Occupational Varicose Veins among School Teachers: Epidemiology, Occupational Risk Factors, Pathophysiological Mechanisms, Clinical Burden, and Preventive Strategies

Enjy Ahmed Esmat Khorshid , Ahmed Refat Abd El Ghafaar Ahmed Refat , Marina Farid Abdou Gerges, Dina Sameh Mohammed El Rafey
Occupational Health & Industrial Medicine Department, Faculty of Medicine- Zagazig University

Corresponding Author: Marina Farid Abdou Gerges

Received: 28 October 2024, **Accepted:** 17 November 2024, **Published:** 20 November 2024

Abstract

Background: Varicose veins are among the most common manifestations of chronic venous disease and represent a significant occupational health concern worldwide. Although the condition is influenced by genetic, demographic, and lifestyle factors, occupational exposures play a crucial role in its development and progression. School teachers constitute a unique occupational group that is frequently exposed to prolonged standing, static postures, limited opportunities for movement, and repetitive classroom activities. These work-related demands, combined with individual risk factors such as aging, female sex, obesity, and family history, increase susceptibility to venous hypertension and valvular dysfunction, ultimately predisposing teachers to occupational varicose veins. Beyond physical discomfort, the condition may impair work performance, reduce productivity, increase sickness absenteeism, and adversely affect quality of life, thereby imposing substantial socioeconomic and healthcare burdens.

Aim: This review aims to comprehensively summarize the current evidence regarding the epidemiology, occupational risk factors, pathophysiological mechanisms, clinical burden, diagnosis, prevention, and management of occupational varicose veins among school teachers. Furthermore, it highlights the contribution of workplace-related factors to disease development and discusses evidence-based preventive strategies from an occupational health and industrial medicine perspective.

Conclusion: Occupational varicose veins among school teachers represent an important yet often underrecognized work-related health problem. Prolonged standing, inadequate ergonomic practices, insufficient movement during working hours, and cumulative occupational exposure interact with established individual risk factors to promote venous insufficiency and disease progression. Early recognition of high-risk individuals, implementation of workplace ergonomic interventions, promotion of regular physical activity, periodic occupational health surveillance, and increased awareness among teachers and healthcare providers are essential to reduce disease burden and improve occupational well-being. Integrating preventive measures into school health policies and occupational health programs may substantially decrease the incidence and progression of varicose veins while preserving teachers' functional capacity, productivity, and overall quality of life.

Keywords: Varicose Veins, School Teachers, Occupational Risk Factors

Introduction

Teaching is one of the most essential professions in every society, contributing directly to educational development and human capital formation. Despite its significant social value, teaching has become increasingly recognized as an occupation associated with multiple health hazards resulting from both physical and psychosocial workplace demands. Teachers are routinely exposed to prolonged standing, static postures, repetitive movements, extended working hours, high workloads, and occupational stress. These occupational exposures have been associated with a wide spectrum of work-related disorders, including musculoskeletal disorders, voice disorders, psychological distress, and chronic vascular diseases. Consequently, protecting teachers' health has become an important priority within occupational health and industrial medicine, not only to preserve individual well-being but also to maintain educational quality and workforce sustainability. [1]

Among occupational vascular disorders, varicose veins represent one of the most prevalent manifestations of chronic venous disease. They are characterized by permanent dilatation, elongation, and tortuosity of superficial veins resulting from venous valvular incompetence and sustained venous hypertension. Although often regarded as a cosmetic condition, varicose veins are now recognized as a progressive chronic disease that may lead to pain, leg heaviness, edema, skin changes, reduced mobility, chronic venous insufficiency, and venous ulceration if left untreated. These complications adversely affect quality of life, functional capacity, and work productivity while imposing considerable healthcare and socioeconomic burdens. [2]

Occupational factors play a pivotal role in the development and progression of varicose veins. Among these, prolonged standing has consistently been identified as one of the strongest occupational risk factors because it increases hydrostatic pressure within the lower extremity venous system, impairs venous return, promotes venous stasis, and accelerates venous valve dysfunction. Additional workplace factors, including prolonged sitting, inadequate opportunities for movement, repetitive static postures, and physically demanding activities, may further contribute to venous hypertension. These occupational exposures often interact with non-modifiable factors such as advancing age, female sex, hereditary predisposition, and previous pregnancy, thereby increasing the overall risk of chronic venous disease. [3]

School teachers constitute a particularly vulnerable occupational group because their daily responsibilities require prolonged standing while delivering lectures, supervising classrooms, writing on boards, interacting with students, and performing various administrative activities. Many teachers spend several consecutive hours standing with limited opportunities for walking or changing posture, particularly in overcrowded classrooms and resource-limited educational settings. Such cumulative occupational exposure may substantially increase the likelihood of developing occupational varicose veins, especially after many years of professional service. Therefore, teachers should be considered an important occupational group for venous health surveillance and preventive workplace interventions. [4]

