Varicose Veins and Prevalence: Systematic Review with ☸SAIMSARA.

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Abstract: This paper aims to systematically review the prevalence of varicose veins and synthesize associated demographic, occupational, and clinical factors based on the provided structured extraction summary. The review utilises 270 studies with 425805 total participants (naïve ΣN). This systematic review reveals that varicose veins represent a highly prevalent and multifactorial condition, affecting a substantial proportion of the adult population globally, with an unweighted median prevalence of 25.3%. Key research topics include the significant impact of occupational factors, strong genetic predispositions, and the influence of age, gender, and pregnancy on prevalence. The widespread reliance on cross-sectional study designs represents a limitation, hindering causal inference. Moving forward, large-scale prospective cohort studies and the implementation of standardized diagnostic protocols are crucial to enhance our understanding of varicose vein epidemiology and to inform more effective preventive and therapeutic strategies.

Keywords: Varicose veins; Prevalence; Epidemiology; Chronic venous insufficiency; Chronic venous disease; Occupational health; Nurses; Teachers; Healthcare workers; Risk factors

Review Stats

- Generated: 2026-02-15 13:04:09 CET
- Plan: Pro (expanded craft tokens; source: Semantic Scholar)
- Source: Semantic Scholar
- Scope: All fields
- Keyword Gate: Fuzzy (≥60% of required terms, minimum 2 terms matched in title/abstract)
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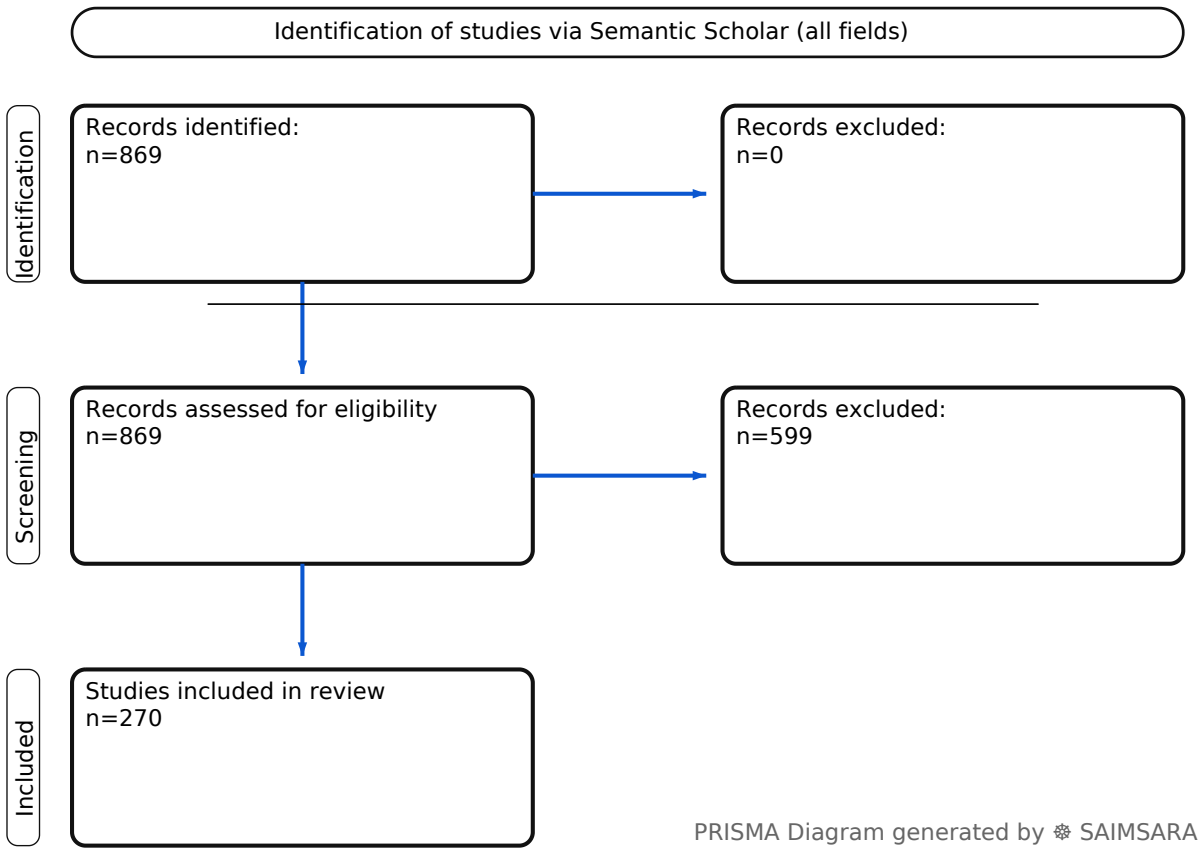
- Included original Abstracts/Papers: 270
- Total study participants (naïve ΣN): 425805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n=869
Records excluded:
n=0
Screening
Records assessed for eligibility
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Records excluded:
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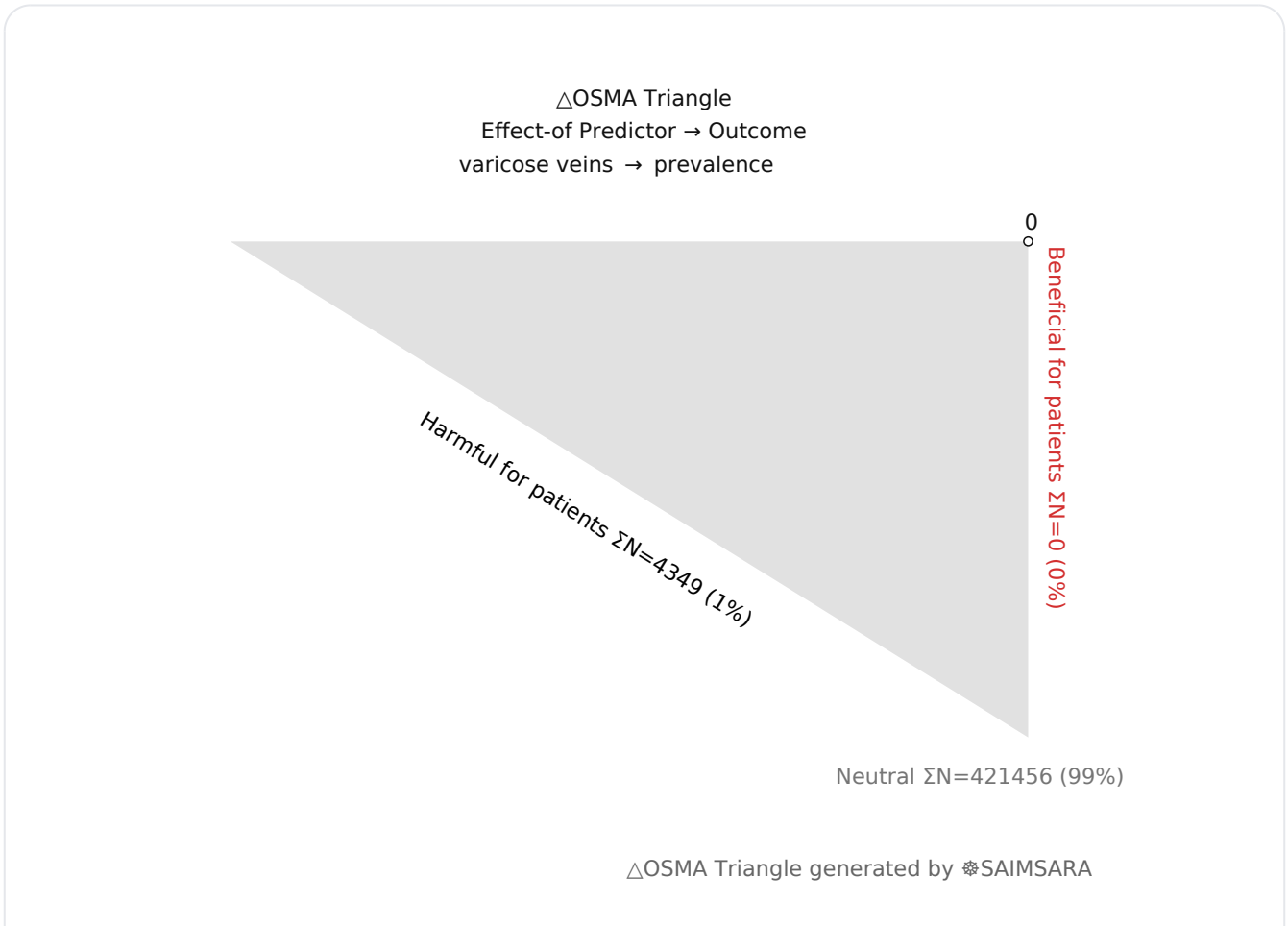
Included
Studies included in review
n=270
PRISMA Diagram generated by ☸ SAIMSARA


