Aetiologies of Leg Pain among Patients Presenting to a Vascular Surgery Clinic

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ABSTRACT

Objective: To determine the frequency and pattern of different aetiologies of leg pain among patients visiting vascular surgery clinics.

Study Design: Cross-sectional study.

Place and Duration of the Study: Vascular Surgery Clinics of the Aga Khan University Hospital, Karachi, Pakistan, between February 2021 and June 2023.

Methodology: This study examined patients presenting with leg pain for the first time at vascular surgery clinics. The socio-demographic and clinical data including the clinical symptoms, physical examination findings, and management of leg pain were noted using a specially designed proforma.

Results: In a total of 142 patients (200 limbs), 82 (57.7%) were females and 60 (42.3%) were males, with a mean age of 46.8 ± 15.1 years. The patients' mean body mass index (BMI) was 30.2 ± 7.9 kg/m^2. Ninety-one (64.1%) patients had a predominantly standing job compared to 51 (35.9%) patients who had a predominantly sitting job. The most common aetiology of leg pain was chronic venous insufficiency (CVI), diagnosed in 107 (53.5%) patients, followed by neurogenic pain [41 (20.5%)], musculoskeletal pain including knee osteoarthritis [30 (15.0%)], and arterial insufficiency [22 (11.0%)].

Conclusion: CVI followed by neuropathic pain was the leading cause of leg pain in vascular surgery clinics at a tertiary care hospital.

Key Words: *Chronic venous insufficiency, Arterial insufficiency, Vascular surgery, Leg pain, Musculoskeletal pain, Neuralgia.*

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INTRODUCTION

Approximately 30% of adults experience varying degrees of joint pain, swelling, or restricted mobility at any given time.[1] Lower extremity pain can be classified into two main groups: Vascular and non-vascular. Vascular origin pain is either due to arterial or venous pathology. Non-vascular origin pain arises from multiple conditions including peripheral nerve pain (diabetic neuropathy), hip or knee osteoarthritis, diabetic neuropathy, spinal cord compression, muscular injury, chronic compartment syndrome, and others.[2-5]

Arterial insufficiency leads to intermittent claudication, causing muscle ischaemia during physical activity due to arterial blockage. On the other hand, venous claudication results from venous hypertension which worsens with exercise.[6] It is either due to venous valvular incompetence and / or venous stenosis.

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Well-conducted studies investigating the prevalence of arterial and venous diseases in the lower extremities discovered that around 40 to 60% of individuals experience exertional symptoms and feelings of tiredness / heaviness. Notably, there were only minor distinctions observed between individuals with and without evidence of vascular disease.[7,8]

Clinical history, physical examination, and ankle-brachial index are effective in accurately diagnosing vascular origin pain. However, it is common for patients to undergo multiple consultations and investigations to confirm or exclude this type of pain. To the best of the authors' knowledge, there has been no study conducted in the local population to identify the aetiologies of leg pain presenting to the vascular surgery speciality. This study aimed to assess the prevalence and pattern of different aetiologies of leg pain among patients visiting a vascular surgery clinic at a tertiary care hospital.

METHODOLOGY

A cross-sectional study was conducted at the Vascular Surgery Clinics of the Aga Khan University Hospital, Karachi, Pakistan, between February 2021 and June 2023. The study included patients presenting with leg pain as the main symptom for the first time. Patients with incomplete records were excluded from the study. A non-probability consecutive sampling technique was used to recruit the study participants. The sample size was calculated using OpenEpi Software by using a conservative prevalence (unknown) of different aetiologies of leg pain as 50% in local

population population, at a significance level <0.05, confidence interval of 95%, and desired precision of ± 7%. A sample size of 196 limbs with leg pain of any origin was calculated for this study. Exemption from the Ethical Review Committee (2021-5121-16840) was obtained before the start of the study. The data were collected from the medical records of the patients, using specially designed proforma. All patients were treated according to the institute's protocol.

