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INCIDENCE AND ETIOPATHOGENESIS OF LOWER LIMB ULCERS- PROSPECTIVE STUDY

General Surgery

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ABSTRACT

Background: An ulcer is a discontinuity in the epithelial surface. Ulcers are wounds with a full-thickness depth and have a varied healing tendency. Ulcers can present with complete loss of the epidermis, loss of the dermis and also loss of subcutaneous fat. Lower limb chronic ulcers are a relatively common condition among adults, which often causes discomforting pain at rest, limits mobility and also brings social distress. It is estimated that the prevalence of active leg ulceration is 0.15%. The aetiology of chronic limb ulcers includes venous disorders, arterial disease and neuropathy. The prevalence of leg ulcers depends on various associated concomitant diseases and also varies geographically and even among ethnic groups. **Aims and Objectives:** This study is being conducted to assess the factors associated with lower limb ulcers and its aetiology on the patients admitted to Kanyakumari Government Medical College. **Materials and Methods:** The study is carried out on 100 patients with lower limb ulcers admitted to the Department of General Surgery at KGMCH. **Results:** The study was conducted among 100 patients, with the majority of patients in the age group between 19 and 78 years of age and a mean age of 61. Male predominance was reported in the study, with 67 patients being male. The ankle-brachial pressure index (ABPI) of the study population is between 0.7 and 0.9 for 43% of patients. The study identified that right foot is the most common site involved. Diabetes was the commonest metabolic disorder and present in 40% of the patients 31% of the patients have hypertension. 57% of the study population presented in Wagner's Grade 3 ulcer. The average size of the ulcer at the time of presentation is 4.8 cm2. **Conclusion:** As the age of people advances, the chances of them getting chronic leg ulcers also proportionately increase. It is also evident that the incidence of ulcers is higher among the male population, as they have more mobility in the outside environment and tend to have more ulcers than the female population. Though systemic diseases like diabetes play a major role as a precipitative metabolic event, leg ulcers are often the leading cause of hospitalisation, loss of mobility, pain and amputation, and incur huge financial burdens. The chronicity of the problem and its perennial nature always result in an ongoing melody throughout the life span of the individuals. Prevention followed by early appropriate care is the only option that can help get rid of this and avoid the agony of amputation. The newer concepts of wound care, such as vacuum therapy, hyperbaric oxygen therapy, PRP therapy, etc., must be made available at all public hospitals to cater to the needs of these suffering people.

KEYWORDS

lower limb ulcer, etiopathogenesis, Wagner's grade, chronic leg ulcers

INTRODUCTION

An ulcer is a break in the continuity of the covering epithelium, skin or mucous membrane. Ulcers can be defined as wounds with a "full thickness depth" and a "slow healing tendency". Chronic leg ulcer is the term used to describe ulcer in the skin below the level of knee and the ulcer persisting for more than six weeks and shows no tendency to heal after three or more months.

When there is an ulcer with a break in the epithelium, it can also induce loss of dermis and also subcutaneous tissues as the ulcer extends. The incidence of ulceration is raising as the age advances due to the increase in risk factors for atherosclerotic occlusions such as smoking, obesity and diabetes. It is estimated that nearly 1% of the adult population and 3.6% of people older than 65 years are affected with the chronic lower limb ulcers due to various aetiologies.

Up to 50% of patients with diabetes and foot ulceration have concurrent Peripheral Arterial Disease, which confers a significantly elevated risk of adverse limb events and cardiovascular disease. When dealing with the management of an ulcer, the interdisciplinary approach is mandatory as numerous factors lead to lower leg ulceration such as vascularity, neuropathy, bone or joint abnormality and coagulation disorders. Each of these factors needs to be diagnosed and appropriately dealt with by the experts in that field. There are few Indian studies on the epidemiology of chronic wounds; one study estimated the prevalence at 4.5 per 1000 population.

