



## ASSOCIATIONS OF ANKLE MOBILITY AND TENDOACHILLES IN CAUSATION AND PROGRESSION OF VARICOSE VEINS

**Dr. Lanka Vimala Rachel\***

Post Graduate 3rd Year, General Surgery, GMCATP \*Corresponding Author

**Dr. G. Venkata Naidu**

M.S General Surgery, Associate Professor, General Surgery, GMCATP.

**Dr. B. Siva Sankar Naik**

M.S General Surgery, Associate Professor, General Surgery, GMCATP.

### ABSTRACT

**Background:** The causative factors of lower limb varicose veins are vast and are still under research. The current paper aims to study the role of ankle mobility and Tendoachilis in causing lower limb varicose veins for effective means of prevention **Aims and Objectives:** This study aims at studying the relationship of Ankle mobility and Tendoachilis in the causation and progression of varicose veins. **Materials and Methods:** This is a prospective study done in the surgical OPD and wards of Government General Hospital, Anantapur with study sample of 100 patients. Data was collected using a questionnaire and clinical assessment and was analyzed using a multivariate analysis. **Results:** According to multivariate analysis, among all the participants, the odds of developing varicose veins were more for population with deranged ankle mobility, plantar flexion and dorsiflexion. **Conclusions:** This study highlighted deranged ankle mobility, dorsiflexion and plantar flexion as an important factor for causation and progression of lower limb varicose veins. These findings lead to an evidence-based treatment and prevention strategy.

**KEYWORDS :** Varicose veins, Ankle mobility, Plantar flexion, Dorsiflexion

### INTRODUCTION

Venous disorders of the lower limbs occur very frequently, and range in severity from minor asymptomatic incompetence of venous valves to chronic leg ulceration. These are defined as “elongated subcutaneous veins”<sup>(1)</sup> present in the Lower extremities, dilated to  $\geq 3\text{mm}$  in its diameter in the upright posture and are usually palpable<sup>(2)</sup>. The other findings may include telangiectasias or fine reticular varicosities. It affects around 10-30% of people in the western world, and in India it is around 5%.<sup>(3)</sup> These diseases cause considerable morbidity with about 2% of national resources of healthcare being spent on the management.<sup>(4)</sup> It has been estimated that chronic leg ulceration may affect around 1% of the population and some surveys show that 57–80% of the patients with leg ulcers have an identifiable venous disease.<sup>(5,6)</sup>

Varicose veins can have primary or secondary etiology. Primary varicosities may result from the intrinsic defects of the walls of veins and absence of valves, whereas, secondary varicose veins have association with superficial or deep venous insufficiency or sequela of DVT.<sup>(7,8)</sup> Risk factors for varicose veins include advancing age, females, heredity, history of trauma to the extremities, multiparity, prolonged standing, inactivity, and a positive family history.

In this study, the ankle mobility and the Tendoachilis in the causation of lower limbs varicose veins have been studied which help in developing effective means of prevention as well as proper cause-based treatment of varicose veins.

### MATERIALS AND METHODS

#### Study design and setting:

A Prospective study conducted during the period of 2020 to 2022 in Department of General Surgery, Government General Hospital, Anantapur. Informed consent was obtained from each patient, and ethical clearance was obtained from institutional ethical committee.

#### Sample size:

100 cases were included in the present study.

#### Inclusion criteria:

1. All patients aged 18 years and above who had given consent with primary varicose veins of the lower limb due to superficial and perforator venous incompetence
2. All patients with complications as below
  - Chronic swelling
  - Skin changes
  - Ulceration
3. Pregnant women.

#### Exclusion criteria:

1. Patients not giving Informed consent.
2. Varicosities other than lower limbs.
3. Deep venous thrombosis.

#### Selection of cases:

Patient who presented to the General Surgery Outpatient clinic during the period of the study were examined to identify cases meeting the case definition of LLVV. Cases of LLVV were diagnosed and classified using the Clinical, Etiologic, Anatomic, Patho-physiologic classification system of chronic venous insufficiency (CEAP), which is widely accepted in the clinical and scientific communities. Interview questionnaire was conducted to collect the following data.

Sociodemographic data included participants' age, sex, rural/urban residence, education attainment and occupation of the participants.

