

# Impact of Yoga Therapy on Ankle Brachial Index Among Middle Aged Men Diagnosed with Asymptomatic Varicose Veins

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## Abstract:-

### ➤ Aim and Objective:

The main goal is to find out if yoga treatment may help men with varicose veins who are diagnosed with less discomfort and swelling in their legs.

### ➤ Methods:

This was an experimental study utilizing a randomized, parallel group, active controlled trial design to determine the effect of yoga therapy on the ankle brachial index in male with middle-aged, asymptomatic varicose veins. A total of sixty middle-aged males with varicose veins were chosen from Chennai city, they were split onto two groups, I and II, each with individuals of thirty. The middle-aged VV males were thought to be significantly more successful on the ankle-brachial index. Before training programme began, a preliminary ankle brachial index test was administered to two groups. Group I participants received sixty-minute yoga therapy sessions three days a week for a total of twelve weeks. Subjects in Group II (CG) were at active rest. After the study period ended, the two groups were retested using the same dependent variables. A paired "t" test was employed to know whether there was a significant differences in efficacy between the experimental and control groups. The ABI should be calculated by dividing the maximum pressure in the leg by the highest pressure in the arm, according to major international medical associations. The significance was fixed at 0.05 level of confidence. Results: The study's findings demonstrated that, among middle-aged male with varicose veins, the Experimental Group saw a greater degree of improvement  $p < 0.001$  in their ankle brachial index (a decrease) in comparison to the Control Group. In a confidence level of 0.05, the hypothesis was accepted. Consequently, it can be said that YT greatly helps middle-aged men with VV maintain a correct walking pattern and restore valve integrity.

**Keywords:-** Yoga Therapy, Ankle Brachial Index, Middle aged men, Asymptomatic Varicose Veins.

## I. INTRODUCTION

Conditions known as chronic venous diseases (CVD) are those in which the function of the venous system is diminished and venous hypertension is brought on by valve insufficiency, venous flow restriction, or both (Erdal ES et. al. 2021). The eight components or limbs of yoga (ashtanga yoga) do not exclude any religion, creed, or race from the spiritual territory of ancient India. A straightforward, noninvasive screening tool for peripheral artery disease (PAD), a blood disorder linked to substantial morbidity and death, is the ankle-brachial index (ABI). Major worldwide medical societies recommend that calculating the ABI by dividing maximum pressure in leg by the highest pressure in arm. The degree of PAD in each leg is determined by ABI values. Normal range is 0.91–1.30; mild occlusion is 0.70–0.90; moderate occlusion is 0.40-0.69; severe occlusion is  $< 0.40$ ; and poorly compressible vasculature is  $> 1.30$  (Mishra, B. 2018).

$$ABI = \frac{\text{highest ankle pressure}}{\text{highest brachial arm pressure}}$$

Two ancient Indian traditional systems are yoga and ayurveda. Yoga adheres to Ayurvedic teachings. Vagbhata describes the symptoms that result from activating the Vata dosha, which are commonly referred to as "varicose veins". There are remedies for varicose veins in ancient Indian writings like the Charaka Samhitha and Astanga-Hridaya (Zulpe R 2023). Yoga is a methodical way to fully relax your body, mind, and soul for varicose veins. Yoga can assist varicose veins become more elastic, strengthen the leg muscles, and increase the physical force required to pump blood towards the heart. All around the world, chronic venous disorders are a leading cause of sickness and disability. These illnesses have detrimental implications on both health and finances. The cost to society is also enormous. In spite of the gravity of the problem, not much has been done to prevent these chronic illnesses (Agarwal et al 2016).

➤ *Objective of the study:*

The purpose of the study is to evaluate and compare the ABI pre and post-test results in middle-aged men who have been diagnosed with VV.

To examine the association between the levels of Ankle Brachial Index in Asymptomatic middle aged asymptomatic varicose veins men.

