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The Relationship between Body Mass Index and Severity of Chronic Venous Insufficiency in Patients at Siloam Hospitals Lippo Village Building B

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Abstract

BACKGROUND: Chronic venous disease, or chronic venous insufficiency (CVI), is a condition that occurs when the venous valves, particularly in the lower extremities, fail to function properly due to venous obstruction or reflux. CVI is often referred to as a chronic venous disease, with clinical symptoms frequently presenting as varicose veins and often remaining undiagnosed accurately. CVI can occur due to various causes, including congenital, primary, secondary, and idiopathic factors. Body mass index (BMI) is a calculation used to estimate the amount of fat in the body and categorize an individual's degree of obesity. Obesity is one of the risk factors that can contribute to the development of CVI, as it can lead to increased volume and pressure in the venous blood vessels due to an elevated BMI.

OBJECTIVE: This study was conducted to investigate and understand the relationship between BMI and the severity of CVI in patients at Siloam Lippo Village Hospital Building B.

METHODOLOGY: This research employed a cross-sectional study design utilizing unpaired categorical comparative analytic study types. The sample was selected using consecutive sampling, with a target sample size of 115 individuals who were patients with CVI at Siloam Lippo Village Hospital Building B. Data were collected through patient interviews during Duplex ultrasound (USG Duplexs) examinations. Subsequently, the data were analyzed using the Chi-square analysis method.

RESULTS: The study revealed a significant association between BMI and the severity of CVI ($p < 0.001$, odds ratio: 6.556, 95% confidence interval: 2.681–16,028).

CONCLUSION: The research findings indicate a significant relationship between BMI and the severity of CVI in patients at Siloam Lippo Village Hospital Building B.

Introduction

Chronic venous insufficiency (CVI) occurs when these valves do not function properly due to obstruction or reverse blood flow, often affecting the leg veins [1]. This condition is associated with manifestations such as varicose veins, where the veins enlarge and become visible under the skin, but diagnosis is often inadequate. The American Venous Forum created the CEAP classification, which includes clinical, etiological, anatomical, and pathophysiological criteria, to aid in diagnosing and treating venous conditions based on their severity [2]. Research in Saudi Arabia showed that CVI prevalence ranged from 25% to 40% in women and 10–20% in men, increasing with age [3], [11].

Risk factors for CVI include family history, obesity, hypertension, leg trauma, pregnancy, sedentary lifestyle, and prolonged sitting or standing. Obesity is a significant risk factor for CVI due to its impact on blood vessel volume and pressure [1], [6]. Obesity is a global health concern, defined by the World Health Organization (WHO) as abnormal or excessive fat accumulation posing health risks [1]. Body mass index (BMI) exceeding 30 kg/m is generally considered obese [1]. Obesity results from an imbalance between daily energy intake and expenditure, leading to excessive fat accumulation, especially around the abdomen [1]. The WHO reported over 650 million individuals worldwide were obese in 2016 [5], [7]. In Indonesia, obesity prevalence has increased over the years, affecting both men and women [6]. Obese patients are at a higher risk of developing comorbidities, including cardiovascular diseases. Research in India indicated that 87% of obese patients suffered from chronic vein insufficiency (CVI), with more cases in men [7].

In conclusion, veins play a crucial role in blood circulation, and their dysfunction, often caused by factors such as obesity, can lead to CVI and related complications. Monitoring and addressing obesity are essential for maintaining vascular health.

Materials and Methods

This study used a cross-sectional study design, specifically utilizing unpaired categorical comparative analytic study types, which enabled a comprehensive exploration of the relationship between variables. The targeted population in this study were all patients suffering from CVI at Siloam Lippo Village Hospital Building B who met the inclusion criteria and would be taken using consecutive sampling. The collected data will be managed using Microsoft Excel software and then processed using the Statistical Package for the Social Sciences. The research data will then be tested using the Chi-square test. Before the research is conducted, ethical approval will be submitted to the Ethics Committee of the Faculty of Medicine, Pelita Harapan University. Sampling was also carried out to get the consent of the respondents. Previously, the selected respondents had to read, know, and fill out the attached informed consent form. The data collection process involved conducting patient interviews concurrent with Duplex ultrasound assessments from January to May 2023.

Results

The data collection process focused on patients diagnosed with CVI, involving 125 respondents. Notably, seven respondents were excluded due to pre-defined criteria. These criteria encompassed patients with a history of lower limb surgery or trauma, those unable to provide interview responses, or individuals declining participation in the research. The ensuing Table 1 encapsulates the outcomes of data analysis, presenting the interrelation between BMI and the severity of CVI. After data processing, a total of 118 respondents provided patient characteristic data as outlined in the table above, specifically the characteristics of respondents based on the severity of CVI. The study population comprised 43 (36.4%) males and 75 (63.6%) females. Based on BMI calculations for all respondents, it was found that 25 (21.1%) patients had a normal BMI, 23 (19.5%) patients were classified as overweight, and 68 (59.5%) patients were classified as obese based on their BMI. This indicates that more than half of the respondents studied had an obese BMI.

Table 1: Patients diagnosed with chronic venous insufficiency

No.	Variable	Severity of CVI		
		Mild, n (%)	Moderate, n (%)	Severe, n (%)
	Sex			
	Male	12 (35.2)	14 (35)	17 (38.6)
	Female	22 (64.7)	26 (65)	27 (61.3)
	Body mass index			
	Underweight	0	0	0
	Normal	12 (35.2)	11 (27.5)	4 (9.1)
	Overweight	13 (41.1)	2 (5)	8 (18.1)
	Obese	9 (23.6)	27 (67.5)	32 (72.7)

CVI: Chronic vein insufficiency.

