

An Epidemiological Study on Diabetic Foot Ulcer Patients Hospitalized in Razi Hospital (Ahvaz) during 2007-2011

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ABSTRACT

Diabetes mellitus is one of the most prevalent diseases caused by endocrine disorders. The prevalence of this disease is dramatically increasing and the condition of diabetic foot ulcers is one of the most serious and costly complications of diabetes. This study aims to investigate the epidemiology of diabetic foot ulcers in Ahvaz, Iran. This is a cross-sectional study conducted on 1658 diabetic foot ulcer patients hospitalized in the Ahvaz Razi Hospital (Iran) during 2007-2011. Data were collected from the medical records of patients and then analyzed using SPSS 16 software. Of 1658 diabetic foot ulcer patients (52.11% male, 47.89% female), 270 patients (16.28%) have had an amputation at different levels, among which 172 patients (10.37%) were male and 98 (5.91%) were female. The average age of the study population was 59.73 ± 13.86 years ranging 17 to 110 years old. Fifty percent of the participants were 60 years or older. The mean number of hospitalizations was 1.95 ranging 1 to 27. The average hospitalization period was 14.24 days ranging 5 to 161 days. Diabetic foot ulcer is a common problem among diabetic men in Iran. Old age and male sex can be among predisposing factors. Our findings highlight the need to control and prevention programs to reduce complications and risk factors of diabetic foot ulcers.

Key words: Diabetes mellitus, Diabetic foot, Epidemiology.

INTRODUCTION

Diabetes mellitus is one of the most prevalent non-contagious diseases and according to the World Health Organization (WHO), there are now about 346 million people worldwide with diabetes. It is predicted that between 2005 and 2030, the number of people with this disease would increase twice and the world's fastest-growing cases will be in developing countries [1]. In addition, in a national survey in Iran and in patients 25 to 65 years old 7.7% prevalence of diabetes was reported [2]. Diabetes mellitus is a metabolic disease with hypoglycemia resulting from defects in insulin secretion, insulin function, or both of them. Chronic hyperglycemia in diabetes is coupled with long-term damage, dysfunction, and failure of various

organs, especially the eyes, kidneys, nerves, heart, and blood vessels [3]. A variety of pestiferous processes involve in the development of diabetes mellitus. Autoimmune destruction of pancreatic β cells together with insulin deficiency and abnormalities that result in resistance to insulin function are among the causes. The foundation of disorders of the metabolism of carbohydrates, fat and protein in diabetes is lack of insulin in target tissues [4]. As defined by the World Health Organization (WHO), the foot of a person with diabetes mellitus that is susceptible to complications such as ulcers and infections with or without the involvement of deep tissues, as well as having nervous disorders and some degrees of vascular lesions is considered as a diabetic foot [1]. Nowadays, due to the provision of access to insulin

and modern diabetes therapies, the possibility of patients' survival followed by the risk of chronic complications of diabetes such as eye, kidney, and cardiovascular diseases has increased during the patients' lives. Diabetic foot ulcer is one of the most prevalent complications of diabetes, which is often overlooked [5]. According to epidemiological studies, annually 5.2% of diabetic patients suffer from foot ulcer and 15% of the total diabetic patients have at least once suffered from foot ulcers during their lives [3, 6-10]. The prevalence of diabetic foot ulcer in diabetic patients was reported about 6.4% to 12% [5, 11]. Contrary to common perception, peripheral vascular disorders rarely result in direct foot ulcers, but when injured by other factors, inadequate blood supply to the damaged area provides problems in wound healing, and even makes it susceptible to infections. Because on the one hand, not enough immune cells as well as oxygen would reach to the wound, and on the other hand, not sufficient amount of the prescribed antibiotics would reach the wound [12]. Wegener's classification of diabetic foot ulcers include: Class 1 flesh wound; class 2 deep wound to the tendon or joint capsule; class 3 deep wound with abscess, osteomyelitis, or joint infection; class 4 localized gangrene in front of the foot or heel, class 5 gangrene of all the foot. Foot ulceration is the most prevalent cause of lower extremity amputations in diabetic patients, since this foot ulcer would be infected due to the absence of proper investigation, and by necrosis and gangrene in a part of the foot, there would be no choice but amputations in many cases. Risk factors for diabetic foot ulcers are given in Tables 1 and 2 [13]. During the recent years several non-pharmaceutical treatments have been developed for the treatment of diabetes and its associated disorders such as neuropathic pain, wound, and musculoskeletal disorders [14-19]. However, the risk of amputation in diabetic patients is relatively high so that the risk of amputation in diabetic patients is about 15-20 times higher than non-diabetic patients [2]. In fact, every 30 seconds a lower limb is amputated due to diabetes [20]. In addition, in the first two years after amputation, there is a 50% risk of the second amputation [21]. Generally, requiring lower extremity amputations in 14-24% of the diabetic foot ulcers [22] and annual incidence of non-traumatic amputations caused by diabetes is by the age of 1.2 to 7.13 in every 1,000