**II. METHODS AND DESIGN**

A randomized, active-controlled, parallel-group experiment was used to examine the impact of yoga treatment on the ankle brachial index in middle-aged men who had been diagnosed with asymptomatic varicose veins. Skin with visible varicose veins (C2) is chosen for examination, under the National Centre for Clinical Guidelines and his CEAP (Clinical, Etiological, Anatomical, and Pathophysiological) Classification of Varicose Veins (2004). Men in their middle years are the target audience. Before any data is collected, all volunteers will be told about the rules and goal of the study and got their signed consent has be obtained. The information obtained led to the division of the participants into two groups. 30 individuals in a yoga therapy group and 30 individuals in a control group. The ankle brachial index is the dependent variable. For the outcome measure, a pretest and posttest were conducted on all of the chosen samples. Participants were selected solely from the Chennai district, and subjects received sixty-minute yoga treatment sessions three days a week for three months. There was active rest for the control group. The ABI should be calculated by dividing greatest pressure in the leg by highest pressure in arm, according to major international medical groups.

➤ *Inclusion Criteria*

- Completing the written consent form and indicating your willingness to participate in the study.
- Those diagnosed with C2 VV based on CEAP classification
- Those diagnosed with Mild occlusion and Moderate occlusion subjects only
- Middle aged men with asymptomatic VV.
- No history of practicing any yoga or other exercises.
- Assessed suitable for practicing YT based on physical exam.

➤ *Exclusion Criteria*

- Current clinical surgery or another significant clinically relevant illness.
- Problems with blood clotting.
- Individuals undergoing long-term anticoagulant medication.
- Subjects who has additional comorbidities.
- Recent vein surgery, varicose eczema, vasculopathy, vascular disease, deep vein thrombosis, pregnancy, and the emergence of venous ulcers.

➤ *Intervention*

For three months, the CG had passive exercises (PE) like the stretching of the hamstring, knee, ankle, hip, shoulder, elbow, wrist, fingers, and neck, while the experimental group underwent yoga therapy (YT). The methods administrated for YT group as part of Yoga were Sukshma-Vyayama (Subtle-joints loosening's), Asanas (yogic-posture), Pranayama (voluntarily-regulated breathing practice), Deep-relaxation techniques (D-R-T), OM-Dhyanam (Meditation). The details about the above-mentioned practices and the duration are given below. For three months, a qualified therapist gave the YT treatments to the EG for sixty-minute three days a week. Both groups were also instructed to continue their YT on their own as per the provided directions or instructions, and phone call follow-up was done. During the trial, no injury or unfavorable impact of the procedure were observed.