The Table 2 delineates the distribution of respondents across various BMI categories – both non-obese and obese – aligned with differing degrees of CVI severity. Upon meticulous statistical analysis, the findings unveil a compelling correlation between escalating BMI and the severity of CVI. The statistical assessment yielded a notably low $p < 0.001$, underscoring the statistical significance of this association. The p-value is less than the conventional threshold of 0.05 indicating a substantive relationship between the independent variable (BMI) and the dependent variable (CVI severity).

Table 2: Distribution of respondents across various BMI categories

Body mass index	Severity of CVI		Total	p-value	Odds ratio	95% confidence interval
	Not severe (n)	Severe (n)				
Not obese	25	25	50	<0.001	6.556	2.681–16.028
Obese	9	59	68			
Total	34	84	118			

CVI: Chronic vein insufficiency.

Moreover, a compelling odds ratio of 6.556 emerged from the analysis. This ratio conveys that individuals with an obese BMI exhibit a 6.556 times higher likelihood of experiencing severe CVI compared to their counterparts with non-obese BMI. This noteworthy finding accentuates the substantial impact of obesity on the severity of CVI, elucidating an essential facet of the disease's progression.

Discussion

In this study, the prevalence of CVI exhibited a higher occurrence among females, with a notable representation of 75 individuals (equivalent to 63.6% of the sample), as opposed to the male cohort, which accounted for 43 respondents (36.4%). This empirical outcome seamlessly aligns with analogous epidemiological studies conducted previously in Qassim, Saudi Arabia [2]. Those antecedent research endeavors similarly indicated an elevated incidence of CVI among the female demographic, signifying a gender-based susceptibility [3]. This intriguing phenomenon can be deciphered through multifaceted lenses, primarily casting a spotlight on the inherent differences in lifestyles between genders [2]. Delving deeper, it becomes apparent that the predisposition for CVI to be more prevalent among females might be a culmination of several intertwined factors. Specifically, the study illuminated that women, particularly those engaged in domestic roles such as homemakers, often adopt routines characterized by prolonged periods of relatively static activities. The very act of standing for extended durations while engaged in cooking or other household chores lends itself to elevating the risk of developing varicose veins, a hallmark of CVI. Furthermore, the intricate interplay of hormones in female physiology emerges as an additional piece in

this intricate puzzle. The presence of estrogen and progesterone holds significant implications for vascular health. Estrogen, though offering diverse benefits, also has the potential to disrupt the integrity of vein valves, thus precipitating the progression of CVI. Progesterone, on the other hand, with its vasodilatory effects, contributes to the relaxation of vein walls, inducing a state conducive to sluggish blood flow [9].

In addition, the lack of daily physical activity heightens the risk of obesity, which is considered a contributing factor to CVI [1]. Notably, in the patients with CVI at Siloam Lippo Village Hospital Building B, a significant portion (78%) exhibited an abnormal BMI. Obesity, in turn, is a recognized risk factor for various cardiovascular diseases, including chronic venous disorders. The increased weight places additional strain on the heart, impacting blood flow, and reducing the elasticity of vein valves, especially in the lower limbs [8]. The research data also indicated that 47% of severe CVI patients were classified as obese based on their BMI.

After data analysis, a clear relationship between BMI and the severity of CVI was established. This correlation aligns with research conducted at Maringa State University (UEM) and Belczak Vascular Center in Brazil, which demonstrated a significant link between higher BMI and the severity of chronic venous diseases [2], [3], [4]. This phenomenon is attributed to the impact of increased weight on cardiac output and venous blood flow from the lower extremities [10]. Furthermore, this study investigated other measures of obesity, such as waist circumference. The study's strengths include conducting interviews directly with patients to ensure accurate responses and obtaining Duplex ultrasound data simultaneously, minimizing potential bias.

However, limitations included restricted and occasionally changing Duplex ultrasound schedules, which prolonged data collection. Spatial limitations also led to missing some patients due to overcrowding, affecting the interview process. In addition, unexamined confounding factors such as age, hypertension, diabetes, cholesterol levels, and family medical history posed potential limitations.

Conclusion

This study uncovers a significant link between BMI and the severity of CVI, echoing findings from similar research, thus emphasizing the influential roles of obesity, lifestyle factors, and hormonal influences in the development of chronic venous disorders. Despite its notable strengths, the study encounters challenges in data collection and unexamined confounding variables. The research analysis results distinctly establish a substantial relationship between BMI and the degree of CVI severity among patients at Siloam Lippo Village Hospital Building B. This connection is explained by the interplay of increased body weight causing heightened cardiac output and decreased venous drainage in the lower extremities. Furthermore, the study highlights that a substantial proportion of CVI patients, constituting 78%, exhibits BMI values exceeding the normal range, encompassing 72 cases of obesity and 20 instances of overweight BMI.

Suggestion

Based on the findings of this study and a comprehensive assessment of its limitations, we present valuable recommendations for future research directions. First, we propose expanding the scope of investigation beyond a singular hospital to achieve a more holistic understanding. Furthermore, to deepen research insights, we advocate for the inclusion of additional confounding factors in forthcoming studies. Finally, to ensure the accuracy and timely collection of data, a nuanced understanding of the scheduling dynamics for Duplex ultrasound sessions at Siloam Lippo Village Hospital Building B is paramount. These recommendations aim to enhance the robustness and applicability of future research endeavors.

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