△OSMA Triangle
Effect-of Predictor → Outcome
varicose veins → prevalence
0
Beneficial for patients ΣN=0 (0%)
Harmful for patients ΣN=4349 (1%)
Neutral ΣN=421456 (99%)
△OSMA Triangle generated by ☸SAIMSARA

Outcome-Sentiment Meta-Analysis (OSMA): *(LLM-only)*

Frame: Effect-of Predictor → Outcome • *Source*: Semantic Scholar

Outcome: prevalence Typical timepoints: 50-y, 60-y. Reported metrics: %, CI, p.

Common endpoints: Common endpoints: healing, complications, recurrence.

Predictor: varicose veins — exposure/predictor. Routes seen: oral, subcutaneous. Typical comparator: non-diabetic patients. a, cvd in patients with hd, men, healthy subjects….

- **1) Beneficial for patients** — prevalence with varicose veins — — — ΣN=0
- **2) Harmful for patients** — prevalence with varicose veins — [214], [226], [230] — ΣN=4349
- **3) No clear effect** — prevalence with varicose veins — [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48], [49], [50], [51], [52], [53], [54], [55], [56], [57], [58], [59], [60], [61], [62], [63], [64], [65], [66], [67], [68], [69], [70], [71], [72], [73], [74], [75], [76], [77], [78], [79], [80], [81], [82], [83], [84], [85], [86], [87], [88], [89], [90], [91], [92], [93], [94], [95], [96], [97], [98], [99], [100], [101], [102], [103], [104], [105], [106], [107], [108], [109], [110], [111], [112], [113], [114], [115], [116], [117], [118], [119], [120], [121], [122], [123], [124], [125], [126], [127], [128], [129], [130], [131], [132], [133], [134], [135], [136], [137], [138], [139], [140], [141], [142], [143], [144], [145], [146], [147], [148], [149], [150], [151], [152], [153], [154], [155], [156], [157], [158], [159], [160], [161], [162], [163], [164], [165], [166], [167], [168], [169], [170], [171], [172], [173], [174], [175], [176], [177], [178], [179], [180], [181], [182], [183], [184], [185], [186], [187], [188], [189], [190], [191], [192], [193], [194], [195], [196], [197], [198], [199], [200], [201], [202], [203], [204], [205], [206], [207], [208], [209], [210], [211], [212], [213], [215], [216], [217], [218], [219], [220], [221], [222], [223], [224], [225], [227], [228], [229], [231], [232], [233], [234], [235], [236], [237], [238], [239], [240], [241], [242], [243], [244], [245], [246], [247], [248], [249], [250], [251], [252], [253], [254], [255], [256], [257], [258], [259], [260], [261], [262], [263], [264], [265], [266], [267], [268], [269], [270] — ΣN=421456

1) Introduction

Varicose veins (VVs) represent a significant global health concern, characterized by elongated, widened, and tortuous veins, predominantly affecting the lower extremities. This condition is widely recognized as a common manifestation of chronic venous disease (CVD) or chronic venous

insufficiency (CVI), impacting a substantial portion of the adult population worldwide. Its multifactorial etiology involves a complex interplay of genetic predispositions, demographic factors such as age and gender, and occupational exposures, including prolonged standing or sitting. Understanding the prevalence and associated risk factors of VVs is crucial for public health planning, early diagnosis, and targeted interventions.

2) Aim

This paper aims to systematically review the prevalence of varicose veins and synthesize associated demographic, occupational, and clinical factors based on the provided structured extraction summary.

3) Methods

Systematic review with multilayer AI research agent: keyword normalization, retrieval & structuring, and paper synthesis (see SAIMSARA About section for details).

- **Bias:** The qualitative assessment of study designs reveals a strong predominance of cross-sectional studies [1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 31, 34, 35, 50, 53, 54, 56, 58, 73, 74, 78, 85, 108, 112, 120, 126, 127, 130, 131, 135, 136, 142, 147, 164, 165, 167, 168, 172, 174, 199, 204, 206, 207, 215, 222, 223, 245, 246, 249, 251, 252, 255]. While some mixed designs, cohorts, experimental studies, and randomized controlled trials (RCTs) are present, the pervasive cross-sectional nature limits the ability to establish causality and introduces potential for selection bias due to varied populations and settings.

