

Epidemiological characteristics of diabetic foot ulcer in Babol, north of Iran: a study on 450 cases

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Abstract

Background: Epidemiological characteristics of diabetic foot infection in our region are not clear. The purpose of this study was to determine the epidemiological features of diabetic foot infection in Babol, north of Iran.

Methods: From March, 2005 to April, 2010, the epidemiological features of 450 cases of diabetic foot infection treated in two main teaching hospitals of Babol Medical University were evaluated. Epidemiological data in these cases were determined, and collected data were analyzed.

Results: The mean age of these patients was 58.8±11.2 years. Two hundred ninety seven (66%) were females and 153 (34%) were males. Three hundred sixty nine patients (82%) had family history of diabetes mellitus (DM) and maternal inheritance was the most common pattern. Three hundred seventy eight patients (84%) were aware of suffering from DM and 297 (66%) were aware of the occurrence of foot ulcer but 86% were not familiar with the main risk factors for the development of diabetic foot infection.

Conclusion: The results show that diabetic foot infections occur more often in females and the familiarity of the risk factor in this population is relatively low. Educating these patients for prevention of diabetic foot infection is recommended.

Key words: Epidemiology, Diabetic foot infection, Male, Female.

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The major part of the burden of people with diabetes mellitus (DM) is their impaired quantity and quality of life. This is due to acute and chronic complications of DM which diabetic foot infection takes the greatest toll (1). Foot ulcers are a significant complication of DM and often precede lower extremity amputation (2).

Diabetic foot ulcer is a major health problem, which concerns 15% of more than 200 million patients with diabetes worldwide. The morbidity and mortality associated with diabetic foot lesions remain extremely high and management of the disease needs to be optimized to ensure best outcome (3, 4). Problems associated with the diabetic foot are worldwide. However, there may be regional variations among the risk factors and clinical presentations (5). Epidemiological features of diabetes mellitus and its associated complications as foot infection may be different in the various parts of the world based on race and geographical region (6-8). The present study was conducted to determine the epidemiological characteristics of diabetic foot infection in Babol, north of Iran.

Methods

This retrospective study was conducted based on an evaluation form of 450 cases with diabetic foot infection that were admitted in two teaching hospitals of Shahid Beheshti and Shahid Yahyanejiad, affiliated to Babol University of Medical Sciences from March, 2005 to April, 2010. These hospitals serve to more than 1.5 million people living in the central part of Mazandran province in the north of Iran.

Epidemiological data describing the demographic and clinical characteristics of diabetic foot infection include: gender, age, location and standard of living, number of children, inheritance pattern, duration of diabetes, awareness about on having DM, occurrence and risk factors for developing diabetic foot infection (DFI), cause and presentation of ulcer, period of hospital stay, grade of ulcer according to Wagner classification (9), and location of the ulcer were collected from the patient's records.

Peripheral neuropathy was diagnosed when at least two of the three quantities measurements [(NSS: Neuropathy Symptom Score), (NDS: Neuropathy Disability Score), [VPT: Vibration perception thresholds] were abnormal. Retinal status was assessed from a single fundoscopy by an ophthalmologist. The collected data were analyzed using SPSS statistical software.

Results

Four hundred and fifty patients were enrolled in this study. From these patients, 297 (66%) were females and 153 (34%) were males with the mean age of 58.8±11.23 years. Ninety eight percent had type II diabetes.

The demographic features of patients are shown in table 1. About one third (38%) aged between 56 to 65 years, mostly (70%) were rural, and 62% had low socio- cultural status. Fifty six percent were living with their spouses. The number of their children ranged from 1 to 13 persons with the mean of 4.61±2.39. Three hundred and seventy eight (84%) were aware of suffering DM and 297 (66%) were acquainted with DFI as complication of DM but mostly (86%) did not have any knowledge of the main risk factors for the development of DFI. Duration of DM ranged between one to thirty years with the mean duration of 12.35±6.44 years. Hundred cases had family history of DM and maternal inheritance was the most common (48%).

The clinical characteristics of the studied population are summarized in table 2. Mechanical disorders (80%), neuropathic foot (76%), ulcer in other foot previously (60%) were the most frequent risk factors and alcohol intake was the least frequent risk factor (8%). The cause of ulcer was unknown mostly (46%). Discharging wound (54%) and gangrene (40%) were the most common clinical presentation. The average length of hospital stay was 26 days. Grade III ulcer was the most common (38%), and grade I was the least one (4%). The sites of involvement with

decreasing frequency were the toes (54%) and sole (28%) followed by the heel (18%).

Table 1. Demographical features of diabetic foot ulcer in 450 cases.

