V. for both groups.

Variables	Group (A)			Group (B)		
	pre ttt	post ttt	P value	pre ttt	post ttt	P value
Velocity of venous blood flow in S.S.V. (cm/min)	1.57±0.45	2.22±0.39	P<0.002	1.72±0.48	2.15±0.49	P<0.02
Velocity of venous blood flow in L.S.V. (cm/min)	1.29±0.54	2.62±0.94	P<0.0001	1.62±0.59	2.09±0.51	P<0.01

ttt : treatment

S.S.V. : short saphenous vein

L.S.V. : long saphenous vein

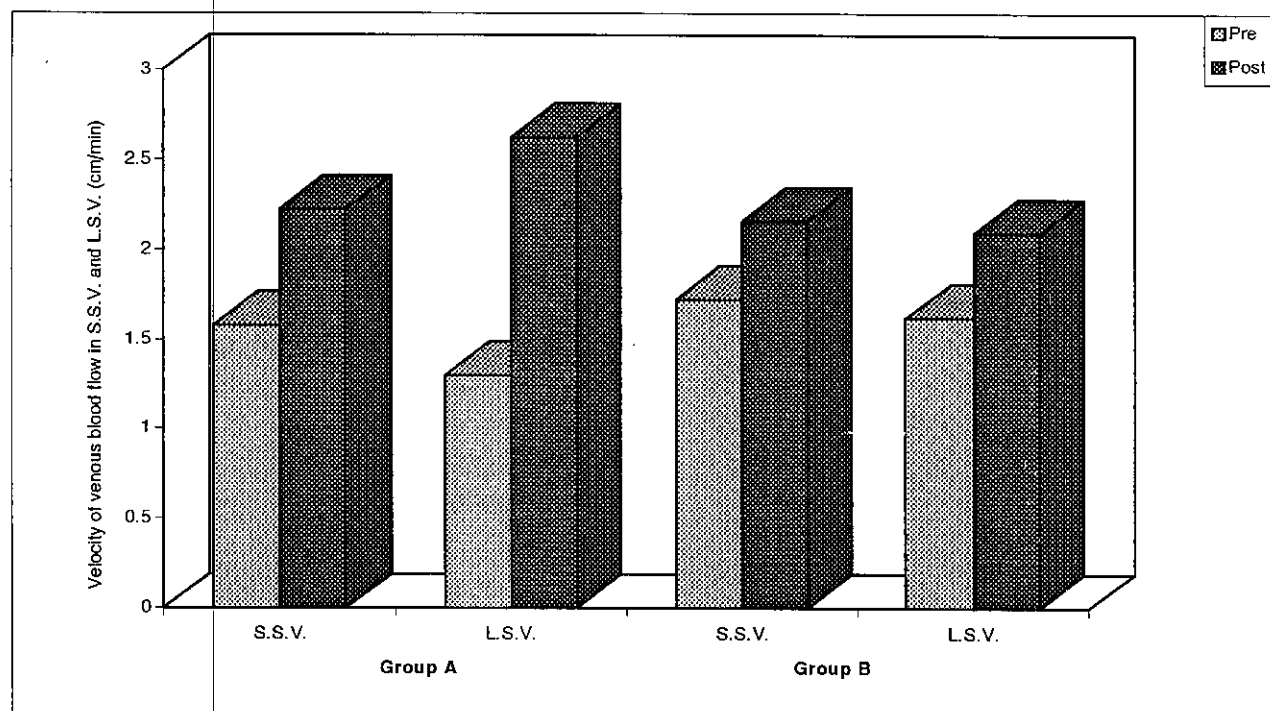


Fig. (3): Changes in mean velocity of venous blood flow in S.S.V. and L.S.V. pre and post treatment of both groups.

Comparison between the two groups before treatment revealed no significant difference between them in the diameter, cross sectional area and velocity of venous blood flow either in S.S.V. or L.S.V. and also post treatment in S.S.V., while in L.S.V. the difference was statistically significant ($P < 0.04$ and $P < 0.02$) respectively for its diameter and cross sectional area, but the difference was non significant for the velocity of venous blood flow in it.

PPI showed that there was statistically significant ($P < 0.05$) decrease in pain intensity either in group (A) or in group (B) from pre to post treatment.

Comparison of PPI between both groups before treatment showed no statistically significant difference, while post treatment the difference was statistically significant ($P < 0.04$).