The burden of occupational varicose veins extends beyond physical symptoms. Persistent lower limb discomfort, pain, swelling, fatigue, and reduced endurance may impair teachers' ability to conduct classroom activities effectively, resulting in decreased productivity, increased sickness absenteeism, reduced job satisfaction, and diminished quality of life. As educational systems increasingly emphasize workforce retention and occupational well-being, preventing work-related vascular disorders has become an important component of comprehensive occupational health programs. [5]

Although numerous studies have investigated chronic venous disease in the general population and among workers exposed to prolonged standing, evidence focusing specifically on school teachers remains fragmented. Existing publications vary considerably regarding reported prevalence, occupational determinants, associated risk factors, preventive measures, and clinical outcomes. Furthermore, few reviews have comprehensively integrated the available evidence from an occupational health and industrial medicine perspective while emphasizing mechanisms linking teaching-related

occupational exposures with venous disease development. [6]

Aim of the review: This review aims to comprehensively summarize the current evidence regarding occupational varicose veins among school teachers, with particular emphasis on epidemiology, occupational and individual risk factors, pathophysiological mechanisms, clinical manifestations, disease burden, diagnosis, preventive strategies, and current management approaches. In addition, the review highlights the importance of occupational health interventions that may reduce disease occurrence, improve teachers' health and quality of life, and support healthier educational workplaces.

Research gap: Despite growing recognition of occupational health hazards among teachers, occupational varicose veins remain an underrecognized and insufficiently investigated condition. Current evidence is dispersed across epidemiological, vascular, and occupational health literature, with limited synthesis specifically addressing school teachers. A comprehensive review integrating occupational exposures, disease mechanisms, clinical implications, and preventive strategies is therefore needed to support evidence-based occupational health policies, guide future research, and promote effective workplace interventions for this high-risk professional group.

Teaching Profession as an Occupational Risk Group

Teaching is a highly demanding occupation that combines educational, administrative, emotional, and physical responsibilities. Although it is often perceived as a non-hazardous profession, teachers are exposed daily to several occupational stressors that may negatively affect their physical and psychological health. Their work frequently requires long classroom hours, prolonged standing, repetitive movements, continuous communication, supervision of students, and performance of administrative duties beyond formal teaching time. These demands may accumulate over years and contribute to chronic occupational health problems, including musculoskeletal, vocal, psychological, and vascular disorders. [7]

The occupational well-being of teachers is closely linked to their ability to maintain professional performance, emotional stability, and physical capacity throughout the working day. Teacher well-being is not limited to mental satisfaction but also includes the capacity to balance workload, health, personal life, and professional fulfillment. When occupational health problems are neglected, teachers may experience fatigue, reduced motivation, impaired classroom performance, and decreased job satisfaction. Therefore, preserving teachers' health is essential not only for the individual worker but also for educational quality and institutional productivity. [8]

Modern teaching environments have become increasingly complex because teachers are expected to manage large classrooms, meet curriculum demands, adapt to educational reforms, handle administrative documentation, and respond to students' social and emotional needs. These combined responsibilities may increase occupational strain and reduce opportunities for adequate rest or movement during working hours. From an occupational medicine perspective, such conditions create a setting in which chronic disorders may develop gradually, particularly when exposure is repeated over many years without preventive workplace measures. [9]

Physical workload in teaching is often underestimated because the profession does not usually involve heavy industrial labor. However, many teaching tasks require sustained upright posture, repeated transitions between standing and sitting, board writing, classroom walking, bending over desks, and carrying books or teaching materials. Prolonged standing is especially relevant to venous health because it increases gravitational pressure in the lower limbs and may impair venous return. When combined with limited active calf muscle contraction, this exposure may contribute to venous pooling and progressive venous insufficiency. [10]

Teachers also face psychosocial stressors that may indirectly influence physical health. High work demands, time pressure, limited administrative support, emotional exhaustion, and low job satisfaction can reduce engagement in healthy behaviors, physical activity, and timely medical care. Occupational stress may also increase fatigue and decrease adherence to preventive practices such as regular movement breaks, leg elevation, weight control, and use of compression when indicated. Thus, venous disease among teachers should be understood as a multifactorial occupational problem influenced by

both physical and psychosocial workplace conditions. [11]

Because teachers represent a large and socially important workforce, their occupational health problems have broad consequences. Chronic symptoms such as leg heaviness, swelling, pain, or visible varicosities may reduce comfort during classroom activities and impair the ability to stand for long teaching sessions. Over time, untreated venous symptoms may contribute to sickness absence, reduced productivity, early treatment costs, and diminished quality of life. Recognizing school teachers as an occupational risk group is therefore a necessary step toward surveillance, prevention, and early intervention for occupational varicose veins. [12]

