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Original Article

The Impact of Knowledge, Perception on the Major Amputation in People with Diabetic Foot Ulcers

Anum Arif, Nayab Munir Malik, Ahsin Manzoor Bhatti, Aima Sohail, Bismah Riaz, Mohammad Salman Imtiaz

Combined Military Hospital, Lahore/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: to evaluate the knowledge and practice of diabetic patients in terms of the diabetic foot and correlate it with the severity of diabetic foot and limb loss.

Study Design: Cross-sectional study

Place and Duration of Study: Department of Vascular Surgery, Combined military hospital, Lahore Pakistan, from Jan 2020 to Jan 2021.

Methodology: Data was recorded in terms of demographics, knowledge and practice of control of blood sugars and foot care of the patients. SINDBAD scoring was used to assess the severity of diabetic foot and compare it with their knowledge and practice and ultimately as an outcome of their limb salvage.

Results: Most patients 171(88.6%) already had a diabetic foot ulcer. Hypertension alone 72(37.3%) was the most common co-morbid condition. A large percentage of patients, 108(63%), ultimately ended up with a limb amputation. A higher age and longer duration of diabetes were associated with an adverse outcome of diabetic foot disease. According to the SINDBAD scoring, the assessment of the foot showed the majority 142(73.6%), had lost protective sensation, with the ulcer being greater than 1cm2 in a large number 147(76.2%) of feet.

Conclusion: While steps are made for patient awareness related to diabetes and its complications, there is a need to address the decreased applicability of this knowledge by the patients, especially with regard to diabetic foot disease.

Keywords: Amputation, Diabetes mellitus, Diabetic foot, Limb loss, Revascularization.

How to Cite This Article: *Arif A, Malik NM, Bhatti AM, Sohail A, Riaz B, Imtiaz MS. The Impact of Knowledge, Perception on the Major Amputation in People with Diabetic Foot Ulcers. Pak Armed Forces Med J 2022; 72(6): 2126-2129. DOI: https://doi.org/10.51253/pafmj.v72i6.7398*

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INTRODUCTION

Diabetes mellitus (DM) is a leading cause of morbidity and mortality worldwide, with the global prevalence in 2019 estimated to be 9.3% and expected to rise to 10.2% by 2030.[1] Pakistan has an even more alarming documented diabetic population of 14.62%,[2] a value likely grossly underestimated due to poor national record keeping. Among the many complications of diabetes, one of the gravest is a diabetic foot (DF), a result of peripheral vascular disease and peripheral neuropathy.[3] DF is one of the leading causes of non-injury-related amputations, with up to 50% of cases which is alarming.[4]

It is widely acknowledged that most complications of DM are avoidable, and DF is no exception. Unfortunately, a lack of patient education and compliance can lead to late presentation to the hospital, with the eventual need for amputation. Comparing patients' knowledge and their practice on good glycemic control, dedicated foot care, and early recognition of ulcers is essential to stop the trajectory of DF leading to limb or life loss.[5] In addition, assessing foot ulcers and assigning a severity score using the SINBAD classification can help to initiate and adjust treatment plans to avoid major amputation.[6-8] Assessing the impact of both socioe-conomic and clinical variables can help to identify the lapses in healthcare associated with diabetic foot and improve patient outcome as well as reduce healthcare costs. The objective of our study was to evaluate the knowledge and practice of diabetic patients in terms of the diabetic foot and its association with the severity of diabetic foot and limb loss.

METHODOLOGY

This cross-sectional study was conducted at the Vascular Surgery Department over one year from January 2020 to January 2021 after getting approval from the Ethical Review Committee (295/2021). The sample size of 86 was calculated with Rao soft sample size calculator with a confidence level of 95%, a margin of error of 5 and a population proportion of 20%,[5] The consecutive sampling technique was used.

Inclusion Criteria: Patients of either gender, between 20 to 80 years, with diabetic foot, were included in the study.

Exclusion Criteria: Patients with the communication barrier were excluded. Patients with debilitating illness and non-consenting individuals were also excluded from the study.

Correspondence: Dr Anum Arif, Consultant Vascular & Endovascular Surgeon, Chiniot General Hospital, Karachi, Pakistan

Received: 18 Sep 2021; revision received: 19 Aug 2022; accepted: 24 Aug 2022

In addition, data were related to demographic variables, knowledge and practice of control of blood sugars and foot care, and the SINBAD scoring system.[9] for any diabetic foot was recorded. Patients were further categorized as those with or without any limb amputation.

Data was entered in Statistical Package for the social sciences (SPSS) version 23.00. Mean and SD were calculated for the qualitative variable. The frequency and percentage for the quantitative variable were calculated with the chi-square test. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 193 patients were recruited in the study. Male pre-dominance was noticed in 129(66.8%) of the participants.