4) Results

4.1 Study characteristics

The included studies predominantly employed cross-sectional designs, with a notable presence of cohort, mixed, and experimental studies. Populations investigated were diverse, ranging from general adult populations and specific occupational groups such as nurses, teachers, and security guards, to patients with particular comorbidities or demographic profiles. Most studies did not report a follow-up period, while others had follow-ups ranging from 30 days to 10 years.

4.2 Main numerical result aligned to the query

The prevalence of varicose veins across various populations and settings demonstrates considerable heterogeneity, ranging from 0.784% [16] to 69.56% [73]. Among studies reporting a single prevalence percentage for varicose veins, the unweighted median prevalence was 25.3%. Representative prevalence figures include 8% among security guards in Lahore [1], 38% among final-

year nursing students in Bangalore [4], 13.3% in the Gutenberg Health Study [131], and 60% among healthcare workers [7]. This wide range underscores the influence of population characteristics, diagnostic methods, and geographical factors on reported prevalence rates.

4.3 Topic synthesis

- **Global and General Adult Prevalence:** Estimates range broadly, with reports of 5% to 30% [61, 129], 10% to 30% [134], 12% to 26% [36], and up to 60% [81] in the adult population. In specific regions, prevalence was 48.5% in Spain [211] and 35% in Portugal for chronic venous disease (CVD) [213].
- **Occupational Prevalence:**
- **Nurses:** Prevalence varied significantly, from 8% [13, 15] to 46% [35, 124] and 42% [207]. Chronic venous insufficiency (CVI) among nurses was reported at 65% [130]. Prolonged standing increased risk by 27 times for every additional hour [35, 124].
- **Teachers:** Prevalence ranged from 14.0% in Sahiwal [3] to 69.56% in primary school teachers [73]. Other figures include 18.8% in Saudi Arabia [6], 37.8% in Lahore [22], and 42% in the Aseer region [23].
- **Security Guards:** Prevalence was 8% in Lahore [1] and approximately 15% [14].
- **Healthcare Workers (General):** Overall prevalence was 60% [7], with ranges from 16.2% to 46% [124].
- **Other Occupations:** 50% for women with prolonged sitting jobs [11], 77.8% for hairdressers working >6 hours [20], 54.7% for tertiary care hospital workers [5, 126], and 38.41% for Korean cosmetics saleswomen [249].
- **Gender Differences:** Women generally exhibit a higher prevalence of varicose veins [27, 34 (35% women vs 12% men), 44 (79.8% women), 59 (females 4.25 times higher), 108, 113, 123, 125, 130 (women 36.14 times higher CVI), 202 (greater effect in females for SHBG), 211 (58.5% women vs 32.1% men in Spain), 251]. However, some studies reported higher prevalence in males, such as 74.5% [47], 91.25% [72], and a 3:1 male-to-female ratio for superficial venous insufficiency [204].
- **Age as a Factor:** Prevalence consistently increases with age [38, 72, 87, 116, 119, 129, 155, 176, 198, 264]. Specific age groups showed high prevalence, such as 87.5% for age >35 years [47], 55.2% for 26-35 age group skilled laborers [126], and 58.7% for individuals with severe obesity [137].
- **Pregnancy and Parity:** Identified as a significant risk factor, with prevalence of lower limb varicose disease during pregnancy reported as high as 72.7% [169]. Pregnancy and number of deliveries had an odds ratio (OR) of 3.041 [82].
- **Family History and Genetics:** A strong association exists, with family history being an independent predictor (OR 6.23) [31] and 69% of patients having a positive family history

[44]. High heritability (17.3%) of CVD is noted [149], and specific genetic variants like PIEZO1 [182, 183] and EFEMP1 [80] are associated with increased risk.