Data were entered and analysed using SPSS. Continuous variables were presented as mean ± standard deviation. Categorical variables were presented as frequencies with their percentages. Analysis of variance was used to assess the differences in means across different aetiologies of leg pain, and the Chi-squared test was used to find associations for categorical variables. A p-value of less than 0.05 was considered significant.

RESULTS

This study included 142 patients (200 limbs) with a mean age of 46.8 ± 15.1 years consisting of 82 (57.7%) females and 60 (42.3%) males. Table I shows the patients' demographics and characteristics. The most common aetiology of leg pain was chronic venous insufficiency (CVI), 107 (53.5%) patients, followed by neurogenic pain [41 (20.5%)], musculoskeletal pain including knee osteoarthritis [30 (15.0%)], and arterial insufficiency [22 (11.0%)] as shown in Figure 1. CVI was managed conservatively in 64 patients (59.8%) or by the intervention in 43 patients (40.2%) which included endovenous ablation in 24 patients (55.8%), sclerotherapy in 7 patients (16.4%), or surgery in 12 patients (27.9%). Conservative treatment included the use of compression stockings and lifestyle modifications.[9] Patients with arterial insufficiency were managed either by best medical therapy (17 patients, 77.3%) or by intervention (5 patients, 22.7%), which included surgery, endovascular or hybrid revascularisation. The best medical therapy included risk factor modification, supervised exercise, anti-platelet, and statin therapy as per the guidelines of the European Society for Vascular Surgery (ESVS).[10] Patients with neurogenic pain were advised analgesics and physiotherapy with directions to consult a spine surgeon. Those presenting with musculoskeletal pain were managed with analgesics and referred to an orthopaedic surgeon.

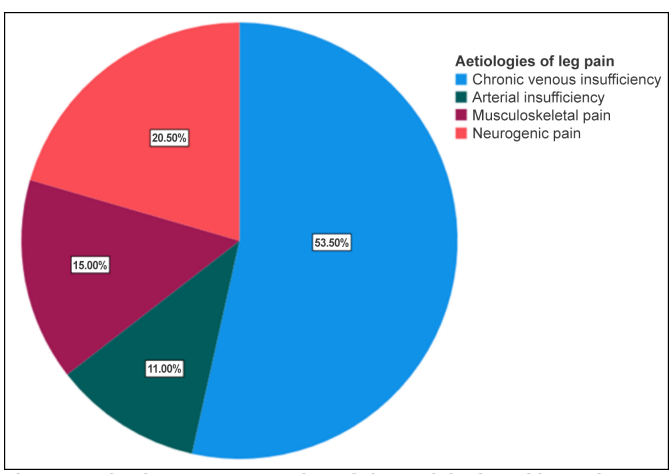

Figure 1: Pie chart representation of the aetiologies of leg pain.

Table II summarises the clinical features of patients with leg pain of different aetiologies while Table III summarises the patients' characteristics. Patient's age (p = 0.004), gender (p <0.001), BMI (p = 0.044), occupation (p <0.001), and number of previous investigations per patient (p <0.001) were found to have statistically significant association with the aetiology of leg pain.

Table I: Patients' demographics and characteristics.

Demographics	Total number of patients (n = 142)
Age (years)	46.8 ± 15.1
Gender	
Male	60 (42.3%)
Female	82 (57.7%)
BMI (kg/m^2)	30.2 ± 7.9
Occupation	
Predominantly standing job	91 (64.1%)
Predominantly sitting job	51 (35.9%)
Duration of leg pain	
Less than 3 months	73 (36.5%)
3 months to 1 year	59 (29.5%)
More than 1 year	68 (34%)
Patients having at least one previous clinic visit	95 (66.9%)
Number of previous clinic visits (n = 95)	
1	47 (49.5%)
2	23 (24.2%)
3	12 (12.6%)
4	6 (6.3%)
5	7 (7.4%)
Patients having at least one previous investigation	121 (85.2%)
Number of investigations done (n = 121)	
1	103 (85.1%)
2	14 (11.6%)
3	4 (3.3%)
Aetiology of leg pain (n = 200)	
Chronic venous insufficiency	107 (53.5%)
Neurogenic pain	41 (20.5%)
Musculoskeletal pain	30 (15.0%)
Arterial insufficiency	22 (11.0%)
Management of chronic venous insufficiency (n = 107)	
Intervention (RFA, sclerotherapy, and surgery)	43 (40.2%)
Conservative treatment	64 (59.8%)
Management of arterial insufficiency (n = 22)	
Intervention (Surgery and endovascular treatment)	5 (22.7%)
Medical treatment	17 (77.3%)