Duration of diabetes was mostly more than ten years in 139(72%) cases. Seventy-two 37(3%) had an HBA1c value between 9.1 to .[10] The diabetic foot was present in 171(88.6%) of the participants. Table-I showed the demographic variables highlighting that hypertension was the most common co-morbid condition present in 72(37.3%) of the patients, diabetic foot ulcer was seen in 171(88.6%) of the people with diabetes with no history was previous limb amputation in 141(73.1%) of the patients. Table-II showed the patients' characteristics according to SINDBAD classification. It showed that forefoot was involved in 103(53.4%) of the patients, at least one palpable pulse in 114(59.1%), sensory neuropathy with loss of protective sensation in 142(73.6%) and infected wound in 149(77.2%). Table-III showed the knowledge and practice of patients regarding diabetic foot care (n=193). It revealed that the difference between the knowledge and practice of blood sugar control, foot care and inspection during outcome outdoor activity, special footwear and nail inspection was statistically significant. Figure-1 showed the outcome of patients with a diabetic foot ulcer in which 108(63%) patients ended up with limb amputation. Figure–2 showed that diabetic foot ulcers healed after amputation in 94(55%) cases.

DISCUSSION

During this current study, 193 patients with diabetes were studied. More than half of the participants were males, 129(66.8%), consistent with the findings in national9 and international,[10] studies conducted in Lahore and south–west of Iraq, respectively. The pre-dominance of male patients could be explained by the fact that men have more outdoor activities than women, which may lead to more foot exposure to different risks, like more pressure on the plantar aspect of the foot and more exposure to injury.[11-13]

Table- I: Characteristics of the Patients (n=193)

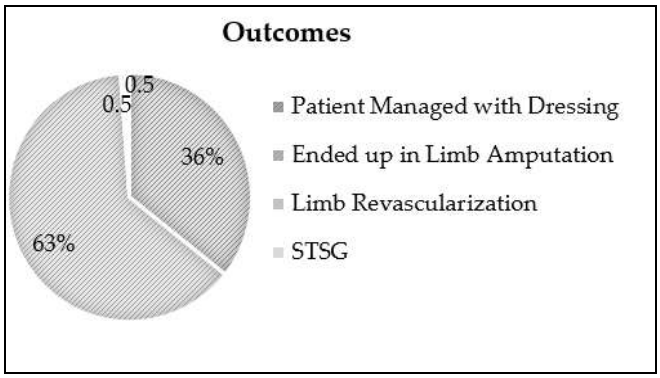
Parameters	n(%)
Comorbids	
No Comorbid	44(22.8)
Only ESRD	2(1.0)
Only HTN	72(37.3)
Only IHD	4(2.1)
HTN and IHD	65(33.7)
HTN and ESRD	1(0.5)
HTN, IHD and ESRD	5(2.6)
Current Foot Ulcer	
Diabetic foot ulcer present	171(88.6)
Diabetic foot ulcer absent	22(11.4)
Previous Foot Ulcer	
Yes	91(47.2)
No	102(52.8)
Previous Amputation	
Yes	52(26.9)
No	141(73.1)
Pulse Wave Doppler	
Monophasic	97(50.3)
Biphasic	75(38.9)
Triphasic	21(10.9)

Table-II: Clinical Characteristics According to Sindbad Classification (n=193)

Variables	n(%)
Site	
Fore foot	103(53.4)
Mid foot and hind foot	67(34.7)
No ulceration	23(11.9)
Ischemia	
At least one pulse palpable	114(59.1)
No pulses palpable	79(40.9)
Neuropathy	
Protective sensation intact	51(26.4)
Protective sensation lost	142(73.6)
Bacterial Infection	
None	44(22.8)
Present	149(77.2)
Area Of Ulcer	
<1cm^2	23(11.9)
>1cm^2	147(76.2)
No ulceration	23(11.9)
Depth	
Confined to skin and subcutaneous tissue	58(30.1)
Reaching bone and tendon	112(58.0)
No ulceration	23(11.9)

Table–III: Knowledge and Practice of patients regarding Diabetic Foot Care (n=193)

Variables	Knowledge n(%)	Practice n(%)	*p*-value
Blood glucose control	189(97.9)	158(81.9)	0.014
Foot observation	157(81.3)	84(43.5)	0.001
Footwear during outdoor activity	145(75.1)	100(51.8)	0.001
Nail inspection	84(43.5)	66(34.2)	0.001
Special footwear	55(28.5)	32(16.6)	0.001



Figure–1: The outcome of Diabetic Foot (n=171)

