



ISSN: 1813-1638

The Medical Journal of Tikrit University

Available online at: [www.mjotu.com](http://www.mjotu.com)

العراقية  
المجلات الأكاديمية العلمية  
IRAQI  
Academic Scientific Journals

Hassan H. Hameed <sup>\*(1)</sup>

## Feet changes in Diabetic Patients Detected in X-ray Film

(1) Nineveh- health office  
Mosul General Hospital  
Nineveh  
Iraq

### Keywords:

Diabetes Millitus  
Mosul  
Hyperostosis  
Osteomyelitis  
Osteoarthritis  
Osteopenia

### ARTICLE INFO

#### Article history:

Received 10 Oct 2018  
Accepted 01 Dec 2018  
Available online 01 June 2019

### ABSTRACT:

**Background** Diabetes mellitus is a condition where sufficient amounts of insulin are either not produced by the body or the body is unable to use the sufficient insulin that is produced. .

The aim of the study is to identify feet changes in diabetic patients that can be detected by plain radiography.

**Patients & Methods:** Design: Cross - sectional study

Participants: One hundred diabetic patients-

Setting: This study was done in September -2005 to June -2006, in Al-Wafaa diabetic out patients clinic & radiology department, Al-Zahravi hospital in Mosul.

Jesuits : One hundred patients were studied, 70 female & 30 males.

**The Results:** Most of them were 41-70 years old (88%), family history association about 67% & additional disease about 47%. Most of patients were type II (NIDDM) about 94%, & mean duration of diabetes about 10 years. The main clinical findings were abnormal sensation, foot deformity & swelling.

The main radiological findings were osteopenia, Hyperostosis foot deformity tuft resorption, osteomyelitis & osteoarthritis.

**Conclusions:** Feet changes in. diabetics are mainly the result of peripheral - neuropathy, which is due to prolonged duration & poor control of diabetes.

DOI: <http://dx.doi.org/10.25130/mjotu.25.01.12>

\*Corresponding author E mail : [dmsabah@yahoo.com](mailto:dmsabah@yahoo.com)

## Introduction

Diabetes mellitus is a condition where sufficient amounts of insulin are either not produced by the body or the body is unable to use the sufficient insulin that is produced. Insulin is the hormone that make glucose enter the cells of body to provide fuel. When glucose cannot enter the cells, it builds up in the blood and the body's cells literally starve

to death. There are two basic types of diabetes:

❖ **Type I** is also called insulin dependant diabetes mellitus IDDM are regarded as autoimmune disorder in which body immune system destroys the cells of the pancreas that produce insulin. Type I accounts for 5-10% of all diabetic cases and usually develops in children & young adults but can occur at any age

❖ **Type II** or non- insulin dependant diabetes mellitus NIDDM which is a metabolic disorder usually develops after the age of 45 years.

### Diabetes & the feet (pathophysiology)

The effect of diabetes on the feet is very important and often complicated. A diabetic patient gradually loses both sensation & circulation to his or her feet as the disease advances. Loss of sensation (peripheral neuropathy) is the greater

risk factor for developing foot infections, ulcers, or amputation. The nerves lose their ability to conduct impulses due to nutritional changes in their small blood vessels as well as changes in nerves conduction membranes. If a minor injury is ignored, it leads to an infection, ulcer, amputation & its tight blood sugar control reduces the impact of the neuropathy.

About 15% of diabetes will develop a foot ulcer at some time, amputation about 102/10000 that is about 56000 cases a year in USA.<sup>(1)</sup>

### Risk factors in diabetics lead to feet tissue damage<sup>(2)</sup>

❖ Precipitatory events like

- Accident cuts
- Shoe's trauma
- Thermal trauma
- laterogenic
- Vascular occlusion
- Skin or nail conditions

❖ Demographic risk factors

- Age (greater risk in old people)
- Gender: male is twice greater (mechanism is unknown, it may be behavioral or physiological)
- Ethnicity (some ethnic group of great risk for feet complication due to behavioral, culture, physiological,



socioeconomic causes.

- Social situation (living alone 2x greater risk )

❖ **Other risk factors**

- Body weight. (type 2 diabetes more prevalence)
- Smoking (uncertain factors in foot problems)
- Foot wear (if inappropriate increase the risk of foot complications).