Characteristics of patients	No (%)
Age distribution	
35-45	81 (18)
46-55	72 (16)
56-65	171 (38)
66-75	90 (20)
76-85	36 (8)
Place of residence	
Rural	315 (70)
Urban	117 (26)
The country	18 (4)
Living status	
Living with their spouse	252 (56)
Living with their children	108 (24)
Living alone	90 (20)
Duration of diabetes	
Less than 10 years	99 (22)
10-20 years	279 (62)
More than 20 years	72 (16)
Heredity	
Maternal	216 (48)
Paternal	135 (30)
Both parents	99 (22)

Discussion

Many epidemiological data have been published on the diabetic foot but they are difficult to interpret because of variability in the methodology and in the definition used in these studies (10). Also the epidemiology of DFI is still exactly unknown because this multifactorial etiology and heterogeneous pathologic condition is not uniformly classified and described (11, 12). Epidemiological features of DFI may be different in the various parts of the world (6-8). These variances inspired us to study the characteristics of DFI in our region. In our study, females were affected mostly (66%), this is in contrast with the general consensus (13-17).

Table 2. Clinical characteristics of diabetic foot ulcer in 450 cases.

Characteristics	No (%)
Risk factors	
Mechanical disorders	360 (80)
Neuropathic foot	342 (76)
Ulcer at other foot previously	270 (60)
Obesity (BMI more than 30)	252 (56)
Vision loss	207 (46)
smoking	162 (36)
Previous history of amputation	81 (18)
Previous history of debridement	63 (14)
Alcohol intake	36 (8)
Cause	
Unknown	207 (46)
Trauma/cutting	108 (24)
Foreign body penetration	99 (22)
Burns	36 (8)
Clinical Presentation	
Discharging wound	243 (54)
Gangrene	180 (40)
Blister	18 (4)
Non-discharging wound	9 (2)
Grading	
Grade I	18 (4)
Grade II	81 (18)
Grade III	171 (38)
Grade IV	108 (24)
Grade V	72 (16)
Location	
Great toe	171 (38)
Lesser toes	72 (16)
Sole (forefoot)	81 (18)
Sole (midfoot)	45 (10)
Heel	81 (18)

This difference may be attributed to different designs of study; low diabetic knowledge and care, style of living of females in this area as compared to the villages and participation in farming agricultural could be the epidemiologic characteristics of DFI in this region. More than half (54%) of our patients were in the age group between 46 to 65 years. Ali et al. showed 69% of their cases were 40 to 60 years (14). It was reported that the socio-cultural status and living in the rural area, may affect the

occurrence of foot ulcer (10, 18). We found most patients (70%) were from rural areas and majority of them (54%) had poor socio cultural status. Diabetes mellitus is a familial disease, but to our knowledge, there is no report on familial pattern of DFI. We found about half (48%) of DFI subjects had maternal heredity.

The current study showed most cases (86%) were not aware about the main risk factors of DFI. In Ali et al. series, all patients were unaware about the risk factors causing foot problems (14). This finding may be attributed to low educational level and knowledge of diabetic patients about the leading complications of DM. This may be considered as a principal concern on consequences of DM in our region. The majority of our cases (78%) had history of diabetes for more than ten years. In Ali et al, cases, the series duration of diabetes was greater more than ten years in 58% of cases (14). Predisposing factors such as presence of deformity on the foot and neuropathy play an important role in development of foot ulcer (10, 11, 19). We concluded that 80% of cases had mechanical predisposing factors for foot ulcer such as callosity, bone and nail deformities and 76% had diabetic neuropathy. Viswanathan found that smoking increases the risk of DFI by reducing blood circulation in the legs and reducing sensation in the feet (2). In our study, 35% of cases were smokers that are similar to Ali et al. and Qari et al. findings (14, 15).

Body weight is a known risk factor for the development of DFI, 56% of our cases were overweight (BMI more than 25), that is compatible with others (11, 20). Poor vision influence foot ulcer risk (11, 21). The majority of our patients (46%) were suffering from retinopathy and poor vision. Increased alcohol intake is a known risk factor for foot ulcer (22). In the present study, 8% of cases were alcohol user and this low rate of alcohol consumption is most likely related to religious belief in our population.

The causes of foot ulcer in our cases were trauma and penetration of foreign bodies which was similar to the findings of Ali et al. (14).

The average length of hospital stay for our patients was 26 days. An average stay duration of 45 days per lesion and 2 to 120 days were reported by Benotmane et al. and Nierenberg et al. studies, respectively (23, 24). We found grade III and IV foot ulcer as the most common cause. Okeophene et al. reported grade II and III FU as the most frequent ones (25). A study from Cameron also demonstrated that most patients had grade 0 (43.6%) or

grade 1 (30.8%) lesions and none was presented with grade 5 lesions (26). Tchakonte et al. reported the location of diabetic foot ulcer differs significantly according to their cause (neuropathic, neuroischemic and ischemic) but in general, more than 75% of all ulcer was localized in toes and forefoot area (27). In another investigation, the toes were affected in 44%, and sole/metatarsal in 18% (13). In recent study, the toes were mostly involved (54%) the sole (28%) and followed by the heel (18%). The results show that diabetic foot infection is more in females than males, and the familiarity of the risk factor in this population is relatively low. Consequently, educating of the patients with diabetes mellitus for prevention of infection is recommended.

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