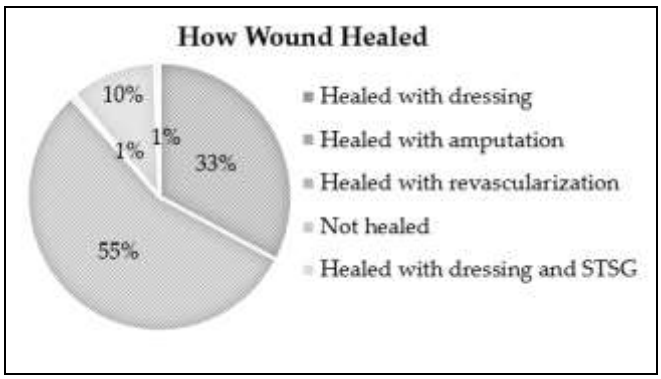


Figure- 2: Patients in which Diabetic Foot Ulcer healed (n=171)

In our study, 157(81.3%) knew foot observation and footwear, but only half were practicing it (p<0.001). Both knowledge and practice considerably decreased regarding special foot care like nail inspection and special footwear. This was consistent with other studies by Hasnain *et al.*[14] and Jinadasa *et al.*[5] and can be attributed to the educational background of many of the respondents. However, in the present study correlation between education and knowledge was not assessed.

SINBAD scoring of respondents was also done, and it showed that mostly forefoot was involved, and at least one pulse was present in many of them. Most of the patient's protective sensation was lost, some evidence of bacterial infection was prevalent, and usually, the ulcer reached bone and tendon. This is in line with a study conducted in UK, Germany, Tanzania and Pakistan that different baseline ulcer characteristics are associated with different outcomes.[15,16] A classification system is required, which must contain all these variables to apply to various populations.

Of the respondents, only 61(31.6%) were managed conservatively with a combination of wound dressing and debridement. As a result, a significant amount 108(56.0%) ended up in limb amputation, which is a large amount considering the high morbidity and the devastating effect of amputation on the patients and their families. This is mainly because patients present very late to the specialist clinic and usually with advanced stage wet gangrene and widespread limb ischemia, in which eventually limb loss becomes inevitable. This is either because of poor knowledge or delayed referral by general practitioners showing a lack of structure in the health care delivery system of Pakistan between primary, secondary and tertiary care units. This outcome is supported by a national study which, despite managing most of the patients with dressing (72.43%), had a high amputation rate (25.7%). The study also reports that most patients present to the clinics at advanced stages of foot ulceration. Late presentation was further aggravated with attempted home treatment, trust in faith healers, inadequate antibiotic treatment and the use of unsterile equipment for dressing resulting in the growth of multi-resistant organisms, which resulted in a high amputation rate.[17] Further comparison to an international study by Marzoq *et al.* showed similar results that 86% of the respondents belonging to the age group ≥65 years ended up in amputation.[18]

Limb revascularization and split-thickness skin graft (STSG) were done in only 1(0.5%) patients. It was because only one patient has wound improved to the extent of STSG after dressings. With the rise in a multidisciplinary approach to managing diabetic foot disease, STSG is recommended to manage chronic lower extremity wounds internationally as they have shown good out comes.[19] Whereas revascularization surgery is mentioned as potentially beneficial for high-risk patients if done early on.[20] Nevertheless, this study was done on only one patient (0.05%). Twenty (10.4%) of the patients had to undergo multiple debridements, dressings and amputation. The outcome remained poor in 18(9.3%) in whom the wound remained unhealed until the last follow-up.

The present study not only highlighted the current status of Pakistan in terms of the association between the diabetic foot and its outcome but also of limb amputations a major concern. It shows how critical it is to have good knowledge about DM and how deleterious it can be to have malpractice of diabetic foot care. Although it is a fairly common disease, our population still lacks basic knowledge about it, leading to a high rate of limb amputation. This study is done with the need to enforce urgent counselling of the vulnerable group, spread constant public awareness regarding the seriousness of the problem and develop effective prevention therapy to reduce its impact on the population's general health. A multidisciplinary approach is recommended with close allies between general practitioners, Medical specialists, diabetologists and Vascular Surgeons. The development of strategy and policy on the prevention of foot ulcers secondary to uncontrolled diabetes, its implementation and improving the self-care practice are highlighted in the present study.

ACKNOWLEDGEMENT

Mr Ammad Asim for his continuous and exceptional technical support.

LIMITATIONS OF STUDY

There was an absence of a correlation between educational status and diabetic foot care and outcome.

CONCLUSION

In conclusion, optimal glycemic monitoring and control, patient education regarding foot care and implementation of its principles, and increasing health care providers' awareness to diagnose diabetic foot disease in the early stages to prevent its deadliest complication, that is, limb loss.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & NMM: Study design, drafting the manuscript, data interpretation, data analysis, critical review, approval of the final version to be published.

AMB & AS: Conception, Data acquisition, critical review, approval of the final version to be published.

