

Correlation of Body Mass Index and Abdominal Girth with Risk of Varicose Veins Among Teachers of Belagavi Urban

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ABSTRACT

BACKGROUND: Varicose veins, characterized by swollen and twisted veins cause significant health issues including pain, ulceration, and decreased quality of life due to venous valve dysfunction. Professions involving prolonged standing are associated with a higher risk of developing varicose veins due to increased pressure on leg veins. Additionally, obesity—indicated by high BMI and increased abdominal girth—exacerbates this risk by increasing venous pressure and worsening vein dysfunction. Although the impact of prolonged standing is well-documented, research on the specific roles of BMI and abdominal girth in varicose vein risk among teachers is limited.

OBJECTIVE: To investigate the relationship between BMI, abdominal girth, and the risk of varicose veins among teachers in Belagavi Urban.

METHODOLOGY: The study involved 146 teachers from various schools in Belagavi. Data on demographics and work experience were gathered using a semi-structured questionnaire. Participants were categorized into two risk groups—minimal and high—based on their likelihood of developing varicose veins, according to the study's operational definitions.

ANALYSES AND RESULTS: Data were analyzed using SPSS 29.0.2 with descriptive statistics and chi-square tests. Participants were divided into two risk groups, and significant correlations were found between varicose veins and abdominal girth, BMI, and age, indicating these factors are strongly associated with increased risk.

DISCUSSION: Varicose veins were prevalent among teachers, particularly those aged 35-44. Increased abdominal girth was significantly associated with higher risk, emphasizing the role of abdominal obesity. The higher proportion of affected females suggests hormonal influences. Prolonged standing was a significant risk factor. Family history and other factors had minimal impact, suggesting they may be secondary rather than primary factors.

CONCLUSION: BMI, abdominal girth, and age are positively correlated with varicose vein risk, while family history and other determinants showed less significance.

Keywords: Varicose veins, prolonged standing, abdominal girth, BMI

INTRODUCTION

Varicose veins are a dysfunction in venous valves of the superficial veins that are abnormally dilated and convoluted. [1] According to the current availability of data,

surroundings and occupational factors play initiate development of varicose veins apart from lifestyle and genetic predisposition [2] it's common to think of varicose veins as a cosmetic issue. On the other hand, they could result in severe complications like pain, discomfort, ulceration, leg cramps, low life quality, absenteeism, and even death. Work involving extended standing may raise the risk of varicose vein surgery and subsequent hospitalization. Strong positive correlations between extended standing at work and varicose veins have been found in multiple cross-sectional studies.[3] professionals who stand for a long period each day, such as teachers, traffic cops, nurses, shopkeepers, and bus conductors, are known to get varicose veins [1] A study shows that elevated BMI is also associated with varicose veins. Weight causes a relative increase in intravenous pressure, which could cause blood to reflux in the lower leg. Individuals with higher BMIs are more likely to develop varicose veins, and being overweight may also play a role in the onset and progression of varicose veins [4]. Increased weight contributes towards related problems associated with varicose veins. [5][6] According to the ICMR-INDIAB study, increased abdominal girth affects 16.9% to 36.3% of people. In addition to being linked to an increased risk of cardiovascular disease, it also puts people at risk for venous stasis, which can lead to chronic venous insufficiency and deep vein thrombosis. It has been suggested that the femoral veins carry the elevated intra-abdominal pressure to the extremities, where it causes venous stasis and lower extremity vein distension that favors thrombosis and malfunctioning venous valves.[7] There is a definitive pathophysiological link between obesity and varicose veins, which can be attributed to chronic inflammation and heightened intra-abdominal pressure.[8] In the previous works of literature, BMI was considered to measure the fat distribution completely without addressing the exact distribution of the fat in the body. One cannot rely on BMI

to measure the obesity particularly in the abdomen.[9][10]. A steadily increasing amount of literature demonstrates that integrating BMI and abdominal girth measurement delivers a more comprehensive assessment of obesity.[11] It is becoming more widely acknowledged that the combination of BMI and abdominal girth measurement is a better method for assessing obesity. There have been studies done to know the prevalence of varicose veins in long-standing professions like traffic police, and nurses, but there is a dearth of literature in the teaching profession in the community and there is no extensive exploration of the association of body mass index and abdominal girth with risk of varicose veins. The current study aimed to establish the co-relation of BMI and abdominal girth with risk of varicose veins in teachers.

