

Study of diabetic foot patients with correlation of blood sugar levels in Bengaluru rural district

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Abstract

Background: type 2 diabetes mellitus is a long term chronic metabolic disease due to both insulin resistance and improper synthesis of insulin from the beta cells of pancreas leads to micro and macrovascular complications. Diabetic foot ulcer is more frequent devastating complication of Type 2 Diabetes mellitus patients and is a major source of morbidity and mortality. **Methods:** This is a Retrospective study conducted in Akash Institute of Medical Sciences and research centre, A total 100 subjects were included after informed consent, blood samples are collected from the all the subjects. The Fasting Blood Sugar was analysed by using Glucose-oxidase and peroxidase method (GBA – 1000 auto-analyser) and remaining anthropometric data was collected from the patient's case reports. **Results:** This study was evaluated the age, gender, place of residence, Fasting Blood Sugar and ulcer size levels in patients with type 2 diabetes mellitus patients. Significantly elevated levels of fasting blood sugar observed in different age groups of type 2 diabetes patients. The fasting blood sugar levels are positively correlated with ulcer size by using Pearson correlation ($P = 0.0001$). **Conclusion:** The study suggesting that the fasting blood sugar levels were significantly elevated in Type 2 diabetic foot. In Bangalore rural region majority people residing in a rural area and more prone to acquire type 2 diabetes mellitus manifestation it as diabetic foot. **Key words:** Type 2 Diabetes Mellitus (T2DM), Diabetic Foot, GOD-POD Method.

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Received Date: 12/01/2021 Revised Date: 19/02/2021 Accepted Date: 04/03/2021

DOI: <https://doi.org/10.26611/10021811>

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	Accessed Date: 06 April 2021

INTRODUCTION

Type 2 diabetes mellitus is a long term chronic metabolic disease due to both insulin resistance and improper synthesis of insulin from the beta cells of pancreas leads to micro and macrovascular complications¹. The T2DM prevalence 347 millions in world wide, in India 73 million peoples my effect by 2030². Diabetic foot is also one of the complication of diabetes mellitus, in this condition ulcers

are injures to all layers of skin, necrosis and gangrene that will observed particularly soles of foot³. In this condition blockage of bold vessels observed due to micro emboli artherothrombosis which is caused by occlusive peripheral vascular disease in diabetes mellitus condition results diabetic gangrene⁴. Amputation is a largely preventable complication of diabetes and >85% of major amputations in patients with diabetes are preceded by foot ulceration⁵. It is therefore timely to review the evidence for the management of peripheral arterial disease (PAD) and the diabetic foot, highlighting recent guidelines produced by the International Working Group on the Diabetic Foot (IWGDF) and the European Society of Vascular Surgery (ESVS)⁶. The lifetime risk of foot ulceration in patients with diabetes lies between 15% and 25%,^{8,9} with an annual incidence of around 2%⁷. The risk of a person with diabetes undergoing a lower extremity amputation is estimated to be 23 times that of a person without diabetes⁸. PAD is an independent risk factor for subsequent ulceration and limb loss in diabetes⁹. The aetiology of DFU

is multifactorial and involves a complex interplay between distal polyneuropathy (motor, sensory and autonomic), abnormal foot anatomy, functional changes in the microcirculation and PAD¹⁰. Diabetic foot ulcers can be followed by bacterial invasion resulting in infection and decay, can occur in any part of the body especially in the distal part of the lower leg¹¹.

MATERIALS AND METHODS

This is a Retrospective study was conducted at “Akash Institute of Medical Sciences and Research Centre”, Karnataka from 2018-2020. A total 100 subjects diagnosed with T2DM patients included according to American Diabetes Association Criteria (ADA)¹². All the subjects were recruited in the study after obtaining their informed consent after obtaining of ethical clearance from the institute. Patients with T2DM and age more than 30 years were included in the present study. Whoever has Exclusion criteria’s for both cases and controls were patients with history of hypertension, hypercholesterolemia, cardiovascular disease, hepatic disorders, acute and chronic renal insufficiency and alcohol abuse excluded

from this study. From the all subjects, after overnight fasting (12hrs), 3 ml of venous blood was collected and transferred into anticoagulant Tube contain fluoride The collected samples were separated by centrifugation at 3000 rpm for 5 min. Plasma Fasting Blood Sugar (FBS) measured by Glucose oxidase peroxidase method (GBA-1000 Autoanalyzer) laboratory standard methods and ulcer size, other anthropometric parameters was collected from patient case sheet.