- **Obesity and Body Mass Index (BMI):** Obesity is a risk factor [27, 50, 82 (OR 1.338), 108, 137, 177, 255]. Varicose veins were highly prevalent (58.7%) among individuals with severe obesity [137].
- **Prolonged Standing or Sitting:** Consistently identified as a major risk factor, with odds of VVs increasing 27 times for every additional hour of standing per day [35, 124]. Prolonged static activity had an OR of 11.262 [82].
- **Associated Conditions:**
- **Chronic Venous Insufficiency (CVI):** Highly prevalent (40.8%) [131], with varicose veins often an early manifestation (30-40% of adults) [123].
- **Deep Vein Thrombosis (DVT):** Varicose veins are a risk factor for DVT [166, 170, 188, 190, 191, 214 (OR=1.990), 224, 225, 226, 230, 265 (HR 2.8)]. Asymptomatic DVT was found in 4.64% of primary VV patients [79].
- **Hemorrhoidal Disease:** A substantial prevalence of concurrent hemorrhoidal disease (HD) and CVD (42.9%) was found [29].
- **Pelvic Venous Disorders (PeVD):** Prevalence of pelvic venous insufficiency (PVI) ranged from 4.45% to 26.95% by age group [244], with lower extremity varicosities present in 35% of PeVD patients [186].
- **Hypertension and Diabetes:** Both are associated with varicose veins [28, 77, 86, 100, 215].
- **Connective Tissue Dysplasia:** Varicose veins were present in 56% of patients with moderate to severe connective tissue dysplasia [187].
- **Liver Cirrhosis:** Varicose veins were detected in 71.3% of patients with cirrhosis [152].
- **Pelvic Organ Prolapse (POP):** Patients with POP reported a higher prevalence of varicose veins [146, 196].
- **Senile Cataract:** Associated with an increased likelihood of detection in patients with varicose veins by 3.7 times [112].
- **Symptom Presentation:** Common symptoms include varicosities (80.85%) and pain (71.49%) [47], prominent veins (39.2%), and prominent veins with edema (32.3%) [125]. Poor sleep quality is significantly associated with leg pain [83].

5) Discussion

5.1 Principal finding

This systematic review highlights a highly variable prevalence of varicose veins across different populations and settings, with an unweighted median prevalence of 25.3% (ranging from 0.784% to 69.56%) [1, 73]. This broad range underscores the complex interplay of demographic, occupational,

and genetic factors influencing the condition.

5.2 Clinical implications

- **Targeted Screening and Prevention:** Given the high prevalence in specific occupational groups (e.g., nurses, teachers, security guards, skilled laborers) [1, 3, 4, 5, 6, 7, 9, 13, 14, 17, 18, 20, 22, 23, 24, 26, 35, 50, 53, 54, 73, 124, 126, 136, 172, 179, 206, 207, 215, 249, 251, 252], occupational health programs should implement targeted screening and ergonomic interventions, such as promoting movement and recommending compression hosiery [237].
- **Risk Factor Management:** Clinicians should counsel patients, particularly women [27, 34, 44, 59, 108, 113, 123, 125, 130, 202, 211, 251], older individuals [38, 72, 87, 116, 119, 129, 155, 176, 198, 264], and those with a family history [31, 44, 80, 82, 149, 180, 207], about lifestyle modifications, including weight management for obese individuals [82, 137, 255] and strategies to mitigate prolonged standing/sitting [11, 35, 47, 82, 124, 189].
- **Comorbidity Awareness:** The strong associations between varicose veins and conditions like deep vein thrombosis (DVT) [79, 166, 170, 188, 190, 191, 214, 224, 225, 226, 230, 265], pelvic venous disorders [60, 127, 186, 244], and chronic venous insufficiency (CVI) [123, 130, 131, 159, 215] necessitate comprehensive vascular assessment in affected patients to address potential systemic implications.
- **Personalized Treatment Approaches:** Given the varied clinical presentations and associated factors, treatment strategies for varicose veins, including surgical interventions, sclerotherapy, or conservative management, should be tailored to individual patient profiles, considering factors like age, gender, and specific comorbidities [46, 49, 51, 52, 76, 88, 150, 157, 158, 171, 235].

5.3 Research implications / key gaps

- **Longitudinal Occupational Studies:** Future research should involve prospective cohort studies to precisely quantify the long-term incidence of varicose veins and CVI in high-risk occupations, establishing stronger causal links and informing targeted preventive strategies [e.g., studies with N/A follow-up or only cross-sectional design in [1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 26, 35, 40, 43, 50, 53, 54, 58, 73, 124, 126, 130, 135, 136, 164, 165, 168, 172, 174, 179, 189, 199, 200, 206, 207, 215, 237, 249, 251, 252, 256]].
- **Standardized Diagnostic Protocols:** The wide range of reported prevalence rates suggests a need for standardized diagnostic criteria and methodologies (e.g., duplex ultrasound protocols) across studies to enable more robust comparisons and meta-analyses

[e.g., implied by heterogeneity in [1, 3, 4, 5, 6, 7, 9, 11, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 31, 35, 38, 41, 50, 53, 54, 73, 81, 120, 126, 131, 136, 137, 138, 149, 156, 159, 179, 206, 207, 211, 219, 220, 246, 249]].