Epidemiology of Occupational Varicose Veins among School Teachers

Varicose veins are among the most prevalent manifestations of chronic venous disease and represent a major public health and occupational health concern worldwide. The disease affects millions of adults and imposes a considerable burden on healthcare systems through outpatient care, interventional procedures, work absenteeism, and reduced productivity. Although varicose veins are often perceived as a cosmetic condition, increasing evidence recognizes them as a chronic progressive vascular disorder that may substantially impair quality of life and occupational performance if left untreated. [13]

The epidemiology of varicose veins varies considerably across populations owing to differences in age structure, sex distribution, genetic susceptibility, occupational exposure, diagnostic criteria, and lifestyle factors. Epidemiological studies consistently demonstrate higher prevalence among women than men, with disease frequency increasing progressively with advancing age. Additional determinants such as obesity, pregnancy, family history, previous deep vein thrombosis, and prolonged occupational standing further contribute to disease occurrence and progression. These findings indicate that varicose veins arise from a complex interaction between constitutional and environmental factors. [14]

Occupational exposure has emerged as one of the most important modifiable determinants of lower limb varicose veins. Workers whose occupations require prolonged standing are consistently reported to have a greater risk of developing chronic venous disease than workers with more dynamic movement patterns. Prolonged standing increases hydrostatic pressure within the lower extremity veins, leading to venous pooling, venous hypertension, valvular dysfunction, and gradual dilation of superficial veins. Repeated exposure over many years substantially increases cumulative venous damage and disease progression. [15]

School teachers represent an occupational group with prolonged daily exposure to static standing during classroom instruction, student supervision, examinations, and other educational activities. Unlike occupations that alternate between sitting and walking, teachers often remain standing in relatively fixed positions for several consecutive hours with limited opportunities for leg movement. This occupational pattern reduces the effectiveness of the calf muscle pump and promotes venous stasis, thereby increasing susceptibility to occupational varicose veins and chronic venous insufficiency. [16]

Several occupational studies have identified teaching as a profession associated with increased risk of lower limb venous disorders because of the cumulative duration of standing throughout a teacher's career. Risk appears to increase with longer years of employment, greater daily teaching hours, higher classroom workload, and inadequate opportunities for rest. Furthermore, occupational exposure may interact synergistically with established risk factors such as female sex, obesity, pregnancy, advancing age, and hereditary predisposition, resulting in substantially greater disease risk among susceptible individuals. [17]

Despite growing awareness of occupational venous disease, epidemiological evidence specifically addressing school teachers remains relatively limited compared with studies involving healthcare workers, retail employees, and industrial workers. Existing studies differ in study design, diagnostic methods, sample characteristics, and reported prevalence, making direct comparisons difficult. Nevertheless, available evidence consistently supports the recognition of school teachers as an occupational group at elevated risk of developing varicose veins, highlighting the need for regular occupational health surveillance, early detection, and implementation of preventive workplace interventions. [18]

Pathophysiological Mechanisms of Occupational Varicose Veins

Varicose veins develop as a consequence of chronic venous hypertension resulting from the interaction between venous valve dysfunction and abnormalities of the venous wall. Under normal physiological conditions, venous valves, together with contraction of the calf muscles, maintain unidirectional blood flow from the lower extremities toward the heart despite the effects of gravity. When venous valves become incompetent, retrograde blood flow (venous reflux) occurs, leading to persistent venous hypertension, progressive venous dilatation, and further deterioration of valve function, thereby establishing a self-perpetuating cycle of chronic venous disease. [19]

Occupational exposure to prolonged standing plays a central role in initiating these pathological changes. During prolonged static standing, the absence of adequate calf muscle contraction reduces the efficiency of the venous muscle pump, resulting in blood pooling within the superficial veins of the lower limbs. The sustained increase in hydrostatic pressure causes venous distension, mechanical stress on the venous wall, and progressive impairment of valvular competence. Repeated daily exposure over several years accelerates the development of chronic venous insufficiency, particularly among occupations such as school teaching where opportunities for movement are limited. [20]

Beyond hemodynamic alterations, chronic venous hypertension initiates a cascade of inflammatory and cellular events that contribute to disease progression. Venous stasis and tissue hypoxia stimulate endothelial cell activation and the release of inflammatory mediators, cytokines, and growth factors. These mediators recruit leukocytes, including neutrophils, macrophages, and monocytes, into the venous wall, promoting chronic inflammation and structural remodeling. Persistent inflammatory activity weakens the extracellular matrix, alters collagen and elastin organization, and reduces the mechanical strength of the venous wall. [21]