## **Patients & Methods**

### **Study Design :**

The study was conducted as cross-sectional study at Al-Wafaa diabetes out patient clinic in Mosul.

### **Period of the study:**

The study was started in Sept. 2005& completed in June 2006.

### **Study Population:**

The sample of the study include 100 diabetic patients; 70 female & 30 males.

### **Patient definition:**

Patients included in this study were those attending Al-Wafaa diabetes out patient clinic who are known to be diabetic for 3 years duration & more.

### **Data collection form:**

General information history, clinical findings & x- ray findings were filled in a questionnaire form for every patient through direct interviewing by the investigator himself ( see appendix page 28)

### **Clinical examination:**

Examination of both feet was conducted in all patients including the presence of swelling, deformity, ulcer abnormal sensation.

### **Radiology:**

X-ray of both feet (AP view) for all the patients was conducted at the department of radiology at Al-Zahrwi hospital (Mosul) & findings were reported in data collection paper.

### **Data statistical analysis:**

Analysis of data was carried out using:-

- Chi - Square test of independence to determine the significance of differences between categorical variables.
- Kappa test : is a statistical test to find the agreement between the results of two tests like clinical & radiological findings or any other two tests.

**Results:****Table (1) Demographic characteristics of the study cases.**

<b>Characteristics</b>		<b>No.</b>	<b>%</b>
<b>Age group ( year )</b>	≤40	7	7.0
	41-50	26	26.0
	51-60	40	40.0
	61-70	22	22.0
	>70	5	5.0
	Mean +SD	55.10+9.92	
<b>Sex</b>	Male	30	30.0
	Female	70	70.0
	Male: Female	0.43	
<b>Occupation</b>	Urban	78	78.0
	Rural	22	22.0
<b>Family history</b>	Present	67	67.0
	Absent	33	33.0
<b>Additional disease</b>	Present.	47	47.0
	Absent	53	53.0
<b>Type of DM</b>	1	6	6.0
	2	94	94.0
<b>Duration (years)</b>	1-5	20	20.0
	6-10	49	49.0
	11-15	15	15.0
	>15	16	16.0
	Mean +SD	9.78+5.11	

88% of patients 41-70 years old, 70% female and 30% male, 78% urban and 22% rural, family history positive 67%, associated disease positive 47%, 94% are NIDDM, mean duration of diabetes 10 years and more.



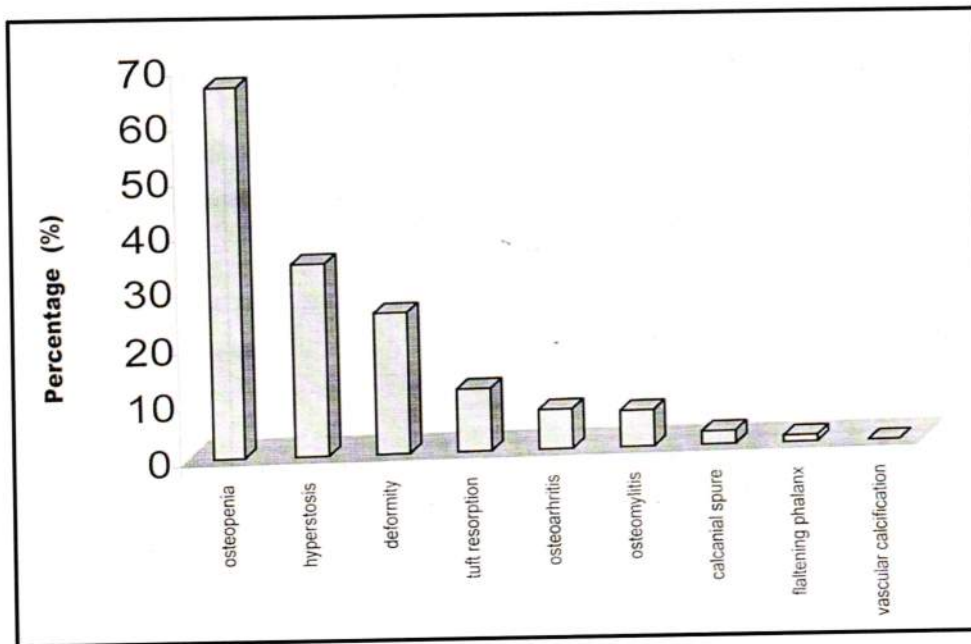


Fig (2) Show the radiological finding.

