TJVS Turkish Journal of Vascular Surgery

Turk J Vasc Surg 2025;34(2):133-8
DOI: 10.9739/tjvs.2025.02.012

Available online at www.turkishjournalofvascularsurgery.org

Original Article

Does the severity of venous insufficiency affect sleep disorders? A study using the pittsburgh sleep quality index

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Received: February 18, 2025 Accepted: March 23, 2025 Published online: June 02, 2025

Abstract

Aim: Varicose veins are usually seen in the legs and cause pain, tingling and aesthetic problems. In patients diagnosed with varicose insufficiency, many comorbid conditions such as sleep disorders that impair the quality of life are detected. We aimed to show that patients whose treatment is arranged can also improve their sleep disorders, including comorbid diseases.
Material and Methods: The study included 299 patients who applied to the Cardiovascular Surgery clinic with complaints of leg pain and tingling and were diagnosed with venous insufficiency. The Pittsburgh Sleep Quality Index (PSQI) was applied to the patients and control group. The patients who were evaluated for venous insufficiency with lower extremity venous doppler were classified from C1 to C6 according to the Clinical, Etiology, Anatomy, and Pathophysiology (CEAP) classification. The patients' scores from the scales were compared among themselves and with the control group.
Results: 65 (21.7%) male and 234 (78.3%) female patients were included in the study. Their ages ranged from 25 to 84 years, and the mean age was 46.88±14.4 years. The mean PSQI score of the patients participating in the study was determined as 7.05 (±4.9).
Conclusion: Venous insufficiency and sleep disorders are common conditions that can be seen together because they share many common risk factors and epidemiological features. As in our patients, it is possible to eliminate sleep disorders and prevent their progression by treating venous insufficiency. However, our study should be supported by further studies.

Keywords: Sleep disorders, venous insufficiency, varicose veins

INTRODUCTION

Venous insufficiency refers to a pathological condition characterized by insufficiency of venous valves, especially the deep veins of the lower extremities. Venous insufficiency disrupts the normal one-way blood flow to the heart, leading to local venous hypertension. This condition can cover a wide range of very serious groups, from asymptomatic varicose veins to patients with venous leg ulcers [1].

The venous bed is a part of the circulatory system that collects and stores blood after perfusing microvessels and delivers this blood to the right atrium of the heart. Most of the leg muscles are static, and venous blood flow to the heart depends on the pumping action of the perivenous muscles and the ventilation mechanism within the thorax. Several pairs of perivenous muscles surrounding the femoral veins in the groin and the deep veins in the leg muscles can generate effective pressure during muscle contraction, and the presence of competent valves prevents retrograde flow. These events can alter local and global hemodynamics and initiate a cascade of deleterious events that can later lead to serious health problems such as venous leg ulcers [2].

Sleep is divided into alternating phases of REM sleep and NREM (non-REM) sleep. Sleep disorders are a growing but poorly understood health problem in modern society. The effects of impaired venous drainage on the brain and sleep physiology are

CITATION
Yildirim G, Yildirim S Does the severity of venous insufficiency affect sleep disorders? A study using the pittsburgh sleep quality index. Turk J Vasc Surg. 2025;34(2):133-8.

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also poorly understood. Sleep apnea, insomnia, and restless legs syndrome are common sleep disorders that seriously affect quality of life [3]. These conditions often have adverse cardiovascular outcomes. Randomized clinical trials in large populations have identified a highly significant association between chronic respiratory failure associated with sleep apnea affecting quality of sleep and widespread arterial and heart disease. Based on current clinical observations, a similar association may exist between chronic venous insufficiency and the impairment of various functions regulated by the autonomic nervous system [4].

The relationship between venous insufficiency and sleep disorders is becoming an increasingly important issue. Clinical observations and research results indicate that chronic venous insufficiency and varicose veins are associated with impaired sleep, daytime sleepiness, and reduced quality of life. It is also thought that sleep disorders may contribute to the progression of venous insufficiency. Presenting current scientific information on both sides of the relationship between venous insufficiency and sleep disorders, focusing on potential contributing biomechanical and neurophysiological mechanisms, may help future researchers address the issue and increase awareness of the potential role of sleep in disease progression [5].

The evaluation and diagnosis of venous diseases are of utmost importance. Clinical evaluation begins with careful history taking and adequate physical examination. Doppler examinations (duplex ultrasound) accurately localize venous disease and determine whether the underlying cause is arterial or venous. Other examinations such as venography, photoplethysmography, air plethysmography, venous capacitance measurement and impedance plethysmography can support the diagnosis [6].