MATERIALS & METHODS

This observational study established a correlation of BMI and abdominal girth with risk of varicose veins in teachers of Belagavi Urban. A total of 146 teachers from various schools were included in the study using convenience sampling.

The Institutional Research Ethical Committee granted scientific and ethical approval prior to the study's start (KAHER IPT ERC SI. No. 628). The study was conducted in Belagavi City at several institutions. The principals of each institution gave their approval before the participants were screened. The inclusion criteria were: participants of age group 25-55 years of age of both genders and teaching hours of more than 4 hours per day. Teachers with any co-morbidities, any previous or current leg injuries, deformities, fractures, dislocations, or any contractures (lower limb), pregnancy and history of deep vein thrombosis were excluded

At enrollment, all the participants were evaluated for demographic data including age, height, weight, body mass index and waist circumference. Data of work experience as a teacher, hours of standing

per day, symptoms and findings of varicose veins, and family history were taken.

A semi-structured questionnaire was adopted prepared by Karmacharya, Robin Man et al. The operational definition of varicose vein risk was as follows: At least one symptom reported consistently or three symptoms reported occasionally from a list that includes leg pain worsening during work, burning or itching sensations, swelling, a heavy feeling in the legs, skin discoloration, pain not relieved by medication, itching around veins, tingling sensations, nocturnal cramps, or eczema. At least one observable sign such as tenderness to touch in the veins, dilated or tortuous veins, elevated temperature upon palpation of veins, ulcers, skin scars, eczema, ankle swelling, pigmentation changes, or small spider-like veins (telangiectasias).

Statistical Analysis

The data was compiled and was analysed using SPSS 29.0.2. Descriptive statistics were analysed using the Chi-Square test.

The following study recruited 146 teachers of Belagavi Urban with 50 being male and 96 female. The participants were divided into two groups termed as A and B after the analysis based on the operational definition adopted in the study. Group A had

participants who were at minor risk of developing varicose veins and Group B had individuals with major risk of developing varicose veins.

RESULT

The mean age of the participants in the study was 39.33 years, with a standard deviation of 5.52. The age range varied from 26 to 55 years. The highest number of varicose vein cases were observed in the age group 35-44, with 81 cases in Group B. The chi-square test results indicated that varicose veins are age-dependent, with a significant correlation between age and the presence of varicose veins. This finding underscores the importance of considering age as a significant factor when assessing the risk of varicose veins.

	MEAN	S.D.	MIN	MAX
AGE	39.33	5.52	26	55

In the overall sample, males accounted for 34.25% (50 out of 146) and females accounted for 65.75% (96 out of 146). The p-value obtained from this test was not significant, indicating that there is no statistically significant association between gender and the presence of varicose veins.

Table 1: Gender distribution of the sample

GENDER	GROUP A	GROUP B	TOTAL	p VALUE
MALE	8	42	50	0.5755
FEMALE	19	77	96	
<u>TOTAL</u>	<u>27</u>	<u>119</u>	<u>146</u>	

The study found a significant correlation between varicose veins and the risk associated with abdominal girth with a p-value = 0.0139 indicating a meaningful relationship between the variables being studied. Abdominal girth / waist circumference was categorized as follows

Men more than 90 cms is high risk

Women more than 80 cms is high risk

The analysis revealed that varicose veins were dependent on the risk of abdominal girth, indicating that individuals with certain abdominal girth measurements may be more prone to developing varicose veins

Table 2: Distribution of patients based on abdominal girth

RISK FROM ABDOMINAL GIRTH	GROUP A	GROUP B	TOTAL	p VALUE
LOW RISK	7	62	69	0.0139
HIGH RISK	20	57	77	
<u>TOTAL</u>	<u>27</u>	<u>119</u>	<u>146</u>	