Table (2) Radiological finding.

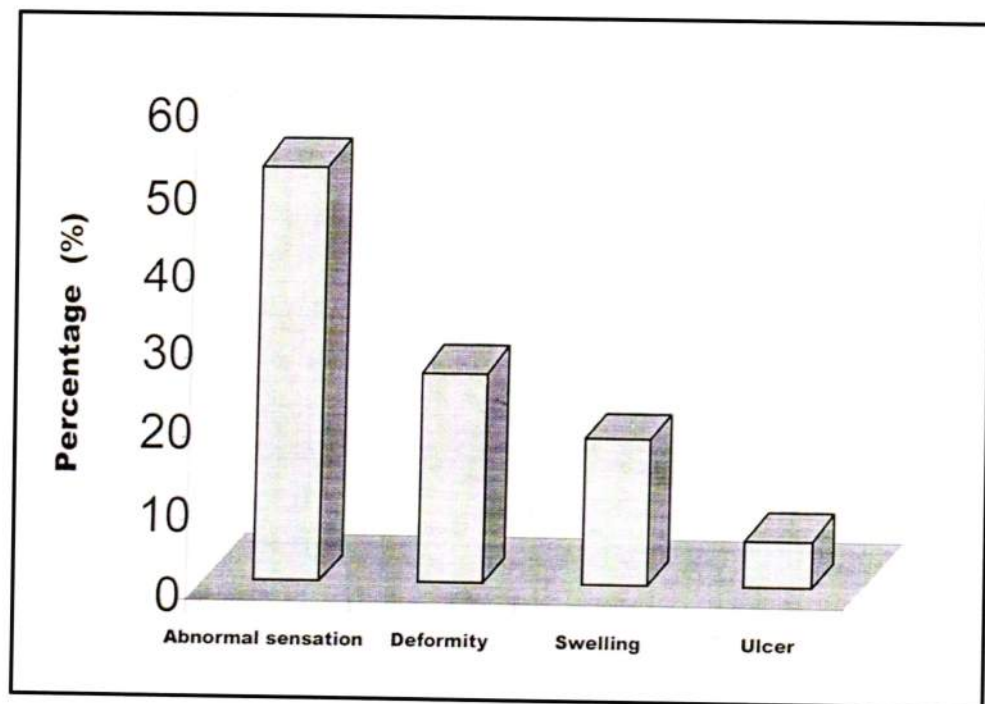
Parameters	No.
<b>Osteopenia</b>	66
<b>Osteoarthritis</b>	7
<b>Clacanal spurs</b>	2
<b>Vascular calcification</b>	0
<b>Flattening phalanx</b>	1
<b>Hyperstosis</b>	34
<b>Tuft resorption</b>	11
<b>Deformity</b>	25
<b>Osteomyeliti</b>	6

This table explain the radiological finding which are mainly osteopenia 66 cases & hyperstosis 34 cases & foot deformity 25 cases & Tuft resorption in 11 cases.

**Table (3) Show the Clinical finding.**

Parameters	No.
Deformity	23
Swelling	17
Ulcer	3
Abnormal sensation	52

This table explain the main clinical finding where abnormal sensation found in 52 cases & foot deformity 23 cases & swelling 17 cases.



**Fig (3) clinical findings of the study cases**



## Discussion

Diabetes mellitus is the commonest cause of neuroarthropathy & osteopathy although less than 1% of patients with diabetes develop such changes <sup>(6)</sup>.

One hundred diabetic patient were covered by this study. 70 females & 30 males. 32% showed normal radiological examination which might be due to a good control of diabetes.

The study showed that patients between (40-70 years old) were more susceptible to feet bones & joints changes, however, other works had shown that usual age of onset is  $\geq 50$  years <sup>(7)</sup>. Neuropathic changes in a 21 years old diabetic <sup>(8)</sup>.

Also, the female sex appears to be a risk factor which is not in agreement, with other studies which had shown that the male sex is a more risky factor <sup>(2)</sup>. However, most of the patients in our study were females, which might explain our findings.