- **Genetic Biomarker Research:** Further investigation into the genetic underpinnings of varicose veins, including specific gene variants (e.g., PIEZO1, EFEMP1) and their interactions with environmental factors, could lead to improved risk stratification and novel therapeutic targets [30, 32, 80, 84, 121, 132, 145, 148, 163, 182, 183, 202].
- **Interventional Prevention Trials:** Rigorous randomized controlled trials are needed to evaluate the efficacy of specific preventive interventions, such as compression therapy or ergonomic workplace modifications, in reducing the incidence or progression of varicose veins in at-risk populations [e.g., mentioned in [43, 237] but lacking strong interventional evidence].

5.4 Limitations

- **Cross-sectional Design Bias** — The majority of studies were cross-sectional, limiting the ability to infer causality or disease progression.
- **Heterogeneous Study Populations** — Studies encompassed diverse populations (e.g., specific occupations, age groups, patient cohorts), making direct comparisons of prevalence challenging.
- **Variability in Diagnostic Methods** — The specific diagnostic criteria for varicose veins were not uniformly detailed across all studies, potentially contributing to the wide range of reported prevalence.
- **Lack of Directionality Data** — Many studies did not specify the directionality, which can impact the interpretation of associations.
- **Missing Abstract Information** — Several DOIs had missing abstracts, preventing extraction of specific results and limiting comprehensive coverage [199, 200, 201].

5.5 Future directions

- **Prospective Cohort Studies** — Conduct large-scale, long-term prospective cohort studies to track incidence and progression of varicose veins.
- **Standardized Diagnostic Protocols** — Develop and implement uniform diagnostic criteria and imaging protocols for varicose veins in epidemiological studies.
- **Genetic Biomarker Research** — Investigate the role of identified genetic variants and biomarkers in diverse populations to refine risk prediction.

- **Occupational Health Interventions** — Evaluate the effectiveness of targeted ergonomic interventions and preventive measures in high-risk occupational groups.
- **Global Comparative Epidemiology** — Facilitate multinational studies with harmonized methodologies to understand global and regional variations in prevalence and risk factors.

6) Conclusion

This systematic review reveals that varicose veins represent a highly prevalent and multifactorial condition, affecting a substantial proportion of the adult population globally, with an unweighted median prevalence of 25.3%. Key research topics include the significant impact of occupational factors, strong genetic predispositions, and the influence of age, gender, and pregnancy on prevalence. The widespread reliance on cross-sectional study designs represents a limitation, hindering causal inference. Moving forward, large-scale prospective cohort studies and the implementation of standardized diagnostic protocols are crucial to enhance our understanding of varicose vein epidemiology and to inform more effective preventive and therapeutic strategies.

References

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Figure 1. Publication-year distribution of included originals

