Some Effective Risk Factors on Diabetic Foot Ulcer: Study on 2643 Cases of Patients with Diabetes

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ABSTRACT
Introduction: Given that chronic skin ulcers in people with diabetes are usually caused in the lower extremities, especially the legs, which affect 15% of people with diabetes. And the most common cause of hospitalization for people with diabetes is diabetic foot ulcer. Almost 50% of diabetics are referred to the hospital for diabetic foot problems. And due to the importance of examining diabetic foot ulcer and so far, few studies in this area have been carried out in Khuzestan province and in Shoushtar province. Therefore, this study was conducted on 2643 diabetes patients with the aim of determining some effective risk factors on diabetic foot ulcer.

Materials and Methods: This study is a retrospective cross-sectional descriptive study. This information was extracted from the field of diabetic patients referring to Khatam-ol-Anbia hospital in Shoushtar from 2014 to 2017. Samples were entered into the study by census method. In this study, 2643 cases of patients referring to Khatam-ol-Anbia hospital in Shoushtar city were studied and records of patients diagnosed with diabetes were extracted and the required data (demographic and clinical) were collected from a researcher-made checklist from the records. Data were then entered into SPSS software version 20. Data was analyzed using descriptive statistics, analytical tests and significance level of p<0.05.

Results: The present study included 2643 diabetic patients with an average age of 52.26 ± 12.23 years. In this study, the relationship between ethnicity with diabetic foot ulcers was significant (p<0.05), in this way, patients with Lor ethnicity, have more diabetic foot ulcers than other ethnicity. In this study, a significant relationship was found between drug abuse and diabetic foot ulcer (p=0.002). 824 people (31.1%) used insulin to control their blood glucose, and the relationship between foot ulcer and insulin use was significant (p<0.05). That is, Insulin Consumers, had more foot ulcers than those users of other oral medications. There was no significant relationship between BMI and diabetic foot ulcer (p=0.01). There was also a significant relationship between the type of diabetes and the prevalence of lower limb ulcer (p=0.003), in this way, people with type 2 diabetes have significantly more recent lesions in their lower extremities.

Conclusion: Identifying skin problems that affect the development of foot ulcers, as well as risk factors for these ulcers and their examination and treatment, can prevent it. It is also advisable to increase the knowledge of medics about diabetes risk factors. And it is necessary to emphasize early identification of at-risk patients and provide them with the necessary training in relation to risk factors for diabetic foot.

Key words: Diabetic foot ulcer, Diabetic patients, Risk factor, Diabetes, Insulin

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INTRODUCTION
Diabetes is a large group of metabolic diseases that are characterized by increased blood glucose and is due to insufficient insulin secretion or insulin resistance [1-3]. Diabetes mellitus is a common disease, and its prevalence is increasing in most societies. This trend is particularly worrying in developing countries. The number of diabetic patients in Iran is about 1.5 million [4-7]. Increased chronic diabetes mellitus is associated with long-term damage, functional impairment and various organ failures, in particular the eyes, kidneys, nerves, heart and blood vessels [1]. Foot ulcer is a major complication of diabetes, with high morbidity and mortality [8]. The risk of a diabetic patient is high in the foot ulcer [9]. These foot ulcers are constantly infected and progress well towards cellulitis and should be treated promptly, otherwise they cause infection with blood and gangrene and sometimes lead to amputation [10]. Diabetic foot ulcers are more common in men than in women and more common in type 2 diabetic patients than in type 1 diabetic patients. High-diabetic patients, high BMI, longer diabetic periods, and
high blood pressure, diabetic retinopathy and a history of smoking have a higher risk of diabetic foot ulcers [11]. 15%-25% of diabetics are susceptible to wound lesions during their illness and it is estimated that an upper limb is cut off in the affected individuals every 20 seconds [9]. A minor traumatic injury to the diabetic foot can cause chronic ulcers for various reasons, including the initial inability of the skin to heal [12]. Therefore, it is necessary to take preventive measures to diabetic foot, which includes identification of people with foot ulcer risk factors, training to patients and their fellows in the field of foot care and treatment, these measures can reduce amputation by more than 50% [13].

Given that chronic skin ulcers in people with diabetes are usually caused in the lower extremities, especially the legs, which affect 15% of people with diabetes [14]. And the most common cause of hospitalization for people with diabetes is diabetic foot ulcer [15]. Almost 50% of diabetics are referred to the hospital for diabetic foot problems [16]. And due to the importance of examining diabetic foot ulcer and so far, few studies in this area have been carried out in Khuzestan province and in Shoushtar province. Therefore, this study was conducted on 2643 diabetes patients with the aim of determining some effective risk factors on diabetic foot ulcer.

