Incidence of Diabetes and Demographic Profile in Lower Limb Ulcers

Pratha Anantha Ramani[1], Chinthagada Jayaraj[2], Murali Manohar Deevi[3], Simhadri Uday Kiran[4], Ginni Vijay Sainath Reddy[5]

ABSTRACT

Introduction: Lower extremity ulcers associated with diabetes pose a significant threat for limb amputations and with improper treatment can increase the risk of mortality. The present study aimed to identify the incidence of diabetes in lower limb ulcers and the influence of demographic variables in those patients, in a tertiary care hospital in Visakhapatnam.

Material and methods: One hundred cases of lower limb ulcers were retrospectively studied from July 2016 to June 2017. Basic clinic- pathological and radiological examination were done in all relevant patients, and ulcers were classified accordingly. Emphasis was made on diabetics, their demographic profile, treatment status, the organisms isolated, treatment modalities and outcomes.

Results: In our study, people with diabetes were marginally more than non-diabetics (52:48). The age of presentation was 18 - 65 years, with an average of 46 years. Almost all the patients have type-II diabetes, and only one patient has Type-I diabetes. Venous ulcers and neuropathic ulcers were predominant in diabetics and the rest in non-diabetics. Prevalence of foot ulcers is more in the rural population (82%) while the incidence of diabetes is more in the urban population (83.3%). Amputation rates were more in non-diabetics (60%) whereas mortality was confined only to the diabetic population.

Conclusion: Diabetes is a significant risk factor for ulceration in the extremities, which possesses considerable mortality and morbidity. The sociodemographic variables play an essential role in diabetic foot ulceration. Early intervention, control of diabetes and compliance of the patient treatment are all necessary to reduce the rates of amputations and mortality in patients with diabetic foot ulcers.

Keywords: Diabetes, Lower Limb Ulcers, Diabetic Foot Ulcers, Incidence

INTRODUCTION

"An ulcer is a discontinuity in a bodily membrane that impedes the organ of which the membrane is a part of, from continuing its normal functions".[1] Ulcers of lower extremities are debilitating to the patient directly and also have a high impact on the economy since significant resources are being spent every year to treat, prevent, or decelerate the progression of the disease. Closely linked with diabetic neuropathy, diabetic nerve pain and diabetes foot care, diabetic foot ulcers affect many people with diabetes. Ulcer types may differ in people with diabetes when compared to non-diabetics. Most of the diabetic patients have neuropathic ulcers, whereas non-diabetic patients are more likely to have venous, pressure or traumatic type ulcers.[2] Diabetes is a significant risk factor for ulceration in the extremities, which possesses considerable mortality and morbidity.

The present study aims to identify the incidence of diabetes in lower limb ulcers and the influence of demographic profile in of patients in a tertiary care hospital in Visakhapatnam with the objectives of detailed clinical examination of lower limb ulcers, assessment of the patients with diabetes in the study population and study of sociodemographic variables, clinical characteristics of ulcers and the treatment factors of all the patients in the study.

MATERIAL AND METHODS

A retrospective database containing 100 cases of lower limb ulcers from 2016 to 2017, who were in-patients of King George Hospital, Visakhapatnam were evaluated. 100 patients of lower limb ulcers were included in the study.

Baseline clinical examination was done to classify the ulcers. Some parameters such as age, gender, duration, average stay, diabetic status and its treatment status, the diet of diabetic patients, type of ulcer, cultures, organisms and outcomes were studied. Cultures were sent every 3rd day. Treatment options like debridement, fasciotomy, split-skin grafting, minor and major amputations were considered.

A foot ulcer was defined as a full-thickness skin defect regardless of the duration. Diabetes was considered present when Fasting blood sugar value is more than 120mg/dl, the postprandial glucose level is more than 180mg/dl, or more importantly, HbA1C is >6.5%. A standard neurological examination was done to test the sensation to light touch, pain, vibration and tendon reflexes at the ankle. Peripheral neuropathy was considered present if three of the four were absent. When both the dorsalis pedis and posterior tibial pulses were absent in the affected limb, peripheral vascular disease (PVD) was considered present. Based on this, ulcers were classified as neuropathic, ischemic, or neuro-ischemic.