Matrix metalloproteinases, reactive oxygen species, adhesion molecules, and pro-inflammatory cytokines have all been implicated in the remodeling process of varicose veins. Activated macrophages and monocytes release proteolytic enzymes that degrade extracellular matrix proteins and damage venous valves, while oxidative stress further impairs endothelial function. Simultaneously, growth factors stimulate smooth muscle cell migration, proliferation, and phenotypic alteration, contributing to venous wall thickening and progressive vascular remodeling. These molecular mechanisms explain why varicose veins continue to progress even after the initial mechanical insult has occurred. [22]

The pathophysiological process is further influenced by several constitutional and occupational factors. Aging reduces venous wall elasticity, female hormonal influences may weaken connective tissue, obesity increases intra-abdominal pressure, and pregnancy further elevates venous pressure through hormonal and mechanical effects. When these non-modifiable factors coexist with prolonged occupational standing, as commonly observed among school teachers, cumulative venous damage becomes substantially greater than either exposure alone, accelerating disease onset and progression. [23]

Ultimately, sustained venous hypertension leads to visible varicosities and may progress to chronic venous insufficiency characterized by edema, skin pigmentation, lipodermatosclerosis, and venous ulceration. These pathological changes explain the progressive clinical spectrum of occupational varicose veins and emphasize the importance of early preventive interventions before irreversible structural damage develops. Understanding these mechanisms provides the biological basis for workplace modifications, regular movement, compression therapy when indicated, and other occupational health strategies aimed at preserving venous function among school teachers. [24]

Occupational and Non-Occupational Risk Factors

The development of varicose veins is multifactorial, resulting from the interaction between non-modifiable individual characteristics and modifiable occupational and lifestyle exposures. Although genetic susceptibility and aging contribute substantially to disease occurrence, occupational factors often determine the onset and progression of venous insufficiency among working populations. Understanding these determinants is essential for identifying high-risk workers and implementing effective preventive strategies in occupational settings, particularly among school teachers. [25]

Age is one of the strongest predictors of varicose veins because progressive degeneration of venous valves and reduced elasticity of the venous wall occur with advancing years. Epidemiological studies consistently demonstrate an age-dependent increase in disease prevalence, reflecting cumulative exposure to venous hypertension and gradual deterioration of connective tissue. Likewise, female sex is associated with a higher incidence of varicose veins owing to hormonal influences on venous wall integrity, pregnancy-related hemodynamic changes, and differences in connective tissue composition compared with males. [26]

Family history represents another important non-modifiable determinant of chronic venous disease. Individuals with a positive family history have an increased likelihood of developing varicose veins, suggesting an inherited predisposition involving connective tissue structure, venous wall function, and valvular competence. In addition, a previous history of deep vein thrombosis may damage venous valves permanently, predisposing affected individuals to chronic venous insufficiency and secondary varicose veins. [27]

Several modifiable lifestyle factors also contribute to disease development. Obesity increases intra-abdominal pressure, impedes venous return from the lower limbs, and promotes venous hypertension. Physical inactivity weakens the calf muscle pump, reducing its ability to propel venous blood toward the heart, whereas maintaining a healthy body weight and engaging in regular moderate physical activity improve venous circulation and may reduce disease progression. These findings emphasize the importance of lifestyle modification as part of comprehensive prevention strategies. [28]

Among occupational exposures, prolonged standing remains the most consistently recognized risk factor for lower limb varicose veins. Standing for extended periods without sufficient walking or positional changes results in sustained hydrostatic pressure within the lower extremity veins, venous pooling, and progressive valve dysfunction. Although prolonged sitting has also been associated with impaired venous return, static standing generally imposes a greater mechanical burden on the superficial venous system because of continuous gravitational loading. Occupations characterized by prolonged standing therefore demonstrate consistently higher rates of chronic venous disease. [29]

School teachers experience a unique combination of occupational exposures that amplify venous risk. Daily teaching activities require standing during lectures, supervising classrooms, writing on boards, monitoring examinations, and interacting continuously with students, often with few opportunities for movement or rest. Long teaching hours, increasing years of employment, classroom overcrowding, inadequate workplace ergonomics, and limited awareness of preventive measures further increase cumulative occupational exposure. Consequently, the interaction between occupational standing and individual susceptibility places teachers among the professional groups at increased risk for occupational varicose veins, highlighting the need for targeted occupational health surveillance and preventive workplace interventions. [30]

Why School Teachers Are at Increased Risk of Occupational Varicose Veins

School teaching is characterized by a unique occupational profile that combines prolonged standing, repetitive classroom activities, limited opportunities for movement, and sustained physical and mental demands. Unlike many office-based occupations where workers may alternate between sitting and walking, teachers often remain standing throughout lectures while maintaining students' attention, explaining lessons, writing on classroom boards, and supervising educational activities. This prolonged static posture substantially increases hydrostatic pressure within the lower extremity venous system, making teachers particularly susceptible to chronic venous insufficiency and occupational varicose veins. [31]