DISCUSSION

Both compression therapy and Burger's produced reduction in the diameter, cross sectional area of S.S.V. and L.S.V. and pain associated with varicose veins, while caused increased in the velocity of venous blood flow of S.S.V. and L.S.V. in this study.

This indicated that both the compression therapy and Burger's exercise have a good effect in treating varicose veins during pregnancy. While, there was statistically significant difference between both groups, which proved that compression therapy to be a good method in treating varicose veins during pregnancy.

These results appear to justify the opinions regarding the effectiveness described in the study of Sabri et al., 1991 which demonstrated

that the application of compression therapy with a pressure of 50 mm Hg, results in increasing velocity of blood in the femoral vein, which results from the reduction of venous volume in patient suffering from varicose veins¹⁷ due to pure mechanical effect of the compression therapy over the venous wall, reducing its diameter and approximately the valve cusps¹¹. Also, in 1984, the study of Halperin et al., represents the effectiveness of intermittent compression in increasing linear velocity results from decrease the cross sectional area of the venous bed¹⁰ and the pooling of venous blood in the calf muscle is prevented¹³. Stemmer, 1989²⁰ stated that their is a significant reduction of the pain after the application of compression in cases suffering from varicose veins.

On the other hand, in 1970, study of Calnan et al.,³ showed that the velocity of venous blood flow is not affected by applying pneumatic compression therapy.

The results of this study for Burger's exercise, agree with those reported by Gaylarde et al., 1993⁹, whose revealed that foot exercises for patients with severe venous disease causing a fall in venous pressure and volume, while earlier study in 1980 reported that elevation of the leg with active exercise to the ankle approximately double the linear velocity of venous blood flow, the valve cusps are not emptied completely when the leg is elevated only and the exercise will empty them by contracting the calf muscle so that veins are completely compressed¹⁴.

The major findings, in this study, which proved that compression therapy is more effective than Burger's exercise in treating varicose veins, while pregnant women were wearing an elastic stocking, does not confirm or contradict by any previous study.

CONCLUSION

As a conclusion, compression therapy and Burger's exercise appear to be effective methods of treating the patient suffering from varicose veins during pregnancy. Finally, this study objectively demonstrates the potential use of compression therapy as effective, and conservative method for reducing diameter, cross sectional area of the veins and pain and increments of the velocity of venous blood flow in women suffering from varicose veins during pregnancy.

REFERENCES

- 1- Callam M.: "Epidemiology of varicose veins", Brit. J. Surg., 81: 167-173, 1994.
- 2- Callam M.: "Prevalence of chronic leg ulceration and severe chronic venous disease", Phlebology, 7(1): 6-12, 1993.
- 3- Calnan J., Pflug J., and Mills C.: "Effect of intermittent pressure on arterial and venous blood flow in the limb", Lancet, 2: 205-210, 1970.
- 4- Calnan J., Hills N., Pflug J., Jeyasingh K., and Boardman N.: "Venous function and intermittent pneumatic pressure of calf", Brit. Med. J., 1: 131-135, 1972.
- 5- Cash J.: Chest, heart and vascular disorders for physiotherapists, London, pp. 325-334, 1975.
- 6- Clarke H., Spiro M., Robert V., and Richard J.: "Effect of externally applied pressure on femoral vein blood flow", Brit. Med. J., 1: 719-723, 1969.
- 7- Dodd H., Gaylarde M., and Sarkany I.: "Skin oxygen tension in venous insufficiency of the lower leg" J. Soc. Med., 78: 373-376, 1985.
- 8- Doran P., and Wright D.: "Values of different methods of treatment of varicose veins", Brit. J. Surg., 76: 297-198, 1976.
- 9- Gaylarde P., Sarkany I., and Dodd H.: "The effect of exercise and compression on venous stasis", Brit. Med. J., 128: 255-258, 1993.