[1]Associate Professor, [2]Professor and HOD, [3]Post Graduate Student, [4]Post Graduate Student, [5]Post Graduate Student, Department of General Surgery, Andhra Medical College, King George Hospital, Visakhapatnam, India

Corresponding author: Murali Manohar Deevi, H. No – 48-13-38/4, Madan Vihar, Janakirama Street, Srinagar, Visakhapatnam - 530016, Andhra Pradesh, India

How to cite this article: Pratha Anantha Ramani, Chinthagada Jayaraj, Murali Manohar Deevi, Simhadri Uday Kiran, Ginni Vijay Sainath Reddy. Incidence of diabetes and demographic profile in lower limb ulcers. International Journal of Contemporary Medical Research 2020;7(8):H1-H4.

DOI: http://dx.doi.org/10.21276/ijcmr.2020.7.8.6

Inclusion criteria

1. Patients with lower limb ulcers, including venous, arterial, traumatic, trophic, neurogenic ulcers.
2. Age ≥18 years.
3. Those who gave valid informed consent.

Exclusion criteria

1. Those who are not willing to participate in the study.
2. Patients below the age of 18 years.
3. Ulcers associated with osteomyelitis, tuberculosis.
4. Malignant ulcers
5. Seropositive cases

RESULTS

Among the 100 patients, 52% are diabetic, and 48% are non-diabetic. Male and female patients are 72% and 28% respectively. There is one NACO positive male case, who is non-diabetic. Diabetics presented from 18-65 years of age with an average of 46years. Non-diabetics presented from 24-90 years of age with an average of 57 years. The age distribution is depicted in Table 1. The length of stay ranged from 3 days to 78 days in diabetics and 5 days to 90 days in non-diabetics. One male patient of 18 years had Type-I diabetes.

Of the total patients in the study, 82% belong to the rural background, and 18% came from urban areas. 70 of 82 patients from rural areas and four patients from the urban population were illiterates. 15 patients of urban population (83.3%) and 37 patients of rural population (45.1%) are diabetic.

The ulcer was present in the dorsum of foot and ankle region in 30 diabetics and 15 non-diabetics. It is present in the plantar aspect of the foot and toes in 18 diabetics and 17 non-diabetics. Ulcers were present in the lower part of the leg below the knee in 9 diabetics and 12 non-diabetics.

The size of the ulcer ranged from 3cm to 40cm in its greatest dimension, with an average being 12cm. The depth of the ulcer ranged from 0.5cm to 3cm, with an average of 1cm.

Cultures were sent/available in 90 cases, of which E. coli was isolated in 27 patients (18-D, 9-ND), Klebsiella in 24 patients (11-D, 13-ND), Pseudomonas in 20 patients (13-D, 7-ND), Staphylococcus in 4(1-D, 3-ND) and Streptococcus in 1(ND) patient. The culture was sterile in 14 (7-D, 7-ND) patients and was not sent/ not available in 10 patients (2-D, 8-ND). The culture report among diabetic patients is depicted in Fig. 1.

The distribution of ulcer types among diabetics and non-diabetics is given in Table 2.

Of the 52 diabetic patients in the study, 17 patients are on insulin therapy, 32 patients are on oral hypoglycaemic agents, and three patients were not on any treatment for diabetes. Duration of diabetes in our study is given in the Table 3.

Most of the Diabetic patients (35) in our study were compliant with the diabetic diet. Thirteen patients were non-compliant with the diet, and four patients were having a regular diet and had no knowledge about the diabetic diet.

Anaemia (Hb <10%) was found in 38 diabetic patients, of which 23 are male, and 15 are female patients. It was found in 20 non-diabetic cases of which male and female are 15 and 5 respectively. Hypertension (B.P > 140/90mmhg) was another co-morbid condition found 32 in diabetic patients, of whom 25 were male, and 7 were females. It was found to be present in 24 non-diabetics, of which 18 were male, and 6 were female patients. Co-morbidity pattern in diabetics and non-diabetics is given in Fig. 2.