BR & MSI: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract 2019; 157: 107843. doi: 10.1016/j.diabres. 2019.107843
2. Akhtar S, Nasir JA, Abbas T, Sarwar A. Diabetes in Pakistan: A systematic review and meta-analysis. Pakistan J Med Sci 2019; 35(4): 1173-1178. doi:10.12669/pjms.35.4.194
3. Moulik PK, Mtonga R, Gill GV. Amputation and mortality in new-onset diabetic foot ulcers stratified by etiology. Diabetes Care 2003; 26(2); 491-494. doi:10.2337/diacare.26.2.491
4. Jinadasa CVM, Jeewantha M. SP5-14 A study to determine the knowledge and practice of foot care in patients with chronic diabetic ulcers. J Epidemiol Community Heal 2011; 65(Suppl1): A449-A449 doi:10.1136/jech.2011.142976p.50
5. Amin N, Doupis J. Diabetic foot disease: From the evaluation of the "foot at risk" to the novel diabetic ulcer treatment modalities. World J Diabetes 2016; 7(7): 153-164. doi: 10.4239/wjd.v7.i7.153.
6. Bakker K, Apelqvist J, Lipsky BA, Van Netten JJ; International Working Group on the Diabetic Foot. The 2015 IWGDF guidance documents on prevention and management of foot problems in diabetes: development of an evidence-based global consensus). Diabetes Metab Res Rev 2016; 32 (Suppl 1): 2-6. doi: 10.1002/ dmrr.2694. PMID: 26409930.
7. Schaper NC, van Netten JJ, Apelqvist J, Bus SA, Hinchliffe RJ, Lipsky BA; IWGDF Editorial Board. Practical Guidelines on the prevention and management of diabetic foot disease (IWGDF 2019 update). Diabetes Metab Res Rev 2020; 36(Supp 1): e3266.
8. Ejaz F, Ahmad A, Hanif K. Prevalence of Diabetic Foot Ulcer in Lahore, Pakistan: A Cross Sectional Study. Asian J Allied Health Sci. 2020 3(4): 34-38
9. Yazdanpanah L, Shahbazian H, Nazari I. Incidence and Risk Factors of Diabetic Foot Ulcer: A Population-Based Diabetic Foot Cohort (ADFC Study)-Two-Year Follow-Up Study. Int J Endocrinol 2018; 2018: 7631659. doi:10.1155/2018/7631659.
10. Riaz M, Miyan Z, Zaidi SI, Alvi SF, Fawwad A, Ahmadani MY, et al. Characteristics and outcomes of subjects with diabetic foot ulceration. Diabetes Care 2012; 35(9): e63. doi:10.2337/dc11-190 6.
11. Khan MIH, Azhar U, Zubair F, Khan ZA. Can we link foot ulcer with risk factors in diabetics? A study in a tertiary care hospital. Pak J Med Sci 2018; 34(6): 1375-1380. doi:10.12669/pjms.346. 16199.
12. Al-Rubeaan K, Al Derwish M, Ouizi S, Youssef AM, Subhani SN, Ibrahim HM, et al. Diabetic foot complications and their risk factors from a large retrospective cohort study. PLoS One 2015; 10(5): e0124446. doi: 10.1371/journal.pone.0124446.
13. Hasnain S, Sheikh NH. Knowledge and practices regarding foot care in diabetic patients visiting diabetic clinic in Jinnah Hospital, Lahore. J Pak Med Assoc 2009; 59(10): 687.
14. Batista F, Augusto Magalhães A, Gamba M, Nery C, Cardoso C. Ten years of a multidisciplinary diabetic foot team approach in Sao Paulo, Brazil. Diabetic Foot Ankle 2010; 1(1): 5203.
15. Ince P, Abbas ZG, Lutale JK, Basit A. Use of the SINBAD classification system and score in comparing outcome of foot ulcer management on three continents. Diabetes Care 2008; 31(5): 964-967.
16. Ali SM, Basit A, Fawwad A, Ahmedani MY, Miyan Z, Malik RA. Presentation and outcome of diabetic foot at a tertiary care unit. Pak J Med Sci 2008; 24(5): 651-656.
17. Marzoq A, Shiaa N, Zaboon R, Baghlany Q, Alabbood MH. Assessment of the outcome of diabetic foot ulcers in Basrah, Southern Iraq: A cohort study. Int J Diabetes Metab 2019; 25(1-2): 33-38. https://doi.org/10.1159/000500911
18. Rose JF, Giovinco N, Mills JL, Najafi B, Pappalardo J, Armstrong DG. Split-thickness skin grafting the high-risk diabetic foot. J Vascular Surg 2014; 59(6): 1657-1663. doi: 10.1016/j.jvs.2013.12. 046.
19. Chang TY, Shieh SJ. Revascularization surgery: its efficacy for limb salvage in diabetic foot. Ann Plastic Surg 2016; 76(1): S13-18.