Original Research Article

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Study of chronic venous insufficiency in relation with body mass index

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ABSTRACT

Background: Chronic venous insufficiency (CVI) is a condition that occurs due to dysfunctional venous wall and/or valves in the lower limb veins. Some common etiological factors of CVI are obesity, age of more than 50 years, family history of CVI, smoking and pregnancy. The combination of obesity and other genetic and environmental factors creates a higher risk for the development of CVI.

Methods: The grade of the venous disease was recorded using the CEAP (anatomical and pathophysiologic criteria). BMI (body mass index) was calculated for each patient and the patients were classified into underweight, normal, overweight and obese categories. Mean, standard deviation, p value and percentage of each stage of venous disease in each group was calculated accordingly and studied.

Results: In this study, it was established that a patient with a high BMI (>25 kg/m²) had a higher probability of developing CVI in comparison to a patient with a lower BMI. According to the data, 28.6% of normal weight patients had CVI, 64.3% of overweight patients had CVI and 81.5% of obese patients had CVI.

Conclusions: In this study, we concluded that as the BMI increases the probability of development of CVI (C3-C6) also increases. Thus, the presence of CVI should be identified and treated promptly in obese individuals with close follow-up in order to prevent complications.

Keywords: BMI, CVI, Clinical, Etiological, CEAP, Obesity, Varicose veins

INTRODUCTION

Veins are the compliance vessel and the peripheral venous system acts as reservoir to store blood and as a conduit to return blood to the heart.¹ The venous blood from lower extremity must travel against gravity to return to central circulation.¹ This unidirectional flow of blood is maintained by series of valves within the veins and peripheral muscle pumps.² CVI occurs when the normal venous blood flow is disturbed.² Most commonly it is

caused by valvular incompetence in superficial/deep venous system or rarely by congenital absence of valve. 1,2

CVI is one of the most prevalent, frequently unrecognized and underestimated diseases worldwide. It is a spectrum of conditions that affect the skin and subcutaneous tissue, with advanced stages manifesting as venous ulcerations.³ The prevalence ranges between 25-40% and 10-20% in women and men, respectively.⁴ The vein consult program evaluated more than 91000 patients

in different parts of the world and found a worldwide prevalence of CVI of 83.6%. It is the leading cause of ulcerations in the leg.⁵

Common etiological factors of CVI include obesity, the 5th-6th decade of life, family history of CVI, smoking, pregnancy.³

The role of obesity is, however, controversial.⁶ Some studies have shown that there is a positive correlation between BMI and clinical severity of venous disease and that being overweight is a separate risk factor for skin changes in venous disease.⁷ The combination of obesity and other genetic and environmental factors creates a higher risk for the development of CVI.⁷ Most western studies that have looked at this aspect are descriptive studies with a few using suitable controls.⁸ Further, the population included in these studies had more cases with early disease as compared to the Indian population where we tend to see more patients with advanced forms of venous disease.

This study was designed to see various modes of presentation of CVI and to see the relationship of various symptoms of CVI with the BMI of the patients.

METHODS

Source of data

Random sampling from general surgery and vascular surgery OPD at a tertiary care hospital from March 2020 to August 2020 was done. The grade of the venous disease was recorded using the CEAP criteria. BMI was

calculated for each patient. Based on the BMI, the patients were classified into underweight, normal, overweight and obese. Mean, standard deviation, p value, and percentage of each stage of venous disease in each group were calculated accordingly. Correlation between BMI and CVI was calculated using a paired t test.

Inclusion criteria

All cases of varicose vein presenting to vascular surgery OPD irrespective of age, gender and addiction were included in the study.

Exclusion criteria

Patients with a history of deep vein thrombosis, patients with a history of surgery/trauma over the lower limb in case of C5 and C6 disease were excluded from the study.

RESULTS

The study comprised a total of 50 patients, among whom there were 36 males and 14 females.

Table 1 suggests that among the population studied, of the normal BMI cases 28.6% had CVI, of the overweight cases 64.3% had CVI and of the obese cases 81.5% had CVI.

The collective p value was <0.001 while correlating increasing BMI with increasing order of clinical stages of varicose veins, which proved that as the BMI increases the probability of development of CVI (C3-C6) also increases (Table 2).

Table 1: Percentage of patient having CVI according to the BMI.

BMI (kg/m²)	Total patients	Clinical stage		Donasato as (0/)
		C1-C2	C3-C6	Percentage (%)
Underweight (<18.5)	00	00	00	00
Normal (18.5-22.9)	09	07	02	28.6
Overweight (23.0- 24.9)	14	05	09	64.3
Obese (≥25)	27	05	22	81.5

Table 2: Correlation between BMI and CVI (paired t test).

Clinical stages	Observations	BMI mean±SD (at 95% confidence interval)	P value
C1-C2	28	23.38±2.05	< 0.001
C3-C6 (CVI)	22	31.18±2.85	< 0.001

DISCUSSION

Varicose veins constitute a progressive disease, remission does not occur except after pregnancy and delivery. During its course, the disease produces symptoms and complications that usually prompt the patient to seek medical care. The most frequent complications are

superficial thrombophlebitis, acute bleeding originating in one of the thin-walled varices, eczema and skin ulceration.⁹

A high BMI is a critical risk factor for CVI.¹ In this study, it was established that a patient with a high BMI (>25kg/m²) had a higher probability of developing CVI in

comparison to a patient with a lower BMI. According to the data, 28.6% of normal weight patients had CVI, 64.3% of overweight patients had CVI and 81.5% of obese patients had CVI. The collective p value was <0.001 while correlating increasing BMI with increasing order of clinical stages of varicose veins, which proved that as the BMI increases the probability of development of CVI (C3-C6) also increases.

Another study done by Matic et al showed a correlation between patients with a BMI of >30 (kg/m²) and its effects on the development of CVI.³ Obesity per se may result in adverse changes in the structural and functional vein wall properties under the influence of the associated hemodynamic and hormonal alterations.

Several epidemiologic studies have given strong evidence to the hypothesis that obesity is a risk factor for CVI.² Obesity is thought to predispose individuals to venous stasis, which is a trigger of CVI.⁷ The correlation between obesity and venous hemodynamic changes has mainly been associated with visceral obesity, which leads to an increase in intra-abdominal pressure. The high pressure is transmitted to the end of the femoral vein, leading to distension of the vein walls, which favors stasis.¹⁰

A study performed by Kröger et al. established that as the CEAP class increase, there was a notable increase in the diameter of the GSV8 compared to the normal GSV.8 The above study has also shown hypertrophic changes in the smooth muscle cells (SMCs) in the media of vein walls with the remodeling of the alignment and structure of the muscles cells, which suggested that the pathological abnormalities in varicose veins are not only due to deficiency of smooth muscle but also due to the inability of the SMC to produce the necessary venous tone. ¹¹

Limitations

The limitations of the study were that the sample size was small, that is, only 50 patients were included, confounding effect of other comorbidities, on the effect of BMI on CVI was not calculated and no other comorbidity was directly correlated with CVI.

CONCLUSION

The results of this study showed that the probability of the development of CVI increases as the BMI increases. It also showed that the percentage of obese patients found in the C6 classification was high.

The collective p value was <0.001 while correlating increasing BMI with increasing order of clinical stages of varicose veins, which proved that as the BMI increases the probability of development of CVI (C3-C6) also increases.

Thus, the presence of CVI should be identified and treated promptly in obese individuals with close follow up to prevent complications.

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Institutional Ethics Committee

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