- 10- Halperin M., Friedland C., and Wilkins R.: "Compression and venous system", Am. Heart J., 65: 221-224, 1984.
- 11- Leon M., Volteas N., and Labropoulos N.: "Effect of compression therapy on the elasticity of the varicose veins", Int. Angiology, 12(2): 112-116, 1993.
- 12- Makin G.: "Studies on the effect of tube grip on flow in the deep veins of the calf", Brit. J. Surg., 56: 369-372, 1979.
- 13- Makin G., Mayes F., and Holroyd A.: "Effectiveness of compression therapy in the venous system", Ibid, 63:280-287, 1989.
- 14- Nelson H.: "The effect of leg elevation on the function of venous system", Brit. J. Surg., 75: 182-184, 1980.
- 15- Norgren L., Nilsson C., and Austiell M.: "Venous function during late pregnancy, the effect of elastic compression hosiery", Vasc., 21: 203-205, 1992.
- 16- Rintoal M.: "Body position and leg elevation in relation to venous pressure", Brit. Med. J., 86: 75-81, 1986.
- 17- Sabri S., Robert V., and Cotton F.: "Effects of external compression on hemodynamics of lower limb", Brit. Med. J., 23: 503-508, 1991.
- 18- Sigel B., Edelstein A., Felix W., and Memhardt C.: "Compression of deep venous system of the lower leg during inactive recumbency", Arch. Surg., 106: 38-43, 1973.
- 19- Skudder P., and Farrington D.: "Venous conditions associated with pregnancy", Seminars in dermatology, 12(2): 72-77, 1993.
- 20- Stemmer R.: "Ambulatory intermittent compression treatment of the lower extremities particularly with elastic stocking", Aertzl. Fortbild, 63: 1-8, 1989.
- 21- Thompson N.: "Diagnosis and treatment of varicose veins", Angiology, 12: 38-45, 1975.

الملخص العربي

تأثير العلاج بالضغط وتمارين برجر على الدوالي أثناء الحمل

تهدف هذه الدراسة إلى دراسة تأثير العلاج بالضغط وتمارين برجر على الدوالي وكذلك الآلام التي تصاحب الدوالي خصوصاً أثناء شهور الحمل الأخيرة. وقد أجريت هذه الدراسة على ٣٠ سيدة حامل من قسم أمراض النساء و التوليد بمستشفى غمرة العسكري و تتراوح أعمارهن ما بين ٢٥-٣٥ سنة و كانت مرات حملهن من ١-٣ مرات و فترة حملهن ما بين ٢٨-٣٢ أسبوع. ثم قسمت العينة عشوائياً إلى مجموعتين متساويتين (كل منهما ١٥ سيدة حامل) : مجموعة (أ) شاركن في برنامج العلاج بالضغط وكانت الجلسة لمدة ٢٠ دقيقة (كان الضغط على الرجل لمدة ٣٠ ثانية بواقع ٦٠ ض.ج.، وكان الاسترخاء لمدة ٢٠ ثانية بواقع ٢٠ ض.ج. على التوالي حتى انتهاء الوقت الكلى) ، مجموعة (ب) شاركن في أداء المستوى الأول و الثاني من تمارين برجر (المستوى الأول : ترفع فيه الساق ٤٥ درجة عن المستوى الأفقي و توضع على وسادة حتى يشحب لونها ، ثم تخفض ثانية إلى مستوى السرير لمدة ٥ دقائق . أما المستوى الثاني : فيتضمن رفع الساق ٤٥ درجة عن المستوى الأفقي و توضع على وسادة مع تحريك مشط القدم للأمام و الخلف حتى يشحب لونها ، ثم تخفض إلى مستوى السرير لمدة ٥ دقائق ، و يكرر أداء المستوى الثاني ٥ مرات خلال الجلسة) . و كان برنامج العلاج لكلا المجموعتين لمدة ١٢ جلسة بواقع يوم بعد يوم ، و كانت جميع الحالات تستخدم الشراب الطبي بعد الجلسة . و تم التقييم في هذه الدراسة من خلال : قياس القطر ، القطاع العرضي ، سرعة سريان الدم في الوريدين الصافن القصير و الطويل وكذلك شدة الألم قبل و بعد إجراء البرنامج العلاجي لكلا المجموعتين (أ ، ب) . في نهاية التجربة أظهر جميع المرضى في المجموعتين نقصاً إيجابياً في القطر ، القطاع العرضي للوريدين الصافن القصير و الطويل وكذلك شدة الألم و زيادة فعالية في سرعة سريان الدم في كلا الوريدين . وفيما بين المجموعتين فقد ظهرت دلالة إحصائية بوجود فرق فعال في سرعة سريان الدم في الوريد الصافن القصير و القطاع العرضي للوريد الصافن الطويل ، وكذلك فرق فعال في شدة الألم بعد ١٢ جلسة من العلاج . ومنه يتضح أن العلاج بالضغط أكثر فعالية من تمارين برجر في علاج الدوالي أثناء الشهور الأخيرة من الحمل .