The most common risk factors which results in the development of the chronic lower limb ulcers are

- Advanced Age
- Diabetes
- Stroke and loss of mobility /paralysis
- Peripheral vascular diseases
- Cardiovascular abnormalities
- Issues in relation to cognition
- Poor nutrition and vitamin deficiency
- Low socioeconomic status
- Occupational hazards
- Neuropathy

The senile physiologic changes such as decreased vascular and nerve supply to the skin, tissue thinning due to trophism and reduction or alteration in the ratio of types of collagen can impair wound healing in the elderly , leading to the chronicity.

Venous ulcers are usually located on the medial side of the leg, most often in the gaiter's zone between the ankle and the calf. Venous insufficiency is the most common cause of lower-leg ulcers and constitute for nearly 80% of all cases. The resultant abnormality of ambulatory venous hypertension due to primary or secondary valvular incompetency results in the development of DVT and as its complication the post phlebitic limb. Venous ulceration become a chronic disease and usually present with exacerbation and remission with less tendency to heal .Chronic venous ulcer by the extent of the disease and chronicity cause physical and psychological discomfort which affects negatively on the functional status of the patient[1]. Calf pump failure is another reason for the increased incidence of venous ulcer resulting from from paralysis, immobility, sleeping or travelling in a chair with legs dependant for long periods of time and fixed ankle joints. Failure of the mechanism ,in which the calf muscles through contraction and relaxation, aids in the flow of blood ,back to the heart through the veins causes stasis of blood and increased venous pressure.

Arterial leg ulcers occur as a result of reduced arterial blood flow and subsequent defective tissue perfusion inducing the trophic changes . The incidence of peripheral arterial disease are on the rise due to the

increased incidence of atherosclerosis, metabolic syndrome and diabetes with micro vascular or macro vascular components. Arterial ulceration typically occurs over the toes, heels, and bony prominences of the foot. The ulcer appears "punched out" with well-demarcated edges [2] and a pale, non-granulating and necrotic base. The pathophysiology of ischemic leg ulcer includes:

- extramural strangulation
- mural thickening or accretion,
- intramural restriction of blood flow.

Diabetic foot ulcers occurs in nearly 20% of the people with diabetic metabolic abnormalities .The comprehensive neuropathy involving all the three systems the sensory, motor and autonomic neuropathy along with or in isolation with vasculopathy cause foot ulcers . The diabetic foot ulcers are the cause of 80% of the limb amputation [3]. Worldwide, it is estimated that a lower limb is lost every 30 seconds as a result of diabetic wound infection[4].

Decubitus or pressure ulcers occur over bony prominences eg, the heel but can occur on any part of the body subjected to pressure. Approximately 70% of all pressure ulcers occur in the geriatric population. Pressure ulcers can be a major source of infection and lead to complications such as wide spread cutaneous gangrene, septicaemia and associated osteomyelitis. At-risk patients for decubitus ulcers should be monitored and preventive measures should be adopted to avert pressure damage to the skin and the underlying tissues. [5]

Table 1: Differential Diagnosis Of Common Leg Ulcers This Study Is Aimed At Knowing The Incidence Of The Various Lower Limb Ulcers And Understanding Its Impacts And Response To Treatment And Outcome.

