IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Short Communication
October 2016 Vol.:7, Issue:3

An Observational Study on Risk Factors, Complications and Foot Care Practice among Diabetic Foot Ulcer Patients in a Rural Setting

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Submission: 30 September 2016
Accepted: 5 October 2016
Published: 25 October 2016

Keywords: Diabetic Foot Ulcer, Peripheral Vasculopathy, Complications of Diabetic Foot Ulcer

ABSTRACT

Diabetic foot ulcer (DFU) is a wound penetrating through the deep vascular and collagenous (dermis) layers of the skin in diabetic patients as a result of diabetic risk factors like poor metabolic control, older age, prolonged diabetes, foot deformities, peripheral vasculopathy and poor knowledge of diabetes. The aim of our study is to assess the risk factors and diabetic foot care practice among inpatients. This prospective observational study was carried among a study population of 114 in a rural tertiary care hospital in Tamil Nadu to assess the risk factors and diabetic foot care practice among in patients. The risk factors for diabetic foot ulcer were determined by analyzing the case sheet and designed questionnaire. The results obtained were entered in the Microsoft offices excel. A total of 114 patients (72 males and 42 females) were observed and studied. Complications of Diabetic Foot Ulcer were observed and include non- healing ulcers of average with 37.71%, abscess (13.15%), cellulitis (7.89%), osteomyelitis (5.26%), gangrene (3.5%) and patients with no complications (32.45%). Peripheral neuropathy, duration of diabetes, peripheral vascular disease and poor glycemic control were significant interpreters of Diabetic Foot Ulcer.

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INTRODUCTION

Diabetic foot ulcer (DFU) is a wound penetrating through the deep vascular and collagenous (dermis) layers of the skin in diabetic patients as a result of diabetic risk factors like poor metabolic control, older age, prolonged diabetes, foot deformities, peripheral vasculopathy and poor knowledge of diabetes. The risk of the diabetic patients developing the complication is about 15% while 5% of them are present with history of foot ulceration.[1] 60–80% of foot ulcers will heal,10–15% of them will remain active, and 5–24% of them will lead to limb amputation within a period of 6–18 months after the evaluation.[2,3] By 2025, there will be around 300 million diabetic patients worldwide according to a study conducted by the World Health Organization (WHO).[1] In India, an estimation of 61.3 million diabetics are present, which is expected to cross 100 million by the year 2030.[3,1] The prevalence of diabetic foot ulcer among diabetics in a rural Indian study was found to be 10.4%.[3,4]

Diabetes along with its complications results in increasing morbidity, mortality and health expenditure as specialized care is required.[2] Ulcers that occur on the dorsal part of toes or on the bony eminences of the foot are often not due to trauma, but due to poorly fitting shoes. Thus, preventive care with footwear is very important.[1,7] The practice of inspection of foot and use of appropriate footwear is considered important in early detection and prevention of further complications.

The management of DFUs include treating the wound by using appropriate therapeutic footwear, wound dressings (glycerin/ saline) to provide a moist wound environment, debridement of the wound whenever necessary, antibiotic therapy (during infection) if osteomyelitis or cellulitis is present, ideal control of blood glucose evaluation and correction of peripheral arterial insufficiency and wound coverage by cultured human cells or heterogenic dressings/grafts (skin grafting). Treatments like application of recombinant growth factors and hyperbaric oxygen are also beneficial only if arterial insufficiency is not present.[7]

METHODOLOGY

This prospective observational study was carried among a study population of 114 in a rural tertiary care hospital in Tamil Nadu to assess the risk factors and diabetic foot care practice among inpatients. The risk factors for diabetic foot ulcer were determined by analyzing the case

sheet through proper follow-up from the date of admission to the discharge. A specifically designed questionnaire regarding the hygienic care of the foot, frequent inspection of foot and the use of foot wears was used to interview the study subject. The results obtained were entered in the Microsoft office excel and analyzed.

RESULTS

Table 1: Socio-Demographics of the Study Subjects

The below table shows the demographics data of the study subjects conducted in the hospital. The study includes gender, age and literacy rate of patients.