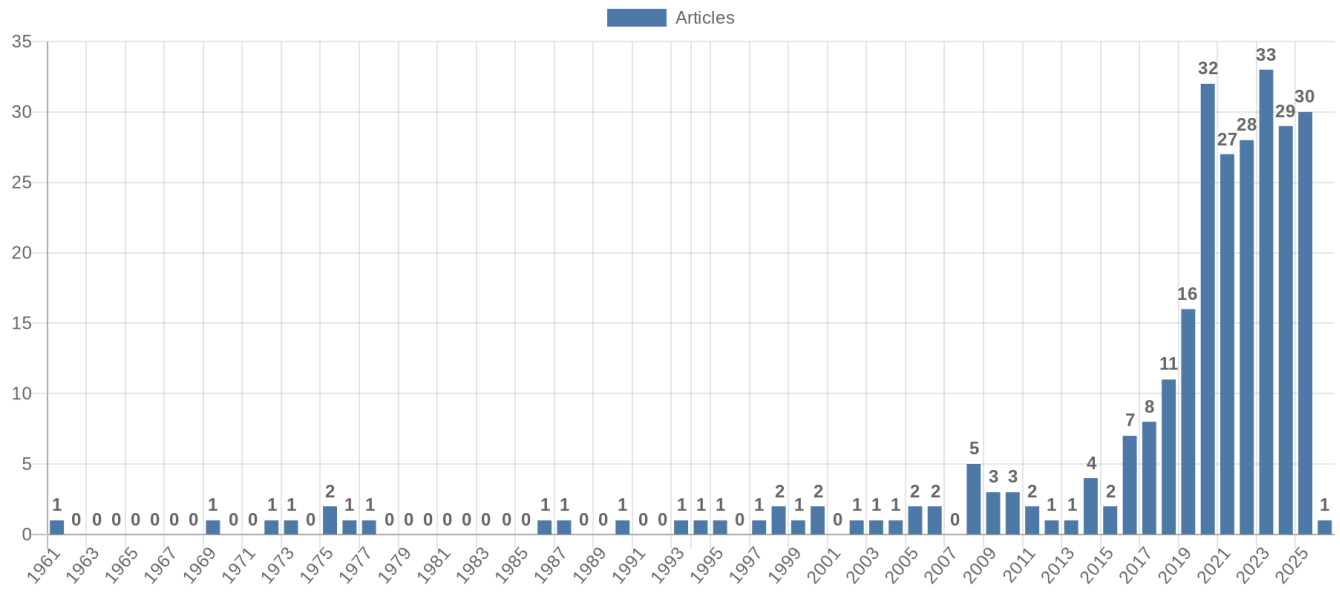

Figure 2. Study-design distribution of included originals

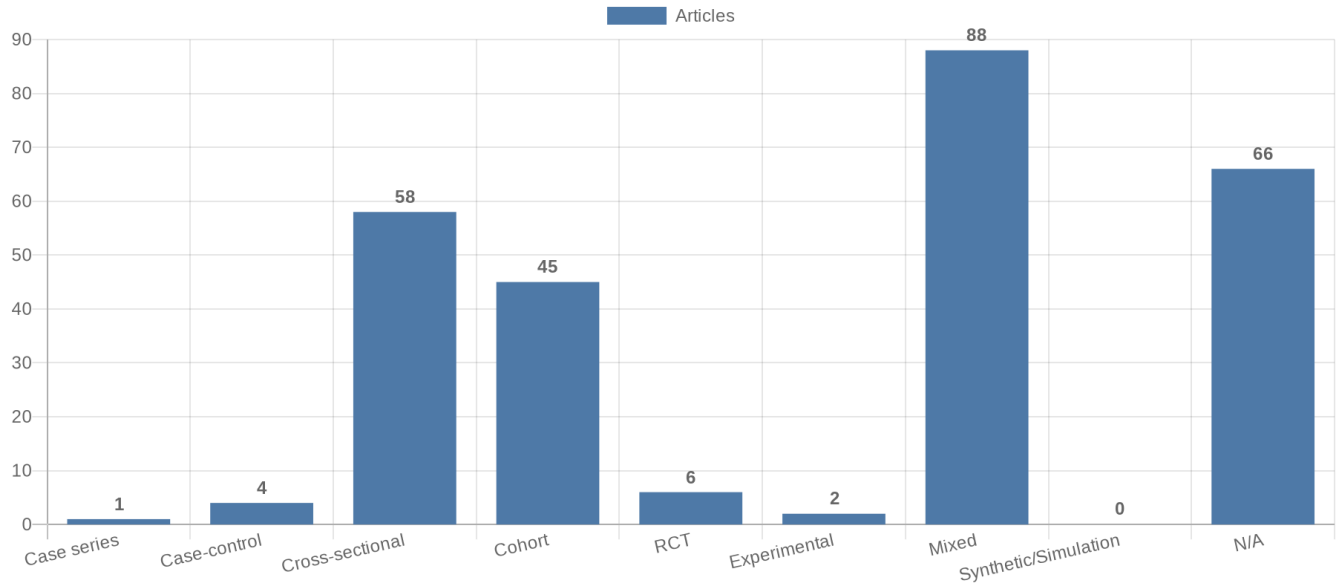

Figure 3. Study-type (directionality) distribution of included originals