Type	History	Usual Location	Pain	Bleeding with Manipulation	Lesion Characteristics	Surrounding Inflammation	Associated Findings
Ischemic/ arterial	Smoking, intermittent claudication	Distal, on dorsum of foot or toes, over bony prominences	Severe, particularly at night; relieved by dependency	Little or none	Irregular edge; poor granulation tissue, dry necrotic base; round or punched-out with sharp demarcation	Absent	Trophic changes of chronic ischemia, pale, hair loss, atrophic skin, cool feet; absence of pulses, prolonged capillary refill (>4–5 s); ABI <0.5; dependent rubor, elevation pallor
Venous	Varicose veins, DVT, trauma, surgery, multiple pregnancies; aching/ swelling worse at end of day, relieved with elevation	Lower third of leg (gaiter area); between malleolus and lower calf, majority at medial malleolus	Mild; relieved by elevation	Venous ooze	Shallow, irregular/ shaggy shape; granulating base; flat or steep elevated margins; fibrinous material at ulcer bed with moderate to heavy exudate	Present	Lipodermato fibrosis/ lipodermato sclerosis, pigmentation, oedema, atrophie blanche; telangiectasia; normal capillary refill time (<3 s), normal ABI
Neurotrophic	Numbness, paraesthesia, burning, loss of sensation in foot, DM	Under calluses or pressure points (e.g., plantar aspect of first or fifth metatarso phalangeal joint)	None	May be brisk	Punched-out, with deep sinus, variable depth partial thickness to severe involving tendon, fascia, joint capsule, or bone	Present	Demonstrable neuropathy, may be associated with underlying osteomyelitis
Vasculitis	History of primary or secondary connective tissue disease	Pretibial and dorsum of foot but not always geographically limited	Extremely painful	Haemorrhagic vesicle	Multiple, punched-out, inflammed indurated base (pathergy phenomenon)	Present, surrounding skin shows reticulated vascular pattern	Fat necrosis/ chronic panniculitis on pathology
Hypertensive (local infarct)	Normal pulses	Lateral malleoli	Severe	—	Black necrosis	Present	Also called Martorell's ulcer; seen in patients with prolonged/ suboptimal controlled hypertension
Pyoderma Gangrenosum	Unknown pathogenesis	Develops in sites of previous trauma, around scars, donor sites used for grafting	Severe	Little or none	Ulceration with purulent base; well-defined, bluish, undermined borders; surrounding erythema; deep necrotic ulcer	Non infective ulcer, surrounding inflammation	Seen with inflammatory bowel disease, immune deficient states, myeloma, leukaemia, Bechet's syndrome

MATERIALS AND METHODS

In the period between January 2019 and December 2022, a total of 100 patients with lower limb ulcers who were admitted to the General surgery wards of the Kanyakumari Government Medical College were taken into the study.

Sample Size : 100 patients with chronic leg ulcers for more than 3 months and not showing tendency to heal

Inclusion

- Patient with chronic leg ulcer
- Age 18 and above

Exclusion

- Ulcers that are caused due to road traffic accidents
- Associated with malignancy
- Septic shock

The Parameters Studied

The parameters of the study include age, sex, comorbidities, site and size of the ulcers, number of ulcers, distal vascularity and ankle-brachial pressure index. If the distal pulse is not palpable then arterial doppler and CT peripheral angiogram parameters are included. Various parameters studied are tabulated in Table 2.

Tables: 2. Components Assessed In Lower Limb Ulcers

Examination	Factors
History of the Patient	History of ulcer development

	Past and current medical problems
	General health status
	Nutrition
	Social status, occupation
	Mobility problem
	Limitations to self-care
	Obesity
Skin changes /deformities	Arterial
	Malignant
	Autoimmune
Vascular Assessment	Pedal pulses
	Ankle Brachial Pressure Index/ toe pressure
Examination of the limb	Oedema
	Circumferences
	Lymphoedema
	Orthopaedic problems
	Sensation and pain
Examination of the ulcer	Site-venous, arterial, pressure
	Appearance
	Size-measure
	Wound base
	Exudate level
	Surrounding skin

RESULTS

Sex Distribution

Male predominance was noted in this study . Out of total 100 patients 67 patients were male and the rest 33 patients were female .

Age Distribution

All the patients are within the age group of 18 to 74 and the mean age group is 61. Lower limb ulcers are common and peak between 60 to 70 years of age.

ABPI Assessment

The ankle-brachial pressure index (ABPI) is determined and it is ranging between 0.7 to 0.9 for about 43% of the study population. The remaining population is split almost equally between less than 0.7 and more than 1 category.

Site Of The Ulcer

In this study, the foot was found to be the most common location for ulcers. The site of the ulcer is the foot for about 89 patients, comprising 89% of the study population.

