Original Article

Factors contributing to the development of diabetic foot ulcers and role of health literacy

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ABSTRACT

Objective

To determine factors contributing to the development of diabetic foot ulcers and the role of health literacy in our set up.

Patients and Methods

This descriptive observational study was conducted in the department of Medicine Khyber Teaching Hospital, Peshawar from September 2008 to August 2010. One hundred diabetic patients with diabetic foot ulcers were studied. Detailed history, clinical examination and relevant investigations were performed.

Results

Out of 100 patients, 63were male and 37 female. Duration of diabetes was more than 10 years in 91% of cases. Poor glycemic control was observed in 69% of cases, hypertension in 33%, dyslipidemia in 61%, neuropathy in 86%, ischemia in 72%, foot deformity in 46%, accidental/foot ware-trauma in 36%, foot infection in 91%, neglected foot in 78%, obesity in 13% and lack of health literacy in 50%.

Conclusion

There were multiple contributing factors in patients with foot ulcer. Early and timely management is required to reduce its incidence. (Rawal Med J 2011;36:34-37).

Key Words

Diabetes mellitus, foot ulcers, neuropathy, dyslipidemia, obesity.

INTRODUCTION

More than 9 % of all adults and 20 % of those with 60 years age or more are suffering from diabetes mellites.[1] It is a major costly and growing cause of morbidity and mortality in America.[2] Prevalence of diabetes is growing, especially a steady increase in type 2 diabetes among young and obese people.[3] In Pakistan, we have more than six million diabetics.[4] Foot ulcers in diabetics is common and frequently leads to the amputation of toes, feet and legs.[5] Furthermore, foot complications are the most frequent reason for hospitalization in patients with diabetes.[6] Annual population based incidence of foot ulcers is 1-4.1 % and overall life time risk of a foot ulcer for diabetic patients may be as high as 25%.[4,7]

The recognized causal pathways leading to diabetic foot ulcers are ischemia, infections, neuropathy, faulty wound healing, minor trauma, cutaneous ulceration and gangrene, [8] with poor glycemic control as a major risk factor.[9] Frequent evaluation of the feet in diabetic patients is important to identify those at risk for foot ulceration.[10] The cost implication of hospital care, treatment, nursing, dressing and debridement, amputations, rehabilitation and long term care, social support and transport is very high. Besides this, heavy psychological burden due to morbid life have a significant impact on healing.[11] Up to 50 % of foot ulcers and amputations could be prevented by early identification of risk

factors and education of patients.[12] The aim of this study was to determine factors contributing to the development of diabetic foot ulcers and to evaluate the diabetic education status in our society.

PATIENTS AND METHODS

This descriptive observational study was conducted in Medical "A" unit, Khyber Teaching Hospital, Peshawar from September 2008 to August 2010 and included 100 consecutive diabetic patients with foot ulcer. 63 were male and 37 female. All were admitted to our unit. Patients who had foot ulcers due to vasculitis/arteritis and diabetics without foot problems were excluded from the study. Detailed clinical history including age, gender, weight, socio-economic conditions, smoking habit, status of health literacy/awareness about diabetic foot care and any delay in seeking proper treatment were recorded.

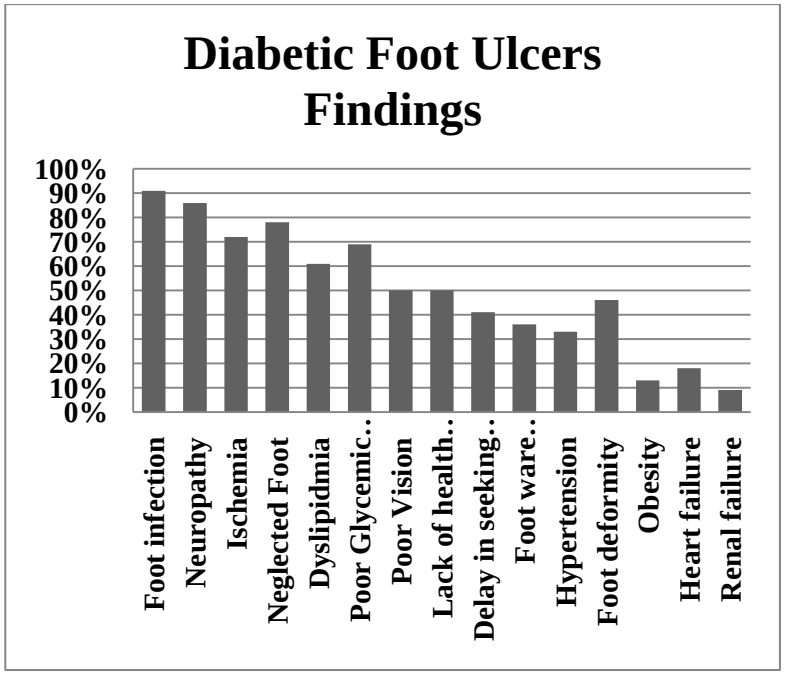
A physical examination was performed with particular attention to evidence of hypertension, heart and renal failure, ischemic foot (cold skin, weak peripheral pulses), neuropathy (insensitive foot, loss of vibration and position sense), foot deformity (claw toes, callus at pressure areas and charcot joints), vision status, immobility of patient (stroke, frailty), footwear trauma, accidental trauma (thorne, glass, insect bite), infection in feet (bacterial and fungal) and neglected foot (unawareness on patient's side). Fasting and random blood sugar, lipid and renal profile, HbA1c, chest X-ray, X-ray foot, echocardiography, urine examination and swabs culture from wounds were performed.