Sleep disturbance, like chronic venous insufficiency, has social significance and therefore requires early assessment and management [7]. Health professionals can play an important role in timely periodic screening using an easily applicable noninvasive tool. As a potential risk factor for venous disease, simple questions about sleep disturbance and home/lifestyle habits will serve as important screening tools. Periodic screening is especially important for high-risk groups. Improvement of sleep disturbance by lifestyle changes and use of sleep hygiene recommendations should raise suspicion of underlying venous disease. All these factors will help to diagnose venous disease in a timely manner and lead to improved quality of life.

The aim of our study is to evaluate patients presenting with venous insufficiency findings and to show that sleep quality may be affected in patients depending on the severity of venous insufficiency.

MATERIAL AND METHODS

The present study was conducted to evaluate the prevalence of sleep disorders in patients with venous insufficiency in our center. We evaluated 299 patients who were admitted to our outpatient clinic for 6 months and who were investigated for venous insufficiency with complaints such as pain, swelling, and burning in the legs.

The study was approved by the Necmettin Erbakan University Ethics Committee (07.02.2025-2025/5512). Various demographic, clinical, and imaging factors were collected. Patients with diagnoses of lymphedema, liver disease, kidney disease, and other potential causes of edema such as steroid use, which could potentially cause swelling and aggravate venous symptoms, were excluded from the study. Informed consent forms were obtained from the patients.

Before starting the scales, general demographic information was requested from the patients; age, gender (female, male), occupation, education status, body mass index, smoking and alcohol use, parity (for female patients), ankle circumference measurement, personal history (phlebitis, asthma, hypertension, leg trauma, cardiac history, other). BMI was calculated with the formula body weight/height^2 (kg/m^2). The obtained data were recorded.

Patients who presented to the outpatient clinic with complaints of venous insufficiency were included in the study. While taking the anamnesis of the patients, the drugs they used were questioned and those who used drugs that would affect sleep patterns such as antipsychotics and antidepressants were not included in the study. The amount of caffeine was questioned and those who used more than 100-200 mg of caffeine per day (1-2 cups of coffee) were not included in the study. To minimize confounding factors that could cause leg pain unrelated to venous insufficiency, we applied the following exclusion criteria: history of peripheral arterial disease, chronic musculoskeletal disorders (e.g., osteoarthritis, rheumatoid arthritis), neuropathies (such as diabetic neuropathy), and patients with recent lower extremity trauma or surgery were excluded. Additionally, individuals with known sleep disorders unrelated to venous insufficiency, such as obstructive sleep apnea or restless legs syndrome, were excluded from the study. A thorough clinical evaluation and medical history review were performed to ensure that venous insufficiency was the primary cause of leg discomfort.

All patients underwent a Doppler ultrasound study to apply the venous reflux protocol by a radiologist. The venous reflux protocol included duplex ultrasound evaluation of all saphenous veins, non-saphenous varices (if present), and deep veins. Enrolled participants were patients over 18 years of age with Clinical, Etiology, Anatomy, and Pathophysiology (CEAP) clinical classes ranging from C1 to C6. Reflux times of >500 milliseconds were defined as pathological for all superficial veins and deep veins below the knee. Pathological reflux was defined as >1000 milliseconds in the common femoral, femoral, and popliteal veins. Pittsburgh Sleep Quality Scale (PSQI) was applied to all patients to evaluate concurrent sleep disturbance. The PSQI scale consists of seven subcategories (subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, medication use, and daytime function assessment) and 19 items. The sum of all subscales is evaluated as a total sleep quality score ranging from 0 to 21, with high scores representing poor sleep quality. In this

study, a total PSQI scale score of <5 was defined as "good" sleep quality and >5 as "poor" sleep quality.

Statistical Analyses

The sample size was determined based on previous studies and feasibility. Descriptive analyses were performed to calculate frequencies and rates of categorical variables. All statistical analyses were conducted using IBM SPSS Statistics (Version 29, IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated for all variables, including means and standard deviations for continuous variables and frequencies for categorical variables. Normality was assessed using the Shapiro-Wilk test.

For group comparisons, one-way ANOVA was performed to examine differences in PSQI score and CEAP Classification (C) among c_group categories. When ANOVA indicated significant results, Tukey's HSD post-hoc test was applied to determine specific group differences. Since the normality assumption was not met, the Spearman's rank correlation test was used to evaluate the relationship between PSQI score and CEAP Classification (C).

A significance level of $p<0.05$ was considered statistically significant for all tests.