Aetiology of Ulcer

The various kind of leg ulcers are noted and they are tabulated in Table 3. It is noted that 15 % patients had mixed aetiology for their leg ulcer

Table: 3. The Cause For The Leg Ulcers

Aetiology	Number (100)	Male (67)	Female (33)
Peripheral arterial Disease	20	12	8
Diabetic Foot	40	30	10
Venous Ulcers	30	20	10
Pressure	4	1	3
Malignancy	4	3	1
Sepsis	2	1	1
Mixed	15	10	5

Concomitant Diseases: Hypertension

The majority of the population doesn't have hypertension. Hypertension was found in 31% of the study population.

Diabetes

About 40% of the study population, comprising 40 patients, was found to be diabetic.

Wagner's Grade Distribution

The Wagner grading system is used to assess the ulcer depth and the presence of osteomyelitis or gangrene. More than half of the study population has a grade of 3, 20% have a grade of 2 and 23% have a grade of 4.

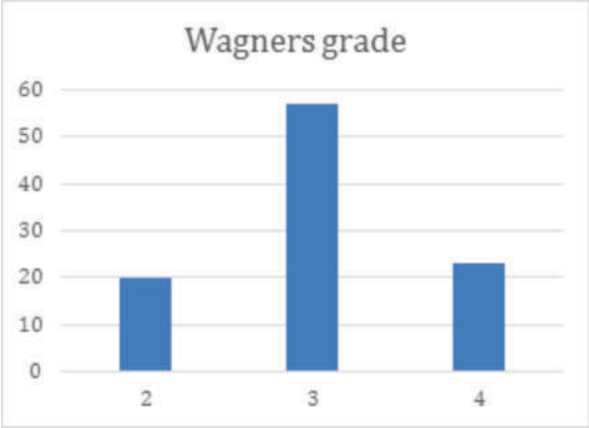

Fig 1: The Incidence Of Ulcer Grades

Peripheral Vascularity

The distal vascularity in the dorsalis pedis artery is felt in 52%, poorly felt in 13%, and absent in 35% of the study population. The number of ulcers:

The majority of the study population (72%) is found to have ulcers at a single site and in the remaining study population (28%), ulcer is seen in more than a single site.

Limb Involvement (Right Or Left Leg)

The majority of the study population has ulcers in the right leg (63%), and the remaining 37% have ulcers in the left leg, probably due to right leg dominance. The details are shown in the graph

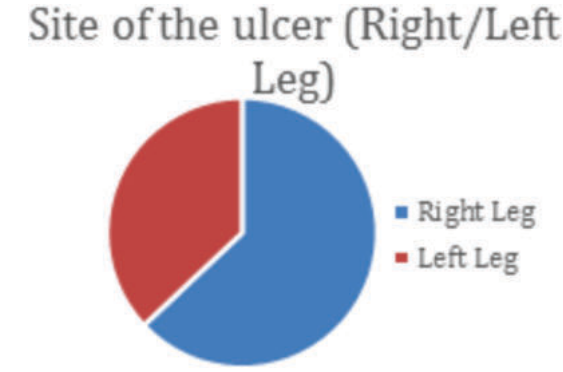

Fig 2: Site Of The Ulcer

Size Of The Ulcer

The size of the ulcer ranges from 1 cm^2 to 16 cm^2 at the time of presentation, with a mean size of 4.8 cm^2.

Fig 3: Diabetic Ulcer & Arterial Ulcer

Fig.4: Venous Ulcer & Trophic Ulcer

Fig.5: Decubitus Ulcer & Martorell Ulcer

DISCUSSION

The age distribution in our study were peaking at the age ranging between 60 to 70. The study conducted by Shah P on Wagner's Classification as a Tool for Treating Diabetic Foot Ulcers [6] also says that incidence is peaking between age 61 to 70.

The gender distribution shows the male predominance in the lower limb ulcers where 67% of our study population were male which is similar to study conducted on Chronic venous ulceration of leg in which 87.95% of the study population were male [7].

