



# A Clinicopathological Study of Ulcers on the Lower Limb and its Management

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## KEYWORDS

Ulcers, Lower limb,  
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ulcers.

## ABSTRACT

**Introduction:** A rupture of the skin accompanied by erosion of the subcutaneous tissue beneath is called an ulcer. The adjacent muscle and bone may be further compromised by this breach. A full-thickness skin defect that has not significantly re-epithelialized for longer than four weeks is referred to be a chronic ulcer. Wounds with "full thickness depth" and a "slow healing tendency" are referred to as ulcerations. In general, the delayed healing tendency cannot be fully explained by depth and size alone. But brought on by a pathologic reality at the root that must be eliminated in order to promote recovery.

**Aims:** To research the treatment of lower leg ulcers and its clinic pathological characteristics.

**Materials and methods:** The present study was a Prospective interventional study. This study was conducted from July 2021-June 2022 at Department of General Surgery, Santosh Medical College & Hospital Ghaziabad. 65 patients were included in this study.

**Result:** In our study out of 8 patients presented with varicose veins the cause of ulcers is of venous aetiology. The value of z is 1.002. The value of p is  $< .001$ . The result is significant at  $p < .05$ . In our study 5 patients had Raynaud's phenomena and the cause of ulcers are of arterial aetiology. The value of z is 0.899. The value of p is  $< .001$ . The result is significant at  $p < .05$ . In our study out of 21 patients with loss of sensation the causes of ulcers are diabetic followed by arterial and venous aetiology. The value of z is 1.074. The value of p is  $< .001$ .

**Conclusion:** We draw the conclusion that, in addition to adding to the expanding body of information on lower leg ulcers, our clinic pathological investigation emphasizes the significance of a thorough, multidisciplinary approach to diagnosis and treatment. Through the implementation of evidence-based treatment options and an attention to the intricate interaction of variables that lead to ulcer formation, our goal is to enhance patient quality of life while mitigating the prevalence of chronic wounds in our communities.

## INTRODUCTION

A rupture of the skin accompanied by erosion of the subcutaneous tissue beneath is called an ulcer. The adjacent muscle and bone may be further compromised by this breach.

A full-thickness skin defect that has not significantly re-epithelialized for longer than four weeks is referred to be a chronic ulcer. Wounds with "full thickness depth" and a "slow healing tendency" are referred to as ulcerations. In general, the delayed healing tendency cannot be fully



explained by depth and size alone. but brought on by a pathologic reality at the root that must be eliminated in order to promote recovery.

Lower limb and foot ulcers are a common and widely distributed ailment that can be linked to various medical, surgical, and dermatological conditions. The patient's discomfort is severe and is typically observed in most surgical wards and outpatient departments. Leg ulcer issues cover a broad range of pathology, origin, severity, and morbidity. Diabetes, lower extremity arterial disease, and inadequate venous valve are the primary reasons. Infections, vasculitis, skin cancers, and ulcerative skin disorders including pyoderma gangrenosum are less common problems.

However, uncommon conditions do arise, such as the recently identified confluence of hypercoagulability and vasculitis. Knowing the many differential diagnoses for leg ulceration is crucial for providing patients with appropriate care. Although there might be a number of reasons, the anatomical location of leg ulcers can sometimes lead to complications that put surgeons' creativity and forbearance to the test.

The incidence of ulcers is higher in the elderly population and is associated with higher risk factors for atherosclerotic occlusion, including obesity, diabetes, and smoking. In the last thirty years, a great deal of information has been discovered on the anatomy, physiology, pathology, and treatment of chronic leg ulcers. Despite all of this, there is still room for innovation when it comes to the treatment of chronic leg ulcers.

The pathophysiology, categorization, clinical evaluation, and investigative approach to the leg ulcer patient were all well covered in the intriguing paper Venous Leg Ulcers: Pathophysiology and Classification by B Vasudevan [1]. Leg ulcers can have a variety of reasons.