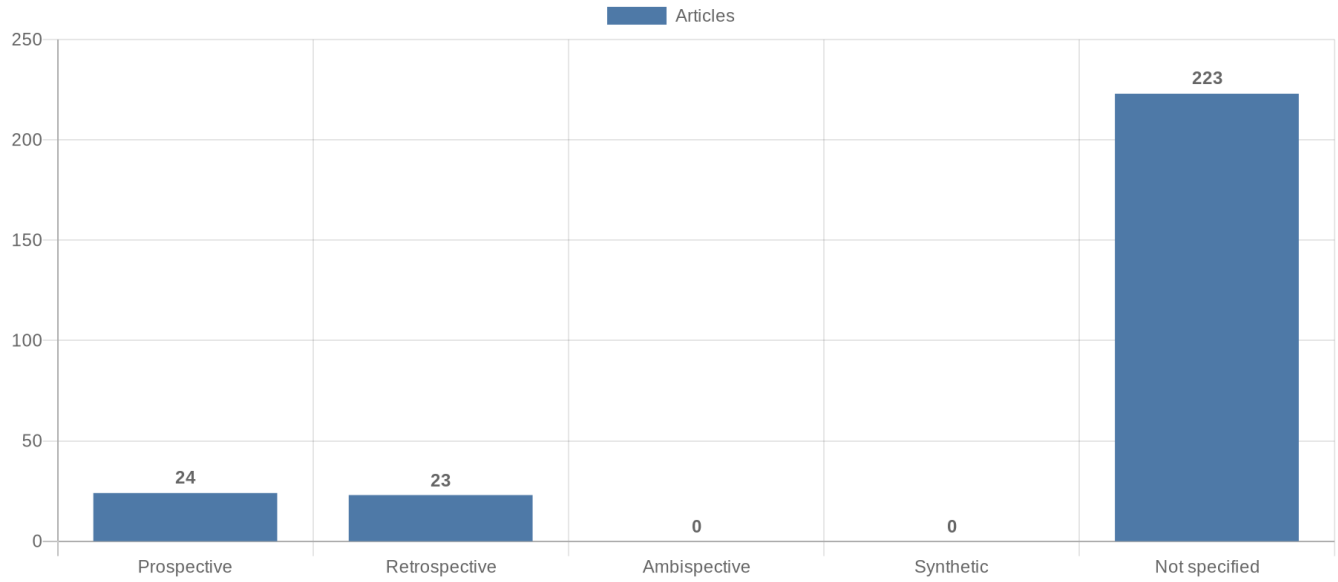

Figure 4. Main extracted research topics

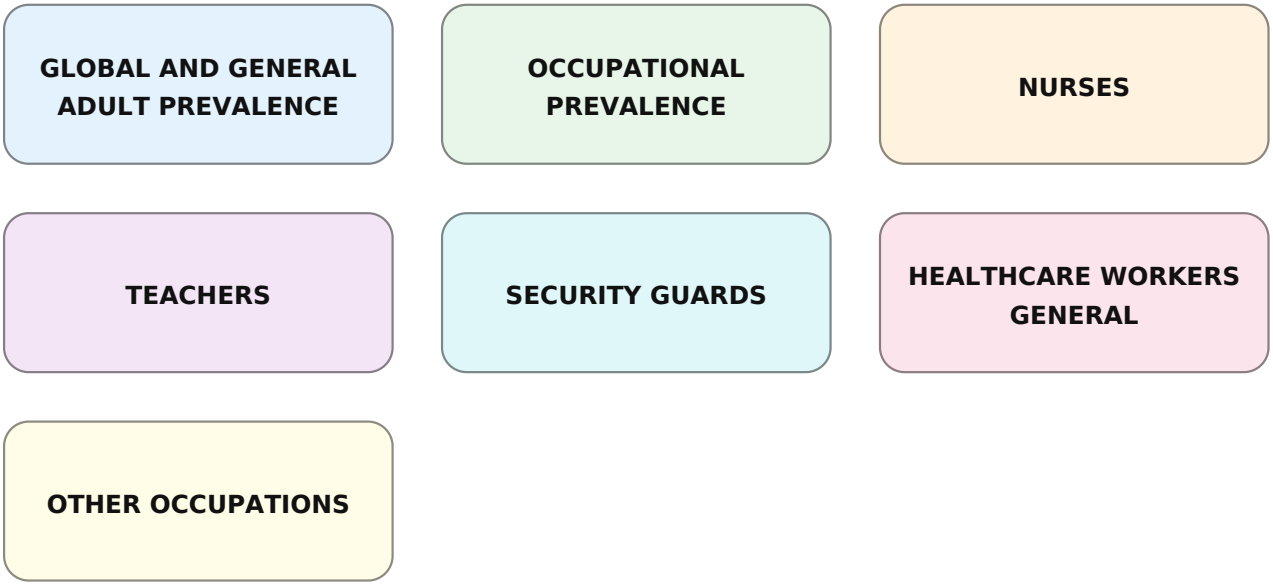

Figure 5. Limitations of current studies (topics)

Figure 6. Future research directions (topics)