Statistical Analysis

The normal distribution of data checked by using Kolmogorov Smirnov test. All the characters descriptively summarized. The mean and standard deviation about the arithmetic mean were used. The significance difference between Age, Gender, locality and Fasting Blood Sugar (FBS) analysed by using independent student’s T- Test. The Pearson correlation was used for between the FBS and Ulcer Size. The Data was compiled in Microsoft excel spread sheets and analyzed using SPSS for windows version 16.0. A p value <0.05 was considered statistically significant.

RESULTS

Table 1: Assessment of distribution of data using Kolmogorov-Smirnov test

Parameter	Group 1
AGE (YEARS)	0.019*
Male: Female Ratio	0.0001*
Urban / Rural	0.0001*
Fasting Blood Sugar (mg/dL)	0.0001*
Ulcer Size	0.0001*

Table 2: Comparison of biochemical parameters in patients with Type 2 Diabetes Mellitus and Healthy Controls

Parameter	T2DM Patients	Group 1
AGE (YEARS)	50.16 ± 10.96	0.019*
Male: Female Ratio	34:56	0.0001**
Urban / Rural	30:70	0.0001**
Fasting Blood Sugar (mg/dL)	174.51 ± 75.78	0.0001**
Ulcer Size	0.78 ± 0.65	0.0001**

Table 3: Correlation (Pearson) of Fasting Blood Sugar (FBS) With Ulcer Size in Type 2 Diabetes Mellitus patients

Parameter	r value	P value
FBS (mg/dL) Ulcer Size	0.808	0.025

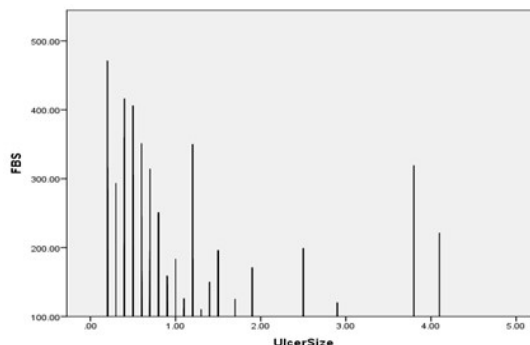


Figure 1: Showed the Fasting Blood Sugar (mg/dL) with Ulcer Size (cm) in Type 2 Diabetes Mellitus

DISCUSSION

T2DM is one of the major metabolic disorders caused by insulin resistance due to improper secretion and activation of insulin leads to hyperglycemia¹³. In T2DM patients significantly increased proteolysis and Lipolysis and increased oxidants levels caused by micro and macrovascular complications¹⁴. Diabetic foot is also one of the complications of diabetes mellitus, in this condition ulcers are injures to all layers of skin, necrosis and gangrene that will observed particularly soles of foot¹⁵. Diabetic foot is classified into two major types The Neuropathic Foot where neuropathy dominates and another one is The Neuroischemic Foot, where occlusive vascular disease is the main factor, although neuropathy is present¹⁶. The incidence of the present study is diabetic foot ulcers among diabetic patients attending AIMSRC was 50 % (95% CI: 7.9, 15.5)¹⁷. This finding is in line with three independent studies done in Ethiopia, 13.6% in Gondar, 12% in Mekelle, and 14.8% in Arbaminch. In addition, similar finding in North India (14.3%) and in Tanzania (15%)¹⁸. However, this finding was more than the study done in Addis Ababa, Ethiopia (31.1%); Telangana, India (16%); and Jordan (4.6%)¹⁹. This association can be explained by biomechanical factors such as the degree of barefoot and in-shoe mechanical stress and the level of adherence to wearing prescribed footwear. In addition, it may be due to the fact that ulcer leads to microvascular dysfunction, macrovascular dysfunction, and peripheral nerve damage. These studies suggest that the blood sugar levels are positively correlated with foot ulcer, continuous monitoring of blood sugar levels are useful for ulcer size.

CONCLUSION

The prevalence of type2 diabetic foot ulcer was 50 % among study population, elevated levels of blood sugar levels and family history of ulceration are more sensitive independent predictor's of diabetic foot ulcers in type 2 diabetes mellitus patients.

Acknowledgments

The authors acknowledge the kind support and cooperation of dean/Principal of Akash Institute of Medical Sciences and Research Centre.

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Source of Support: None Declared
Conflict of Interest: None Declared