But most chronic leg ulcers (>90%) have a vascular etiology; of these, chronic venous hypertension is assumed to be the primary cause in around 70% of cases and a substantial contributing component in the remaining 15% of cases with a combination of venous and arterial etiology. Five percent of cases are caused by arterial insufficiency. Diabetes, vasculitis, cancer, hematological problems, rheumatoid arthritis, pressure, and other traumas might be the cause of the remaining

cases. [2]

The pathophysiology of venous ulceration has been well covered by the writers, including the clinical, etiologic, anatomical, and pathophysiological (CEAP) categorization, which is crucial for clinical assessment and therapy. The pathogenesis of other common ulcers should be briefly discussed. Lower arterial blood flow and the ensuing tissue perfusion are the causes of arterial leg ulcers. Three pathophysiological processes are identified: (a) extramural strangling; (b) mural thickening or accretion; and (c) intramural blood flow restriction.

It is predicted that 15% of all diabetics may develop diabetic foot ulcers at some point in their lives. Diabetic foot ulcers typically have a complex etiology. It has been established that the most frequent contributing factor to foot ulcers is peripheral neuropathy. Peripheral neuropathy, biomechanical distortion, and superimposed mild trauma are the three factors that might cause ulceration. [3] Generally speaking, undetected recurrent stress and loading that results in skin and soft tissue disintegration and opens up an entrance site for infection is caused by neuropathy-related loss of feeling.

## MATERIAL AND METHODS

**Study Area-** Department of General Surgery, Santosh Medical College & Hospital Ghaziabad

**Study Population-** All the patients with lower limb ulcers attend surgery OPD and admitted in surgery ward.

**Study Period** – July 2021-June 2022.

**Sample Size-** 65 Patients.

**Study Design-** Prospective interventional study.

**Study technique-** Convenient technique.

**Inclusion Criteria: -**

1. Patient willing to participate in the study.
2. Patient suffering from any type of lower limb ulcers.
3. Patient of age group 18-65 years.

**Exclusion Criteria: -**

1. Patients' refusal to be a part of study.
2. Patients <18 years and >65 years of age.
3. Immunocompromised patients.
4. Patients with suspected malignancy.

## RESULT

**Table: Causes of ulcers association with All Parameters**

	Causes of ulcers	Absent	Present	Grand Total
Varicose veins	Arterial	11	0	11
	Diabetes	22	0	22
	Trauma	6	0	6
	Venous	18	8	26
	Grand Total	57	8	65
Raynaud's phenomena	Arterial	6	5	11
	Diabetes	22	0	22
	Trauma	6	0	6
	Venous	26	0	26
	Grand Total	60	5	65
Loss of sensation	Arterial	4	7	11
	Diabetes	14	8	22
	Trauma	6	0	6
	Venous	20	6	26
	Grand Total	44	21	65
Peripheral pulses	Arterial	5	6	11
	Diabetes	0	22	22
	Trauma	0	6	6
	Venous	1	25	26
	Grand Total	6	59	65
HTN	Arterial	3	8	11
	Diabetes	13	9	22
	Trauma	4	2	6
	Venous	18	8	26
	Grand Total	38	27	65
DM	Arterial	6	5	11
	Diabetes	0	22	22
	Trauma	6	0	6
	Venous	14	12	26
	Grand Total	26	39	65
H/O Smoking	Arterial	1	10	11
	Diabetes	5	17	22
	Trauma	2	4	6
	Venous	13	13	26
	Grand Total	21	44	65
Surgical debridement	Arterial	9	2	11
	Diabetes	5	17	22
	Trauma	6	0	6
	Venous	16	10	26
	Grand Total	36	29	65
Lumbar sympathectomy	Arterial	9	2	11
	Diabetes	22	0	22
	Trauma	6	0	6
	Venous	26	0	26



	<b>Grand Total</b>	63	2	65
<b>Amputation</b>	<b>Arterial</b>	4	7	11
	<b>Diabetes</b>	21	1	22
	<b>Trauma</b>	6	0	6
	<b>Venous</b>	25	1	26
	<b>Grand Total</b>	56	9	65