MATERIALS AND METHODS

This study is a retrospective cross-sectional descriptive study. This information was extracted from the field of diabetic patients referring to Khatam-ol-Anbia hospital in Shoushtar from 2014 to 2017. Samples were entered into the study by census method. In this study, 2643 cases of patients referring to Khatam-ol-Anbia hospital in Shoushtar city were studied. And records of patients diagnosed with diabetes were extracted, and the required information was collected through a researcher-made checklist from the records. The criteria for entering the study were all diabetic patients type one and two in each age group and sex, any diagnosis of diabetes or a history of diabetes in their case, and other cases that had medical diagnosis other than diabetes, pregnancy-related diabetes, cases without diabetes and incomplete cases (n=106) were excluded.

License this article is taken from the Faculty of Nursing and Midwifery of Behbahan University of Medical Sciences. Before Read and collect data proceeding, a Letter Written by the Vice-Chancellor for Education and Research of Shoushtar University of Medical Sciences to the head of the Khatam-ol-Anbia hospital was sent to the archives department, and after obtaining permission from the head of the hospital, 2643 cases were investigated. Then demographic information such as age, gender, ethnicity, education, and clinical information related to the disease, such as the level of glucose at the time of admission, BMI, the prevalence of lower limb ulcer and lower limb amputation, history of smoking and drug abuse, Severity of wound healing by Wagner criteria, the type of drug used to control blood glucose and type of diabetes was collected.

In this study, as noted, the severity of the patient’s wounds recorded in their records was used as a variable. Patients are classified according to Wegner’s criteria as follows: grade zero: Skin appears to be healthy, grade 1: surface and localized ulcer; grade 2: deep ulcers to the ligament tendon, bone and joint, grade 3: deep abscess and osteomyelitis and arthritis, grade 4: toe gangrene (front of the leg), grade 5: includes total leg gangrene.

Data was then entered into SPSS version 20 software, and using descriptive statistics and analytical tests, including Chi-square and Chi-square Pearson tests, t-test, ANOVA and significant level of p<0.05 were analyzed.

RESULTS

The present study included 2643 diabetic patients with an average age of 52.26 ± 12.23 years. Of these, 1571 (59.4%) were male and the rest were female. The average blood glucose level in these patients was 214.23 ± 63.81. The mean BMI in these patients was 30.12 ± 2.36, indicating obesity grade one.

The prevalence of lower limb ulcers in this study was 9.4% (251 patients). Also, 149 patients (5.6%) had lower limb amputation. There was a significant relationship between blood glucose and limb amputation (p<0.05). That is, patients with more blood glucose were more likely to suffer from limb amputations. However, the relationship between blood glucose and diabetic foot ulcer was not significant (p=0.02).

Women had lower limb ulcer than men, but this relationship was not statistically significant (p=0.07). Also, those with higher literacy were more likely to suffer from lower limb ulcer than the less literate, but this relationship was not statistically significant (p=0.09).

In this study, the relationship between ethnicity with diabetic foot ulcers was significantly (p<0.05), in this way, patients with Lor ethnicity, have more diabetic foot ulcers than other ethnicity. Kurdish people also had the least level of ulcers and limb amputations.

In this study 215 (8.1%) had a history of smoking. Also, 84 (3.1%) had a history of drug abuse. There was a significant relationship between smoking and lower limb amputation (p<0.05). There was a significant relationship between drug use and diabetic foot ulcer (p=0.002).

In this study, the severity of the majority of ulcers was based on Wagner’s criteria. Grade 2 (54.1%); Also, 20.1% had grade 1 ulcer, 11.3% grade 3 ulcer, 14.2% grade 4 and 4.8% had grade 5 ulcers.

In this study, 824 people (31.1%) used insulin to control their blood glucose, and the rest of the patients used metformin, glibenclamide, and other oral medications. And the relationship between foot ulcer and insulin use was significant (p<0.05), that is, insulin consumers, had more foot ulcers than those of the user other oral medications. This means that, 149 (18.0%) of insulin users had foot ulcers, but 102 (5.6%) of non-consumers of insulin had diabetic foot ulcers (Figure 1).
In this study, the severity of diabetic foot ulcers varied among drug users, most drug abuse patients were severely affected by ulcer by grade 3 Wagner criteria, and Non-abusers, and the severity of their ulcer was grade 2. There was a significant statistical relationship between these two variables (drug abuse and wound severity) (p<0.05). That is, the more patients had drug abuse, the greater the severity of their ulcers. That is, with an increase in drug abuse, the severity of the ulcer increased in patients.

There was no significant relationship between BMI and diabetic foot ulcer (p=0.01), but there was a significant correlation between this variable and limb amputation (p<0.05).

There was a significant correlation between type of diabetes and the prevalence of lower limb ulcer (p=0.003), this means that people with type 2 diabetes were significantly, had lower limb ulcers (Figure 2).