Regarding the occupation, the present study shows that most patients were housewives which is a risk factor and this might be explained by the fact that feet changes induced by stress of the weight bearing that leads to gradual damage of the foot, in addition to repeated minor trauma to unprotected joints of foot due to neuropathy <sup>(2)</sup>.

For the type of diabetes, in the

present study those patients were type I ( I DDM) and were more liable to develop feet bones & joints changes than type II (NIDDM). This is in accordance with other studies <sup>(1)</sup>.

For the duration of diabetes, the present study shows that duration of more than 10 years is a risk factor for feet bones joints changes. This is in line with other studies. <sup>(3)</sup>

Regarding family history of diabetes, the present study shows that family history of diabetes is a risk factor for feet bones & joints changes in diabetes. This is in the line of other studies. <sup>(3)</sup>

Regarding clinical symptoms like parathesia, swelling & ulcer, they are associated with feet bones & joints changes in diabetes. This is in agreement with other studies. <sup>(1)(2)(3)(13)</sup>

Regarding autonomic neuropathy, in our study there is a very highly significant association between neuropathy, feet changes, and autonomic neuropathy is risk factor, which is in agreement with other studies. <sup>(1)(2)(3)</sup>

Regarding associated disease in diabetic patients, hypertension appears to increase the risk of feet joints & bonechanges, & this in line with other studies <sup>(2)</sup>

The main radiographic finding in the present study is osteopenia, which this is in agreement with other studies. <sup>(5)(16)(17)</sup> This might be related

to pathatic autonomic neuropathy which leads to increase blood flow and osteopenia.

Also, there is a significant association between hyperstosis of the shafts of the metatarsal , deformities of joints of the foot, and resorption of the tufts of the distal phalanges. These are in consistence with other Studies<sup>(5)</sup>

Other significant radiography findings were osteoarthritis & osteomyelitis which this is in agreement with other studies and is mostly because of feet ulceration.

### Conclusions

From the results of the present study , it may be concluded that feet bones joints changes in diabetes are mainly due to peripheral neuropathy & that poor control of diabetes & prolonged duration are the main leading causes of these changes. In additional, it appears that females, housewives & those with hypertension, family history are more liable to have feet changes in diabetes.

### Recommendations

1. Good control of diabetes .
2. Any patients with peripheral neuropathy should be regarded as potential victims of neuropathy, so regular clinical & radiological examination is manditary.
3. Patients at risk also should have to do regular clinical & radiological

examination of the feet.

### Acknowledgment

I would like to express my deep gratitude and appreciation to my supervisor Dr. Hazim Hameed Al-Saleh Assistant professor & the head of Radiology department, University of Mosul, for his continuous help , support & kind guidance during this study .

Also I would like to express my great appreciation & thanks to Dr. Hazim Khalil AL-Allaf lecturer & secretary of radiology department, Medical college , University of Mosul for his valuable advice, throughout the work.

I am extremely grateful to my teacher Dr. Abdul-Kader Taboo, Assistant professor, Radiology department, College of Medicine , University of Mosul for his help when so ever needed .

Also my respect & thanks go to the staff of Al-Wafa'a diabetes outpatients clinic & Al-Zahrawi hospital -department of radiology-for their cooperation.

### References

1. K. Patil, G, Charanya, K. Prabhu the international journal of lower extremity vol.1, No.2, 93-103 (2002).
2. Mike Edward, journal Digest-diabetes foot update vol.8, No.1, spring 2005.



3. Rathur and Boulton, journal of Bone & Joint surgery (BR) vol. 87, 2005, 1605-1610.
4. B.M. Eicke, J. Bauer, S. Mink, V. Kuhl, A. Victor Diabetic care, September 1, 2003: 26(9): 2616-2621.
5. John H. Klippel, Textbook (2001): Primer on the rheumatic diseases, edition 12, p.436.
6. Coughlin MJ . Lesser toe deformities, orthopedics 1987 vol. 10 page 63-75.
7. Thomson FJ , Masson EA , Boulton AJM. The clinical diagnosis of sensory neuropathy in elderly people . Dabetic medicine 1993 vol. 10 page 843-846.
8. Goodman , M.A. , and Swartz, W : Infection a charcot joint , a case report, J . Bone & surgery 1985: vol 67 , page 642-643.