

Investigating the end of patients suffering from diabetic foot hospitalized in Be'sat hospital of IRIAF from 2009 to 2014.

Mohammad Darvishi¹, Mohammad Reza Nazer², Mohammad Reza Alipour^{3*}

¹Infectious Diseases and Tropical Medicine Research Center (IDTMRC), AJA University of Medical Sciences, Tehran, Iran

²Department of Infectious Diseases, Lorestan University of Medical Sciences, Khoramabad, Iran

³Tehran Medical Sciences Branch, Islamic Azad University, Tehran, Iran

Abstract

Foot problems are considered to be a major cause of death and paralysis among those patients suffering from diabetes. Considering the costs and side effects, it is necessary to study the dangerous factors and the prognosis of the patients. The present research seeks to study the prognosis of those patients with diabetic foot hospitalized in Be'sat Hospital of IRIAF from 2009 to 2014. This descriptive-analytical study was conducted on patients with diabetic foot resorting to Be'sat Hospital of IRIAF from 2009 to 2014. As many as 291 diabetic patients were selected for research in accordance with the inclusion and exclusion criteria. The raw data was then analyzed using IBM SPSS Statistics version 22, 66.7% of the participants in this research were male and 33.3% were female. The average age of the patients was reported to be 60.8 ± 11.25 years old. Amputation was conducted on 12.4% of the patients. 7.2% of amputation cases were major and the remaining 5.2% were minor. As much as 97.6% of the patients recovered in this research. Our research pointed to a significant correlation between the age of the patients and amputation ($P\text{-Value} < 0.05$). We failed to find any significant correlation between gender, HbA1C and type of treatment (each one separately) with amputation ($P > 0.05$). Taken together, we may conclude that the frequency of amputation among those patients with higher average ages is more, and higher levels of HbA1c are observed among them. Most cases of amputations were within the major class which had a significant influence on the life quality of patients.

Keywords: Diabetic foot, Amputation, HbA1c level, Patient, Analysis.

Accepted on March 06, 2017

Introduction

Diabetes is one of the most common metabolic complications which is known to be the 4th most common disease in the world. There are as many as 140 million people with diabetes throughout the world and this number is expected to reach 300 million by 2025. According to statistics, diabetes has a frequency of 5.1 to 5.8 in Iran [1]. The prevalence of diabetes in developed countries is on the rise due to changes in people's life styles. Due to various physical and psychological issues, the life quality of those suffering from diabetes is really low. As a result, it is really important to diagnose and treat this disease [2]. Diabetes had acute (ketosis, acidosis, and non-ketone Hyperosmolar hyperglycemic state) and chronic (funduscopy artery obstruction, renal artery obstruction, neuropathy, skin lesions, circulatory disorders, diabetic ulcers in foot and delayed and unnatural recovery of wounds) side effects [3]. A major problem in diabetic patients is diabetic ulcers and diabetic foot is one of such issues [4]. Diabetic foot is considered to be one of the most serious chronic issues

among these patients. It is observed in 5.3% of all the patients and it may be caused by arterial or nervous mechanisms or both of them in some cases [5]. What worries us about this disorder is that it may result in amputation, paralysis and severe reduction of life quality and these side effects are observed among 1.2 to 13.7% of all diabetic patients [6].

This complication is responsible for more than 50% of all non-traumatic cases of amputation. This issues costs the health centers as much as 1 billion dollars every year. Diabetic foot ulcer is a result of neuropathy and arterial failure. A common complication is neural neuropathy caused by compressive and tensile forces. As specified by WHO, diabetic foot ulcer is a term to refer to infection, ulceration and destruction of deep tissues, along with unnatural nervous functioning and different degrees of environmental arterial diseases of lower limb which is one of the most serious side effects of diabetes. Greater blood flow which is quite necessary for the wound to recover following injury and infection does not take place among diabetic patients due to vascular compromise and supplying

oxygen to the wound will be disrupted. Failures in recovering diabetic foot ulcer may be due to these factors. The dangerous factors causing diabetic foot ulcer are divided into 2 groups based upon their controllability: external factors (small and thermal trauma, smoking cigarettes, alcohol consumption, inappropriate control of sugar and tea) and internal factors (male gender, neuropathy, vasculopathy, immunopathy, age, length of the disease). 70% of foot ulcers in diabetic patients run the risk of recurring within 5 years.

