International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Correlation of Body Composition with Varicose Vein Symptoms in School Teachers: An Observational Study

Dr. Priyanka Jethmal Khandelwal[1], Dr. Dhara Desai[2]

[1]Assistant Professor, Smt. Shantagauri Rasiklal Shah (Rangwala) College of Physiotherapy, Hemchandracharya North Gujarat University, Kadi, Gujarat, India.
[2]P.G. Guide and Assistant Professor, MPT (Cardiorespiratory Disorders), Shree Swaminarayan Physiotherapy College, Gujarat University, Ahmedabad, India.

ABSTRACT

BACKGROUND: Varicose vein refers to large, tortuous and dilated veins, resulting from venous valvular dysfunction. Unidirectional upward flow of the blood gets disturbed if there is any incompetence of valves, resulting in reflux and backflow in the veins. Varicose veins (VV) are common chronic condition adversely affecting patient's quality of life as it can cause assortment of manifestations extending from tingling to ulceration. The risk factors for the development of varicose vein are prolonged standing, advancing age, prolonged sitting, previous leg injury, family history of varicose veins, smoking, alcohol consumption and obesity. This condition is mostly seen in pregnancy, long standing occupation like policeman, teachers, shop assistants etc. The clinical features being dull ache pain in lower limb, pressure sensation in the legs after prolonged standing, fatigue in legs with difficulty in walking, cramps in calf muscles, heaviness in leg etc. In today's world, obesity or overweight is a recognized risk factor for a host of disorders. Overweight leads to increase in intra-abdominal pressure which may in turn results in increased pressure on pelvic veins causing greater reflux, increased veins diameter and venous pressures.

AIM: The aim of the study will be to check the correlation of body composition with varicose vein symptoms in school teachers.

METHODOLOGY: A total of 132 school teachers with the age group of 30-50 years were selected according to inclusion criteria. A written consent form was taken from the subjects. After that Body mass index (BMI), skin fold thickness (SFT) and waist-hip ratio measurements were measured by the therapist. Then VEINES QOL/ Sym questionnaire was explained and filled by the patients under the supervision of therapist. After completion of questionnaire filling and all measurements taken, data analysis was done using SPSS v.20 software.

OUTCOMES: VEINES-Qol/Sym questionnaire, Body mass index, Skin fold thickness, Waist-hip ratio.

RESULT: As per statistical analysis, Spearman's Rho test (non-parametric) was used as the data was not normally distributed, test showed correlation is significant at the 0.05 level for BMI with VEINES Sym. There is very weak negative correlation for BMI with VEINES QOL, very weak correlation of abdominal, thigh and calf skin fold thickness with VEINES QOL/Sym, very weak correlation of waist-hip ratio with VEINES Sym and very weak negative correlation of WHR with VEINES QOL in school teachers.

CONCLUSION: It can be concluded that varicose vein symptoms occur in teachers almost independent of their body composition. It can be considered as one of the aggravating factors of varicose veins along

with various factors which works in conjunction for the development of varicose vein symptoms in school teachers.

KEYWORDS: Varicose Veins, Body Composition (BMI, SFT [Abdomen, Thigh, Calf], Waist-Hip Ratio), School Teachers, Varicose Veins Symptoms and Quality of Life.

INTRODUCTION

Chronic venous disease (CVD) is a chronic, progressive and often neglected disease that is prevalent in the general population and has a significant impact on physical health, mental health and socioeconomic status. [1,2] CVD involves wide range of venous abnormalities in which it causes abnormal venous flow resulting in poor blood return. [3] Varicose veins (VV) of the lower limb are the most common manifestation of CVD. Other signs of CVD include telangiectasia and reticular veins. [4] Varicose vein refers to large, tortuous and dilated veins, resulting from venous valvular dysfunction. Unidirectional upward flow of the blood gets disturbed if there is any incompetence of valves, therefore resulting in reflux and backflow in the veins. [5] Varicose veins are a common chronic condition that can affect the quality of life of patients as they cause manifestations ranging from tingling to ulceration. [6] Worldwide, the incidence of varicose veins varies between 10% and 60% and this incidence is higher in Asian region as compared to western world up to 30%. [7] According to the latest survey done in India, varicose veins occur in 46.7% of women and 27.8% of men and worldwide frequency of varicose veins varies from 10% to 30%. [8] The most commonly affected population with varicose veins is pregnant females and in occupation that requires prolonged standing/sitting i.e., teachers, clerks, dealers, labourer's, road cleaners, receptionists, security guards and nursing staff. Sitting/standing for a long period of time can also have a detrimental effect on the arteries', as prolonged sitting does not allow much movement in the lower body. It increases pressure on the veins of the lower extremities, as the veins must resist gravity for venous return. [9] Compared to office workers, teachers have a 1.6 times higher risk of impaired work performance. Teachers are more prone to heavy workloads, which can increase their chances of early retirement due to illness, they face several problems due to heavy work and professional reasons. Prolonged standing increases the risk of musculoskeletal disorders such as pain in lower back, lower body and knees and varicose veins. [10] Teaching is a job that need high physical activity, long standing and efforts while conducting practical's and taking lectures. [10,11] During prolonged upright standing, decreased pumping activity of the calf muscles causes accumulation of venous blood in the lower extremities, which may damage venous valves and result in the formation of VV. [12] Literatures suggest that long hours of standing make the teachers prone to varicose veins, which if not taken into consideration, can lead to Chronic venous insufficiency (CVI). Varicose veins are one of the earliest manifestations of chronic venous insufficiency. It may although not require treatment initially but if it's progressed, it results in swelling, painful lower limb and intense itching. In severe cases, varicose ulcers can occur if these veins rupture. Hence, all these symptoms are associated with high morbidity and add up to healthcare expenses. Hence, there is a need to increase the awareness and educate the teaching faculties and also assess their perception regarding varicose veins to maintain a good quality of life. Obesity is responsible for poor venous circulation in the lower limb. As the physical load on the lower limb related to overweight is expected to have a deleterious effect on veins, it is hypothesized that the occupational (prolonged standing at work) and personal (overweight) factors interact to accelerate varicose veins formation. But very few literatures are available which supports this hypothesis.