Clinical examination was conducted to collect the following data:

- Clinical examination of lower limbs: Participants were subjected to a clinical examination of the lower limbs for the presence of LLVVs. Cases were classified into six categories following the CEAP system including: C0, no visible or palpable signs of CVI; C1, telangiectasia or reticular veins; C2, varicose vein > 4 mm in diameter; C3, edema as a sequel of varicose vein; C4, skin changes (pigmentations, venous eczema, etc.); C5, skin changes with healed ulcerations; and C6, skin changes with active ulcerations
- Ankle mobility was calculated by taking the measurements of dorsiflexion and plantar flexion at the ankle level using a goniometer. The participants were asked to sit at the edge of the table and maximal dorsiflexion was calculated using a goniometer in a non-weight bearing area. The average value of dorsiflexion was taken as 15 degrees (10-20 degrees) and the average value of plantar flexion was taken as 35 degrees (20-50 degrees). The total range of movement of the ankle was calculated as the sum of both dorsiflexion and plantar flexion.

#### Ethical Considerations:

The study protocol was approved by an institutional human ethical committee. Informed consent was obtained from all the participants. Confidentiality of data was maintained.

#### Data Analysis:

Data were analysed using SPSS 20.0. P-value <0.05 was considered significant.

### RESULTS

- The commonest age range of all patients was between 41 to 50 years (37%).

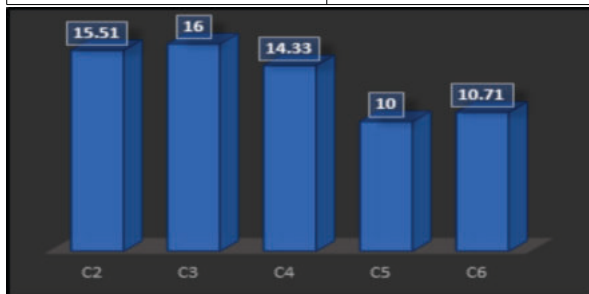
- Lower limb varicose veins were more common in females in our study. Out of 100 patients, 57 were females and 43 were males.
- The left side is predominantly involved with 53 cases followed by right side with 26 cases and 21 bilateral lower limb varicose vein cases.
- Most the patients belong to category of manual labourers which include Coolie (30%), Farmers (16%) who have been exposed to continuous standing long hours of the day.
- The present study included majority of the limbs with C2 (56.19%) followed by C4 (24.79%), C5 (9.09%), C6 (5.78%) and C3 (4.13%).
- Most of them had Primary etiology (91%) where the exact cause was unknown. Others had secondary etiology (9%)- 6 patients of which 5 were pregnant females and 1 female was diagnosed to have a pelvic mass.
- 57 limbs had both superficial and perforator incompetence, 32 limbs had only perforator incompetence and 11 limbs had only superficial system incompetence.
- 93% of the patients had pathology due to reflux and 7% had due to obstructive pathology.
- The normal value of dorsiflexion was taken as 15 degrees on average for normal persons.

There was significant reduction of the dorsiflexion seen in the patients with ulceration-

- C5: 10 degrees followed by
- C6: 10.71 degrees.
- C2, C3, C4 were almost near the normal reference value.

This in turn suggested a positive correlation between the decrease in the dorsiflexion which in turn appears to be related to the Tendoachilis action, which may be affected due to the chronic venous insufficiency.

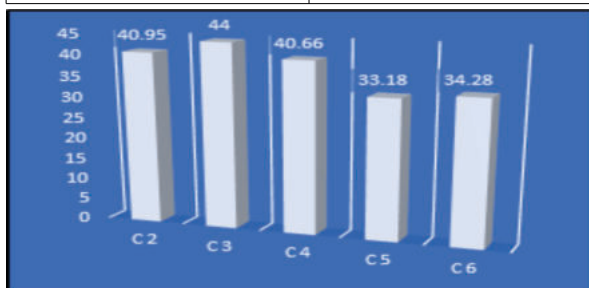
Clinical grade	Dorsiflexion
C2	15.51
C3	16
C4	14.33
C5	10
C6	10.71



**Figure 1: Dorsiflexion in the present study**

- The plantar flexion is indirectly related to the action of the calf foot venous muscle pump which is deranged in chronic venous insufficiency related to impaired plantar flexion. The reference range was taken around 35 degrees as average. The participants with the complications showed decreased range of plantar flexion, C5 showing the least degree of 33.18, followed by C6.