RESULTS

Demographic and clinical characteristics of 299 patients with CVD symptoms are presented in Table 1. Of the patients who participated in our study, 234 were female and 65 were male. The mean age of the patients was 46.8 years and 75.6% (226) were either current or former smokers.

Table 1. Demographic and clinical characteristics of patients

Gender	Female 78.3% (n=234)
Age	46.88±14.4
BMI	28.21±5.14
Weight	77.9±13.5
HT	17 % (n=51)
CHF	11 % (n=33)
Occupation	Housewife 37% (n=110)
PSQI score (Avarage)	7.05 (±4.9)
CEAP groups	
C0	15.4% (46)
C1	34.1% (102)
C2	25.4% (76)
C3	18.7% (56)
C4	5.4% (16)
C5	0.7 % (2)
C6	0.3% (1)

BMI: body mass index, HT: hypertension, CHF: congestive heart failure, PSQI: The Pittsburgh Sleep Quality Index

The clinical component of the CEAP classification was obtained in 299 patients. According to the CEAP classification, the distribution of patients was as follows; the number of patients in the C0 group was 46 (15.4%), the number of patients in the C1 group was 102 (34.1%), the number of patients in the C2 group was 76 (25.4%), the number of patients in the C3 group was 56 (18.7%)the number of patients in the C4 group was 16 (5.4%), the number of patients in the C5 group was 2 (0.7%), and the number of patients in the C6 group was 1 (0.3%).

The mean PSQI index of the patients who participated in the study was determined as 7.05 (±4.9). When the PSQI index averages were examined, it was seen that the average value was 7.17 in women and 6.62 in men. In the CEAP classification performed according to the venous doppler results of the patients, it was determined that as the C class increased, the PSQI scores also increased significantly and in addition when patients with C0 to C1 and patients with C2 to C6 were divided into two separate groups and the PSQI scores between them were analyzed, a statistically significant difference was found between the two groups. (p=0.007) (Table 2).

When the relationship between body mass index (BMI) and PSQI scores was assessed, there was significant difference in mean BMI when compared with PSQI scores (p=0.002). No significant relationship was found between age and gender and sleep disorders in our study.

When individuals with severe sleep problems (PSQI>11) were grouped according to PSQI scoring and the relationship with C classification was examined, a statistically significant relationship was found (p=0.003) (Figure 1 and Table 2).