➤ *Consort Flow Diagram*

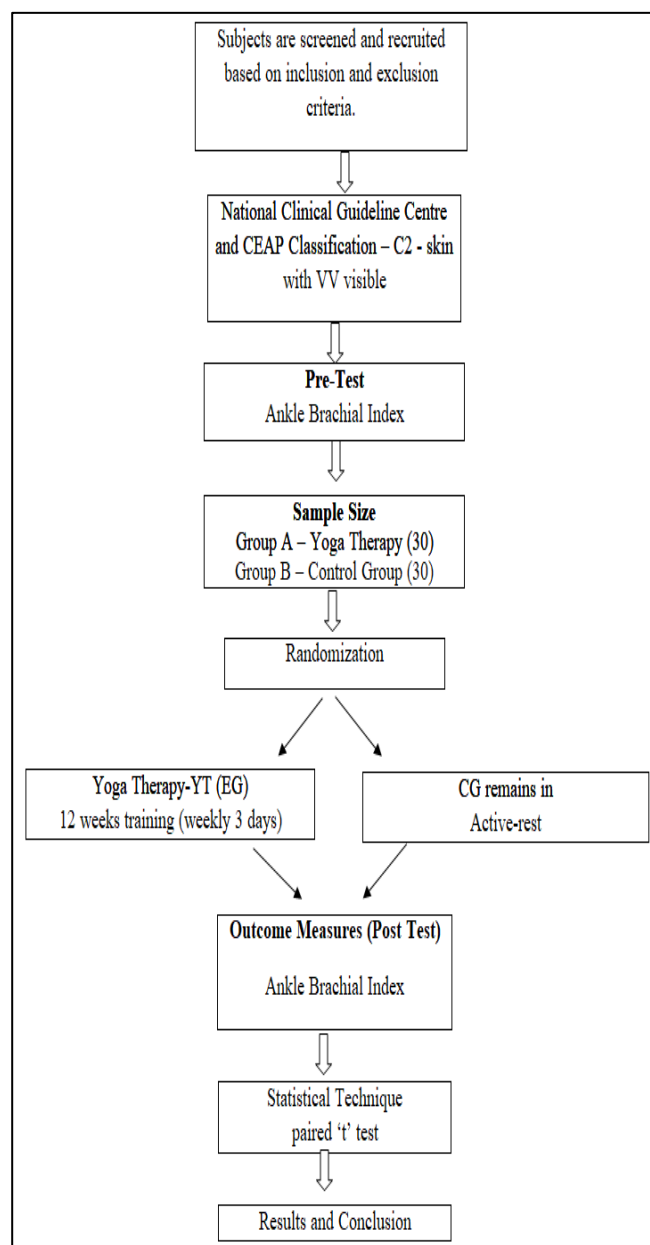


Fig 1 Consort Flow Diagram

Table 1 The Procedures for the Experimental and Active Control Groups are Explained in Table

Groups	List of the Practices	Frequency	Duration	
EG	Yoga-Therapy Practice	3 days a week	10 min.	
	1. Sukshma-Vyayama (subtle-joint loosening practice) Manibandhashaktivikasikaa (wrist-loosening's exercise), Skandha-chakra (shoulder-rotation), Padangulinaaman (toes - stretch), Gulf naman (ankle stretch), Gulf-Chakra (anke-rotation), Gulf Goornan (ankle-rotation), Janu-chakra (knee-crank), Janunaaman (knee-bending), Baddhakonasan (full butterfly pose)			
	2. Asanas (YP) Utthanapadasana (raised leg), Chakra padasana (leg-rotation), Setubandhasana (bridge pose), Viparitakarani (inverted pose), Sarvangasana (shoulder stand), Pada sanchalanasana (cycling), Salabhasana (locust-pose, Dhanuarsana (bow pose), Paschimottanansna (forward-stretch), Makarasana, Upavistkonasana, Jatharaparivartasana, Trikonasana, Parsvakonasana	3 days a week	20 min.	
	3. Pranayama (voluntarily-regulated breathing techniques) Kaplabhati (frontal brain cleansing), Nadisuddhi (alternate nostril breathing), Shitali, Sheetkaari.	3 days a week	10 min.	
	4. Deep-Relaxation technique 5. OM-Dhyana (OM-Meditation) Total Duration	3 days a week	10 min. 60 min/day	
Control Group	1. Passive-Exercise A. Neck Exercise B. Shoulder Elbow exercise C. Arm wrist exercise D. Hand finger exercise E. Hip Knee exercise	3 days a week	45 min.	
	2. Passive-Stretching Calf-Hamstring stretching's Total Duration	3 days a week	15 min 60 min/day	

### III. RESULTS

The variable's pre- and post-training data from both groups were statistically analysed using the paired 't' test to see whether there was a significant difference; a 0.05 level of confidence was used for the hypothesis.

➤ These are Shown in the Tables below.

