**International Journal of Science Academic Research**
Vol. 03, Issue 05, pp.3787-3789, May, 2022
Available online at http://www.scienceijsar.com

ISSN: 2582-6425

**Research Article**

# RISK CATEGORIZATION OF DIABETIC FOOT IN DIABETIC PATIENTS ATTENDING ADC (ADEN DIABETIC CENTER ADEN – YEMEN)

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**Received** 11th March 2022; **Accepted** 19th April 2022; **Published online** 30th May 2022

**Abstract**

Diabetes and its complications are rapidly becoming the world's most significant cause of morbidity and mortality. It is predicted that by 2040 there will be over 642 million people with diabetes in the world (1) With the lifetime incidence of foot ulcers occurring in up to 25% of patients ( 2 ), we need to pay far more attention to the diabetic foot and shift our focus to preventing ulcers rather than treating them. Diabetes morbidity rates are staggeringly high and the 5-year mortality rate, after a lower extremity amputation, is only second to lung cancer.(3)

**Keywords:** Diabetes, Melitus type 1 & 2 risk catogerziation of diabetic foot.

## INTRODUCTION

### Definition

According to the World Health Organization and to the International Working Group on the Diabetic Foot [4], diabetic foot is defined as the foot of diabetic patients with ulceration, infection and/or destruction of the deep tissues, associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb.

### Objective

Diabetic foot ulcers and amputations are preventable. Aim of this study was to determine the distribution of categories of foot at risk in patients with diabetes attending Aden Diabetic center at Al-Gamhouriah Modern General Hospital.

## MATERIALS AND METHODS

### Study Design and Population

Cross –section study for diabetic foot categorization risk was done in Aden Diabetic center at Al-Gamhouriah Modern General Hospital in Aden – Yemen from February 2015 - May 2019. The data of the patients was collected in a well designed preformed.

### Sample Size

Accurate number of population of diabetic patients in Yemen is unknown, the total sample size calculated is 1500 diabetes mellitus patients with Type 1 & Type 2 .

### Inclusion Criteria

1. History of previous Ulcer / amputations Based on the history of previous ulcer/ amputations [5]age.
2. age> 16 years < 70 years .
3. Sex
4. duration of diabetes.
5. HbA1C (Two reports have recommended incorporating hemoglobin A1c (HbA1c) into the current diagnostic criteria [6,7], and, more recently, the WHO [8] has stated: 6.5% or higher).
6. ABI: The ratio of ankle to arm systolic blood pressure was calculated by Pulse wave form (PVW) Doppler. Presence of peripheral artery disease (PAD) was confirmed if ankle brachial index was < 0.9 as recommended by American Diabetes Association [9]. PAD severity in each leg is assessed according to the levels of ABI [10]:
   - 0.91–1.30: normal;
   - 0.70–0.90: mild occlusion;
   - 0.40–0.69: moderate occlusion;
   - 1.30: poorly compressible vessels:
7. Biothesiometer : vibration perception threshold (VPT) test was carried out by biothesiometer which was applied to the distal part of great toe and vibration was increased until the threshold is reached where vibration is recognized. Two repetitive tests on each location is carried out and averaged, and values above 25 Volts are considered positive for neuropathy and has shown strong correlations with foot ulcerations [11].
8. Education and trained: The goal was to assist doctors and nurses in the identification and characterization of diabetic foot complications, and equip them to manage such complications effectively through a structured programmed of education and training [12].

### Exclusion Criteria

1. Patient who do not agree to participate in study,
2. Patients with gestational diabetes,
3. Renal failure.
4. Liver failure.