people [23]. Fortunately, more than 85% of the amputation cases caused by diabetic foot are preventable [24]. In addition, casualties due to amputation are also high. Casualty rates was reported in the first year, the third year, and the fifth year after the amputation are 13-40%, 35-65%, and 39-80%, respectively (a figure equal to the casualties of the malignant diabetes) [25]. Treatment and taking care of diabetic foot is expensive and its most expensive complication, that is amputation, occurs 10-30 times higher in diabetic patients than the normal population [26, 27]. In addition, infection in a diabetic foot also leads to an increased risk of hospitalization in the hospital and eventually amputation. Thus, it must be treated immediately and seriously [28]. In addition, lower limb amputation requires rehabilitation, home care and social supports [20]. The first goal in the treatment of diabetic foot ulcers is coagulating the wound and accelerated this process. The basic of treatment pillars include: Debridement, reducing the pressure on the foot and appropriate treatment of the wound, wound infection, and ischemia of the affected area. In the meantime, attention to the patient's comorbidities and other complications of diabetes on the patient and psychological problems are important. Thus, by allowing wound healing basis, many of these costs including the cost of treatment and hospitalization period, as well as the burden of diabetic foot would be reduced.

According to the above figures, as well as the growing prevalence of diabetes in Iran and the world, and the lack of sufficient information about patients with diabetic foot ulcers in the South-west of Iran, this study aims to investigate the epidemiology of diabetic foot ulcers in patients referring to the Ahvaz Razi Hospital (Iran) as the main diabetic foot ulcers treatment center in the region.

MATERIALS AND METHODS

This was a descriptive study based on the data from hospital records for all patients with diabetic foot ulcers hospitalized in the Ahvaz Razi Hospital during March 2007 to 2011.

The study includes all patients diagnosed with diabetes and suffering from diabetic foot ulcers.

Study variables include age, gender, hospitalization period, frequency of hospitalization and amputations.

Checklist was used to collect the data, then descriptive statistics methods was applied to determine the distribution of frequencies, comparing and analyzing the condition related to the recorded diabetic foot ulcers cases and finally the results were analyzed using SPSS 17 software.

RESULTS

In this study total of 1658 diabetic foot ulcers patients were investigated among which 864 patients (52.11%) were male and 794 patients (47.89%) were female (Table 1).

The average age of the study population was 59.73 ± 13.86 , ranging from 17 to 110 years. 50% of participants were 60 or older. The most frequency of patients was in the range of 60-70 years and then 50-59 years with 498 (30.4%), and 456 patients (27.50%), respectively (Table 2).

Figure 2 shows the age distribution of patients by gender. As shown in Fig. 2, male frequency is higher in old ages.

Hospitalization period was an average of 14.24 days, ranging from 5 to 161 days, among which 40.65%, 49.58%, and 9.77% of the patients were hospitalized for less than a week, between one week to one month, and over one month, respectively. The frequency of the patients was shown in Table 3.

Fig. 3 shows the gender distribution of the frequency of hospitalization period in the studied patients. In this study half the patients were hospitalized from one week to one month, and as

Table 1: The frequency of the study patients according to gender

Gender	Percent (%)	Frequency
Male	52.1	864
Female	47.9	794
Total	100	1658

seen in the figure, men have had a higher hospitalization period than women.

In this study, 53.32% (884), and 43.31% (718) of the patients were hospitalized once, and twice to five times, respectively. The average frequency of hospitalization was 1.95, ranging from 1 to 17. Frequency of the patients in terms of the frequency of hospitalizations is given in Table 4.

Fig. 4 shows the gender distribution of the frequency of hospitalization period in the studied patients. As it can be seen in the figure, women have had a higher hospitalization period than men.

Table 5 shows the statistical analysis of the data by age, frequency of hospitalization, hospitalization period. The average age of the study population is 13.86 ± 59.73 years, ranging from 17 to 110 years. Hospitalization period and frequency of hospitalization were an average of 14.24 days and 1.95 times, ranging from 5 to 161 days and 1 to 27, respectively.

Considering the consequences of this complication, 270 patients (16.28%) had amputations at different levels, among which 172 patients (10.37%), and 98 patients (5.91%) were male and female, respectively. The amputation in the men is almost twice that of the women (Fig. 5).

Amputation or non-amputation of the studied patients in the following is shown according to age groups, hospitalization period, and frequency of hospitalization, respectively (Figs. 6, 7, 8).