Particulars	Total number	Percentage (%)
GENDER		
Male	72	63.15
Female	42	36.8
AGE GROUP		
<40	7	6.14
41-49	53	46.49
50-59	38	33.33
>60	16	14.03
LITERACY RATE		
Illiterate	56	49.12
Primary	41	35.96
Higher	17	14.91

Risk Factors of Diabetic Foot Ulcer

The descriptive analysis of risk factors of Diabetic Foot Ulcer contains body mass index, duration of the disease, HbA1C, co- morbidities and history of foot ulcer. Table 2 below demonstrates the data analyzed.

Table 2: Risk Factors of Diabetic Foot Ulcer

RISK FACTORS	TOTAL NUMBER	PERCENTAGE
BODY MASS INDEX		
Underweight (<18.5)	8	7.01
Healthy weight(18.5-24.9)	22	19.29
Over weight (24.9-29.5)	32	28.07
Obese (>30)	52	45.61
DURATION OF THE DISEASE (in years)		
3-5	11	9.64
6-10	37	32.45
11-20	49	42.98
>21	17	14.9
HbA1C		
Good control (<7%)	45	39.47
Poor control (>7%)	69	60.52
CO-MORBIDITIES		
Hypertension	37	32.45
Cholesterol	42	36.84
Combination	35	30.71
HISTORY OF FOOT ULCER	57	50

Table 3: Diabetic Foot Care Practice Questionnaire

Table 3 depicts the questionnaire asked to patients regarding diabetic foot care practice.

SL NO	QUESTIONS	YES	NO
1	Do you inspect your feet daily?	78(68.42%)	36(31.57)
2	Do you wash your whenever it is necessary?	33(28.94%)	81(71.06%)
3	Do you dry well your feet and toes	5(4.38%)	109(95.62%)
4	Do you use emollients for dry skin?	23(20.17%)	91(79.83%)
5	Do you cut your toenails properly?	49(42.98%)	65(57.02%)
6	Do you walk bare outside home?	27(23.68%)	87(76.32%)
7	Do you use special shoes and socks recommended by physicians	12(10.52)	102(89.47%)
8	Do you check the temperature of water?	0	114(100%)
9	Do you check for any injury in the foot daily?	18(15.78%)	96(84.21%)
10	Do you seek medical help immediately for any problem in the foot?	43(37.71%)	71(62.28%)
11	Do you change your footwear frequently when it is ill-fitting?	34(29.82%)	80(70.17%)
12	Do you wear footwear indoors?	0	114(100%)

Complications of Diabetic Foot Ulcer

The below Figure (1) demonstrates the data analyzed on Complications of Diabetic Foot Ulcer and it includes non- healing ulcers, abscess, cellulitis, osteomyelitis, gangrene and patients with no complications.