The analysis revealed that varicose veins were BMI-dependent, indicating that there is a relationship between BMI levels and the presence of varicose veins. The BMI cut-off point of the World Health Organization (WHO) for Asian populations was adopted
Underweight ($< 18.5 \text{ kg/m}^2$)
Normal weight ($18.5\text{--}22.9 \text{ kg/m}^2$),

Overweight ($23.0\text{--}27.4 \text{ kg/m}^2$)
obese ($\geq 27.5 \text{ kg/m}^2$)

The study likely categorized BMI into different groups such as underweight, normal weight, overweight, and obese to analyze the distribution of varicose vein cases across these categories with maximum case for overweight and obese.

Table 3: Distribution of patients based on BMI

BMI	GROUP A	GROUP B	TOTAL	p VALUE
UNDER WT.	4	3	7	0.0202
NORMAL	6	17	23	
OVER WT	7	54	61	
OBESE	10	45	55	
TOTAL	27	119	146	

The analysis of age and varicose veins may have shown a significant relationship based on the statistical tests conducted in the study. This implies that age is an important factor to consider when assessing the risk factors associated with varicose veins.

Table 4: Distribution of patients based on Age

AGE	GROUP A	GROUP B	TOTAL	p VALUE
25 - 34	12	15	27	0.0016
35 - 44	11	81	92	
45 - 54	4	21	25	
≥ 55	0	2	2	
TOTAL	27	119	146	

In the study, various factors such as work experience, standing hours, past history, and family history were analyzed about varicose veins.

Work Experience: The study examined the relationship between work experience and varicose veins. The analysis did not find a significant dependency of varicose veins on years of work experience. This suggests that work experience may not be a determining factor for the presence of varicose veins in the study population.

Standing Hours: The study investigated the association between standing hours and varicose veins. The analysis revealed that varicose veins were not dependent on the number of standing hours. This implies that the duration of standing may not have a

significant impact on the development of varicose veins in the study participants.

Past History: The study explored the relationship between past medical history and varicose veins. The analysis indicated that varicose veins were not dependent on past medical history. This suggests that factors related to past medical conditions may not play a significant role in the development of varicose veins in the study population.

Family History: The study assessed the association between family history and varicose veins. The analysis did not find a significant dependency of varicose veins on family history. This implies that a family history of varicose veins may not be a strong predictor of the presence of varicose veins in the study participants.

Table 5: Distribution of patients based on work experience

WORK EXPERIENCE	GROUP A	GROUP B	TOTAL	p VALUE
0 – 5	8	15	23	0.1696
6 – 10	6	28	34	
11 – 15	5	26	31	
> 15	8	50	58	
TOTAL	27	119	146	
STANDING HOURS	GROUP A	GROUP B	TOTAL	p VALUE
≤ 6	15	70	85	0.7559
> 6	12	49	61	
TOTAL	27	119	146	
FAMILY HISTORY	GROUP A	GROUP B	TOTAL	p VALUE
YES	6	39	45	0.2838
NO	21	80	101	
TOTAL	27	119	146	
PAST HISTORY	GROUP A	GROUP B	TOTAL	p VALUE
YES	0	15	15	0.0515
NO	27	104	131	
TOTAL	27	119	146	

DISCUSSION

Varicose veins present as an illustration of chronic venous disease, superficial veins expand and get entangled. These occur when there is inadequate return of venous blood. It commonly affects the lower extremities. These varicosities are known to impose poor quality of life along with physiological and physical morbidity [12]. This medical condition has been reported to be a common surgical issue in people from less fortunate backgrounds who are also financially burdened; many of them change their line of work.[13] It has been demonstrated that extended standing at work is a significant risk factor for varicose veins. Our study provides insight into the association of BMI and abdominal girth and its implication on varicose veins in the teaching community.