Regular debridement alone was satisfactory in 63% of the study group, whereas debridement, along with skin grafting, was required in 13% and fasciotomy in 6% of the patients. Minor amputations were carried out in 8% and major amputation in 10% of the study group. Above-knee amputation was required in 6 cases, of which only one patient had diabetes. Four patients underwent below-knee amputation, of which three patients had diabetes, which includes one death. Readmission was required in 21% of the study population.

There were a total of 5 deaths recorded, all of them having diabetes and belonging to the male sex. The mean age was

Age distribution of diabetic patients			
Age range (in yrs)	**Number**	**Male**	**Female**
11-20	1	1	0
21-30	1	1	0
31-40	11	9	2
41-50	16	9	7
51-60	15	7	8
61-70	8	5	3
Total	52	32	20

Table-1: Age distribution of diabetic patients

Type of ulcer	Diabetics	Non-diabetics	Total
Venous ulcer	28	14	42
Traumatic ulcer	10	13	23
Ischaemic ulcer	5	6	11
Trophic ulcer	9	6	15
Neuro-ischaemic ulcer	4	5	9

Table-2: Distribution of ulcer types.

Duration of diabetes	No. of patients
De-novo	5
< 6months	11
6 months – 1 year	6
1 year – 5 years	7
>5 years	21

Table-3: Duration of diabetes among the study population.

Results			
	Amputation	**Deaths**	**Marginal row totals**
Diabetics	4	5	9
Non- diabetics	6	0	6
Marginal column totals	10	5	15 (Grand Total)

Table-4: Results of our study.

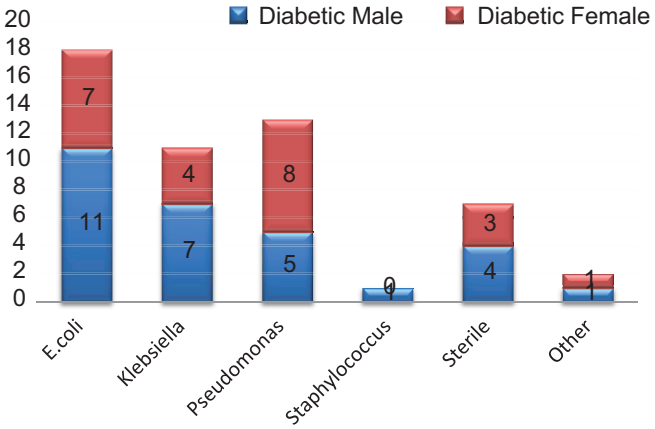

Figure-1: Culture report among diabetic patients.

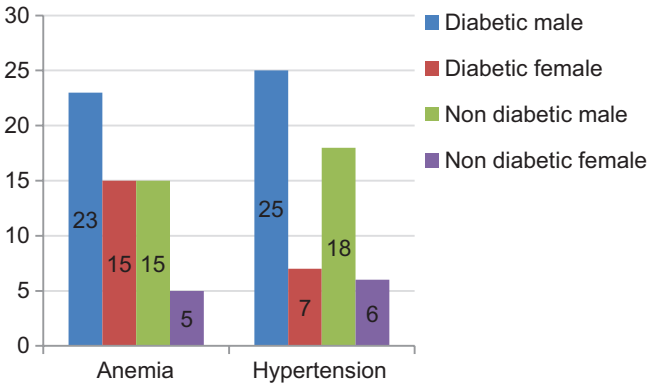

Figure-2: Co-morbidities in diabetics and non-diabetics.

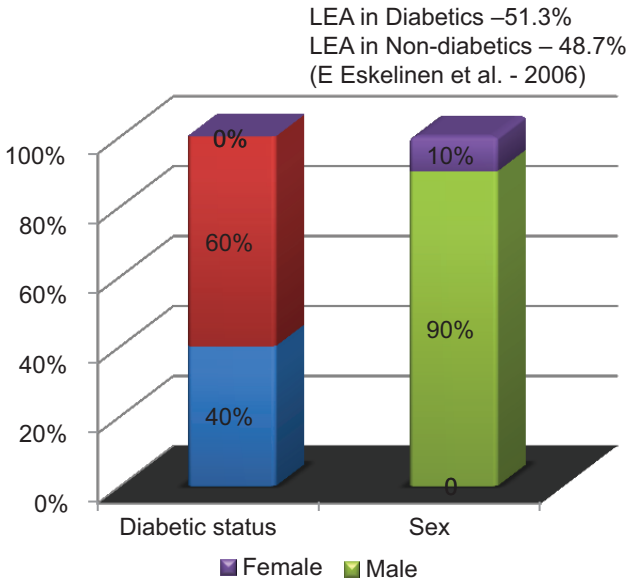

Figure-3: Statistics of lower extremity ulcers.