In our study out of 8 patients presented with varicose veins the cause of ulcers is of venous aetiology. The value of  $z$  is 1.002. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ . In our study 5 patients had Raynaud's phenomena and the cause of ulcers are of arterial aetiology. The value of  $z$  is 0.899. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ . In our study out of 21 patients with loss of sensation the causes of ulcers are diabetic followed by arterial and venous aetiology. The value of  $z$  is 1.074. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ . In our study 6 patients had absent peripheral pulses and the causes of ulcers are arterial followed by venous aetiology. The value of  $z$  is 1.062. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ . In our study 27 patients had HTN in them causes of ulcers are diabetic followed by equal number of arterial and venous aetiology. The value of  $z$  is 1.028. The value of  $p$  is  $.001$ . The result is significant at  $p < .05$ . In our study 39 patients had DM among them the causes of ulcers are diabetic followed by venous and arterial aetiology. The value of  $z$  is 1.298. The value of  $p$  is  $.001$ . The result is significant at  $p < .05$ . In our study 44 patients had H/O smoking among them the causes of ulcers are diabetic followed by venous and arterial aetiology. The value of  $z$  is 1.050. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ . In our study 29 patients under went surgical debridement among which the causes of ulcers are diabetic followed by venous and arterial aetiology. The value of  $z$  is 1.274. The value of  $p$  is  $.001$ . The result is significant at  $p < .05$ . In our study 2 patients under went lumbar sympathectomy among which the causes of ulcers are of arterial aetiology. The value of  $z$  is 0.927. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ . In our study 9 patients under went Amputation among them the causes of ulcers are arterial followed by equal number of diabetic and venous aetiology. The value of  $z$  is 0.910. The value of  $p$  is  $< .001$ . The result is significant at  $p < .05$ .

## DISCUSSION

The present study was a Prospective interventional study. This study was conducted from July 2021-June 2022 at Department of General Surgery, Santosh Medical College & Hospital Ghaziabad. 65 patients were included in this study.

According to Phillips, Tania, et al., the prevalence of leg ulcers is most likely between 0.18% and 1% [4]. According to Gilliland, vascular etiology accounts for 95% of leg ulcers [5], and among all chronic wounds, lower limb venous ulcers dominate the differential diagnosis, accounting for up to 90% of cases [6]. 10% to 5% of cases are caused by arterial disorders; the remainder are either neuropathy-related or a mix of the two. (Youth J. R.) [7]

In our study, out of 65 patients, most of the patients were [25 (38.5%)] 51-60 years of age which was statistically significant ( $p=0.00026$ ) ( $Z=3.6648$ ).

In Mohanta PK et al.'s research [9], The majority of ulcers (36.3%) were caused by diabetes, which was followed by venous ulcers (22.3%), traumatic ulcers (15.5%), arterial ulcers (12.4%), and ( $Z=2.17$ ;  $p=0.01$ ). Furthermore, Yound J. R. [7] notes that the proportion of various ulcer types varies throughout studies: venous ulcers range from 70% to 90%, arterial ulcers from 5% to 15%, and miscellaneous ulcers from 1% to 5%.

In our study ulcer with vascular etiology accounted for only 37 (56.9%) of all ulcers. Out of 65 patients 26 (40.0%) patients had Venous ulcers, 22 (33.8%) patients had Diabetes ulcer, 11 (16.9%) patients had Arterial ulcers, 6 (9.2%) patients had Traumatic ulcers. The value of  $z$  is 4.0721. The value of  $p$  is  $< .00001$ . The result is significant at  $p < .05$ .

Research conducted by Callam M.J. [8]. Not just the elderly are at risk: 22% of the participants in his research had ulcerations that started before the age of 40.

In our study the mean Age of patients was  $48.8000 \pm 13.0972$ . 8 (12.3%) patients were  $\leq 30$  years of age, 7 (10.8%) patients were 31-40 years of age, 13 (20.0%) patient were 41-50 years of age, 25 (38.5%) patients were 51-60 years of age and 12 (18.5%) patients were



>60 years of age. The value of  $z$  is 3.6648. The value of  $p$  is .00026. The result is significant at  $p < .05$

In our study out of 8 patients in age group <30 years arterial and venous cause ulcers are most common, out of 7 patients in age group 31-40 years venous cause of ulcers are most common, out of 13 patients in age group 41-50 venous cause of ulcers are most common, out of 25 patients in age group 51-60 years diabetic cause of ulcers are most common followed by venous cause, out of 12 patients in age group > 61 years arterial, venous, diabetic cause of ulcers are equal in number. The value of  $z$  is 13.289. The value of  $p$  is .001. The result is significant at  $p < .05$ .