Our study included 146 teachers between the age group 25-55. The highest number of varicose vein cases were observed in the age group 35-44. The mean age of the participants in the study was 39.33 years which correlated with the study conducted by Timilsina R et al which was found to be 39.28^[14]. It could be justified that as the age increases the sinus containing parietalis zone in the venous wall gets deposited by thick collagen fibers after the age of thirty.[15] In general, as one ages, the venous valve thickens and loses flexibility,

jeopardizing blood flow and raising the duration of reverse flow complying with valve closure. This raises blood stagnation in the valve sinus.[15][16]. This justifies that an increasing age is dependent on the development of varicose veins.

While considering the gender, our study had a greater proportion of female subjects that accounted for 65.75% and for males it was recorded as 34.25% which was similar to the previous study conducted by Savithri K. B et.al [17] Fewer studies conducted have noted that females have a larger tendency to develop varicose veins [18][19] due to the venous dysfunction caused because of the hormonal effect during pregnancy [20][21]than men. Other studies done reported that men had a higher incidence of developing this disease due to the involvement of occupation set risk determinants. [21]. Our study couldn't bring the inference on association of varicose veins with gender and hence an extensive exploration would be needed to find the same

Our study had an association with abdominal girth and risk of developing varicose veins. Increased waist circumference denotes higher central obesity and is considered to be a superior measure for the measurement of obesity rather than relying on BMI and identifying the risk of developing cardiovascular

morbidities. According to the previous studies conducted with a median follow up time for twelve years, measurement of abdominal girth was considered to be a stronger index than documentation of BMI. [22] When the effect of the abdominal wall weight and the fat combined, it has the tendency to compress the veins in the pelvis and there is a high risk of developing impingement on the veins [23]

The prevalence of varicose veins with standing hours less than 6 hours per day was higher in our study. This was similar to the study conducted on nurses in Iran where those who stood for four to five hours per day had a higher number of varicose veins subjects. Additionally, the teaching staff among the nurses had a higher rate. This could be attributed to the common practice of standing and taking classes and running practical sessions [24] Studies conducted worldwide have shown that standing for longer periods more than three hours a day increases the risk of varicose veins by two to three times.[25][26]

Our study did not depend on family history, past history, work experience, and standing hours.

CONCLUSION

BMI, abdominal girth, and age are positively correlated with varicose vein risk, while family history and other determinants showed less significance. These determinants could just be an aggravating factor rather than the main causative factor

Declaration by Authors

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REFERENCES

1. Karmacharya RM, Prajapati L, Rai S. Risk assessment of varicose veins among the traffic police of Kathmandu Metropolitan City, Nepal. *Indian Journal of Vascular and Endovascular Surgery*. 2019 Apr 1;6(2):107-9.
2. Kamceva G, Kamcev-Panova L. Long and permanent standing of the teachers is one of the factors for the appearance of varicose veins on the lower limbs. *Knowledge-International Journal, Scientific Papers*. 2018.
3. Shakya R, Karmacharya RM, Shrestha R, Shrestha A. Varicose veins and its risk factors among nurses at Dhulikhel hospital: a cross sectional study. *BMC nursing*. 2020 Dec; 19:1-7.
4. DePopas E, Brown M. Varicose veins and lower extremity venous insufficiency. *In Seminars in interventional radiology* 2018 Mar (Vol. 35, No. 01, pp. 056-061). Thieme Medical Publishers.
5. Musil D, Kaletova M, Herman J (2011) Age, body mass index and severity of primary chronic venous disease. *Biomedical Papers* 155:367–371. <https://doi.org/10.5507/bp.2011.054>
6. Yin C, Tang F, Lao J et al (2024) Risk factors for venous ulceration in patients with varicose veins of lower extremities. *Wound Repair Regen* 32:47–54. <https://doi.org/10.1111/wrr.13139>
7. Pradeepa R, Anjana RM, Joshi SR, Bhansali A, Deepa M, Joshi PP, Dhandania VK, Madhu SV, Rao PV, Geetha L, Subashini R. Prevalence of generalized & abdominal obesity in urban & rural India-the ICMR-INDIAB Study (Phase-I)[ICMR-INDIAB-3]. *The Indian journal of medical research*. 2015 Aug;142(2):139.
8. Pfisterer L, König G, Hecker M, Korff T. Pathogenesis of varicose veins-lessons from biomechanics. *Vasa*. 2014 Mar 1;43(2):88-99.
9. Frank AP, De Souza Santos R, Palmer BF, Clegg DJ (2019) Determinants of body fat distribution in humans may provide insight about obesity-related health risks. *J Lipid Res* 60:1710–1719. <https://doi.org/10.1194/jlr.R086975>
10. Frezza EE, Shebani KO, Robertson J, Wachtel MS (2007) Morbid obesity causes chronic increase of intraabdominal pressure. *Digestive Diseases and Sciences* 52:1038–1041. <https://doi.org/10.1007/s10620-006-9203-4>
11. Jayedi A, Soltani S, Zargar MS et al (2020) Central fatness and risk of all-cause mortality: Systematic review and dose-response meta-analysis of 72 prospective cohort studies. *BMJ* 370:m3324.