- Demographic Variables

Table 2 Demographic Details of Yoga Therapy Group and Control Group has been given with Numbers and Percentage

Characteristics	Number	Percentage
<b>Age Group (years)</b>		
31-35	9	15
36-40	15	25
41-45	24	40
46 and above	12	20
<b>Marital Status</b>		
Un Married	3	5
Married	57	95
<b>Occupational Status</b>		
Un Skilled <sup>1</sup>	19	31.6
Semi- Skilled <sup>2</sup>	24	40
Skilled <sup>3</sup>	17	28.3
<b>Distended Superficial Veins</b>		
Left Leg DSV	33	55
Right Leg DSV	27	45

- ✓ Unskilled occupations include physical labor & watchman
- ✓ Semi-Skilled occupations include of hotel workers & Sales Persons
- ✓ Skilled occupations were Advocate & Teachers

Table 3 Distribution of Demographic Variables Among Middle Aged Men for Yoga Therapy and Control Group

Demographic variables	YT (n=30)		CG (n=30)		Chi- square value and p value
	No.	%	No.	%	
1. Age in Years					$\chi^2 = 2.100$ d.f = 3 p= 0.552 (N.S)
a.31 to 35	6	20.0	3	10.0	
b.36 to 40	6	20.0	9	30.0	
c.41 to 45	11	36.7	13	43.3	
d.45 and above	7	23.3	5	16.7	
2. Educational Qualification					$\chi^2 = 0.111$ d.f = 2 p= 0.946 (N.S)
a. SSLC	10	33.3	9	30.0	
b.HSC	12	40.0	12	40.0	
c.Degree Holder	8	26.7	9	30.0	
3. Occupational Status					$\chi^2 = 0.111$ d.f = 2 p= 0.946 (N.S)
a. Unskilled Occupation	10	33.3	9	30.0	
b. SemiSkilled Occupation	12	40.0	12	40.0	
c. Skilled Occupation"	8	26.7	9	30.0	
4. Marital status					$\chi^2 = 0.351$ d.f = 1 p= 0.554 (N.S)
a. Unmarried	2	6.7	1	3.3	
b. Married	28	93.3	29	96.7	
5. Distended Superficial Veins					$\chi^2 = 0.606$ d.f = 1 p= 0.436 (N.S)
a. Left Leg	18	60.0	15	50.0	
b. Right Leg	12	40.0	15	50.0	
6. Religion					$\chi^2 = 3.000$ d.f = 2 p= 0.223 (N.S)
a. Hindu	27	90.0	27	90.0	
b. Muslim	3	10.0	1	3.3	
c. Christian	0	0.0	2	6.7	

- ✓ Unskilled occupations include physical labor & watchman
- ✓ Semi-Skilled occupations include of hotel workers & Sales Persons
- ✓ Skilled occupations were Advocate & Teachers

Table 4 Descriptive Statistics for Study Variables Among Middle Aged Men in Pretest for Yoga Therapy and Control Group

Study variables	Yoga (n=30)		Control (n=30)		t test value and p value
	Mean	SD	Mean	SD	
<b>Physiological Variables</b>					
ankle_brachial_index_pre	0.74	0.08	0.70	0.07	t = 1.820 p= 0.074 (N.S)

Note: \* - p<0.05 Level of Significant, N.S. – Not Significant

Table 5 Descriptive Statistics for Study Variables Among Middle Aged Men in Posttest for Yoga Therapy and Control Group

Study variables	Yoga (n=30)		Control (n=30)		t test value and p value
	Mean	SD	Mean	SD	
<b>Physiological Variables</b>					
ankle_brachial_index_pre	1.00	0.06	0.69	0.06	t = 21.293 p= 0.000 ***

Note: \*\*\* - p<0.001 Level of Significant, N.S. – Not Significant

Table 6 Effectiveness of Yoga Therapy on Ankle\_Brachial\_Index Among Middle Aged Men Between Yoga and Control Group

Group	Effect Score of ankle_brachial_index		
	Mean	SD	Paired t test and p value
YT	0.26	0.10	t=13.761 p=0.000 ***
CG	-0.02	0.05	t=2.184 p= 0.037 *
<b>Independent 't' value and p value</b>	t = 13.420, p= 0.000 ***		

Note: \* - p<0.05, \*\*\* - p<0.001 Level of Significant

The effectiveness of the YT on ankle brachial index between YT group (M=0.26, SD=0.10) and CG (M=-0.02, SD=0.05) shows that the t-value for YT group is 13.761, p value p=0.000 and for CG t value is 2.184, p value is p=0.037. This show that there is a significant difference. Hence, it is proved that YT group has intensify the measure in ankle brachial index (reduced) among middle aged asymptomatic varicose veins men.