Environmental neuropathy plays a major role in pathogenicity of these ulcers and is associated with the higher risk (8 to 18 times higher) of causing these ulcers. The heterogeneous nature of diabetic foot ulcer will make it impossible to use a single type of dressing for all of them. Infection of diabetic foot ulcers are among the most common causes of these patients' hospitalization and they usually result in amputation. Their treatment needs to be based upon tissue culture and microbial resistance pattern. There are not many documented reports concerning the prognosis of these patients and their clinical conditions and the future status of these patients' feet treated through various methods is unclear. Based on these issues and keeping in mind the importance of this problem, the researchers decided to study the end of patients with diabetic foot hospitalized in Be'sat Hospital of IRIAF from 2009 to 2014.

Materials and Methods

Ethical committee

The study was carried out according to the principles of the Declaration of Helsinki. The study protocol was approved by the Ethics Committee of Tehran Heart Center, and informed written consent was obtained from all the patients.

Study design and population

This is a descriptive-analytical research conducted on patients with diabetic foot resorting to Be'sat Hospital of IRIAF from 2009 to 2014 who were qualified for inclusion in the research. Affliction with diabetic foot which resulted in hospitalization and the possibility of following patients' status according to their file were the inclusion criteria. Patients with incomplete files or without advanced diseases intensifying diabetes were excluded from the research. Having gained the consent of the patients and in line with principles of medical ethics, the participants voluntarily took part in the research. Based on the previous researches and according to exclusion and inclusion criteria, as many as 291 patients were finally selected. First, patients' demographic information such as age, gender, length of the disease, treatment method, site of ulcer, and smoking cigarettes was registered in questionnaires. Amputation and its type were also recorded in questionnaires.

Data analysis

The analysis was carried out with SPSS software program version 22. Non-parametric chi square test was used to

compare the ends of all patients with one another in different subgroups. Statistical analysis was considered to be statistically significant $P < 0.05$.

Results

First, the variables were introduced and then the raw data was studied using appropriate statistical tests. The present research was conducted on 291 patients resorting to Besat Hospital. The patients aged from 21 to 91 with an average age of 60.82 ± 11.25 years old. 194 (66.7%) of the participants were male and the remaining 97 (33.3%) were female. The average length of affliction and suffering from diabetes among those with diabetic foot ulcer was 14.7 ± 7.58 years. The following three therapeutic methods were studied in this research: oral medication, injected medication and mixed with the following frequencies for each method respectively: 58.4%, 40.9%, and 0.7%. 24.7% of those suffering from diabetic foot used to smoke cigarettes. The following values were reported concerning the distribution of the site of diabetic foot ulcers: 34.4% (100 people) in toes, 33.3% (97 people) in shins, 13.1% (38 people) in soles, 6.9% (20 people) in ankle, 6.2% (18 people) in toes and sole, and 6.2% (18 people) in both feet (Figure 1).