METHODOLOGY

Ethical Approval: Was obtained from the Institutional Ethical Committee prior to the study.
Study design: An Observational study
Source of data: Primary, secondary and higher secondary schools in community.
Study duration: 1 year.
Sampling technique: Consecutive sampling.
Sample size: n=132 (using power analysis) considering level of significance 5% and power of study 80%.

SELECTION CRITERIA:

INCLUSION CRITERIA	EXCLUSION CRITERIA
1. Subjects willing to participate. 2. Age group: 30 to 50 years. 3. Both males and females. 4. Work experience of ≥ 5 years. 5. Hours of standing ≥ 4 hours per day. 6. Subjects who have experienced any 3 of the 5 symptoms assessed in Varicose Vein Symptoms Questionnaire (VVSymQ) within last one month.	1. Subjects associated with any kind of weight loss programme. 2. Subjects diagnosed with any peripheral vascular disease other than varicose vein. 3. Any recent orthopedic surgery in lower limb within 1 year. 4. Subjects with cardiopulmonary, neurological and systemic illness. 5. Subjects undergoing any routine treatment protocol (medical, surgical, compression therapy) for varicose veins.

PROCEDURE

In the study 150 subjects were recruited from the different schools of the community with prior permission from school's respected Principals and chairman of the school with a permission letter. The subjects were screened for inclusion and exclusion criteria and among them 132 subjects met the criteria and were included in the study. The subjects were explained about the purpose of the study. If the subjects were willing to participate, their informed written consent was taken with proper explanation of details in it. Once the subjects gave their written consent, name, age, gender, work experience, hours of standing, varicose vein symptom questionnaire score, history, BMI, skin fold thickness, waist-hip ratio and VEINES-Qol/ Sym questionnaire score was filled in the assessment form. A proper history about their occupation, medical, drug, surgical and personal history was documented. Physical examination was done for each patient. Before the history and examination part the benefits, aims, objectives, and purpose of the study were clearly explained to the subjects. In examination, measurements like **BMI**, **Skin fold thickness** and **waist-hip ratio** were measured.

- For **BMI** height and weight [Body weight (kg) ÷ Stature (m^2)] were measured using weighing machine and stadiometer. [13]
- For **skin fold thickness** different sites were measured like abdomen (vertical fold 1 inch to the right of the umbilicus), thigh (vertical fold at the midline of the thigh, two-thirds of the distance from the middle of the patella to the hip) and calf (vertical fold below the popliteal fossa in the back of the calf, measured with the knee slightly flexed) using digital caliper. [13] [Reliability of Skin Fold Measurement: 0.62-0.85, Reliability of Digital Skin Fold Caliper: 0.86 – 0.93]
- **Waist-hip ratio** is measured as Abdominal girth (cm or in) / Hip girth (cm or in). Waist girth represents

the smallest girth around the abdomen (the natural waist). Hip girth reflects the largest girth measured around the buttock. It's measured while standing relaxed, not pulling in stomach, standing with feet together using the measuring tape. Ratio for significant health risk- **Males:** ≥ 0.95 & **Females:** ≥ 0.80. [13] [Reliability: ≥ 0.90]

- **The Venous Insufficiency Epidemiological and Economic Study (VEINES-QOL/Sym) Questionnaire** was taken. The VEINES-QOL questionnaire consists of 26 items, a subset of ten of these items, questions 1a to 1i and 7, is used to create a symptom score (VEINES-Sym). For both the VEINES QOL and VEINES-Sym scores, high values indicate better outcomes. Items in questions 6 and 7 must be reverse scored. [14] [Reliability: 0.92]

After that the data was analyzed further to check for the correlation among BMI, skin fold thickness and waist-hip ratio with varicose vein symptoms in school teachers.

.

