



# The Systemic Impact of Varicose Veins on Edema

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## ABSTRACT

Classically, edema is categorized into systemic and local types, with varicose veins being a common local cause. In a recent study published in *Phlebology* (May 2024), we hypothesized that varicose vein treatment could reduce edema not only in affected legs but also systemically. Using a body composition analyzer (InBody 770), we confirmed that the extracellular water ratio (E/T) was elevated ( $>0.390$ ) in patients with varicose veins across multiple body regions. Post-treatment, E/T ratios decreased significantly in the treated leg, untreated leg, trunk, and entire body. These findings suggest that varicose veins contribute to systemic edema, challenging the traditional view of varicose veins as a localized condition. This concept, underexplored in current literature, emphasizes the systemic implications of venous insufficiency and necessitates multidisciplinary research to further understand and manage the broader impacts of varicose veins on overall health.

**Keywords:** Varicose vein; Local edema; Systemic edema; Extracellular water ratio; Circulatory system; After load; Pre-load; Venous return

## DESCRIPTION

Classically, edema is categorized into systemic edema and local edema, with the latter including conditions such as varicose veins. In my recent publication in *Phlebology* (May 2024), I proposed a novel hypothesis that treatment of varicose veins can reduce edema not only in the affected legs but also throughout the entire body. This hypothesis was tested and confirmed using a body composition analyzer (InBody 770, InBody Japan Inc., Tokyo, Japan) to measure the extracellular water ratio (E/T). Our findings indicated that the E/T ratios of the treated leg, untreated leg, trunk, and entire body were all greater than 0.390. Signifying the presence of edema in patients with varicose veins. Post-treatment, there was a notable reduction in the E/T ratios across all these regions.

Our research suggests that varicose veins are not merely a localized condition but have systemic implications. Systemic edema, such as that resulting from heart failure, often leads to secondary leg edema. Similarly, we propose that local edema caused by varicose veins can induce systemic edema.

Despite the prevalence of varicose veins, this concept is not widely discussed in existing literature. One reason may be the treatment system for varicose veins, where patients are often referred by family practitioners or cardiologists to vascular surgeons, who tend to focus solely on the varicose veins rather than the systemic implications. My attention was drawn to this phenomenon when a patient reported significant reduction in facial and hand edema post-surgery, prompting a more detailed inquiry into clinical symptom relief.

Physiologically, blood ejected by the left ventricle travels through arteries to peripheral tissues, where oxygen and nutrients are consumed, and desaturated blood is drained into peripheral veins. Venous return is facilitated by one-way venous valves, the calf muscle pump, the suction effect of the Inferior Vena Cava (IVC) during respiration, and the active dilation of the right ventricle. In varicose vein conditions, this circulatory system is compromised due to venous valvular insufficiency, decreased compliance of the IVC and right ventricle, increased venous blood volume, and elevated preload for the heart. This venous hypertension increases vascular resistance in peripheral arteries,

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leading to an increased after load for the heart and subsequently elevated NT-proBNP levels.

The venous system plays a critical role in maintaining smooth blood circulation. Once compromised, it can affect other organs, including the heart. In varicose vein conditions, increased pre-load combined with sub-clinical heart compromise can lead to systemic edema, including in the legs affected by varicose veins.

Case reports from our study demonstrated a decrease in the extracellular water ratio of treated, untreated, trunk, and whole body regions post-surgery. Clinical symptoms, such as edema of the face, hands, and both treated and untreated legs, were significantly ameliorated. Another case indicated a reduction in nocturia frequency, likely due to decreased pre-load after surgery.

Determining the specific symptoms derived from varicose vein-induced systemic edema remains challenging. Future studies should focus on clarifying the clinical symptoms and underlying mechanisms by which varicose veins influence other body parts.

## CONCLUSION

Our research indicates that varicose veins are not merely a local disease but have systemic effects. We have opened a novel avenue of research, and further investigation is needed to elucidate the association between varicose veins and systemic health. Collaboration from researchers across various medical fields, including cardiology, phlebology, radiology, and rehabilitation, is essential to advance our understanding in this area.