DISCUSSION

Diabetes mellitus is a common disease, and its prevalence is increasing in most societies. This trend is particularly worrying in developing countries. The number of diabetic patients in Iran is about 1.5 million [4-7]. 15%-25% of diabetics are susceptible to wound lesions during their illness and it is estimated that an upper limb is cut off in the affected individuals every 20 seconds [9]. A minor traumatic injury to the diabetic foot can cause chronic ulcers for various reasons, including the initial inability of the skin to heal [12]. Due to the importance of examining diabetic foot ulcer and so far, few studies in this area have been carried out in Khuzestan province and in Shoushtar province. Therefore, this study was conducted on 2643 diabetes patients with the aim of determining some effective risk factors on diabetic foot ulcer.

The mean age of this study was consistent with studies [17-20] that compared to previous studies; the mean age of diabetic patients has been decreasing, as it is normally expected to develop diabetes as a chronic disease at a higher age. The highest incidence of lower limb ulcers was in diabetic type 2 patients, because the population of patients with type 2 diabetes is higher than type 1, which is justifiable.

The prevalence of lower limb ulcers in this study was 9.4%. Also, 149 patients (5.6%) had lower limb amputation. There was a significant relationship between blood glucose and limb amputation (p<0.05). That is, patients with more blood glucose were more to suffer from limb amputations. However, the relationship between blood glucose and diabetic foot ulcer was not significant (p=0.02). In a study, the prevalence of lower limb ulcer was 19% [20]. In another study, the prevalence of foot ulcer was 2.7%, which is in line with the results of this study [21]. However, the prevalence of foot ulcer in this study was higher than other studies. But in another study, the prevalence of foot ulcer was 2.5% [22] and in another study, the prevalence of foot ulcer was 0.34% [23]. The reason for the difference in the incidence of ulcer in different studies can be the difference in the methods of prevention and effective treatment of foot ulcers, as well as the important role of genetics, lifestyle, nutrition and education level.

In this study, the severity of the majority of ulcers was based on Wagner’s Grade 2 criteria (54.1%). Also, 20.1% had grade 1 ulcer, 11.3% grade 3 ulcer, 14.2% grade 4 and 4.8% had grade 5 ulcers. In one study, severity of their wounds in 60.3% population was based on the second grade Wagner criteria [24]. In another study, in
most patients, diabetic foot ulcers (75%) had severity of ulcers based on grade 2 Wagner criteria. There was a significant relationship between the severity of the ulcer with factors such as body mass index, cigarette, fasting blood glucose, blood glucose 2 hours after food and the depth of the ulcer [10].

In this study, the number of diabetic men is higher than that of women. In the study, the number of men was higher in women and consistent with the present study [25]. But in some studies, the number of diabetic women was higher than that of men, which was not consistent with the results of the study [17,20,23]. And in Tan et al. study, the number of men and women was equal [26]. The diabetic women’s population is more than men in many studies perhaps because of their gender characteristics, but in terms of complications of diabetes, men are more likely to become involved with women.

There was no significant relationship between BMI and diabetic foot ulcer, but there was a significant relationship between this variable and limb amputation. The relationship between blood glucose and limb amputation was significant. That is, patients with more blood glucose, were more likely to suffer from limb amputations. However, the relationship between blood glucose and diabetic foot ulcer was not significant. Also, those with higher literacy were more likely to suffer from lower limb ulcer than those with a less educated level, but this relationship was not statistically significant. But in one study, the relationship between BMI and severity of ulcer was significant. But with limb amputation, it was not meaningful. Also, the relationship between blood glucose level and severity of foot ulcer and also limb amputation was significant, that is, those who had more blood sugar, had more severity of their ulcer and had more amputations. Also, there was a significant relationship between education level and limb amputation. So that people with lower levels of education were more likely to suffer from limb amputation [24]. Various studies have shown that education can play an important role in reducing the complications of a disease, because the prevention and treatment follow-up is usually higher in patients with higher levels of literacy but in this study, people with higher literacy were more likely to suffer from lower limb ulcers than less literate people.

Overall, it can be said that this study was conducted on 2643 cases of diabetes patients and aimed at determining some of the risk factors affecting diabetic foot ulcers, showed that ethnicity (Lor people have the highest percentage of foot ulcer), drug abuse, insulin consumption and type of diabetes have a direct impact on diabetic foot ulcers. Also, as noted, in this study, the severity of diabetic foot ulcers varied among drug abusers, most drug abuser’s patients, the severity of their ulcers is based on Wagner’s were grade 3, and Non-abusers were grade 2. There was a significant statistical relationship between these two variables (drug use and severity of ulcers), that is, the patients with more drug abuse, the severity of their ulcers was greater.

CONCLUSION

Identifying skin problems that affect the development of foot ulcers, as well as risk factors for these ulcers and their examination and treatment, can prevent it. It is also advisable to increase the knowledge of medics about diabetes risk factors. And it is necessary to emphasize early identification of at-risk patients and provide them with the necessary training in relation to risk factors for diabetic foot. Certainly conducting retraining classes can be effective in promoting this. It is also recommended to emphasize the importance of nursing care in nursing students’ lessons on the foot of diabetic patients.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

REFERENCES


