

# Incidence and Determinants of Diabetic Foot Ulcers in Amara City

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## Abstract

Diabetic foot infections are frequent clinical problem. Properly managed, most can be cured, but many patients needlessly undergo amputations because of improper diagnostic and therapeutic approaches. The aim of this study is to evaluate patients with diabetic foot ulcer and their incidences. 320 cases were taken for our study of different gender and age group, date of study was from January 2019 to the end of December 2019, study was done in Maysan Endocrine and Diabetology Center. Most cases were males about (59%) of young age group, most of the cases occurred in extreme weathers. Diabetic foot ulcers are preventable lesions, males at active age group more prone to develop diabetic foot lesions because they are more liable to expose to minor trauma during work. Health education for protection of diabetic patients from serious DFU complications.

**Keywords:** Diabetic Foot; DM; Ulcers; Metabolic Disorder; Limb Amputations

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## Introduction

Diabetes mellitus (DM) is one of the most important and common metabolic disorders affecting about 2-5% of the population in Europe and about 20% of the population in various other parts of the world [1]. The incidence of diabetes mellitus is increasing worldwide. This estimation occurred because of longer life expectancy and changing habits of diet [2]. Even though there are many complications affecting the person with diabetes, none are more devastating than those complications involving the foot [3]. Diabetic foot lesions have significant health and socioeconomic problems holding adverse effects on the quality of life of the patient and imposing a heavy economic burden on the patient's family [4]. Foot ulcers significantly contribute to morbidity and mortality of patients with diabetes mellitus. The diabetic patients with foot ulcers require long-term hospitalization and carry the risk of limb amputation [5]. Foot complications are common in diabetic patients and are considered one of the most expensive diabetes complications to treat [6]. People at greatest risk of ulceration can easily be identified by careful clinical examination of the feet during provision of health education about diabetes complication and during follow-up visits [7]. In developing countries, foot ulcers are one of the most feared and common complications of diabetes. They are a major cause of disability, morbidity, and mortality among diabetic patients, and it has been estimated that 15% of all people with diabetes will have an ulcer at some stage of their life [8]. The most important complications of diabetes mellitus are neuropathy and foot ulcer. Manifestations of complications range from simple to highly complex, including limb amputations and life-threatening infections [9]. Studies show that severity of diabetic foot ulcer is the strongest significant risk

factor of amputation for diabetes patients [10]. In developed countries, one in every six people with diabetes will have an ulcer during their lifetime. The risk is even higher in developing countries [10]. Risk factors associated with the natural history of foot ulcer in diabetic patients include metabolic or biologic characteristics and the extrinsic characteristics which result from the patient's interaction with the environment. Peripheral neuropathy, peripheral vascular disease, and foot trauma were also reported risk factors in the pathophysiology of foot ulcer [11].

## Methods

A prospective study was done in Maysan Endocrine and Diabetology Center. The date of study was from January 2019 to the end of December 2019. The data was collected from patients by clinical history and examinations and available investigations. This study included 320 patients both genders and different age group and their socioeconomic background and their smoking history.

\*Seasonal variation very important in increased incidence of diabetic foot disease and ulceration from this table we notice increased incidence in winter and summer especially in coldest and hottest months.

## Results

In relation to gender on our study we noticed that DF is more common in Males (58.75%) than females (41.25%) (Table 1). In relation to age of patients we noticed that high incidence among age (30-59 years) about 75% of total patients where neuropathic and



angiopathic complication started to appear at the same time they are still physically active and more exposed to trauma, wounds, pressure sore and so on (Table 2). At this period many cases presented to us with foot complication due to hard, prolong walking for (Al Arbaen Visitation to Imam Hussein) where dorsal and planter aspect of the foot are affected due to wearing tight shoes (Table 3). First examination is checking ankle/brachial pressure index we saw about 57.18% had critical ischemic foot where ABI between (0.8-0.99) (Table 4). About 20.93% are developed ischemia with arterial stenosis and atherosclerotic change where ABI less than 0.79 (Table 5). This checking is established by measuring TCPO<sub>2</sub> about 57.8% had critical ischemic foot where TCPO<sub>2</sub> (40-54 mmHg) and about 19-37% had developed ischemia where TCPO<sub>2</sub> less than 40 mmHg (Table 6). On the other hand we take sample (deep swab) from clinically infected lesion of 100 patient and send for culture at Al-Zahrawy Hospital bacteria lab and private labs. We saw the most common organism are staph-aureus which is about 34%. Pseudomonas are the second most common organism which is

**Table 1:** Sex distribution.

No. of Males	%	No. of Females	%
188	58.75%	132	41.25%

**Table 2:** Age distribution of patients.

Age group	No. of patients	%
20-29	20	6.25%
30-39	60	18.75%
40-49	100	31.25%
50-59	80	25%
60-69	50	15.62%
70-79	10	3.12%

**Table 3:** Seasonal variation.

Month	No. of patients	%
January	55	17.10%
February	41	12.80%
March	12	3.75%
April	13	4%
May	11	3.40%
June	16	5%
July	49	15.30%
August	57	17.80%
September	11	3.43%
October	14	4.37%
November	16	5%
December	25	7.80%

**Table 4:** Site of foot lesion.

Site of lesion	No. of patients	%
Dorsal aspect of foot	95	29.86%
Planter aspect of foot	180	56.25%
Mixed	45	14.06%

\*According to the lesion involve whether dorsum or the sole of foot or both as first presentation.