FIGURE 1: MEASURING HEIGHT

FIGURE 2: MEASURING WEIGHT

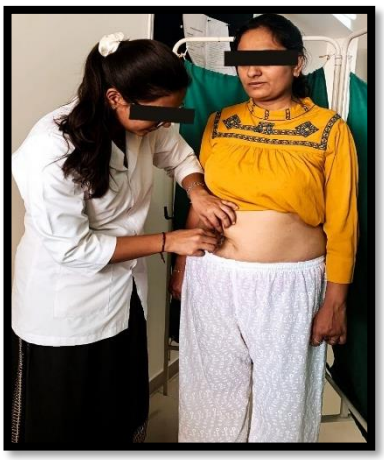


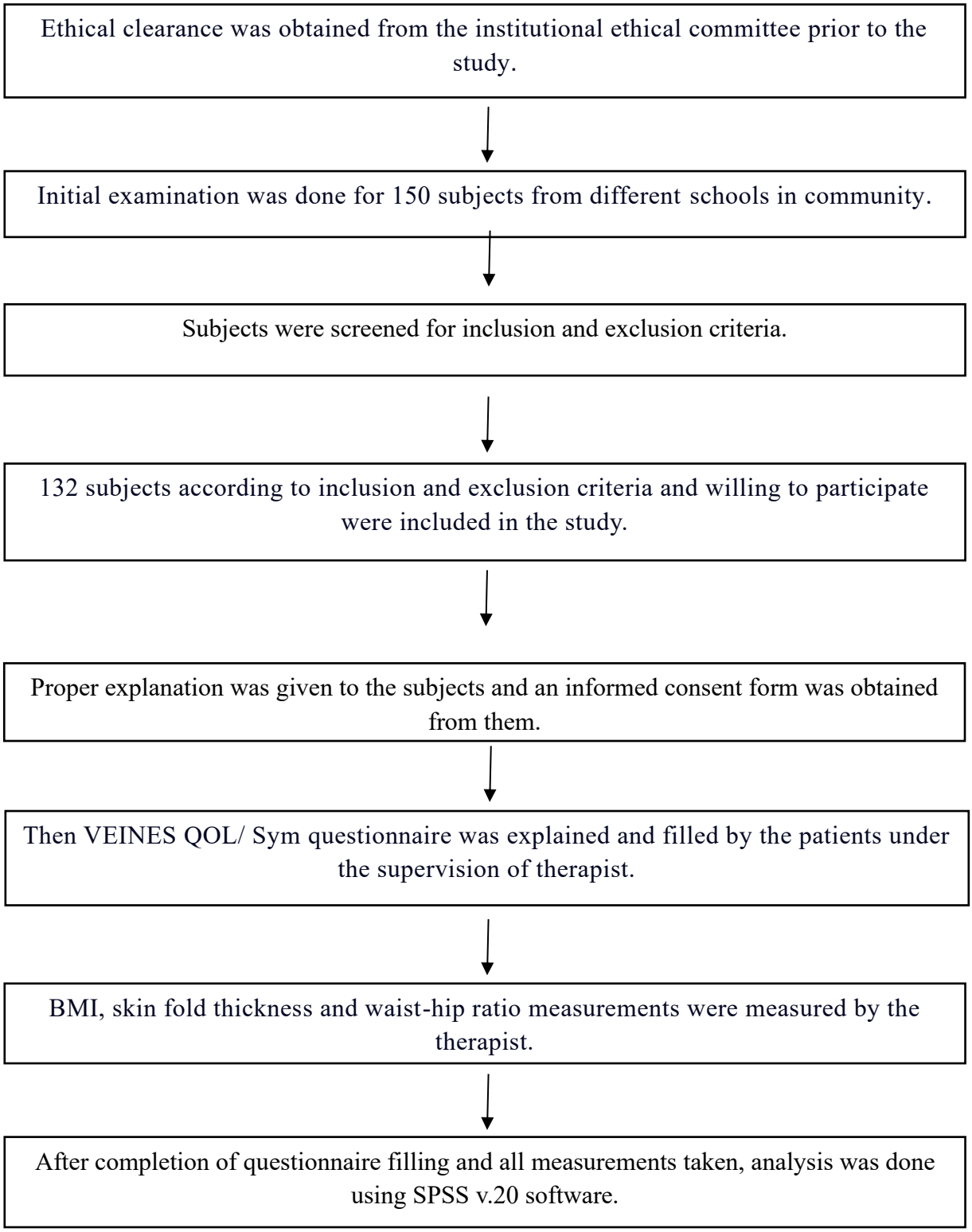
FIGURE 3: MEASURING ABDOMINAL SFT

FIGURE 4: MEASURING THIGH SFT

FIGURER 5: MEASURING CALF SFT

FIGURE 6: MEASURING WAIST-HIP RATIO

FLOW OF THE STUDY



RESULTS

The current study was conducted to find out the correlation of body composition with varicose vein symptoms in school teachers.