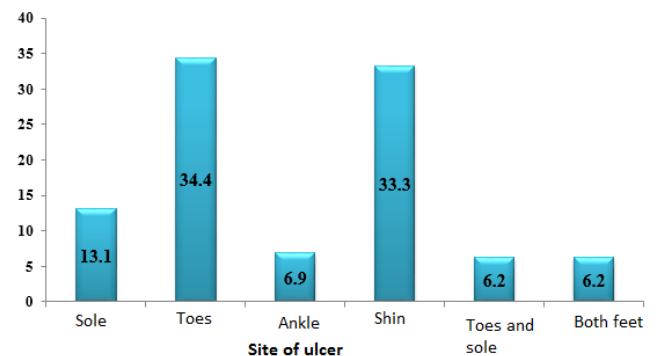


Figure 1. Frequency of site of ulcer

Out of 291 patients suffering from diabetic foot, 284 (97.6%) recovered and only 7 of them (2.4%) passed away. In the present research, 12.4% (36 people) of the patients underwent amputation. 58.3% (21 people) of them underwent major amputation, while 41.7% (15 people) underwent minor amputation. 72.2% (26 people) of those patients undergoing amputation were male and the remaining 27.8% (10 people) were female. Our research pointed to no significant difference between amputation and gender ($P > 0.05$). According to the results, the prevalence and frequency of diabetic foot and amputation among men was more than what was observed among women. The average age of those who had undergone amputation was 65.9 years old, while this average for those not undergoing amputation was 60.1 years old. The correlation between the age of patients suffering from diabetic foot and amputation was studied and a statistically significant correlation was observed between them ($P = 0.004$). The average age of affliction with diabetes among those who had undergone amputation was 16.1 years, while those who had not undergone amputation were suffering from this disease for 14.5

years. The results of statistical analysis indicated a statistically significant correlation between average length of affliction and diabetes and amputations ($P=0.25$). Amputation was observed with oral medication among 58.3% of patients, while 41.7% of patients had amputation with injected medication (Table 1). We also studied the difference between the two type of treatment for those with diabetic foot and amputation. The results pointed to no statistically significant difference between these two variables ($P=0.860$), 39.9% of those suffering from diabetes used to smoke cigarettes while 61.1% of them were non-smokers (Table 2). The results indicate a statistically significant difference between smoking cigarettes and amputation ($P=0.036$).

Table 1. Investigating the correlation between amputation and type of treatment.

P-value	Type of treatment			
	Oral/injected	Injected	Oral	
0.860	0	15	21	Yes
	2	104	149	No

Amputation

Table 2. Investigating the correlation between amputation and smoking cigarette.

P-value	Smoking cigarette		
	No	Yes	
0.860	22	14	Yes
	197	58	No

Amputation

The average level of Hb1Ac among those undergoing amputation and those not undergoing amputation was 11.2% and 10.3% respectively. The results pointed to no significant correlation between level of Hb1AC and amputation ($P=0.41$). Amputation was observed among 91.7% of those patients recovered and 8.3% of those patients who passed away (Table 3). The results of this research indicate a statistically significant difference between the final status of patients and amputation ($P=0.013$). Despite the little death toll among the patients, amputation was observed among those patients who had recovered.

Table 3. Investigating the correlation between amputation and patients' status.

P-value	Patients' status		
	Death	Recovery	
0.013	3	33	Yes
	4	251	No

Amputation

Discussion

One of the several complications observed among those suffering from diabetes is diabetic ulcers. The most important

diabetic ulcer is diabetic foot. This complication may result in amputation, so it is very important to diagnose and treat them in the proper time [6]. The present research was conducted on 291 diabetic patients hospitalized in Be'sat Hospital of IRIAF. According to the results of this research, 97.6% of the 291 patients studied could recover. The frequency of amputation among them was 12.4% with 7.2% of them being major and 5.2% being minor.

Many researches have been done on this issue. A research was conducted on 152 patients suffering from diabetes in a medical center in Spain to diagnose the factors that accompany amputation. Those patients with a history of amputation or foot ulcer resulting in hospitalization were categorized as highly risky group. According to the results of their research, there is no significant correlation between the history of previous ulcer and consequences of ulcer [7]. The results of the present research are in line with those of Mehmood et al., Ghanassia et al., Shojaiefard et al., and Oyibo et al. [8-11]. In a descriptive research conducted in Pakistan, Mehmood et al. studied 116 patients with diabetic foot. According to their results, 77.7% of the patients could recover without any side effects and only 14.7% of them needed amputation [8]. Ghanassia et al. conducted a descriptive study on 94 patients suffering from diabetic foot. 77.5% of these patients recovered without any complications and 44.9% of could regain their appropriate performance in long term follow up [9]. In another research conducted by Shojaiefard et al. on 146 patients suffering from diabetic foot, 5.5% of the patients required major amputation and 22.6% required minor amputation [10]. In another research conducted by Oyibo et al. in England, 194 patients suffering from diabetic foot were examined. According to their results, 15% of the patients required amputation, 4% passed away, 16% did not recover and 65% did recover [11].