In their study, Mohanta PK et al. [9] found that the percentage of men was 84.5%, substantially greater than the proportion of women (15.5%) ( $Z=9.89$ ;  $p<0.0001$ ). According to our research, there were more men [45 (69.2%)] than women [20 (30.8%)] in the population. This difference was statistically significant ( $p<.00001$ ) ( $Z=4.3853$ ).

In Mohanta PK et al.'s study [9], the left leg's percentage (49.2%) was greater than the right leg's (47.2%), but the difference was not statistically significant ( $Z=0.28$ ;  $p=0.77$ ). Of the patients, only 3.6% had ulcers on both legs. 42 patients (64.6%) and 23 patients (35.4%) in our research were on the left side.  $Z$  has a value of 3.3328.  $P$  has a value of .00086. At  $p < .05$ ., the finding is significant. In a research by Mohanta PK et al. [9], 79.2% of the ulcer's microorganisms were discovered, which was considerably more than the 20.8% of no growth ( $Z=8.25$ ;  $p<0.0001$ ).

In our investigation, 30 patients (46.2%) had Sterile in Culture (Organism) and 35 patients (53.8%) had Growth Seen.  $Z$  has a value of 0.8771.  $P$  has a value of .37886. At  $p < .05$ ., the finding is not significant. In his research, Mohanta PK et al. [9] found that the most prevalent origin of ulcers was muscle (35.2%), followed by bone (26.4%) and subcutaneous tissue (24.9%). In 6.7% of the instances, only the bone base and a tendon were discovered. ( $p=0.11$ ;  $Z=1.58$ ). 35 patients (53.8%) in our research had bone, 15 patients (23.1%) had muscle, and 15 patients (23.1%) had tendon.  $Z$  has a value of 3.6056.  $P$  has a value of .0003. At  $p < .05$ ., the finding is significant.

The majority of the ulcer floors in Mohanta PK et al.'s study [9] were made up of poor granulation tissue and slough (36.3%), which was followed by pale granulation tissue and slough (22.3%). The percentage of instances with elevated abnormal granulation tissue that extended beyond the edge was 2.1%. ( $p=0.03$ ;  $Z=2.17$ ). Thirty-

three patients (50.8%) in our research had Granulation Tissue, while thirty-two patients (49.2%) had Slough in Floor.  $Z$  has a value of 0.1754.  $P$  has a value of .85716. At  $p < .05$ ., the finding is not significant. In Mohanta PK et al.'s study [9], the majority of ulcer margins (38.3%) had irregular edges, which was substantially higher ( $Z=2.46$ ;  $p=0.0139$ ) than the thin bluish irregular edges (22.3%). The majority of ulcers had shallow edges (55.4%), followed by sloping edges (20.7%) ( $Z=5.05$ ;  $p<0.001$ ). Merely 3.1% of the ulcer edge exhibited regularity. In our study, 32 patients (49.2%) had punched out, 29 patients (44.6%) had slopped, and 2 patients (3.1%) had undermined.  $Z$  has a value of 5.9871.  $P$  has a value of less than .00001. At  $p < .05$ ., the finding is significant. And in our study, 26 (40.0%) patients had Irregular Margin, 39 (60.0%) patients had Regular Margin. The value of  $z$  is 2.2804. The value of  $p$  is .0226. The result is significant at  $p < .05$ . Studies on leg and foot ulcers conducted by Hansson Carita [10] indicate that vascular insufficiency and/or diabetes are the main causes of ulcers below the shoe and foot line. The most common cause of ulcers on the medial portion of the ankle in the gaiter zone is insufficient blood flow to the veins. In our study out of 65 patients, 28 (43.1%) patients had Foot, 34 (52.3%) patients had Leg and 3 (4.6%) patients had Thigh in Location of Ulcer. The value of  $z$  is 6.0255. The value of  $p$  is < .00001. The result is significant at  $p < .05$ .