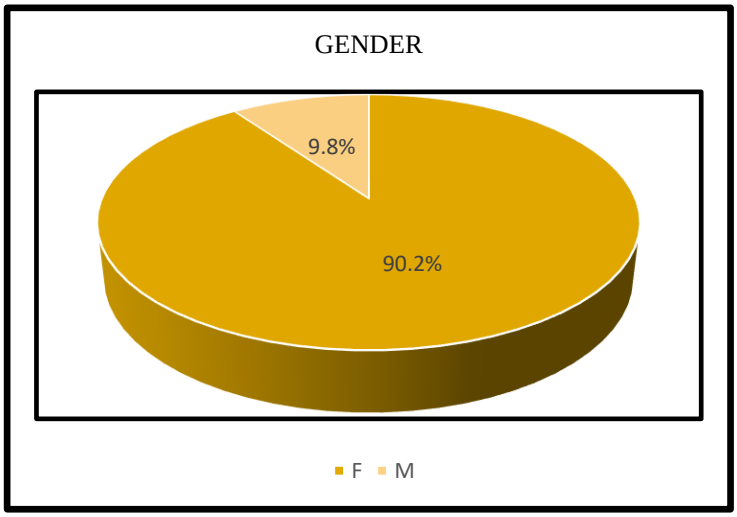
Total 132 subjects were included in this study who met inclusion criteria.

Data analysis was done using Statistical Package for Social Science Version 28 (SPSS V.28) and Microsoft Excel 2021.
Normality of data was analyzed with Kolmogorov-Smirnov test.

Table 1: Descriptive Statistics of Demographic Data

DEMOGRAPHIC DATA N (132)	MEAN ±SD
AGE	42.78 ± 5.84
WORK EXPERIENCE	15.20 ± 7.04
HOURS OF STANDING	8.53 ± 2.41
VVSymQ	13.03 ± 3.42

Table 1 shows Mean ± SD of Age, work experience, hours of standing, VVSymQ of school teachers.



Graph 1: Gender Distribution

Graph 2 shows the gender distribution of 132 participants among which it includes 90.2% (119) females and 9.8% (13) males.

Table 2: MEAN ± SD of BMI, SKIN FOLD THICKNESS, WAIST-HIP RATIO and VEINES QOL/Sym

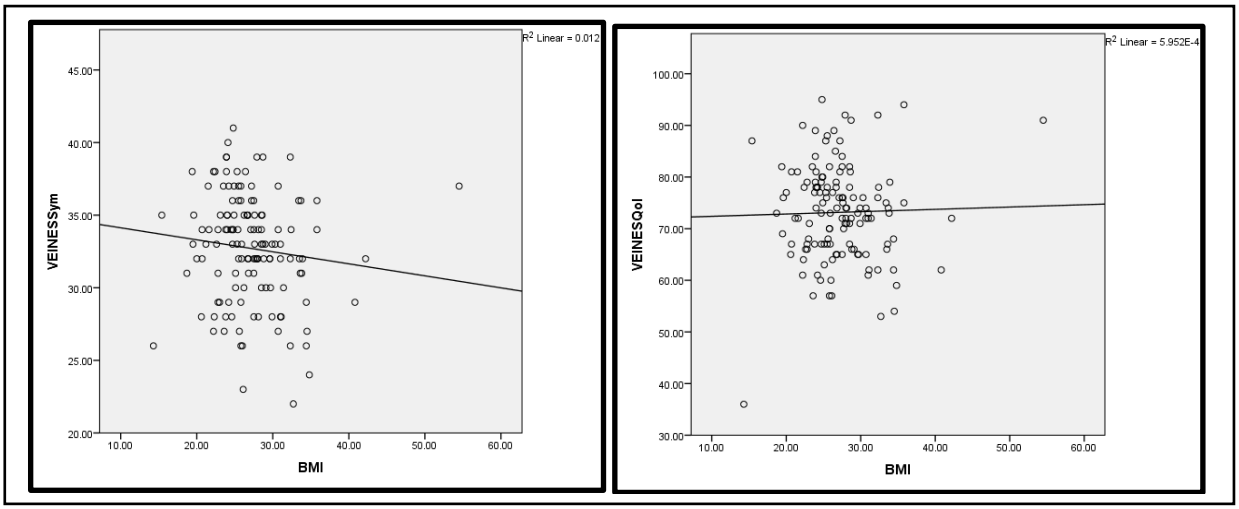
OUTCOME MEASURES		MEAN ± SD
BMI		27.14 ± 5.08
SKIN FOLD THICKNESS (SFT)	ABDOMEN	22.37 ± 6.28
	THIGH	17.26 ± 4.79
	CALF	18.34 ± 5.32
WAIST-HIP RATIO		0.85 ± 0.59
VEINES QOL/ Sym	VEINES Sym	31.40 ± 4.30
	VEINES QOL	70.12 ± 9.87

Table no 2 shows the Mean ± SD of BMI, Skin fold thickness (abdomen, thigh, calf), waist-hip ratio, VEINES QOL/Sym.

Since most of the values were not normally distributed so **non-parametric test** applied.

Table 3: Correlation of BMI with VEINES QOL/Sym in School Teachers

SPEARMAN'S RHO			
		r value	**p value**
BMI	**VEINES Sym**	0.184	0.035
BMI	**VEINES QOL**	-0.111	0.203
**Correlation is significant at the level of 0.05 level			



Graph 2: Correlation of BMI with VEINES Sym and VEINES QOL Questionnaire

The table 3 and graph 2 show there is a very weak Positive correlation of BMI with varicose veins symptoms and very weak negative correlation of BMI with quality of life in school teachers.
Correlation analysis of different categories of BMI among the subjects is as follows.