The findings of the "t" test for the intervention group's ankle brachial index among middle-aged men with asymptomatic varicose veins are displayed in the above table. The pretest results for the YT group and the CG in the experimental group do not indicate a statistically significant difference, whereas the YT group's posttest results are statistically significant compared to control group posttest results. The YT group's posttest performed better than the CG's. Thus, it is determined that the experimental group's ankle brachial index shows a statistically significant substantial difference between the Pre and Post-test.

#### IV. DISCUSSION

This is the first research in yoga treatment and yogic science in India using the variable Ankle Brachial Index. As to the findings of (Agarwal, Vipul & Agarwal 2016) study, 27.8% of males in the northern Indian population were found to have varicose veins (Agarwal, Vipul & Agarwal 2016). Furthermore, epidemiological research of Indian rail road workers in the north and south was done in 1972 (Malhotra S. L. et. al., 1972). The study found that the prevalence of VV was much greater in north Indian sweepers (6.8%) and south Indian sweepers (25.08%). Subjects with C2 varicose vein classification were selected for this investigation. The researcher on VV (Ph.D.) in Yoga Therapy (Zulpe R et. al., 2023) is from India. In this study, ABI in conjunction with yoga therapy is also innovative. The current study may conclude that the ABI may be used to assess YT's effectiveness on VV based on an analysis of the data. This implies that yoga may be a more successful VV therapy. It was predicted that, among VV, the YT group would have a much lower ankle brachial index than the CG. The results showed that compared to control group, the YT group had a significantly lower ankle brachial index (reduced). Consequently, the hypothesis was accepted at confidence level of 0.05. This is the first research on ABI measurement for middle-aged men with YT therapy who have asymptomatic varicose veins. One tool or treatment for varicose veins is yoga.

#### V. CONCLUSION

Peripheral artery disease may be monitored risk-free using ABI. It was revealed that among middle-aged men with asymptomatic varicose veins, YT significantly altered the ankle brachial index (reduced) for EG-A when compared to the control group. Those who are ailing can be healed by yoga. For guys with VV, YT is therefore helpful in maintaining ankle blood flow and blood pressure.

#### DECLARATIONS

##### ➤ Ethical Considerations

We followed ethical guidelines. The institutional ethics committee (IEC) of Meenakshi Academy of Higher Education and Research-MAHER (Deemed to be University) examined and approved the experiment during its meeting on February 20, 2022. The reference number for the institutional ethics committee clearance certificate is MMCH/RI/PhD/01/JAN/23. The clinical study has been submitted to the Clinical Trials Registry-India (CTRI). The trial's registration number is CTRI/2023/05/052928.

##### ➤ Permission to publish

The final paper's content was agreed upon by all authors.

##### ➤ Funding

This study was entirely self-funded, with no outside sponsorship or financial support.

##### ➤ Conflict of Interest

The authors reported no possible conflicts of interest.

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#### REFERENCES

- [1]. Agarwal, V., Agarwal, S., Singh, A., Nathwani, P., Goyal, P., & Goel, S. (2016). Prevalence and risk factors of varicose veins, skin trophic changes, and venous symptoms among Northern Indian population. *International Journal of Research in Medical Sciences*, 4(5), 1678-1682. doi: 10.18203/2320-6012.ijrms20161248.
- [2]. *Angiology*, 57(5), 546-555. doi: 10.1177/0003319706293115.
- [3]. Badri, K., & Subbulakshmi, V. (2023). Impact Of Yoga Therapy On 6 Minute Walk Test Among Middle Aged Men Diagnosed with Varicose Veins. *Rivista Italiana di Filosofia Analitica Junior*, 14(2), 1481-1486.
- [4]. Bergonse, F. N., & Rivitti, E. A. (2006). Evaluation of arterial circulation using the ankle/brachial blood pressure index in patients with chronic venous ulcers. *Anais Brasileiros de Dermatologia*, 81, 131-135.
- [5]. Chauhan S, Patra SK. Yoga and its adjuvant therapies for the management of varicose vein disease: A narrative review. *Yoga Mimamsa* 2021;53:134-40
- [6]. Clift, J. K., Meekins, M. M., Coleman, F. A., Bradford, J. L., & Hatten, M. W. (2017). Reliability of physical therapists in performing ankle-brachial index measurements. *Cardiopulmonary Physical Therapy Journal*, 28(4), 128-135.