In our study, 4 (6.2%) patients had Anterior, 17 (26.2%) patients had Dorsal and 18 (27.2%) patients had Lateral, 18 (27.7%) patients had Lateral, 16 (24.6%) patients had Medial, 5 (7.7%) patients had Plantar, 5 (7.7%) patients had Posterior. The value of  $z$  is 3.2747. The value of  $p$  is .00108. The result is significant at  $p < .05$ .

The prevalence of peripheral vascular disorders rises with age, with individuals 60 years of age and beyond having a 7-fold higher incidence than those under 20. (Carita Hansson) [10]

In our study, arterial and venous diseases were found to be maximum in the age group of 51 to 65 years. And also, venous ulcers were found to be most common in the age group of 51 to 60 years and Arterial were found to be more common in the age group of > 60 years. As most of our patients belong to the working class which involved long hours of standing. In our study, 18 (27.7%) patients had Heavy Work, 14 (21.5%) patients had Moderate and 33 (50.8%) patients had Sedentary Life Style. The value of  $z$  is 3.4685. The value of  $p$  is .00052. The result is significant at  $p < .05$ . According to Mohanta PK et al.'s study [9], venous ulcers were more



prevalent among those 45-68 years old (mean  $51.58 \pm 4.72$ ), with a plurality of men (83.7%) and a predominant involvement in the agricultural or service sectors. Leg region affected in 83.7% of cases, with ulcers more prevalent on the left leg (76.7%).

As part of a continuous study of health and illness in a Michigan community, Coon et al. [11] investigated the prevalence and incidence of venous thromboembolism and other venous diseases. 24 million Americans are thought to have "significant" varicose veins, 6–7 million have leg skin stasis abnormalities, and 400,000–500,000 now or formerly had varicose ulcers. the adult population's comparatively large frequency of second it ions.

In our study Out of the 65 patients, 26 (40%) were having venous ulcers out of them 9 (34.6%) patients were in between the age group 51-60years with male preponderance. Most common comorbidities associated are diabetes and hypertension. In out of 26 venous ulcer patients 8 (30.7%) were due to varicose veins. Out of 8 patients with varicose veins, 6 (75%) underwent surgery in form of ligation and or Trendelenburg's operation and 2 (25%) underwent sub fascial ligation which are statistically significant. Remaining venous ulcers mostly managed by surgical debridement. Total 8 (12.3%) patients having Claudication Pain it was statistically significant ( $p < .00001$ ) ( $Z=8.5952$ ).

Out of 65 patients in the study 11 (16.9%) patients having arterial ulcers among them 4 (36.3%) were in the age group more than 60years which was statistically significant with Male preponderance. Five (45.4%) patients had Raynaud's phenomenon, according to Itin & Winkelmann [12], and five (45.4%) patients had no peripheral pulses, which was statistically significant. Smoking history is closely linked to arterial ulcers, particularly in TAO patients Mekkes et al., [13]. A statistically significant lumbar sympathectomy was performed on 2 (18.18%) of the patients. In our investigation, ulcers resulting from diabetes were the leading cause of HTN in 27 individuals, with an equal proportion arising from venous and arterial etiologies. Z has a value of 1.028. P has a value of .001. At  $p < .05$ ., the finding is not significant.

In our study Out of the 65 patients, 22 (33.8%) patients having diabetic ulcers among them 12 (54.54%) patients are in the age group 51-to-60-year age group, which was statistically significant. Out of 65 patients in the total 21 (32.3%) having loss of sensations among them 8(38.01%) patients were having diabetic ulcers which was statistically significant. van Deursen, [14],

Hypertension follows diabetes The most prevalent co-morbidities connected to diabetic ulcers are listed by Singer et al. [15]. Six (9.23%) of the patients in our research had traumatic ulcers, and five (50%) of those patients were in the 51–60 age range, which was statistically significant. Patients with fewer numbers had [10 (15.4%)] It was statistically significant ( $p < .00001$ ), conservative ( $Z=7.8935$ ).

The best clothing is your skin (Lister). It can be used in several pinch graft applications or as a partial thickness graft. Large ulcers or those that refuse to heal are best left for conservative care (Gilland E. L., John H. N. Wolf). [5]

In our study, 7 (10.8%) patients had Skin Grafting. The value of z is 8.946. The value of p is  $< .00001$ . The result is significant at  $p < .05$ . In our study higher number of patients had [35 (53.8%)] Follow Up at 15days (Healing) it was not statistically significant ( $p = .37886$ ) ( $Z=0.8771$ ). All patients had Follow-up at 2months.