It was observed that majority of the population (about 43%) falls between the range of 0.7 to 0.9 ankle brachial pressure index (ABPI). In our study, it clearly shows that the foot is the most predominant site of the ulcer (about 91%) of the study population has ulcer at the foot. The result is similar to the Cross-Sectional Study conducted by Abdissa D[8].

Stratification of diabetic foot patients and appropriate management based on their Wagner's grade helps reduce amputation rates and mortality. In addition, multimodal management and exceptional attention to diabetes and lifestyle control improve long-term outcomes [9]. More than half of the study population (57%) has grade 3, 20% has grade 2 and 23% has grade 4. This result is similar to the study conducted by Shah P on Wagner's Classification [6] where most of the population has grade 3 (34%) and 4 (42%).

Most of the patients in our study population had diabetes which comprises of 40% where the result in study on severity and anatomical distribution of diabetic foot ulcer shows 76.9% had uncontrolled blood sugar [10]

Only about 31% of our study population has hypertension. The result is higher compared to the study in Evaluation of Chronic Leg Ulcer [11] where 12% of the population has hypertension.

Patients who had concomitant chronic venous insufficiency as a sequel of deep vein thrombosis develop trophic changes and present with Venous Leg Ulcers (VLUs) which affects commonly people at 5th to 6th decade. Post phlebitis limb with cutaneous lesion are most common in people who are obese, has decreased mobility and people who do not have proper anti thrombotic care, including wearing the elastic stocks. Such kind of venous ulcers are hard to heal and incur a great financial burden on the person and family[12].

The studies shows there is an increase in the incidence in the occurrence of limb ulcers in relation to the raising geriatric population. Age has a significant impact as it augment the environment for increased chance of atherosclerotic occlusions. The other most important life style factor is smoking and the concomitant non communicable disease are obesity and diabetes. It is postulated, the lifetime risk of 10% of the population to develop chronic wound, in which the wound-related mortality rate is 2.5%. .The ulcer needs appropriate early diagnosis of the etiology and precipitating factor and a comprehensive multimodality care for the correction and preventing further deterioration of the ulcer leading on to amputation.[13].

The factors which aggravates the occurrence and recurrence of the ulcer includes increased BMI due to obesity , metabolic syndrome , neuropathy and foot self-care practice were factors significantly associated with diabetic foot ulcer. The health care providers are recommended to enhance preventive measures in the reduction of foot ulcer through promoting foot self-care practice, giving special emphasis during follow-up of patients who come from rural areas, educating the patient to reduce overweight and managing the neuropathy thoroughly in order to decrease the occurrence of diabetic foot ulcer [14].The mean size of the ulcer at time of presentation in our study is 4.8cm^2 which is similar to the study conducted by Bradley P. Abicht et al. in which the mean ulcer size is 4.4 cm^2.[15]

The various modalities of treatment adopted in these patients depends on the associated vascular or anatomical abnormalities and the type of microbial infection [9]. Many novel methods like epidermal growth factor application, Vac therapy, Offloading, Phenytoin therapy were used after adequate debridement and metabolic control [16]. Patient with Osteomyelitis required longer duration of antibiotic use after through debridement and saucerization. If adequate care with multi modality management is applied and aggressive debridement is ensured, then more limbs can be saved. Patient with vasculopathy need appropriate intervention to restore blood circulation.

Conclusion: As the age of people advances, the chances of them getting chronic leg ulcers also proportionately increase. It is also evident that the incidence of ulcers is higher among the male population, as they have more mobility in the outside environment and tend to have more ulcers than the female population. Though systemic diseases like diabetes play a major role as a precipitative metabolic event, leg ulcers are often the leading cause of hospitalisation, loss of mobility, pain, amputation and incur huge financial burdens. The chronicity of the problem and its perennial nature always result in an ongoing melody throughout the life span of the individuals. Prevention followed by early appropriate care is the only option that can help get rid of this and avoid the agony of amputation. The newer concepts of wound care, such as vacuum therapy, hyperbaric oxygen therapy, PRP therapy, etc., must be made available at all public hospitals to cater to the needs of these suffering people.

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