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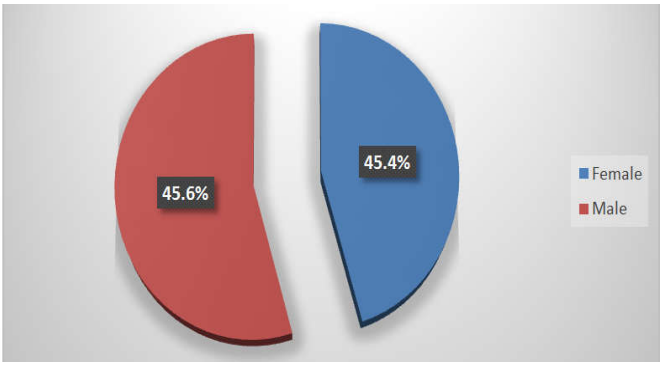
5. Vertebral column pathologies e.g. Lumbar stenosis, Disc prolapse.

## RESULTS

The Males patients consisted 54.6% represent higher percentage in comparison with Female's patients 45.4%.

**Table 1. Distribution of diabetic patients by Sex**

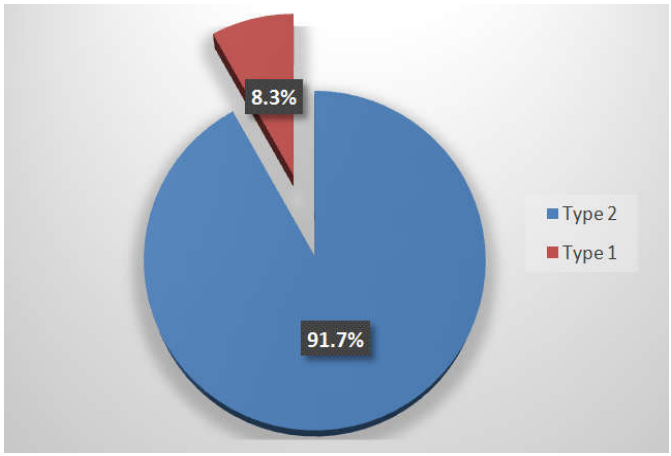
| Sex | Frequency | Percent % |
|---|---|---|
| Male | 819 | 54.6 |
| Female | 681 | 45.4 |
| Total | 1500 | 100 |




The Type 2 DM consisted 91.7% represent higher percentage in comparison with Type 1 DM 8.3%,

**Table 2. Distribution of diabetic patients by types**

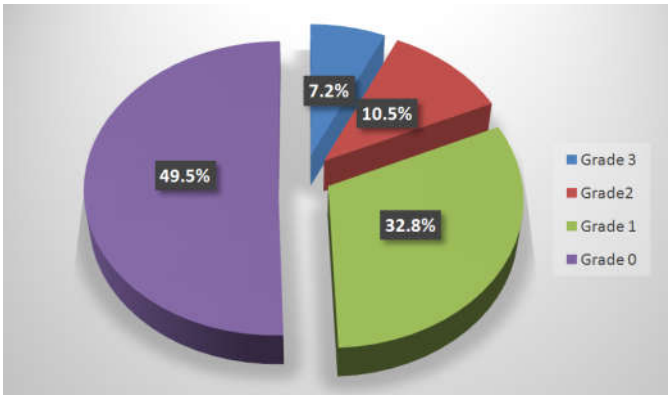
| Types of DM | Frequency | Percent % |
|---|---|---|
| Type 1 | 124 | 8.3 |
| Type 2 | 1376 | 91.7 |
| Total | 1500 | 100 |




The Patients with Grade 0 consisted 49.5% represent higher percentage in comparison with other Grades.