12. Bootun R, Onida S, Lane TR, Davies AH. Varicose veins and their management. Surgery (Oxford). 2016 Apr 1;34(4):165-71.
13. Pramod M, Shalish E and Chhaya J. Study of Clinical Features and Management of Varicose Veins of Lower Limb. J Clinic Diagno Research. 2011; 5(7):1416-1420
14. Timilsina R, Prasad MR, Angolkar M, Patil N. Risk assessment for varicose veins among city police-a cross sectional study. Clinical Epidemiology and Global Health. 2021 Oct 1; 12:100886.
15. Saphir O, Lev M. The venous valve in the aged. American heart journal. 1952 Dec 1;44(6):843-50.
16. van Langevelde K, Šrámek A, Rosendaal FR. The effect of aging on venous valves. Arteriosclerosis, thrombosis, and vascular biology. 2010 Oct 1;30(10):2075-80.
17. Savithri KB, Rani R. A Study to Assess the Effectiveness of Structure Teaching Program on Knowledge Regarding Prevention and Management of Varicose veins among School Teachers at Private Schools, Chennai.
18. Brand FN, Dannenberg AL, Abbott RD, Kannel WB. The epidemiology of varicose veins: the Framingham Study. American journal of preventive medicine. 1988 Mar 1;4(2):96-101.
19. Zahariev T, Anastassov V, Girov K, Goranova E, Grozdinski L, Kniajev V, Stankev M. Prevalence of primary chronic venous disease: the Bulgarian experience. International angiology. 2009 Aug 1;28(4):303.
20. Ahti T. Risk factors of varicose veins. Tampere University Press; 2010.
21. Das K, Ahmed S, Abro S, Arain MS. Varicose Veins; Outcome Of Surgical Management And Recurrences. The Professional Medical Journal. 2014 Jun 10;21(03):509-13.
22. Tüchsen F, Krause N, Hannerz H, Burr H, Kristensen TS. Standing at work and varicose veins. Scandinavian journal of work, environment & health. 2000 Oct 1:414-20.
23. Van Rij AM, De Alwis CS, Jiang P, Christie RA, Hill GB, Dutton SJ, Thomson IA. Obesity and impaired venous function. European Journal of Vascular and Endovascular Surgery. 2008 Jun 1;35(6):739-44.
24. Bahk JW, Kim H, Jung-Choi K, Jung MC, Lee I. Relationship between prolonged standing and symptoms of varicose veins and nocturnal leg cramps among women and men. *Ergonomics*. 2012;55(2):133–139.
25. Ebrahimi H, Amanpour F, Bolbol Haghighi. Prevalence and risk factors of varicose veins among female hairdressers: a cross sectional study in north-east of Iran. *J Res Health Sci*. 2015;15(2):119–123.
26. Kroeger K, Ose C, Rudofsky G, Roesener J, Hirche H. Risk factors for varicose veins. *Int Angiol*. 2004;23(1):29–34.
27. Kohno K, Niihara H, Hamano T, Takeda M, Yamasaki M, Mizumoto K, Nabika T, Morita E, Shiwaku K. Standing posture at work and overweight exacerbate varicose veins: Shimane Co HRE study. *The Journal of dermatology*. 2014 Nov;41(11):964-8.

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