**Table 5:** ABPI (Ankle brachial pressure index).

ABPI	No. of patients	%
1.0-1.2	70	21.87%
0.9-0.99	96	30%
0.8-0.89	87	27.18%
0.5-0.79	55	17.18%
Less than 0.5	12	3.75%

\*It's the ratio between ankle blood pressure and brachial blood pressure which is usually 1 in normal individual.

**Table 6:** TCPO<sub>2</sub>.

TCPO <sub>2</sub>	No.	%
>55 mmHg	73	22.80%
40-54 mmHg	185	57.80%
<40 mmHg	62	19.37%

\*Measurement of O<sub>2</sub> level of tissue below the skin, it's a reliable indicator of local ischemia but maybe affected by local heat, edema, stress. Checked by special instrument by putting probe on the dorsum of foot.

about 20% then E-Coli 11% (Table 7), negative results or false negative could be due to inappropriate taking of swap or transport of sample or lab fault or patient on antimicrobial therapy.

**Table 7:** Bacteriological study for culture and sensitivity.

Culture and sensitivity C/S	No.	%
Negative results	30	30%
Staph. Aureus	34	34%
E. coli	11	11%
Pseudomonas aragenosa	20	20%
Proteus	3	3%
Klabsella	3	3%

\*Deep swab was taken from 100 patients and sent for culture and sensitivity.

## Discussion

Diabetic foot ulcer whether infected or not it leads to increase in morbidity and mortality as important complication of diabetes mellitus type 1, 2, Clute neuropathy, angiopathy and infected tissue is good agar of growth of aerobic and anaerobic pathogens.

Male more commonly affected than females by diabetic foot ulcer could be due to occupation related causes, traveling history, smoking, other social causes. Usually male patients have hard working jobs like being a worker or farmer wearing tight shoes which means they are more exposed to trauma Unlike females especially that high percent of females are housewives. Our study takes environmental seasonal effect in consideration to be related to increase the incidence of DFU, we saw that the incidence of DFU increases in coldest and hottest months throughout the year at January and February about 29.9% of total patients, at July and August about 33.1% of total patients. Common age affected between 40-60 years due to many causes including that they are physically active and angiopathy and neuropathy well established and most of them have uncontrolled hyperglycemia.

By taking a perfect history we noticed that during winter diabetic patient feels very cold extremities due to angiopathic change. So, they put their foot close to heat source and because of neuropathy pain sensation lost our decreased so they develop first or second or third degree burn or blisters mostly on planter aspect of foot especially on the tip of toes and central planter space. During summer most of the patients is affected due to walking bare foot on a very hot ground at sunny hot days. Foot area commonly effected due to close contact with ground like lateral and medial planter space.

In concern with the effected site of foot whether dorsum or planter aspect we saw 56.25% are planter aspect involved and those usually had neuropathicsignandsymptoms.Skinandtissuelyingonbonyprominence. Tip of toes and skin closely contacted with ground due to pressure effect, hot ground, heat sources or during religious Al Arbaen Visitation where people are walking about 400 km continuously where they develop mixed dorsal and planter ulceration which is about 14.06%. Dorsal ulceration usually developed due to vascular ischemia which is about 29.86%. In concern with neurological complication most of



patients we deal with are complaining symptoms started from simple numbness to lose of sensation and touch and other symptoms. Our study concern with vascular indices to evaluate blood supply of feet. Male group are mainly involved in blood vessel pathology

## Conclusion

From our study and after studying many researches we notice that Diabetic foot ulcers are preventable lesions due to most common causes of its occurrence are traumatic whether physical trauma, dry burn, moist burn, bad and tight shoes wearing, inappropriate nail cutting and walking with bare foot. Uncontrolled hyperglycemia goes with high risk of infection of diabetic foot ulcers so controlled blood sugar decrease mortality and morbidity in diabetic patients. Males at active age group more prone to develop diabetic foot lesions because they are more liable to expose to minor trauma during work. Neuropathic and angiopathic changes with decreased immunity play major role in developing diabetic foot ulcers and their complications. Health education for protection of diabetic patients from walking with bare foot, wearing tight shoes, exposure to heat and cold, also daily examination of feet, moisturizing, clearing and changing stocks twice daily plus correction vision in elderly patients may play important role in decreasing the occurrence of diabetic foot ulcers.

## Limitations

Our patients are those referred to diabetic foot center which is located in the center of city, so most of the patients are from the center of Amarah only limited patients from the rural area. About 100 patients with severe lesions are admitted at Al-Zahrawi surgical hospital in the surgical ward for inpatient treatment and follow up and bacteriological investigations and so we follow their condition. Anaerobic cultures are unavailable in our hospital so cultures were sent for only aerobic bacteria.

## Recommendations

Because of diabetic foot ulcers morbidity and mortality about 20% of patients and with minor and major amputation, and because it's a

preventable disease by simple health education and control of blood sugar so medical institute must take its' role with media and civil society organization to inform health education to all diabetic patients.

## Conflict of Interest

No.

## Funding Support

No.

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