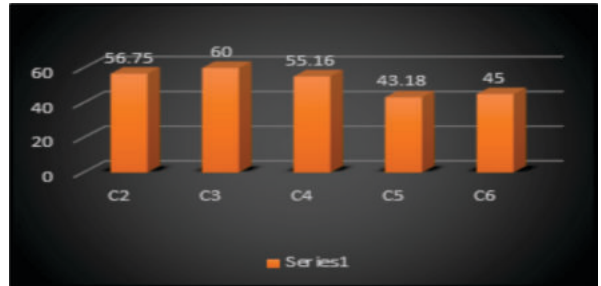
Clinical grade	Plantar flexion
C2	40.95
C3	44
C4	40.66
C5	33.18
C6	34.28



**Figure 2: Plantar flexion in the present study**

- Ankle mobility: The reference range was taken as 47°-69°. The most effected group was the patients who had ulceration due to the venous disease as a complication who had a total range of motion of 43.18 as average in C5 group and 45 in C6 group

GRADE	RANGE OF MOTION
C2	56.98
C3	60
C4	55.16
C5	43.18
C6	45



**Figure 3: Ankle mobility in the present study**

**DISCUSSION**

Venous disorders of the lower limbs occur very frequently, and range in their severity from minor asymptomatic incompetence of the venous valves to chronic leg ulceration. Early identification of the causative factors may help in slowing down the progress of the disease to prevent complications. The present study consists of 100 cases with 121 affected lower limbs varicose veins who were studied and treated in Government General Hospital, Ananthapuram during the period of November 2020 to November 2022. The results were compared and analysed with other similar studies. The analysis is as follows: This study included more people affected from the 5th decade of life. The average age according to the study is 48.24 years in females and 49.93 years in males. Various aged people with multiple complications have been included. In the present study, predominantly female patients were seen around 57%. Most of the studies in India have a male predominance, as females wear attires which usually covers up most of their legs. But in the present study, females were seen attending the outpatient as well as the inpatient department due to high rate of complications associated with varicose veins. Elizabeth Yim et al in their study, found out that severe CVI limbs had significantly reduced total range of motion. The present study also had a significant p value of 0.0015 which shows a positive correlation with significant reduced total range of motion in cases with complications. Plantar flexion and dorsiflexion have been analysed in all the patients affected with varicose veins. An overall decrease in the plantar as well as dorsiflexion has been observed. This reduced dorsiflexion may be due to Achilles tendon due to the venous stasis, and the plantar flexion due to the calf muscle pump dysfunction. In this study, some of the many causative factors have been studied. This needs further genetic and colocalization studies for further workup which was limited in this study.

**CONCLUSION**

The present study concludes that there are various new factors which are resulting in the causation of varicose veins such as deranged ankle mobility and abnormal dorsiflexion and plantar flexion. This is in partly related to the concept that the genetics are altered due to gene mutations, thus needing further combined epidemiological, genetic studies and colocalization studies. Better anatomical/physiological knowledge of the leg venous system can even improve new methods of compression therapy. For an appropriate prevention and treatment strategy, it is ideal to know about the various factors causing varicose veins. Strategies which can target the risk factors can help in early detection to prevent further complications of the disease. General health education and increased awareness of varicose veins in society are needed to achieve timely treatment, favourable outcomes, and reduced morbidity

**REFERENCES**

1. Burkitt DP. Varicose veins, deep vein thrombosis, and haemorrhoids: epidemiology and suggested aetiology. Br Med J. 1972; 2:556-561.
2. Kistner RL, Eklof B. Classification and etiology of chronic venous disease. Gloviczki P. Handbook of Venous Disorders: Guidelines of the American Venous Forum. 3rd ed. Hodder Arnold: London; 2009:37-46.
3. Mishra S, Ali I, Singh G. A study of epidemiological factors and clinical profile of

- primary varicose veins. *Med J DY Patil Univ* 2016; 9:617-21
4. Laing W. *Chronic venous diseases of the leg*. London: OYce of Health Economics, 1992:1-44.
  5. Callam MJ, Harper DR, Dale JJ, et al. Chronic ulcer of the leg: clinical history. *BMJ* 1987; 294:1389-91.
  6. Alexander House Group. Consensus paper on venous leg ulcers. *Phlebology* 1992; 7:48-58.
  7. O.Gloviczki P, et al. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg*. 2011; 53:2s-48s
  8. Labropoulos N, Giannoukas AD, Delis K, et al. Where does venous reflux start? *J Vasc Surg*. 1997; 26:736-742.