A descriptive prospective study of 300 patients with chronic lower limb ulcers, with a median age of 32 years, was conducted by Mbunda F et al. [16]. The ratio of men to women was 2:1. Of all the ulcer types, traumatic ulcers accounted for 60.3% of cases. 33.7% of cases typically included the leg, while 48.7% of cases concerned the right side. Of the patients in this research, sixty-eight (22.7%) had smoked cigarettes in the past. Among the 300 patients, 212 (70.7%) exhibited positive aerobic bacterial growth. Of those treated surgically, 270 (90.0%) had debridement, which was the most prevalent surgical treatment in 24.1% of cases. Amputation rates of limbs were 8.7%. 54 patients (18.0%) had a history of premorbid illnesses, including 32 (59.3%) with diabetes mellitus, 8 (14.8%) with chronic pulmonary diseases, 6 (11.1%) with hypertension, 4 (7.4%) with peripheral vascular diseases, and 2 (3.7%) with congenital cardiac disorders and obstructive jaundice. Complication following surgery Age  $>20$  years old P value-0.004, female sex 0.001, pre morbid comorbidities p value 0.041, kind of ulcers infective p value 0.001, and metabolic ulcers p value 0.007 are the predictor (independent) factors.

John A. et al. [17] The Italian Association for Cutaneous Ulcers (AIUC) sponsored a two-year observational study to track the epidemiology of leg ulcers, the healing trend, and the more common therapeutic approaches in lower limb ulcers, according to a sizable multicenter observational study on vascular ulcers of the lower limbs (Studio Ulcere Vascolari). The trial featured 59 locations spread over 14 different areas in Italy, and 1333 patients



were enrolled, of whom 1163 underwent comprehensive evaluation and were monitored for nine months. A prevalence of females (62%) was observed with a mean age of 70 years and a high rate of hypertension (62%), diabetes (38%) and obesity (29%). Venous ulcer was most frequent (55%), followed by mixed (25%) and diabetic (8.3%) ulcers. These comorbidities were present in different frequencies depending on the type of ulcer, both in the case of hypertension and diabetes ( $P < 0.001$ ,  $\chi^2$  test) and obesity ( $P < 0.01$ ,  $\chi^2$  test). The granulation tissue was very low, with a frequency ranging from around 17% to 23%. The exudate was present in all the ulcers, mainly of medium grade with a frequency that ranged from 41.9% (arterial ulcers) to 47.9% (ulcers combined). It has been found that patients receiving drugs in association with local therapy (LT) showed a significantly ( $P = 0.001$ ). In venous ulcers, blood hypertension was reported to significantly delay the healing of ulcer with an odds ratio (OR) of 1.45 (CI at 95%: 1.07–2.06;  $P < 0.02$ ), while obesity showed OR of 1.46 (CI 95%: 1.04–2.04;  $P = 0.03$ ). Obesity represented a detrimental factor for the healing of mixed ulcers also, with an OR of 1.73 (CI 95%: 1.01–2.97;  $P < 0.05$ ). Patients with varicose veins in the vast saphenous system were the subjects of a retrospective observational research conducted by Dhakal P et al. [18]. Varicose vein pigmentation and ulceration are influenced by age, gender, length of disease, and symptoms. There were 223 patients in all. Male: female ratio was 1.47, indicating a larger proportion of male patients. 43.7 years (SD, 13.4) was the average age; 41.8 years (SD, 14.3) for men and 46.4 years (SD, 11.9) for women. Ulceration in varicose veins was strongly predicted by four factors. There were significant predictors for pain ( $\beta = 0.366$ ,  $P < 0.01$ ), itching ( $\beta = 0.355$ ,  $P < 0.01$ ), sickness duration ( $\beta = 0.204$ ,  $P < 0.01$ ), and male gender ( $\beta = 0.196$ ,  $P < 0.01$ ). Age, however, did not significantly predict ulceration.

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