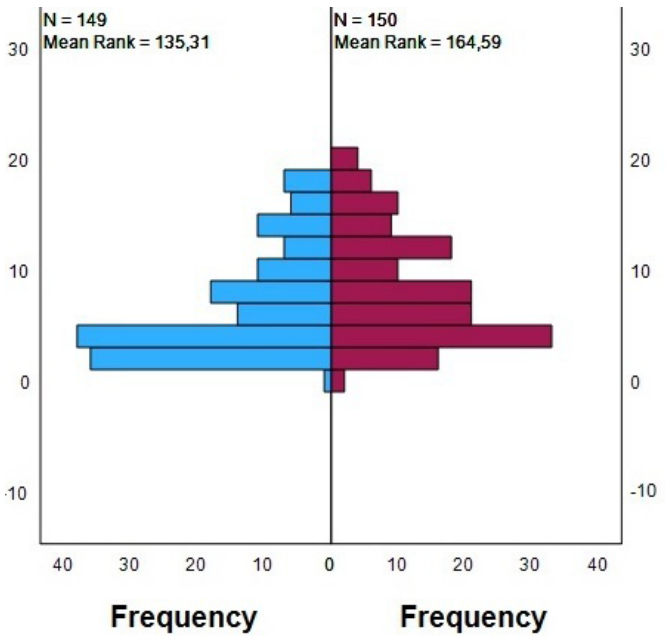

Figure 1. Sleep disorders and CEAP classification relation

Table 2. Correlations of the groups

		CEAP group	PSQI score	CRF	CHF	BMI	Age	Gender	CEAP
CEAP group	**Correlation coefficient**	1.000	.170**	0.019	0.095	.176**	0.107	0.087	.893**
	Sig. (2-tailed)		0.003	0.744	0.101	0.002	0.064	0.131	0.000
PSQI score	**Correlation coefficient**	.170**	1.000	-0.024	-0.069	0.008	0.086	-0.018	.185**
	Sig. (2-tailed)	0.003		0.676	0.234	0.895	0.137	0.753	0.001
CRF	**Correlation coefficient**	0.019	-0.024	1.000	.114*	0.067	.179**	0.002	0.062
	Sig. (2-tailed)	0.744	0.676		0.048	0.246	0.002	0.972	0.285
CHF	**Correlation coefficient**	0.095	-0.069	.114*	1.000	-0.049	.169**	.156**	0.110
	Sig. (2-tailed)	0.101	0.234	0.048		0.399	0.003	0.007	0.057
BMI	**Correlation coefficient**	.176**	0.008	0.067	-0.049	1.000	.267**	-.137*	.156**
	Sig. (2-tailed)	0.002	0.895	0.246	0.399		0.000	0.017	0.007
Age	**Correlation coefficient**	0.107	0.086	.179**	.169**	.267**	1.000	.126*	0.079
	Sig. (2-tailed)	0.064	0.137	0.002	0.003	0.000		0.030	0.174
Gender	**Correlation coefficient**	0.087	-0.018	0.002	.156**	-.137*	.126*	1.000	0.111
	Sig. (2-tailed)	0.131	0.753	0.972	0.007	0.017	0.030		0.056
CEAP	**Correlation coefficient**	.893**	.185**	0.062	0.110	.156**	0.079	0.111	1.000
	Sig. (2-tailed)	0.000	0.001	0.285	0.057	0.007	0.174	0.056	

PSQI; The Pittsburgh Sleep Quality Index, CHF; congestive heart failure, CRF; chronic renal failure, BMI; body mass index, CEAP; clinic etiological anatomic and pathophysiological classifications

DISCUSSION

Chronic venous insufficiency (CVI) is a disease that is quite common in society and affects approximately 5-30% of the adult population. It is seen in 40% of the general population [8]. Venous diseases have serious socioeconomic effects due to their prevalence in society. The general prevalence of CVI in the world varies between 1-17% in men and 1-40% in women. These ranges vary depending on the application of diagnostic criteria, availability of medical facilities, and the distribution of population-specific risk factors [9].

The main risk factors for chronic venous insufficiency include pregnancy, number of births, advanced age, connective tissue weakness, inactivity, obesity, use of high-heeled shoes, standing for long periods, wearing tight clothing, female gender, geographical factors and incorrect eating habits. The most important risk factor that creates the picture of chronic venous insufficiency is advanced age. It has been stated that the risk of developing varicose veins increases 2.42 times with advanced age. The mean age of the patients in our study was 46.88 (±14.4) years and no statistically significant relationship was found between age and venous insufficiency. Epidemiological studies have reported that the prevalence of chronic venous insufficiency increases with advanced age in both genders [10]. One of the main risk factors for the formation of CVI is female gender. Studies have shown that the male/female prevalence is 1.5/3.5%. While the prevalence of varicose veins in the male population between the ages of 30-40 is 3% on average, it increases to 40% over the age of 70. Similar results were obtained in women. While the prevalence in the female population between the ages of 30-40 is 20%, it increases to over 50% after the age of 70 [11]. A total of 299 patients were included in our study, 234 of whom were women (78.3%) and 65 of whom were men (21.7%). When we looked at the CEAP classification of women and men in our study, it was seen that chronic venous insufficiency was significantly more common in women.

Studies have found that obesity is an important risk factor for the development of venous insufficiency. In a study it was stated that body mass index in women correlates with the clinical severity of CVI [12]. A further study reported that patients with venous insufficiency C2 and above had a higher body mass index than patients with venous insufficiency below C2. The factors contributing to the clinical severity of CVI in obese patients, as well as in normal patients, include a lack of physical activity, restricted venous circulation, a sedentary lifestyle, and limited ankle and calf muscle function [13]. The mean BMI of the patients who participated in our study was 28.2 (±5.1).

When we looked at the relationship between the patients' BMI results and other variables, we found that the relationship between them and the PSQI was not significant but the relationship between BMI and C classification was found to be significant.

The patients who participated in the study were from occupational groups such as housewives, private sector employees, students and civil servants who spend most of their time standing during the day. Studies have shown that venous insufficiency increases as the time spent standing increases [14]. The present study revealed no significant differences between the various occupational categories. The majority of individuals who participated in our study were housewives.

Comorbid diseases seen in patients diagnosed with chronic venous insufficiency include hypertension, heart failure, peripheral artery disease, chronic obstructive pulmonary disease, obstructive sleep apnea (OSA), diabetes mellitus, skeletal system or joint diseases [15]. In our study, hypertension (HT) and heart failure (HF) were the most common comorbid diseases. 17% of the patients had HT and 11% had HF.