**Table 3. Distribution of sample study by risk categorizations**

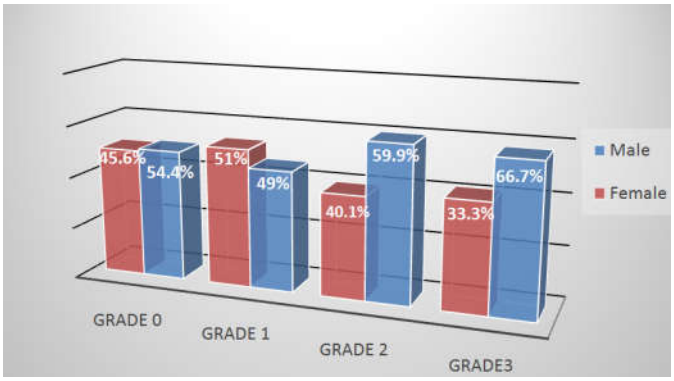
| Risk Categorizations | Frequency | Percent |
|---|---|---|
| Grade 0 | 743 | 49.5 |
| Grade 1 | 492 | 32.8 |
| Grade 2 | 157 | 10.5 |
| Grade 3 | 108 | 7.2 |
| Total | 1500 | 100.0 |




Female had high percentage in grade 1 while Male had high percentage in grade 0, 2 and 3 respectively.

**Table 4. Distribution of Sample Study by Risk Categorizations and sex**

| Risk category | Sex | | Total (no) |
|---|---|---|---|
| | Male (no/%) | Female (no/ %) | |
| Grade 0 | 404 (54.4%) | 339 (45.6%) | 743 |
| Grade 1 | 251 (51.0%) | 241 (49.0%) | 492 |
| Grade 2 | 94 (59.9%) | 63(40.1%) | 157 |
| Grade 3 | 72 (66.7%) | 36 (33.3%) | 108 |




## DISCUSSION

The goal of the study was not to assess the responsible cause or cluster of causes that lead to an ulceration or amputation but rather to determine if a classification system would predict which group of diabetic patients at low risk to offer preventable methods to protect them from diabetic foot complications .Our data suggests that the classification system proposed by the task force of interested group of the American diabetes Association (ADA ) with endorsement by American Association of Clinical Endocrinology ( AACE ) (13) is the preferred applicable system to our study (Patients having normal protective sensations were put in low risk (grade 0), those having loss of protective sensations in moderate risk (grade 1), those having loss of protective sensations with either high pressure or poor circulation or structural foot deformities or onychomycosis in high risk (grade 2) and those having past history of ulceration, amputation or neuropathic fracture were put in very high risk (grade 3), from that point the greatest numbers of diabetes patients 743 (49.5 %) found with low risk (grade 0) and 492 (32.8% )diabetic patients with moderate risk (grade 1) and 157(10.5% ) with high risk (grade 2), 108 (7.2%) patients with very high risk (grade 3). there is strong relationship between sex found, As far as sex is concerned there were 404 (54.4%) male and 339 (45.6%) female in grade 0, 251 male (51.0%)241 female (49.0%) in grade 1, 94 male

(59.9%) and 63 female (40.1%) in grade 2, 72 male (66.7%) and 36 (33.3%) in grade 3 .

**Conclusion**

This study revealed that 743 (49%) patients attending the diabetic clinic are at low risk .A strong relation was found between sex.

Recommendation: Those Patients with low risk need annual follow up and examination to their feet, good education and training for diabetic foot health care, good glycemic control periodically and smoke cessation.

**Limitation of study:** This is a cross sectional study and the result of this study cannot be generalized. Prospective cohort studies are needed in local population to determine the risk categorization of diabetic foot.

Consent and ethical approval: The study was performed after the permission of Ethical Review Committee of Aden Diabetic Center. Written informed consent was taken from participants.

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**Recommendations For Risk Categories For Patients With Diabetes[8]**

| Category | Risk Profile Evaluation | Recommended Frequency Of Podiatry Visits |
|---|---|---|
| 0 | Normal | Annual |
| 1 | Peripheral neuropathy | Semi-annual |
| 2 | Neuropathy, deformity and/ or PAD | Quarterly |
| 3 | Previous ulcer or amputation | Monthly to quarterly |

Adapted from Boulton AJ, Armstrong DG, Albert SF, et al. Comprehensive foot examination and risk assessment: a report of the task force of the foot care interest group of the American Diabetes Association, with endorsement by the American Association of Clinical Endocrinologists. *Diabetes Care.* 2008; 31(8):1679-85.

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