Table 4: Correlation of Different Categories of BMI with VEINES QOL/Sym in School Teachers

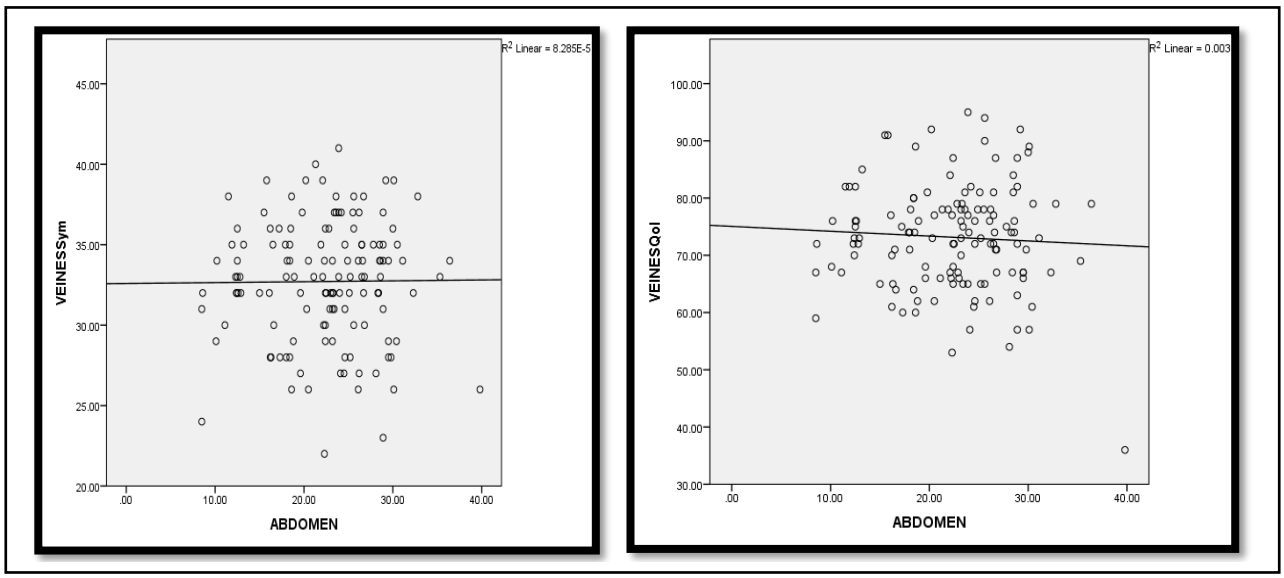
SPEARMAN'S RHO			
BMI	**VEINES Sym/ QOL**	**r value**	**p value**
NORMAL	**VEINES Sym**	0.260	0.093
NORMAL	**VEINES QOL**	0.152	0.330
OVERWEIGHT	**VEINES Sym**	0.050	0.703
OVERWEIGHT	**VEINES QOL**	-0.042	0.749
OBESE	**VEINES Sym**	0.206	0.303
OBESE	**VEINES QOL**	-0.333	0.090

UNDERWEIGHT	**VEINES Sym**	1.00	1.00
UNDERWEIGHT	**VEINES QOL**	-	-

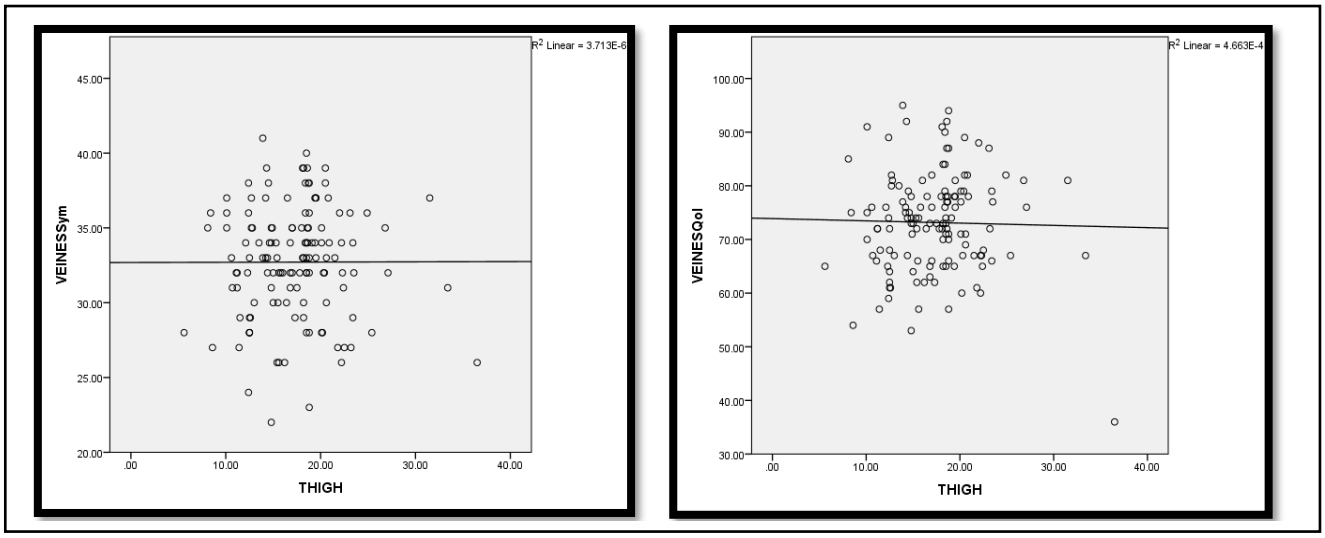
Table 5: Correlation of Different Sites of SFT (Abdomen, Thigh, Calf) with VEINES QOL/Sym in School Teachers