DISCUSSION

This study focused on examining patients presenting with leg pain for the first time at the authors' tertiary care hospital. This study provides insight into the prevalent causes of leg pain in local population. CVI (53.5%) was found to be the leading cause of leg pain, followed by neurogenic pain (20.5%), musculoskeletal pain (15.0%), and arterial insufficiency (11.0%), respectively. These conditions were diagnosed based on clinical symptoms, examination findings, and imaging studies.

The field of vascular surgery is in its preliminary stages in Pakistan with a limited number of vascular surgeons available, typically confined to 5-6 tertiary care centres located primarily in major cities. Karachi, the capital of the Sindh province, is one such city. Remarkably, besides the three tertiary care hospitals in Karachi, no other hospital in the entire province has a qualified vascular surgeon.[11] The lack of availability of vascular surgeons combined with an ineffective healthcare referral system in Pakistan has resulted in fragmentation of healthcare in the field of vascular surgery.[12]

Table II: Leg symptoms and examinations in different aetiologies of leg pain.

Diagnoses	Leg symptoms and examination findings										
	Varicose veins	Oedema	Ulcer	Intermittent claudication	Neurologic Symptoms	Non-palpable peripheral pulses	Skin changes / pigmentation	Increased temperature	Delayed capillary refill	Infected ulcer	ABI ≤0.9
Chronic venous insufficiency (n = 107)	86 (80.4%)	81 (75.7%)	12 (11.2%)	4 (3.7%)	11 (10.3%)	5 (4.6%)	34 (31.8%)	25 (23.4%)	10 (9.3%)	3 (2.8%)	0 (0.0%)
Arterial insufficiency (n = 22)	4 (18.2%)	5 (22.7%)	3 (13.6%)	18 (81.8%)	6 (27.3%)	16 (72.7%)	9 (40.9%)	3 (13.6%)	11 (50%)	3 (13.6%)	20 (90.9%)
MSK / knee OA (n = 30)	3 (10.0%)	5 (16.7%)	0 (0.0%)	5 (16.7%)	6 (20.0%)	4 (13.3%)	2 (6.7%)	0 (0.0%)	1 (3.3%)	0 (0.0%)	2 (6.7%)
Neurogenic pain (n = 41)	8 (19.5%)	10 (24.4%)	0 (0.0%)	7 (17.1%)	29 (70.7%)	3 (7.3%)	2 (4.9%)	3 (7.3%)	2 (4.9%)	0 (0.0%)	2 (4.9%)

Table III: Distribution of patients' characteristics in different aetiologies of leg pain.

	Chronic venous insufficiency (n = 107)	Arterial insufficiency (n = 22)	Musculoskeletal pain (n = 30)	Neurogenic pain (n = 41)	p-value
Age (Mean ± SD)	44.6 ± 12.5	56.3 ± 13.3	49.3 ± 19.8	46.2 ± 13.5	0.004
Gender	-	-	-	-	-
Male	31 (29.0%)	19 (86.4%)	16 (53.3%)	12 (29.3%)	<0.001
Female	76 (71.0%)	3 (13.6%)	14 (46.7%)	29 (70.7%)	
BMI	30.5 ± 6.2	26.6 ± 5.1	32.5 ± 12.5	32.6 ± 8.9	0.044
Occupation	-	-	-	-	-
Predominantly standing job	80 (74.8%)	4 (18.2%)	16 (53.3%)	34 (82.9%)	<0.001
Predominantly sitting job	27 (25.2%)	18 (81.8%)	14 (46.7%)	7 (17.1%)	
Duration of leg pain	-	-	-	-	-
Less than 3 months	33 (30.8%)	5 (22.7%)	6 (20.0%)	15 (36.6%)	0.153
3 months to 1 year	31 (29.0%)	10 (45.5%)	16 (53.3%)	16 (39.0%)	
More than 1 year	43 (40.2%)	7 (31.8%)	8 (26.7%)	10 (24.4%)	
Previous clinic visits (Mean ± SD)	1.24 ± 1.34	1.64 ± 1.62	1.60 ± 1.79	1.17 ± 1.24	0.396
Previous investigations (Mean ± SD)	1.06 ± 0.48	1.05 ± 0.79 -	1.10 ± 0.62	0.66 ± 0.53	<0.001