The daily workload of teachers extends beyond classroom instruction and includes lesson preparation, invigilation during examinations, student counseling, meetings, administrative documentation, and extracurricular activities. These additional responsibilities frequently prolong working hours and reduce opportunities for adequate recovery between periods of standing. Consequently, the cumulative duration of occupational standing may exceed several hours each working day, resulting in repeated venous stress that progressively impairs venous valve function over years of professional service. [32]

The working environment may further amplify venous risk. Overcrowded classrooms, inadequate classroom design, insufficient seating opportunities, and limited scheduled breaks often restrict teachers' ability to change posture or engage in brief walking periods that activate the calf muscle pump. Furthermore, educational systems with high student-to-teacher ratios and intensive teaching schedules may increase continuous standing time while reducing opportunities for leg elevation or other preventive measures during the working day. Such workplace characteristics create conditions favorable for venous stasis and chronic venous hypertension. [33]

Occupational exposure among teachers rarely occurs in isolation but frequently coexists with individual susceptibility factors. Female teachers represent a substantial proportion of the educational workforce, and female sex is independently associated with a higher prevalence of varicose veins because of hormonal influences and pregnancy-related venous changes. Advancing age, obesity, prolonged employment duration, hereditary predisposition, and previous pregnancies may further interact with occupational standing, producing a cumulative effect that markedly increases disease risk compared with either occupational or individual factors alone. [34]

Early venous symptoms among teachers are often overlooked because leg heaviness, fatigue, aching pain, or mild ankle swelling are commonly attributed to routine occupational fatigue rather than early chronic venous disease. Consequently, many teachers continue their normal work activities without seeking medical evaluation until visible varicosities or more advanced symptoms develop. Delayed recognition may allow progressive deterioration of venous function, increasing the likelihood of chronic venous insufficiency and long-term complications that could otherwise have been prevented through early intervention. [35]

Recognition of school teachers as an occupationally vulnerable population has important implications for occupational health practice. Periodic health surveillance, workplace ergonomic improvements, education regarding venous disease, encouragement of regular movement breaks, promotion of healthy body weight and physical activity, and timely referral for vascular assessment among symptomatic individuals should be incorporated into school occupational health programs. Such preventive strategies may reduce disease progression, preserve teachers' functional capacity, and improve long-term occupational well-being while minimizing the economic burden associated with chronic venous disease. [36]

Clinical Manifestations, Disease Burden, and Diagnosis

The clinical manifestations of varicose veins range from asymptomatic superficial venous dilatation to advanced chronic venous insufficiency with significant functional impairment. Early-stage disease may initially present with visible dilated superficial veins without substantial discomfort; however, as venous hypertension progresses, patients frequently develop lower limb heaviness, aching pain, fatigue, burning sensation, nocturnal leg cramps, itching, and ankle swelling that typically worsen after prolonged standing and improve with rest or leg elevation. These symptoms may progressively interfere with daily activities and occupational performance, particularly among workers whose duties require extended standing such as school teachers. [37]

Chronic venous disease progresses through a well-recognized clinical spectrum. Early manifestations include telangiectasia and reticular veins, followed by clinically apparent varicose veins resulting from superficial venous incompetence. Continued venous hypertension eventually leads to persistent lower limb edema, skin hyperpigmentation secondary to hemosiderin deposition, venous eczema, and lipodermatosclerosis. In advanced stages, chronic inflammation and tissue hypoxia may culminate in venous ulceration, representing the most severe manifestation of chronic venous insufficiency and a major cause of disability and healthcare utilization. [38]

The burden of occupational varicose veins extends well beyond physical symptoms. Persistent lower limb discomfort may reduce teachers' ability to stand comfortably throughout classroom sessions, impair concentration, decrease work efficiency, and limit participation in prolonged educational activities. Progressive symptoms may contribute to sickness absenteeism, reduced productivity, diminished occupational satisfaction, and impaired quality of life. From an occupational medicine perspective, these

consequences affect not only individual workers but also educational institutions through increased healthcare costs, reduced workforce efficiency, and greater demands for replacement staff during prolonged sick leave. [39]

Clinical evaluation begins with a comprehensive occupational and medical history, including symptom duration, occupational standing exposure, previous pregnancies, family history, obesity, previous deep vein thrombosis, and lifestyle factors. Physical examination should assess the distribution and size of varicose veins, presence of edema, skin pigmentation, dermatitis, lipodermatosclerosis, ulceration, and other features suggestive of chronic venous insufficiency. Careful assessment of occupational exposure is particularly important among teachers because cumulative standing duration may contribute significantly to disease severity. [40]