SPEARMAN'S RHO			
SFT	**VEINES Sym/ QOL**	**r value**	**p value**
SFT-ABDOMEN	**VEINES Sym**	0.027	0.755
SFT-ABDOMEN	**VEINES QOL**	0.013	0.881
SFT- THIGH	**VEINES Sym**	0.035	0.691
SFT- THIGH	**VEINES QOL**	0.103	0.242
SFT- CALF	**VEINES Sym**	0.076	0.385
SFT- CALF	**VEINES QOL**	0.051	0.565

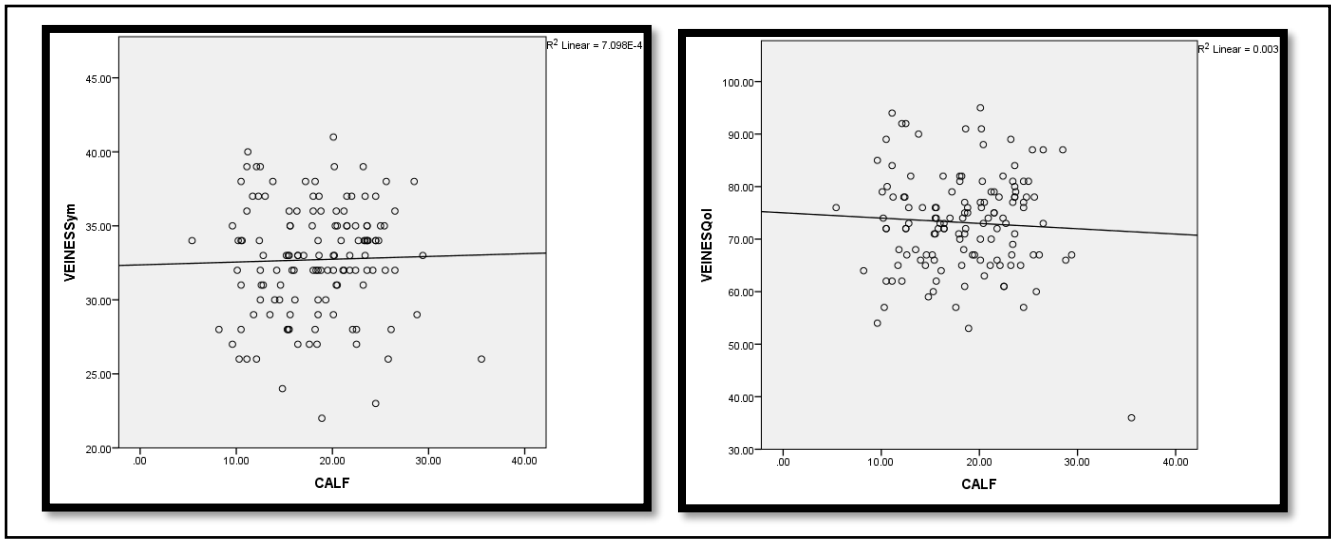
The table 5 shows a very weak correlation of abdominal, thigh and calf skin fold thickness with VEINES QOL/Sym in school teachers respectively