The current literature suggests a correlation between the presence of symptoms of venous insufficiency and an increased prevalence of sleep disorders. The PSQI is a self-report measure that assesses sleep quality over a one-month period. In our study, we found an increased rate of positive PSQI in patients presenting with symptomatic CVI. This supports the idea that CVI is associated with a higher risk of sleep disorders, as well as other diseases associated with fluid overload, such as heart failure, renal failure, and resistant hypertension.

There are objective studies showing that sleep quality decreases in patients with venous insufficiency due to decreased rostral fluid exchange from the legs at night. In one study, it was shown that wearing compression stockings for 1 week in patients with OSA had a decreasing effect on the AHI index by reducing the severity of venous insufficiency [16]. Based on this study showing that the severity of OSA decreased, it is possible to predict that sleep quality will decrease as the severity of venous insufficiency increases. Similarly, in a study conducted with 197 patients, it was reported that approximately 60% of patients with chronic venous insufficiency had poor sleep quality and that there was no significant relationship between sleep quality and exercise capacity [17]. In our study, high PSQI scores support a strong relationship between sleep disorders and venous insufficiency. In future studies, clinical studies on sleep quality with compression stockings or similar physical interventions are recommended to understand the mechanisms of this relationship.

Venous insufficiency patients usually apply to the hospital for reasons such as severe pain, thrombophlebitis, feeling of heaviness, bleeding, tension, swelling, restless legs, cramps, itching, hyperpigmentation. Although surgical intervention is applied to patients with advanced venous insufficiency, the psychosocial effects of this disease on the patient are not given enough importance. Leg pain associated with chronic venous insufficiency, which is one of the most important conditions that brings patients to the hospital, is a common problem in society and can lead to low quality of life, anxiety and depression. Physical interventions to be applied to patients are not sufficient on their own. Evaluating and monitoring patients in terms of depression and anxiety and adding additional measures to the treatment will increase the quality of life of the patient as a whole, in addition to the treatment of venous insufficiency [18].

In our study, we aimed to see the effect of disease severity on sleep disorders in patients diagnosed with chronic venous insufficiency. Varicose veins cause severe pain, especially during their formation. In advanced varicose veins, patients complain of heaviness in their legs. There may be edema in the foot and ankle, itching and burning sensation in the skin around the affected vein. In addition, leg pain, night cramps and fatigue are observed. In patients who enter this vicious cycle, the development of OSA becomes easier if other risk factors are present due to the deterioration of sleep quality. Therefore, we believe that it would be beneficial for clinicians to carefully examine venous insufficiency patients in the early stages, to organize their medical and, if necessary, surgical treatments, and to eliminate pathologies that may lead to many comorbid conditions by deteriorating sleep quality.

The results of this study show that patients diagnosed with venous insufficiency should not only have their physical symptoms evaluated, but also their sleep disorders. Early evaluation of these patients by clinicians using questionnaires such as PSQI will both improve their quality of life and prevent serious complications such as OSA that may develop in the long term.

Limitations of the Study

Adding a scale to our study that assessed restless legs syndrome could have allowed us to distinguish between these two pathologies in our patients diagnosed with CVI, in case they were confused with restless legs syndrome, and to compare them with individuals without this syndrome.

In addition, randomized controlled trials evaluating the effect of compression stockings on sleep quality will increase the knowledge in this area.

CONCLUSION

This study underscores the multifaceted nature of CVI, demonstrating that its impact extends beyond physical symptoms to include significant effects on sleep quality and overall well-being. Whilst traditional risk factors such as female gender, advanced age, obesity, and prolonged standing remain prominent, the present findings emphasise the importance of considering sleep disturbances – particularly poor sleep quality as assessed by the PSQI – as a relevant comorbidity in patients with CVI. Despite the pivotal role of surgical and physical interventions in the management of venous insufficiency, these measures may

prove inadequate when employed as standalone therapeutic modalities. Consequently, a comprehensive approach to care should encompass the management of sleep-related symptoms, the assessment of mental health status, and the recommendation of lifestyle modifications. Early identification and treatment of sleep disturbances have been demonstrated to enhance patient quality of life and assist in the prevention of the development of conditions such as obstructive sleep apnea. It is recommended that future interventional studies concentrate on the effects of compression therapy and other non-pharmacological measures on sleep quality in CVI patients. This will allow for further exploration of this important relationship.

Ethics Committee Approval: The study was approved by the Necmettin Erbakan University Ethics Committee (07.02.2025-2025/5512).

Patient Consent for Publication: Informed consent was provided by all patients.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: All authors contributed equally to the article.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article.

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