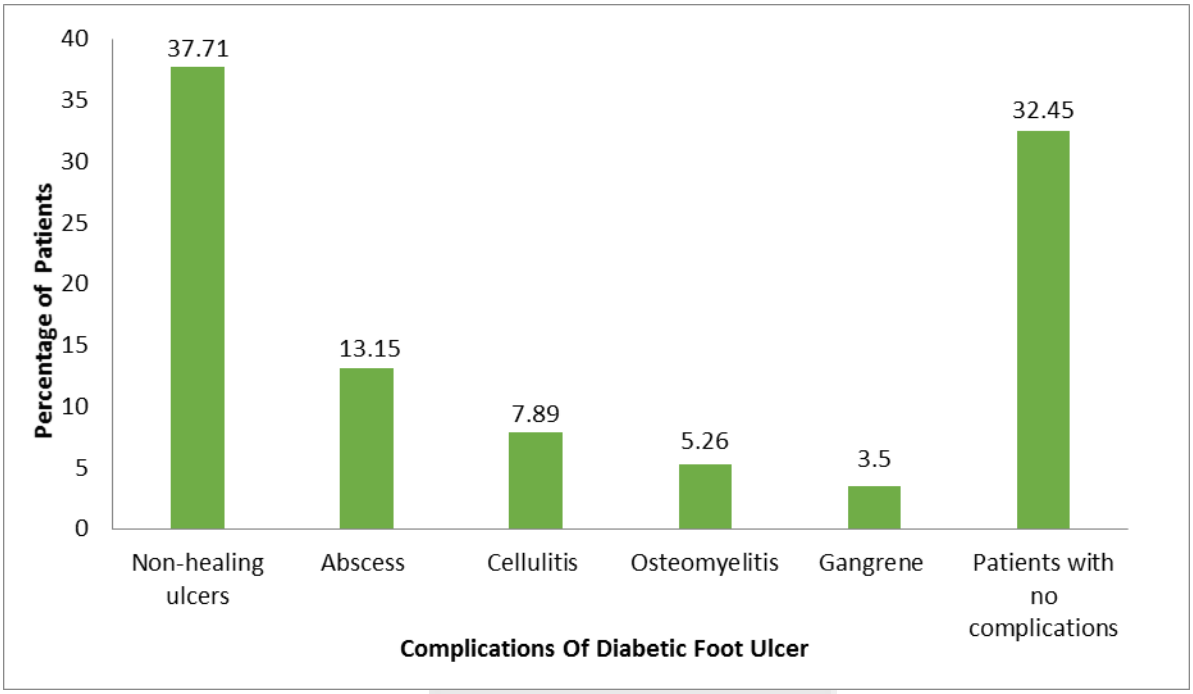

Fig 1: Complications of Diabetic Foot Ulcer

DISCUSSION

In our study, the majority were males, which is suggestive of the fact that sex is risk factor. The cross-sectional study conducted by Fryberg et al. says that sex is a risk factor while Kumar et al found that there is no significance of sex.[4] Obesity determined based on BMI is a risk factor of diabetes mellitus supported by Boyko et al. and Ctercteko et al. But this is not in agreement with studies conducted by Mantly et al who conducted that there is no association between BMI and DFU.[7] The study results of Cowley et al conducted that long duration of diabetes mellitus is major risk factor which is consistent with our study results.[4] Another major risk factor is poor glycemic control as suggested by Merza et al., which is similar to our study result.HbA1c is determined for checking the glycemic level of the patient, also PPBs, FBS. Cowley et al. say that previous foot ulcer and amputation are risk factor of DFU, which is a support of our finding.[7]

Illiterate and poor education status is one of the reason for increasing DFU which is in support our study. Tranian study showed that patient educated could improve the diabetes mellitus foot care[7,3]

The co-morbidities like hypertension; higher cholesterolemia is also a risk factor as told by Fatma Al-Maskari et al. supporting our finding.[5] Periber et al. highlights the importance of nail care in preventing ulcers as our study results show poor nail care likewise the case of appropriate footwear is also essential as suggested by Sreed et al.[6,7] The risk of developing foot ulcers in Asian and African patient is lower compared with European diabetes mellitus patients.[1] The practice of foot inspection daily is very high in our study whereas the percentage of patient is slightly lower in studies by Saurabh et al.[3] But the number of people who check for injury in very low.

Barefoot walking outdoors is slight higher in our study as it is rural area than studies other conducted in Saudi (18%) and in Indian survey (10%).[2] The practice of use of footwear indoors is not followed as it is not a part of Indian custom. Likewise the use of shoes are not favored due to humid and hot climate [3]Only half of them do regular inspection is done as in Nigerian and Saudi studies.[2] The use of moisturing is very low, which is similar to study of Saurabh et al. The practice of washing and drying foot is very low compared to result of Saurabh et al.[3]

CONCLUSION

Based on our findings, the study concludes that Diabetic Foot Ulcer is increasing among rural areas. Generally few of the patients are aware about the practice of foot ulcer. These data shows that the foot ulcer is prevalent among illiterate and obese patients. With the presence of high rates of foot ulcer in rural areas, it is imperative to emphasize the importance of regular screening and treatment to reduce it. Health care professionals should be encouraged to put forth more awareness and care to foot examination, particularly among the elderly and illiterate patients; as sufficient evidence from the study proves that potential risk factors for foot complications are drastically associated with illiteracy.

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