RESULTS

Out of 100 patients, 63 were male and 37 female. Most of the patients (68%) were above 50 years of age (Mean 55 years). In ninety one patients (91%), the duration of diabetes

was more than 10 years. In fifty patients (50%), body mass index (BMI) was more than 25 (over weight) and in 13 patients (13%), it was more than 29 (obese). All these obese patients were females. Nine (9%) patients were smokers. Diabetes was poorly controlled in 69 patients and worse controlled in 18 patients. HbA1c was more than 8% in 68 patients and less than 6% in none. Hypertension was documented in 33 patients. Lipid profile was deranged in 61 patients. Heart and renal failure were found in 18 and 9 patients respectively. Evidence of ischemic foot was present in 72 patients and that of neuropathy in 86 patients. Neuroischemic ulcers were seen in 43%. Some sort of foot deformity was present in 46 patients. Poor vision of variable extent was reported in half of the patients. Twenty seven patients were immobile either due to loss of vision or stroke or fraility.

Fig. 1. Various risk factors for foot ulcers.



Accidental foot injury and foot-wear trauma were noted in 36 patients each. Infection of variable extent and neglected foot were present in 91 and 78 patients respectively. There was delay in seeking proper specialist care in 41 patients. Half of the patients (50%) did not know about diabetes, its treatment, life style and diet modification and foot care (Fig. 1).

DISCUSSION

Males outnumbered females with a ratio of 3:2 in our study. This may be due to much more exposure of males to trivial foot injury, foot wear trauma and bare foot walking particularly in mosques and working in agricultural fields. This male predominance has been reported by others.[13,14] Sixty eight percent patients were above age of 50 years. In most of earlier studies, mean age of the patients was more than 50 years also.[15,16] Duration of disease was more than 10 years in 91 % of our patients. Same has been reported in other studies, [15,17.18] and longer the duration of diabetes, higher is the risk for ulcers.[19]

Obesity was present in 13 % of our patients and all were females. This contributory factor could be due to lack of exercise, high prevalence of inactivity and unhealthy eating habits. Obesity is a well known risk factor for diabetes and its complications.[3] Smoking is mentioned as a risk factor for foot ulcers in diabetics,[19, 20] and it was seen in 9% of our patients.

Poor glycemic control was found in 69 % patients and glycemic control was worse in 18 % of patients (Poorly controlled diabetes means HbA1c level 8-10 while worse controlled diabetes means HbA1c >10). Poor glycemic control is an isolated recognized risk factor for development of foot ulcer as observed in many studies.[10, 15, 17,19] Hypertension and

dyslipidemia were found in 33% and 61% of our patients respectively. These have been noted as the risk factors for diabetic neuropathy, ischemic neuropathy and foot ulcers. [21] Heart failure and renal failure were found in 18% and 9% of patients respectively. These co-morbid states might contribute to the development of foot ulcers due to generalized ischemia, oozing ulcers in edematous feet, chronic eczema, infection and immobility. Neuropathy and ischemia were noted in 86 % and 72 % of our patients respectively while neuro-ischemic ulcers were found in 43% of patients. Diabetic neuropathy is a common complication of diabetes mellitus that eventually affects the majority of these patients. Mahmood et al reported 78.4% neuropathic ulcers in diabetic foot which nearly correlates to our study.[21] They also reported neuroischemic ulcers in 22.6%. Ali et al found neuropathic ulcers in 42 % and neuroischemic in 58%.[22] Because of insensitive foot and loss of position sense, patients can injure their feet without knowing and cannot avoid trivial injury and healing is compromised.

In 46% of cases, there was some sort of foot deformity. The co-existence of ischemia and/ or neuropathy and any type of foot deformity increases the risk of foot ulceration considerably. [23] Diminished vision of variable extent was found in 50 % of our patients. It is an important risk factor for foot ulcer in diabetics in presence of ischemia and/ or neuropathy as the patient cannot protect or avoid foot injuries.[19] Accidental/foot-wear trauma were reported in 36 % of cases. These are described in another study as risk factors as well as initiating factors for ulcers.[8] These were common in our patients, not only due to neuropathy/ischemia but also due to poorly fitted shoes, bare footed walk and lack of attention to care of feet.

Foot infection was present in 91 % of our patients, as observed by others. [24, 25] Infection contributes to development of chronic ulceration, osteomylitis, gangrene and foot amputation. Neglected foot/delay in seeking treatment were two common contributing factors and were noted in 78 % and 41 % patients respectively. The reason could be either due to poverty or lack of diabetic education and knowledge about foot care, as 50 % diabetics in our study had poor knowledge. Lack of health literacy regarding diabetes has been reported in high percentages in other studies as well.[14,22]

CONCLUSION

Poor glycemic control, ischemia, neuropathy, dyslipidemia and concomitant diseases, accidental trauma, smoking, poor foot care, obesity and very poor health literacy were main risk factors for development of diabetic foot. Many of these factors can be avoided. Education of the patients, their relatives and families may help in prevention of disabling foot complications.

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