Graph 3: Correlation of Abdomen SFT with VEINES Sym and VEINES QOL Questionnaire



Graph 4: Correlation of Thigh SFT with VEINES Sym and VEINES QOL Questionnaire

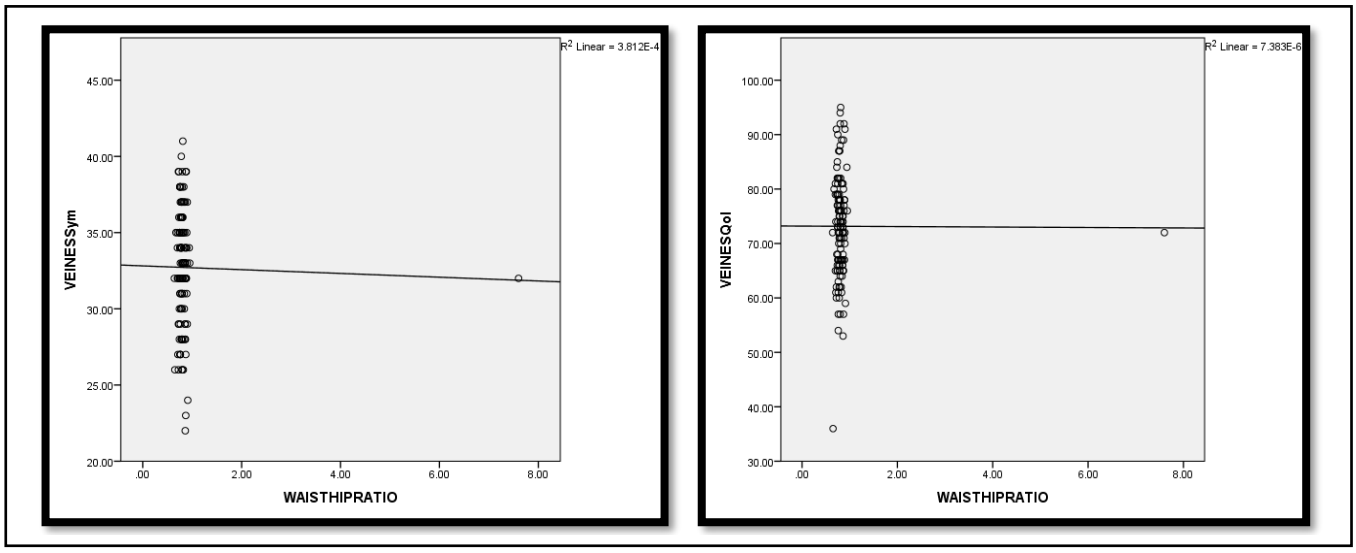


Graph 5: Correlation of Calf SFT with VEINES Sym and VEINES QOL Questionnaire

SPEARMAN'S RHO			
WHR	**VEINES Sym/ QOL**	**r value**	**p value**
WAIST-HIP RATIO	**VEINES Sym**	0.030	0.732
WAIST-HIP RATIO	**VEINES Qol**	-0.004	0.963

Table 6: Correlation Of Waist-Hip Ratio with VEINES QOL/Sym in School Teachers

The table 6 shows there is very weak positive correlation of WHR with varicose veins symptoms and very weak negative correlation of WHR with quality of life in school teachers



Graph 6: Correlation of WHR with VEINES Sym and VEINES QOL Questionnaire

DISCUSSION

The results showed that there is a very weak correlation of BMI with varicose vein symptoms which is statistically significant ($p \leq 0.05$), very weak negative correlation of BMI with quality of life of teachers with VV, very weak correlation of abdominal, thigh and calf skin fold thickness with varicose vein symptoms and quality of life of teachers with VV respectively, very weak correlation of waist-hip ratio with varicose vein symptoms and very weak negative correlation of WHR with quality of life of teachers with VV. In a study done by **Correa et al** found that there was a positive correlation between BMI and development and severity of varicose vein among which obese patients show's a greater severity, because of increased intra-abdominal pressure resulting from the mass effect of the fat contained within the abdomen compressing the veins of the pelvis and possibly impairing venous return. [15] The effect of obesity results in increasing femoral vein diameter, whereas a decrease in femoral vein flow due to increase in inflammation is well known risk factors for deep vein thrombosis. [16] The present study shows a very weak correlation of abdominal, thigh and calf skin fold thickness with varicose vein symptoms in school teachers. **T. Willenberg et al** studied the Influence of Abdominal Pressure on Lower Extremity Venous Pressure and Hemodynamics: A Human In-vivo Model Simulating the Effect of Abdominal Obesity found that external abdominal pressure application creates venous stasis in lower limbs which indicates that abdominal obesity might induce resistance to venous backflow from the lower limbs. Venous valves close due to backflow as the minimum venous velocity is usually slightly negative. Though it might be expected that higher venous backflow occurs under raised IAP (intra-abdominal pressure. [17] **Davide Costa et al** studied the Association between Anthropometric Measurements and Vascular Disease found that the lowest waist-hip ratio (WHR) was found in Chronic venous disease patients, and this describes a more gynoid characteristic in these patients and hence can be simply explained with the major prevalence of this disease in females and in the hormonal effects of estrogens in the beginning and progression of CVD. The highest WHR value was linked with patients with Carotid Stenosis, that is related to a more android aspect especially in overweight patients. [18] So, present study showed that for WHR very weak correlation was obtained for teachers with varicose vein and among them **17 %** of the teachers belong to **low health risk category**, **47%** teachers belong to **moderate health risk** and **36.3%** teachers belongs to **high health risk category** of disease.

Subjects were asked about the VEINES QOL questionnaire, and most of them indicated that it covered most of the important factors affecting QoL, such as heavy and aching legs, reduced ability to carry out activities which they were able to complete previously, cosmetic appearance of leg. A very little affection in their social gathering activities and shopping, choice of clothing. **Danya Ahmed Alghamdi et al** studied The Effect of Varicose Veins on the Quality of Life of Adult Female Patients in the Eastern Region of Saudi Arabia found that females with VVs may suffer from reduced QoL as they grow older in part because of limitations in their physical abilities and social impairment, and also increased BMI of participants was associated with a decrease in overall QoL. [19]

The limitations of the study are recalling bias, the upper limit for work experience was not considered and also the sample size was very less for underweight BMI participants. Hence its recommended in future studies to be done with a larger sample size, the gender comparison can be considered in future studies, also can be done in different populations (policeman, labourers, hairdressers etc). Future studies can be done in accordance with CEAP classification system, the correlation of hours of standing and work experience with varicose vein symptoms can be considered and also the correlation of waist-hip ratio categories can be done with the varicose vein symptoms and quality of life in school teachers as well various other populations.