In this study, 66.9% of the patients had at least one prior clinical consultation with a non-vascular speciality before ultimately seeking care from a vascular surgeon. Additionally, 71 cases (35.5%) of leg pain were determined to have non-vascular origins upon presentation, including musculoskeletal and neurogenic causes. Vascular Surgery clinics are specialised to take care of the patients suffering from arterial and venous insufficiency. If selected patients with only these problems are referred to these clinics, that can improve efficiency of these clinics as physicians can spend their limited clinic time more on managing these patients. This filter can be done at the primary physician level. These results can be potentially attributed to ineffective referral by primary physicians or self-referral by patients. Khan *et al.* identified the lack of referrals by primary physicians and general population unawareness as key reasons for the late presentation of limb ischaemia to vascular surgeons.[11] The findings of Khan *et al.* and this study, highlight the challenges faced by primary physicians in identifying leg pain of vascular origin and effectively referring such cases to vascular surgeons. To address this issue, primary physicians can play a crucial role by identifying the distinguishing symptoms and physical examination findings highlighted in this study for patients with vascular and non-vascular pain. For CVI, these may include varicose veins, oedema, skin pigmentation or changes, and increased temperature (Table II). Conversely, for arterial insufficiency, symptoms may include intermittent claudication, non-palpable peripheral pulses, and an ankle-brachial index (ABI ≤0.9, Table II). By recognising these indicators of vascular leg pain, primary physicians can facilitate timely referrals to vascular surgeons, improving patient outcomes and reducing the burden on tertiary care centres.

CVI was commonly seen in young (44.6 ± 12.5), obese (30.5 ± 6.2), female (71.0%) patients who had a predominantly standing job (74.8%). The authors' findings are consistent with the results of previous studies conducted in local population by Khan *et al*. and Rehman *et al*. which reported the mean ages of patients with CVI as 39 ± 13.2 and 47.83 ± 12.01 years, and mean BMI of 32.49 ± 18.3 and 31.51 ± 232.74 kg/m^2, respectively.[13,14] CVI was more prevalent in females as supported by the previous findings of Kanchanabat *et al*. and Brand *et al*.[15,16] Predominantly standing job was frequently observed among individuals within the present cohort diagnosed with CVI, consistent with findings reported in a study conducted in Denmark by Tuchsen *et al*.[17]

Commonly reported symptoms and leg examination findings in patients with CVI consisted of varicose veins (80.4%), oedema (75.7%), skin changes / pigmentation (31.8%), and increased temperature (23.4%). According to a study conducted in Romania, the prevalence of varicose veins in patients with CVI was reported to be 26.6%, oedema was 13.4%, and skin alterations were 7.85%.[18] The variations in findings can be attributed to the inclusion of patients with pre-existing leg pain in this study in a vascular surgery setting. Additionally, the limited availability of vascular facilities in the Pakistani population leads to delayed presentations by most patients and thus severe symptoms.