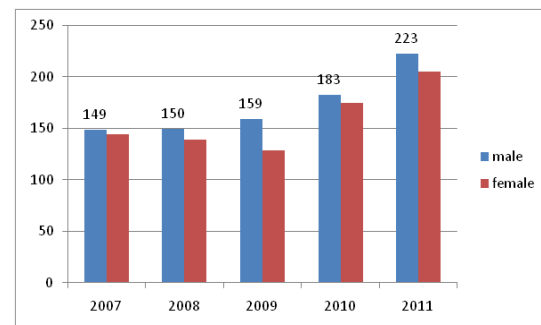


Fig. 1: Gender distribution of the patients in the studied years

DISCUSSION AND CONCLUSION

Diabetes is one of the metabolic diseases that regarding its increasing prevalence, has become one of the most important challenges facing the health authorities in different countries, both developing and developed, of the world. Nowadays, due to the provision of access to insulin and modern diabetes therapies, the possibility of patients' survival followed by increased risk of suffering from

chronic complications of diabetes including diabetic foot ulcers [29].

This study aims to investigate the epidemiology of diabetic foot ulcers in patients admitted to the Ahvaz Razi Hospital as the main center for treatment of diabetic foot ulcers in the region.

In this cross-sectional study, all diabetic foot ulcers patients hospitalized during 2007-2011

Table 2: The frequency of the study patients according to age

Cumulative percentage	Percent (%)	Frequency	Age
3	3	49	< 30 years
8.3	5.3	88	30-39 years
2.4	12.1	201	40-49 years
47.9	27.5	456	50-59 years
77.9	30	498	60-70 years
100	22.1	366	< 70 years
100	100	1658	Total

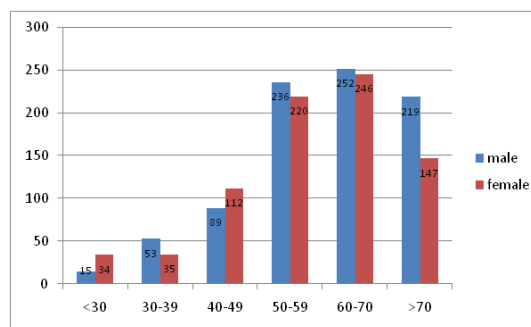


Fig. 2: Age distribution of the study patients according to gender

Table 3: The frequency of the study patients according to hospitalization period

Cumulative percentage	Percent (%)	Frequency	Hospitalization period
40.7	40.7	674	1 week
90.2	49.6	822	1 week to 1 month
100	9.8	162	> 1 month
100	100	1658	Total

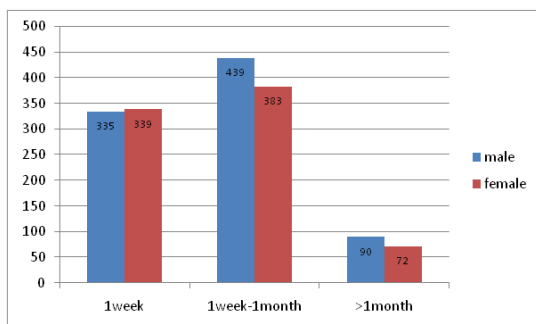


Fig. 3: Gender distribution of the study patients according to hospitalization period

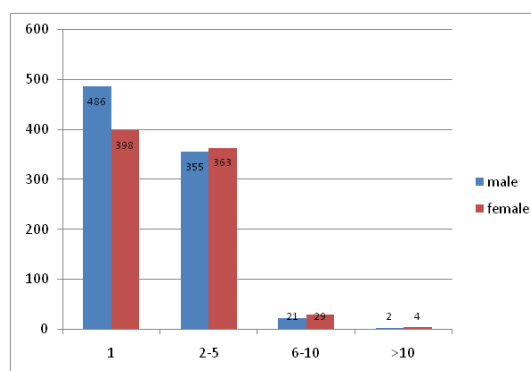


Fig. 4: Gender distribution of the patients according to frequency of hospitalizations

were studied. The records of 1658 patients with diabetic foot ulcers were investigated, from which 864 (52.11%) and 794 (47.89%) patients were male and female, respectively. Nikkhooy et al (2009) study in Ahvaz reported 59% and 41% of the patients were male and female, respectively [30]. In addition, frequency of men was higher in other studies [31-33].

Higher rate of this complication in men than in women can be probably due to their higher conflict of their jobs than women. On the other hand, relative decrease in stress and attention to personal hygiene as well as having enough time to take care of themselves have an important contribution in the treatment and control of diabetes in women [33].

The frequency of patients with diabetic foot ulcers in recent years has had a significant increase (an 50% increase during 2009-2011), which is caused by the number of people with diabetes due to population growth, aging population, urbanization, industrialization, and increasing prevalence of obesity and physical inactivity [11]. The average age of the study population was 59.73 ± 13.86 years ranging 17 to 110 years. Fifty percent of the studied women were 60 or older. The frequency of men was higher in old ages. The study

population was in their seventies in average that is consistent with other researches and reference books [30, 33]. The hospitalization period was an average of 14.24 days, ranging from 5 to 161 days. In this study, hospitalization period had a significant relationship with amputation that is consistent with other studies [33].