The main new message of the study is that the school teachers have to spend good number of long hours of standing which makes them prone to develop varicose veins and hence they are in danger, so the family physicians should increase their efforts to find the remedies and solutions.

CONCLUSION

The study concludes that, based on the analysis of 132 school teachers the alternative hypothesis ($H_1{}^a$) is accepted as there is a statistically significant correlation between BMI and VEINES Sym at the 0.05 level.

REFERENCES

1. Nicolaides, A.N., Labropoulos, N. Burden and Suffering in Chronic Venous Disease. Advances in Therapy, 2019, 36.
2. Davies, A.H. The Seriousness of Chronic Venous Disease: A Review of Real-World Evidence. Advances in Therapy, 2019, 36, 5–12.
3. Ligi D., Croce L., Mannello F. Chronic venous disorders: The dangerous, the good, and the diverse. International Journal of Molecular Sciences. 2018, 19, 2544.
4. Piazza G. Varicose veins. Circulation 2014, 130, 582–587.
5. Abdullah Dalboh, Nawaf Amer Al shehri, Abdul majeed Abdullah Alrafie, Khalid Ali Bakri. Prevalence and awareness of varicose veins among teachers in Abha, Saudi Arabia. Journal of Family Medicine and Primary Care, 2020.
6. Savithri K. B, Raj Rani. Prevalence of Varicose Vein and its Related Hazard Factors among School Teachers in Chennai, Tamil Nadu: A Cross-Sectional Study. International Journal of Science and Research (IJSR).7, July 2020.
7. Al Shammeri O, Al Hamdan N, Al-Hothaly B, Midhet F, Hussain M, Al-Mohaimeed A. Chronic venous insufficiency: Prevalence and effect of compression stockings. International Journal of Health Sciences (Qassim) 2014, 8:231-6.

8. Shrestha P, Karmacharya RM, Dahal S, Dhakal P, Bhandari N, Bade S. Patient literacy on varicose veins in cases presenting at the university hospital of Nepal subjected for surgical management of varicose veins. Journal of Vascular Nursing, 2021, 39(1):2–5.
9. Kajol Gujar, Seema Saini, Tushar J. Paleka. Varicose Vein Relationship with BMI In Male Desk Job Employees. Journal of Orthopaedic and Rehabilitation, 2020 January-June, 5(1):6-9.
10. Abirami M. J, Raj Kala A. Health Implications of School Teachers - A Review. International Journal of Health Sciences & Research, May 2018.
11. Alqahtani T.A. The prevalence of foot pain and its associated factors among Saudi school teachers in Abha sector, Saudi Arabia. Journal of Family Medicine and Primary Care, 2020, 9(9), p.4641.
12. Kunie Kohno, Hiroyuki Niihara, Tsuyoshi Hamano, Miwako Takeda, Masayuki Yamasaki, Kazuo Mizumoto, Toru Nabika, Eishin Morita, Kuninori Shiwaku. Standing posture at work and overweight exacerbate varicose veins: Shimane CoHRE Study. Journal of Dermatology 2014; 41: 964–968, 25 August 2014.
13. Essentials of Exercise Physiology by Victor L. Katch (Author), William D. McArdle (Author), Frank I. Katch (Author). Section 6, Chapter 16, page no. 533.
14. K. Kotteeswaran, Pradeep kumar S, Poojasree B. Study on the Prevalence Rate of Varicose Veins among School Teachers. International Journal of Physiotherapy and Research 2022;10(5):4337-4341.
15. Martha Ofelia Correa Posada, Laura Maria Contreras Correa, John Fernando García Vélez. Factors associated with chronic venous disease: study in 1,136 patients treated for varicose veins of the lower limbs in a specialized clinic. Journal Vascular Brasiliero, 2022.
16. Davies HO, Popple well M, Singhal R, Smith N, Bradbury AW. Obesity and lower limb venous disease – the epidemic of phlebesity. Phlebology. 32(4):227–33. 2017.
17. T. Willenberg, Clemens, L.M. Haegeli, B. Amann-Vesti, I. Baumgartner, M. Husmann. The Influence of Abdominal Pressure on Lower Extremity Venous Pressure and Hemodynamic: A Human In vivo Model Simulating the Effect of Abdominal Obesity. European Society for Vascular Surgery. 2011.
18. Costa D, Andreucci M, Isabella F, Ielapi N, Peluso A, Bracale U.M, Serra R. Association between Anthropometric Measurements and Vascular Disease: A Cross-Sectional Study. Journal of Vascular Diseases, 2023, 2, 13– 22.
19. Danya Ahmed Alghamdi, Rahaf Hasan Al-Shehri, Mona Faisal Al Qahtani, Uzma Ali Mehmood A. The Effect of Varicose Veins on the Quality of Life of Adult Female Patients in the Eastern Region of Saudi Arabia. The Open Public Health Journal, 2020, Volume 13.