Arterial insufficiency was frequently seen in relatively older (56.3 ± 13.3), male (86.4%), and overweight (26.6 ± 5.1) patients with predominantly sitting jobs (81.8%). Commonly observed symptoms and examination findings included intermittent claudication (81.8%), non-palpable peripheral pulses (72.7%), and ABI ≤0.9 (90.9%). The results of ABI in this study

in detecting arterial insufficiency are consistent with multiple previous studies which report the sensitivity of ABI to be around 79-95%.[19,20] This study's results align with those of a study conducted in India, where approximately 85.8% of the patients with peripheral arterial disease were males, with a median age of 58 years.[21] Previous studies have reported that intermittent claudication occurs in 10-20% of patients with peripheral arterial disease.[22] The observed prevalence of intermittent claudication in this study is higher as all the patients already had leg pain, leading to an increase in reported cases of intermittent claudication.

This study is the first of its kind in the local population as it examines the prevailing causes of leg pain in patients presenting to vascular surgery clinics. This is an exciting and active area of research and more studies are needed to look for the patterns and aetiologies of different vascular conditions in the Pakistani population to vascular clinics such as patients presenting with leg ulcers and gangrene.

This study has some limitations. The study's reliance on a single tertiary care setting may limit its generalisability to other healthcare facilities. Moreover, the sample size may not be large enough to fully represent the entire population.

CONCLUSION

CVI was found to be the leading cause of leg pain followed by neurogenic pain, musculoskeletal pain, and arterial insufficiency, respectively in patients presenting first time to vascular surgery clinics at tertiary care hospitals.

ETHICAL APPROVAL:
Exemption from the Ethical Review Committee (2021-5121-16840) was obtained before the start of the study.

PATIENTS' CONSENT:
Not applicable as the data were collected from the medical records of the patients.

COMPETING INTEREST:
The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:
ZUR: Study concept, design of the work, acquisition, and analysis of the data, and drafting.
MA, AR, HS: Acquisition of the data, analysis, and drafting of the manuscript.
NAS, FS: Review of the draft.
All authors approved the final version of the manuscript to be published.

REFERENCES

1. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bull World Health Organ* 2003; **81(9)**:646-56. doi:10.1590/S0042-96862003000900007.
2. Lyden SP, Joseph D. The clinical presentation of peripheral arterial disease and guidance for early recognition. *Cleve Clin J Med* 2006; **73(Suppl 4)**:S15-21. doi: 10.3949/ccjm.73.suppl_4.s15.
3. Van der Velden SK, Shadid NH, Nelemans PJ, Sommer A. How specific are venous symptoms for diagnosis of chronic venous disease? *Phlebology* 2014; **29(9)**:580-6. doi: 10.1177/0268355513515859.
4. Nicolaides A, Kakkos S, Baekgaard N, Comerota A, de Maeseneer M, Eklof B, *et al*. Management of chronic venous disorders of the lower limbs. Guidelines according to scientific evidence. Part I. *Int Angiol* 2018; **37(3)**:181-254. doi: 10.23736/S0392-9590.18.03999-8.
5. Santler B, Goerge T. Die chronische venose insuffizienz - Eine zusammenfassung der pathophysiologie, diagnostik und therapie. *J Dtsch Dermatol Ges* 2017; **15(5)**:538-57. doi: 10.1111/ddg.13242_g.
6. Boyraz I, Koc B, Yazici S. Demographic characteristics of the patients referred to physical therapy outpatient clinic. *Electron J Gen Med* 2016; **13(1)**:53-7. doi: 10.15197/ejgm.01485.
7. Hirsch AT, Criqui MH, Treat-Jacobson D, Regensteiner JG, Creager MA, Olin JW, *et al*. Peripheral arterial disease detection, awareness, and treatment in primary care. *JAMA* 2001; **286(11)**:1317-24. doi: 10.1001/jama.286.11.1317.
8. Chiesa R, Marone EM, Limoni C, Volonte M, Petrini O. Chronic venous disorders: Correlation between visible signs, symptoms, and presence of functional disease. *J Vasc Surg* 2007; **46(2)**:322-30. doi: 10.1016/j.jvs.2007.04.030.
9. Shingler S, Robertson L, Boghossian S, Stewart M. Compression stockings for the initial treatment of varicose veins in patients without venous ulceration. *Cochrane Database Syst Rev* 2011; **(11)**:CD008819. doi: 10.1002/14651858.CD008819.pub2.
10. Aboyans V, Ricco JB, Bartelink MEL, Bjorck M, Brodmann M, Cohnert T, *et al*. Editor's choice - 2017 ESC guidelines on the diagnosis and treatment of peripheral arterial diseases, in collaboration with the European Society for Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg* 2018; **55(3)**:305-68. doi: 10.1016/j.ejvs.2017.07.018.
11. Khan AR, Shaikh FA, Riaz A, Rehman ZU, Sophie Z, Siddiqui NA. Why do patients with limb ischaemia present late to a vascular surgeon? A prospective cohort study from the developing world. *J Pak Med Assoc* 2019; **69(Suppl 1)**:S3-6.
12. Kakakhel SI, Mahmood H, Khan J, Makey G, Arif M, Jamil S, *et al*. Assessment of referral patterns and utilization of basic health facilities in the outpatient department of a tertiary care hospital: A cross sectional study: Referral patterns and utilization of basic health facilities. *Pak J Health Sci* 2023; **4(6)**:42-6. doi: 10.54393/pjhs.v4i05.406
13. Khan AF, Chaudhri R, Ashraf MA, Mazaffar MS, Zawar-ul-Imam S, Tanveer M. Prevalence and presentation of chronic venous disease in Pakistan: A multicentre study. *Phlebology* 2013; **28(2)**:74-9. doi: 10.1258/phleb.2012.011122.
14. Rehman ZU. Pattern of chronic venous insufficiency among patients presenting to a vascular surgery clinic in low- to middle-income countries (LMIC): A cross-sectional study. *Ann Vasc Dis* 2021; **14(2)**:118-21. doi: 10.3400/avd.oa.20-00088.
15. Kanchanabat B, Stapanavatr W. Venous ultrasonography findings and clinical correlations in 104 Thai patients with chronic venous insufficiency of the legs. *Singapore Med J* 2018; **59(3)**:155-8. doi: 10.11622/smedj.2017043.