The Clinical-Etiological-Anatomical-Pathophysiological (CEAP) classification remains the internationally accepted system for describing chronic venous disease and standardizing clinical assessment. The CEAP classification categorizes disease according to clinical severity, underlying etiology, anatomical distribution, and pathophysiological mechanisms, thereby facilitating communication among clinicians, improving disease staging, and supporting treatment planning. Although CEAP does not determine treatment directly, it provides an essential framework for evaluating disease progression and monitoring clinical outcomes over time. [41]

Duplex ultrasonography is considered the diagnostic gold standard for evaluating lower limb venous disease because it provides a comprehensive assessment of venous anatomy, valve competence, venous reflux, and blood flow. The technique is non-invasive, painless, widely available, and capable of identifying superficial venous insufficiency, incompetent perforating veins, deep venous pathology, and associated thrombotic disease. Early diagnosis through clinical assessment and duplex ultrasonography enables timely implementation of conservative or interventional management, thereby reducing disease progression and minimizing long-term occupational disability among school teachers. [42]

Prevention and Management of Occupational Varicose Veins

The prevention of occupational varicose veins should primarily focus on reducing prolonged venous hypertension before irreversible structural changes develop. Because chronic venous disease progresses gradually over many years of occupational exposure, preventive strategies are considerably more effective when implemented early. From an occupational health perspective, prevention should combine workplace modifications, individual lifestyle interventions, health education, and periodic medical surveillance to minimize cumulative venous stress among school teachers. [43]

Reducing prolonged static standing represents the cornerstone of occupational prevention. Teachers should be encouraged to alternate between standing, walking, and sitting whenever classroom activities permit. Brief movement breaks throughout the working day activate the calf muscle pump, enhance venous return, reduce venous pooling, and decrease hydrostatic pressure within the lower extremities. Classroom organization and teaching methods should therefore be adapted, where feasible, to promote regular posture changes without compromising educational activities. [44]

Lifestyle modification is another essential component of disease prevention. Maintaining a healthy body weight, engaging in regular moderate physical activity, avoiding prolonged sedentary behavior outside working hours, and elevating the legs after prolonged standing all contribute to improved venous circulation. Physical exercise strengthens the calf muscles, enhances venous pump function, and facilitates venous return, thereby reducing the progression of chronic venous insufficiency. Conversely, obesity and physical inactivity increase venous pressure and accelerate disease development. [45]

Conservative management remains the first-line approach for many patients with uncomplicated varicose veins and includes compression therapy, lifestyle modification, leg elevation, and pharmacological agents when appropriate. Graduated compression stockings improve venous return by reducing venous distension and edema, thereby relieving symptoms such as leg heaviness, swelling, and discomfort. In addition, venoactive medications (phlebotonics), particularly flavonoid-based preparations, may improve venous tone, reduce capillary permeability, and provide symptomatic relief in selected patients, although they should complement rather than replace lifestyle and occupational

interventions. [46]

Patients with persistent symptoms, significant venous reflux, or advanced chronic venous disease may require interventional treatment. Contemporary minimally invasive procedures, including endovenous thermal ablation and ultrasound-guided foam sclerotherapy, have largely replaced conventional surgical stripping for many patients because they provide high success rates, faster recovery, less postoperative pain, and lower complication rates. Surgical intervention remains appropriate in selected cases where minimally invasive techniques are unsuitable or have failed. Treatment decisions should be individualized according to symptom severity, duplex ultrasonography findings, anatomical characteristics, and patient preferences. [47]

From an occupational medicine perspective, employers and educational institutions play an important role in primary prevention. School-based occupational health programs should incorporate health education regarding venous disease, ergonomic workplace assessments, scheduled movement breaks, encouragement of regular physical activity, and early referral of symptomatic teachers for vascular evaluation. Periodic occupational health surveillance may facilitate early detection of venous disease before complications develop, thereby preserving work ability, reducing sickness absenteeism, and improving long-term quality of life among teachers. Integrating these preventive measures into occupational health policies may substantially reduce the burden of occupational varicose veins within the educational workforce. [48]

Conclusion and Future Perspectives

Occupational varicose veins represent an important but frequently underrecognized occupational health problem among school teachers. The nature of the teaching profession exposes educators to prolonged standing, static postures, repetitive classroom activities, and limited opportunities for movement, all of which contribute to sustained venous hypertension and progressive venous valve dysfunction. When these occupational exposures coexist with established non-modifiable risk factors such as advancing age, female sex, hereditary predisposition, obesity, and pregnancy, the likelihood of developing chronic venous disease increases substantially. [49]