Half of the patients had the hospitalization background ranging one week to one month, causing great financial burden and emotional effects on the society. Almost half of the patients had been hospitalized more than once, indicating its being chronic and a high probability of the recurrence of this complication.

The amputations rate in this study was 16.28%, indicating amputation ratio in males almost twice the females. Larijani (2005) et al reported 34.7% of the patients underwent amputation. Bejestani et al (2004) reported amputation for about 41.5% of the patients. In the Mofid et al. (2007), 30.2% of the patients suffered amputation from which 75.67% and 24.33% were male and female, respectively. According to the statistics it can be said that frequency of amputation in men was higher than women in other studies as well [30, 33, 34]. The higher prevalence of amputations among men

Table 4: The frequency of the study patients according to frequency of hospitalizations

Cumulative percentage	Percent (%)	Frequency	Frequency of hospitalizations
53.5	53.3	884	1
96.6	43.3	718	5-2
99.6	3	50	10-6
100	0.4	6	>10
100	100	1658	Total

Table 5: Statistical analysis by age, frequency of hospitalization, and hospitalization period

	Average	Mean	Standard deviation	Minimum	Maximum
Age	59.7	60	13.86	20	110
Frequency of hospitalizations	1.95	1	1.66	1	27
Hospitalization period	14.24	10	12.91	5	161

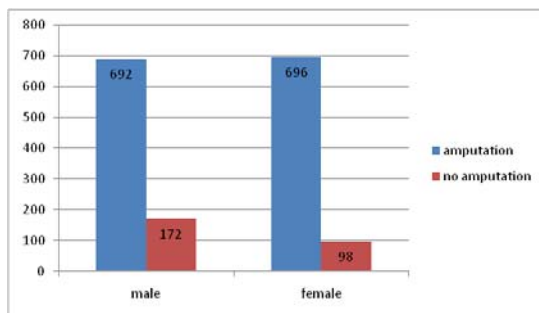


Fig. 5: The frequency of amputations in the studied patients according to gender

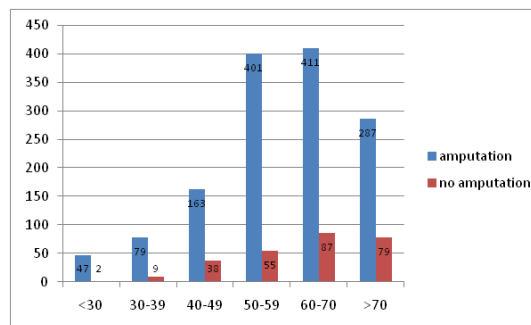


Fig. 6: The frequency of amputations in the studied patients according to age

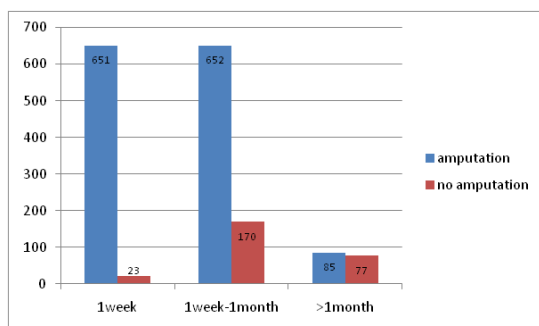


Fig. 7: The frequency of amputations in the studied patients according to hospitalization period

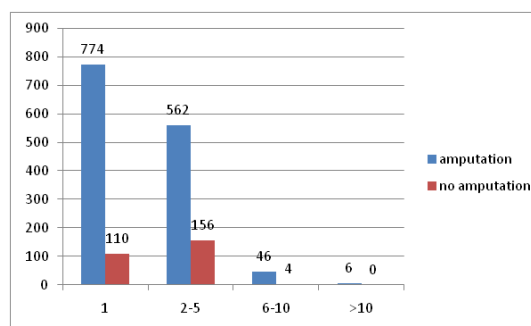


Fig. 8: The frequency of amputations in the studied patients according to frequency of hospitalization

may be due to men's admittance to hospital in advanced stages of the disease [35].

According to the obtained results, the frequency of patients with diabetic foot ulcers has increased in recent years, leading to increased amputation that is a warning to the society. In addition, based on the results, frequency of men with diabetic foot ulcer was more than women, and the amputation in men was twice the women. Since the economic more burden in our country on the men, lack of attention to this disease leads to

irreparable losses to the economy of family and society. Diabetic foot is a common problem in men with diabetes in Iran. Old age and male sex can be among factors of the patients predisposed to this condition. Our findings highlight the need to control and prevention programs to reduce complications and risk factors of diabetic foot ulcers.

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