16. Brand FN, Dannenberg AL, Abbott RD, Kannel WB. The epidemiology of varicose veins: The framingham study. *Am J Prev Med* 1988; **4(2)**:96-101.

17. Tuchsen F, Krause N, Hannerz H, Burr H, Kristensen TS. Standing at work and varicose veins. *Scand J Work Environ Health* 2000; **26(5)**:414-20. doi: 10.5271/sjweh.562.

18. Feodor T, Baila S, Mitea IA, Branisteanu DE, Vittos O. Epidemiology and clinical characteristics of chronic venous disease in Romania. *Exp Ther Med* 2019; **17(2)**:1097-105. doi: 10.3892/etm.2018.7059.

19. Rac-Albu M, Iliuta L, Guberna SM, Sinescu C. The role of ankle-brachial index for predicting peripheral arterial disease. *Maedica (Bucur)* 2014; **9(3)**:295-302.

20. Ichihashi S, Desormais I, Hashimoto T, Magne J, Kichikawa K, Aboyans V. Accuracy and reliability of the ankle brachial index measurement using a multicuff oscillometric device *versus* the doppler method. *Eur J Vasc Endovasc Surg* 2020; **60(3)**:462-8. doi: 10.1016/j.ejvs.2020.06.013.

21. Sharma S, Vaddavalli VV, Savlania A, Ravi A, Kaman L, Behera A. Demographics and Prevalence of risk factors in patients with peripheral arterial disease presenting to a tertiary care center in northern India. *Cureus* 2022; **14(12)**:e32397. doi: 10.7759/cureus.32397.

22. Alzamora MT, Fores R, Pera G, Baena-Diez JM, Heras A, Sorribes M, *et al*. Incidence of peripheral arterial disease in the ARTPER population cohort after 5 years of follow-up. *BMC Cardiovasc Disord* 2016; **16**:8. doi: 10.1186/s12872-015-0170-6.