The available evidence demonstrates that occupational varicose veins should no longer be considered merely a cosmetic condition but rather a chronic vascular disorder capable of impairing physical function, work performance, quality of life, and long-term occupational productivity. Early recognition of symptoms, timely diagnosis using duplex ultrasonography, and implementation of preventive measures are essential to interrupt disease progression before irreversible complications such as chronic venous insufficiency and venous ulceration develop. Furthermore, occupational health surveillance programs should include routine assessment of venous health among teachers, particularly those with prolonged teaching experience or additional individual risk factors. [50]

Future research should focus on large multicenter prospective studies evaluating the true prevalence and incidence of occupational varicose veins among teachers using standardized diagnostic criteria such as the CEAP classification and duplex ultrasonography. Additional studies are also needed to quantify the cumulative effects of standing duration, teaching workload, classroom ergonomics, and years of employment on venous disease progression. Evaluating the effectiveness of workplace interventions—including ergonomic modifications, scheduled movement breaks, health education programs, compression therapy, and physical activity promotion—will provide stronger evidence for developing evidence-based occupational health policies. Such initiatives have the potential to improve teachers' vascular health, preserve work ability, reduce healthcare costs, and promote healthier educational workplaces for future generations.

References

1. Gloviczki P, Comerota AJ, Dalsing MC, 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(5 Suppl):2S-48S.
2. Wittens C, Davies AH, Bækgaard N, et al. Management of chronic venous disease: Clinical practice guidelines of the European Society for Vascular Surgery (ESVS). Eur J Vasc Endovasc Surg. 2015;49(6):678-737.
3. Rabe E, Pannier F. Clinical, etiological, anatomical and pathophysiological (CEAP) classification: Gold standard and limits. Phlebology. 2012;27(Suppl 1):114-118.
4. Eklöf B, Rutherford RB, Bergan JJ, et al. Revision of the CEAP classification for chronic venous disorders: Consensus statement. J Vasc Surg. 2004;40(6):1248-1252.
5. Beebe HG, Bergan JJ, Bergqvist D, et al. Classification and grading of chronic venous disease in the lower limbs: A consensus statement. Eur J Vasc Endovasc Surg. 1996;12(4):487-491.
6. Raffetto JD, Khalil RA. Mechanisms of varicose vein formation: Valve dysfunction and wall dilation. Phlebology. 2008;23(2):85-98.
7. Raffetto JD. Pathophysiology of chronic venous disease and venous ulcers. Surg Clin North Am. 2018;98(2):337-347.
8. Santler B, Goerge T. Chronic venous insufficiency—A review of pathophysiology, diagnosis, and treatment. J Dtsch Dermatol Ges. 2017;15(5):538-556.
9. Rabe E, Breu FX, Cavezzi A, et al. European guidelines for sclerotherapy in chronic venous disorders. Phlebology. 2014;29(6):338-354.
10. Paravastu SCV, Horne M, Dodd PDF. Endovenous ablation techniques, surgery and foam sclerotherapy for varicose veins. Cochrane Database Syst Rev. 2016;(11):CD005624.
11. Raetz J, Wilson M, Collins K. Varicose veins: Diagnosis and treatment. Am Fam Physician. 2019;99(11):682-688.
12. Bush RG, Derrick M, Manjoney D. Major pathways and treatment options for chronic venous disease. J Vasc Surg Venous Lymphat Disord. 2017.
13. Evans CJ, Fowkes FGR, Ruckley CV, Lee AJ. Prevalence of varicose veins and chronic venous insufficiency in men and women in the general population: Edinburgh Vein Study. J Epidemiol Community Health. 1999;53(3):149-153.
14. Brand FN, Dannenberg AL, Abbott RD, Kannel WB. The epidemiology of varicose veins: The Framingham Study. Am J Prev Med. 1988;4(2):96-101.
15. Zöller B, Ji J, Sundquist J, Sundquist K. Family history and risk of hospital treatment for varicose veins in Sweden. Br J Surg. 2012;99(7):948-953.
16. Rabe E, Guex JJ, Puskas A, Scuderi A, Fernandez Quesada F. Epidemiology of chronic venous disorders in geographically diverse populations: Results from the Vein Consult Program. Int Angiol. 2012;31(2):105-115.
17. Prochaska JH, Arnold N, Falcke A, et al. Chronic venous disease and its clinical manifestations. Vasa. 2021.
18. Eberhardt RT, Raffetto JD. Chronic venous insufficiency. Circulation. 2014;130(4):333-346.
19. Partsch H. Compression therapy of the legs: New aspects. Dermatol Surg. 2009.
20. Ono T, Bergan JJ, Schmid-Schönbein GW, Takase S. Monocyte infiltration into venous valves in varicose veins. J Vasc Surg. 1998.
21. Lurie F, Passman M, Meisner M, et al. The 2020 update of the CEAP classification system and reporting standards. J Vasc Surg Venous Lymphat Disord. 2020;8(3):342-352.
22. Meissner MH, Gloviczki P, Bergan J, et al. Primary chronic venous disorders. J Vasc Surg. 2007;46(Suppl S):54S-67S.
23. Porter JM, Moneta GL; International Consensus Committee on Chronic Venous Disease. Reporting standards in venous

disease: An update. J Vasc Surg. 1995;21(4):635-645.