- [7]. Eichinger S, Minar E, Bialonczyk C, et al. D-Dimer Levels and Risk of Recurrent Venous Thromboembolism. *JAMA*. 2003;290(8):1071–1074. doi:10.1001/jama.290.8.1071
- [8]. Erdal ES, Demirgüç A, Kabalcı M, Demirtaş H. Evaluation of physical activity level and exercise capacity in patients with varicose veins and chronic venous insufficiency. *Phlebology*. 2021;36(8):636-643. doi:10.1177/02683555211002339
- [9]. Fu, Z., Zhuang, X., He, Y. et al. The diagnostic value of D-dimer with simplified Geneva score (SGS) pre-test in the diagnosis of pulmonary embolism (PE). *J Cardiothorac Surg* 15, 176 (2020). <https://doi.org/10.1186/s13019-020-01222-y>
- [10]. Lattimer, Christopher & Kalodiki, Evi & Geroulakos, George & Syed, Daneyal & Hoppensteadt, Debra & Fared, Jawed. (2015). D-Dimer Levels are Significantly Increased in Blood Taken From Varicose Veins Compared With Antecubital Blood From the Same Patient. *Angiology*. 66. 10.1177/0003319714565168.
- [11]. Leal, F. D. J., Couto, R. C., Silva, T. P. D., & Tenório, V. D. O. (2015). Vascular physiotherapy in treatment of chronic venous disease. *Jornal Vascular Brasileiro*, 14, 224-230.
- [12]. Malhotra, S. L. (1972) An epidemiological study of varicose veins in Indian railroad workers from the South and North of India, with special reference to the causation and prevention of varicose veins *International Journal of Epidemiology*, 1 (2). pp. 177-183. ISSN 0300-5771
- [13]. Mishra, B. (2018). Role of Ankle Brachial Index (ABI) in management of non-healing ulcers of lower limb. *Journal of Universal Surgery*, 6(1), 7.
- [14]. Phull, Gaurav Clinical Evaluation of Effect of Leech Therapy in the Cases of Varicose Veins (2022) <http://hdl.handle.net/10603/388849>
- [15]. Robertson, L., Lee, A. J., Gallagher, K., Carmichael, S. J., Evans, C. J., McKinstry, B. H., ... & Fowkes, F. G. (2009). Risk factors for chronic ulceration in patients with varicose veins: a case control study. *Journal of vascular surgery*, 49(6), 1490-1498.
- [16]. Somers, P., & Knaapen, M. (2006). The histopathology of varicose vein disease.
- [17]. Verma, Mukta & Singh, Arun & Kumar, Vijay & Mishra, Brijesh. (2018). Role of Ankle Brachial Index (ABI) in Management of Non-Healing Ulcers of Lower Limb. *Journal of Universal Surgery*. 06. 10.21767/2254-6758.100096.
- [18]. Zulpe R, Sharma KK. A study of the Effect of Yogic Interventions on Varicose Veins. *JDDT [Internet]*. 15Jan.2023 [cited 8Aug.2023];13(1):X1-X4. Available from: <https://jddtonline.info/index.php/jddt/article/view/5911>

➤ *Books*

- [19]. SRB'S MANUAL OF SURGERY, Sriram Bhat M, Foreword Prakesh Rao, 2009