around 60 years. The duration of ulcers in these patients ranged from 2 days to 45 days, and the length of stay in hospital was less than five days. Comparison of mortality and morbidity in diabetics and non-diabetics is given in Fig. 4.

By considering the null hypothesis that there is a significant association between diabetics and increased morbidity and mortality, Fisher exact test is applied. The Fisher exact test statistical value is 0.044. The result is significant at $p<0.05$.

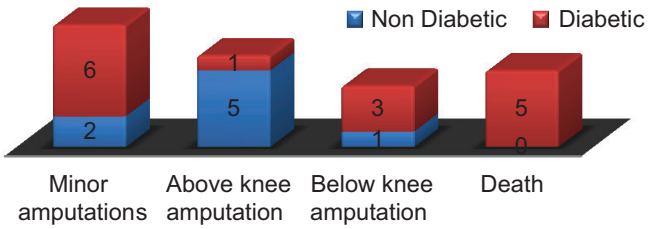

Figure-4: Comparison of mortality and morbidity in diabetics and non-diabetics.

The results are depicted in Table 4.

Therefore, we can say that in our study there is a significant association between diabetic status and the increased risk of morbidity and mortality.

DISCUSSION

In our study males were the predominant study subjects. The ratio of patients with and without diabetes is almost equal (52:48) in our study which differs from many national and international studies where people with diabetes predominate (71.8:28.2)].[2] On average, diabetic patients were younger than non- diabetics (average age 46y in diabetics, 57y in non-diabetics). Fifteen patients of urban population (83.3%) and 37 patients of the rural population (45.1%) have diabetes, indicating the influence of lifestyle in the pathogenesis of diabetes. The higher prevalence of foot ulcers in rural than urban population (82% vs 18%) may be attributed to barefoot walking, increased prevalence of smoking and lesser use of customised footwear.[19] The most common location of ulcer in our study was over the dorsum of foot and ankle region (45%) which varies with Pedras S et al. 2016[18] where toes were the most common location (63%). Venous ulcers and Neuropathic ulcers were predominant in diabetics, whereas other types of ulcers were seen more with non-diabetics population, which correlates with the literature.[3] The culture and sensitivity burden in our study was carried mainly by E.coli, Klebsiella and Pseudomonas which varies with other studies where staphylococci and enterococci predominate.[5] Poor diabetic control was found in 20 of 52 cases with diabetes. The incidence of Lower extremity amputations was less in people with diabetes (40%) which differs with Eskelinen et al. 2006 (51.3%).[8] Though the number of major amputations was slightly more in non-diabetics in our study, a significant proportion of minor amputations being carried out in diabetics and the total death toll (5%) belonging only to diabetic population signifies the higher risk of mortality and morbidity associated with diabetes in lower limb ulcers. Diabetic foot infected with Pseudomonas carried higher morbidity (risk for toe or lower limb amputation) and increased mortality (Wahab WFA et al. 2013).[13] The mortality appears to be independent of factors increasing the ulcer risk, i.e., neuropathy and PVD.[4]

CONCLUSION

Diabetes has an increased risk of mortality and morbidity in patients with lower limb ulcers and also leads to significant impairment of quality of life**.** The sociodemographic

variables play an essential role in diabetic foot ulceration. Poor control of diabetes found in nearly half of the diabetic patients emphasises the need for specialised diabetic units. An aggressive multidisciplinary approach is required to manage foot problems in such patients and also to recognise and reduce the risk of death from other co-morbid conditions to save both limb and life. Emphasis should be made on educating people about diabetes, and its complications, about foot care and wound care. It helps to reduce the burden of lower limb ulcers and to improve the quality of life.