24. Kistner RL, Eklof B, Masuda EM. Diagnosis of chronic venous disease of the lower extremities: The CEAP classification. Mayo Clin Proc. 1996;71(4):338-345.
25. Labropoulos N, Leon LR Jr. Duplex evaluation of venous insufficiency. Semin Vasc Surg. 2005;18(1):5-9.
26. Coleridge Smith P. The causes of skin damage and leg ulceration in chronic venous disease. Int J Low Extrem Wounds. 2006;5(3):160-168.
27. Nicolaides AN. Investigation of chronic venous insufficiency: A consensus statement. Circulation. 2000;102(20):E126-E163.
28. Eberhardt RT, Raffetto JD. Chronic venous insufficiency. Circulation. 2014;130(4):333-346.
29. De Maeseneer MG, Kakkos SK, Aherne T, et al. Editor's Choice—European Society for Vascular Surgery (ESVS) 2022 Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs. Eur J Vasc Endovasc Surg. 2022;63(2):184-267.
30. Antani MR, Dattilo JB. Varicose Veins. In: StatPearls. Treasure Island, FL: StatPearls Publishing; 2023.
31. Patel SK, Manea C, Surowiec SM. Venous Insufficiency. In: StatPearls. Treasure Island, FL: StatPearls Publishing; 2024.
32. Chung JH. Varicose veins and the diagnosis of chronic venous disease: A review. Vasc Specialist Int. 2023.
33. Alsaigh T, Almulhim A. Varicose veins and chronic venous disease. Cardiol Clin. 2021;39(4):567-581.
34. Elamrawy S, Elkazaz AY, et al. Epidemiological, lifestyle, and occupational factors associated with lower limb varicose veins. J Epidemiol Glob Health. 2021.
35. Criqui MH, Denenberg JO, Bergan J, et al. Risk factors for chronic venous disease: The San Diego Population Study. J Vasc Surg. 2007;46(2):331-337.
36. Robertson L, Evans C, Fowkes FG. Epidemiology of chronic venous disease. Phlebology. 2008;23(3):103-111.
37. Bergan JJ, Schmid-Schönbein GW, Smith PD, Nicolaides AN, Boisseau MR, Eklof B. Chronic venous disease. N Engl J Med. 2006;355(5):488-498.
38. Moneta GL. Venous insufficiency. Med Clin North Am. 1998;82(3):459-473.
39. Coleridge Smith P. Management of chronic venous disease. Phlebology. 2009;24(Suppl 1):2-7.
40. Gloviczki P, Dalsing MC, Henke P, et al. Handbook of Venous Disorders: Guidelines of the American Venous Forum. 4th ed. CRC Press; 2017.
41. Perrin M, Eklof B, van Rij A, et al. Venous symptoms in chronic venous disease: A review. Phlebology. 2016;31(1 Suppl):3-9.
42. Ruckley CV. Socioeconomic impact of chronic venous insufficiency and leg ulcers. Angiology. 1997;48(1):67-69.
43. Beebe-Dimmer JL, Pfeifer JR, Engle JS, Schottenfeld D. The epidemiology of chronic venous insufficiency and varicose veins. Ann Epidemiol. 2005;15(3):175-184.
44. Carpentier PH, Maricq HR, Biro C, Ponçot-Makinen CO, Franco A. Prevalence, risk factors, and clinical patterns of chronic venous disorders. J Vasc Surg. 2004;40(4):650-659.
45. Tüchsen F, Hannerz H, Burr H, Krause N. Prolonged standing at work and hospitalization due to varicose veins. Scand J Work Environ Health. 2005;31(5):350-357.
46. Krause N, Lynch JW, Kaplan GA, Cohen RD, Goldberg DE, Salonen JT. Standing at work and progression of carotid atherosclerosis and vascular disease risk. Scand J Work Environ Health. 2000;26(3):227-236.
47. Mekky S, Schilling RSF, Walford J. Varicose veins in women working in different occupations. Br Med J. 1969;2:591-595.
48. Jawien A. The influence of environmental factors in chronic venous insufficiency. Angiology. 2003;54(Suppl 1):S19-S31.
49. Allegra C, Antignani PL, Bergan JJ, et al. The "C" of CEAP: Suggested definitions and refinements. Int Angiol. 2003;22(2):107-111.
50. World Health Organization. Healthy Workplaces: A Model for Action. Geneva: World Health Organization; 2010.