Keeping in mind the results achieved in this research, we may arrive at the conclusion that these patients require to receive the proper instructions as to how to take care of their feet through health centers of mass media. It is also necessary to pay enough attention to small and non-infectious foot ulcers in diabetic people. It is also recommended to conduct researches to find out the bacterial causes of diabetic foot and antibiotic resistance pattern and cases of amputation.

Acknowledgement

The foundation project was funded by the Tehran Medical Sciences Branch, Islamic Azad University (No: 2015/2016).

References

1. Azimi-Nezhad M, Ghayour-Mobarhan M, Parizadeh M, Safarian M, Esmaeili H. Prevalence of type 2 diabetes mellitus in Iran and its relationship with gender, urbanisation, education, marital status and occupation. Singapore Med J 2008; 49: 571-576.
2. Pietrzykowska E, Zozulinska D, Wierusz-Wysocka B. Quality of life in patients with diabetes. Polski merkuriusz

- lekarski: organ Polskiego Towarzystwa Lekarskiego 2007; 23: 311-431.
3. Araki A, Izumo Y, Inoue J, Takahashi R, Takanashi K, Teshima T. Factors associated with increased diabetes burden in elderly diabetic patients. *Nihon Ronen Igakkai Zasshi Japanese J Geriatrics* 1995; 32: 797-803.
 4. Frykberg RG. Diabetic foot ulcers: pathogenesis and management. *Am Fam Physician* 2002; 66: 1655-1662.
 5. Kumar S, Ashe HA, Parnell LN, Fernando DJ, Tsigos C, Young RJ, Ward JD, Boulton AJ. The prevalence of foot ulceration and its correlates in type 2 diabetic patients: a population-based study. *Diabet Med* 1994; 11: 480-484.
 6. Bartus CL, Margolis DJ. Reducing the incidence of foot ulceration and amputation in diabetes. *Curr Diab Rep* 2004; 4: 413-418.
 7. Gulamabbas Z, Lutale J, Morbach S, Archibald L. Clinical outcome of diabetes patients hospitalized with foot ulcers, Dares Salaam, Tanzania. *Diabetic Med* 2002; 19: 575-579.
 8. Mehmood K, Akhtar ST, Talib A, Abbasi B, Naqvi I. Clinical profile and management outcome of diabetic foot ulcers in a tertiary care hospital. *J College of Physicians and Surgeons Pakistan JCPSP* 2008; 18: 408-412.
 9. Ghanassia E, Villon L, Thuan Dit Dieudonné JF, Boegner C, Avignon A, Sultan A. Long-term outcome and disability of diabetic patients hospitalized for diabetic foot ulcers: a 6.5-year follow-up study. *Diabetes Care* 2008; 31: 1288-1292.
 10. Shojaiefard A, Khorgami Z, Larijani B. Independent risk factors for amputation in diabetic foot. *Int J Diabetes Dev Ctries* 2008; 28: 32-37.
 11. Oyibo SO, Jude EB, Tarawneh I, Nguyen HC, Armstrong DG, Harkless LB, Boulton AJ. The effects of ulcer size and site, patient's age, sex and type and duration of diabetes on the outcome of diabetic foot ulcers. *Diabet Med* 2001; 18: 133-138.

***Correspondence to**

Mohammad Reza Alipour
Tehran Medical Sciences Branch
Islamic Azad University
Iran