REFERENCES

1. Wikipedia - https://en.wikipedia.org/wiki/Ulcer
2. Rohrmann A, Young D, Abbas Z et al. Profile of diabetic and non-diabetic patients treated for wounds or ulcers. Diabetic Foot Canada 2013;1: 42–7
3. Georgios Spentzouris and Nicos Labropoulos et al. - The Evaluation of Lower-Extremity Ulcers. Semin Intervent Radiol. 2009; 26: 286–295.
4. N. K. Chammas, R. L. R. Hill, M. E. Edmonds - J - Increased Mortality in Diabetic Foot Ulcer Patients: The Significance of Ulcer Type. Diabetes Res. 2016; 2016: 2879809.
5. Bowler PG, Davies BJ. The microbiology of infected and non-infected leg ulcers. J Dermatol 1999;38:573-8.
6. Tesfamichael G. Mariam, Abebaw Alemayehu, Eleni Tesfaye, Worku Mequannt, Kiber Temesgen, Fisseha Yetwale, Miteku Andualem Limenih - Prevalence of Diabetic Foot Ulcer and Associated Factors among Adult Diabetic Patients Who Attend the Diabetic Follow-Up Clinic at the University of Gondar Referral Hospital, North West Ethiopia, 2016: Institutional-Based Cross-Sectional Study - J Diabetes Res. 2017; 2017: 2879249.
7. Probal K. Moulik, Robert Mtonga and Geoffrey V. Gill - Amputation and Mortality in New-Onset Diabetic Foot Ulcers Stratified by Etiology. Diabetes Care 2003;26: 491-494.
8. Eskelinen, E., Eskelinen, A., Albäck, A., & Lepäntalo, M. Major Amputation Incidence Decreases Both in Non-Diabetic and in Diabetic Patients in Helsinki. Scandinavian Journal of Surgery 2006;95:185-189.
9. Fosse S, Hartemann-Heurtier A, et al. Incidence and characteristics of lower-limb amputations in people with diabetes. Diabetic Medicine. 2009; 26: 391-396.
10. Renzi R, Unwin N, Jubelirer R, et al. An international comparison of lower extremity amputation rates. Ann Vasc Surg. 2006;20:346–350.
11. Maria Narres, Tatjana Kvitkina, Heiner Claessen, Sigrid Droste, Björn Schuster, Stephan Morbach, Gerhard Rümenapf, Kristien Van Acker, Andrea Icks - Incidence of lower extremity amputations in the diabetic compared with the non-diabetic population: A systematic review. PLoSOne. 2017;12:e0182081.
12. Jakob J. Thorud and Joslin L. Seidel. A Closer Look At Mortality After Lower Extremity Amputation. Podiatry Today 2018;31:12-16.
13. Wahab WFA, Bakhiet MA, Mahadi SElDI, Mahmoud SM, Widataal AH, et al. Diabetic Foot Infections with Pseudomonas: Jabir Abueliz Diabetic Center Khartoum Experience. Clin Res Foot Ankle 2013;S3:001.
14. Rizk MN, Ameen AI. Comorbidities associated with Egyptian diabetic foot disease subtypes. Egypt J Intern Med 2013;25:154-8
15. Ingrid Kruse, DPM and Steven Edelman, MD - Evaluation and Treatment of Diabetic Foot UlcersClinical Diabetes 2006;24:91-93.
16. S. Dean. Leg ulcers and management. Australian Family Physician 2006;35:480–485,.
17. Pedras Susana, Carvalho Rui, Pereira Maria da Graça. Sociodemographic and clinical characteristics of patients with diabetic foot ulcer. Rev. Assoc. Med. Bras. 2016;62:171-178.
18. Vijay Viswanathan, Sivagami Madhavan, Seena Rajasekar, Snehalatha Chamukuttan, Ramachandran Ambady. Urban-Rural Differences in the Prevalence of Foot Complications in South-Indian Diabetic Patients. Diabetes Care Mar 2006;29:701-703.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 11-06-2020; **Accepted:** 18-07-2020; **Published:** 04-08-2020