Original Research Article

A Prospective Study of Assessment of Anemia and Hypoalbuminemia in a Diabetic Patients with Ulcers

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Abstract

Introduction: Diabetic foot ulceration (DFU) continues to be the commonest cause of severe limb ischemia in vascular surgery. Up to 25% of diabetic patients are at risk of developing DFU during their lifetime and poor wound healing is a principle reason for morbidity and mortality.[1] Diabetes carries an increased risk of a person undergoing lower extremity amputation over twenty times that of age-matched healthy individuals.[2]
Materials and methods: 90 patients presenting to with diabetic foot infections were included in the study after oral consent Patients fulfilling the criteria were chosen for the study by simple random sampling. The patient details such as age, sex, and duration of diabetes were collected. At admission, the patients underwent blood tests for hemoglobin, HbA1c and albumin among other tests. These data were collected and tabulated. A hemoglobin cut off level of 12 g/dl was chosen to detect anemia, and albumin levels below 3.5 g/dl were considered as hypoalbuminemia. HbA1c levels of more than 7 g/dl indicated poor glycaemic control. The tabulated data was analysed by descriptive tests such as mean and standard deviation.**Results:** The patients ranged in age from 21-89 years, with a mean age of 57±16.72 years. 29 (16.57%) were less than 40 years of age while 146 were more than 40 years of age (83.42%) (Table1). 33 (37.7%) patients were female while 56 (62.28%) were males. 10 of the 90 patients (11.42%) had type 1 diabetes mellitus and 80 patients (88.57%) had type 2 diabetes mellitus. The duration of diabetes in these patients ranged from 1 year to 25 years, with a mean duration of 10.75±6.17 years. The values of glycosylated hemoglobin ranged from 5.6 g/dl to 14 g/dl. The mean value of glycosylated hemoglobin was 8.5±2.03 g/dl. Of the 90 patients, 65 (72.57%) had poor glycaemic control with HbA1c levels of more than 7 g/dl while 25 (27.42%) had good glycaemic control.**Conclusion:** We are concluded that anemia and hypoalbuminemia are common occurrences in patients with diabetic foot ulcers, with males being more commonly affected by both than the females and older age group being more commonly affected than the younger age group. However, further studies on a larger scale are needed for better validation. Also, interventional studies are needed to ascertain the effect of correction of these abnormalities on the prognosis of the ulcer.

Keywords: Diabetic foot ulceration, HbA1c, hypoalbuminemia, anemia.

Introduction

Diabetic foot ulceration (DFU) continues to be the commonest cause of severe limb ischemia in vascular surgery. Up to 25% of diabetic patients are at risk of developing DFU during their lifetime and poor wound healing is a principle reason for morbidity and mortality[1]. Diabetes carries an increased risk of a person undergoing lower extremity amputation over twenty times that of age-matched healthy individuals[2,3].The pathophysiology of DFU is complex and the reasons for slow and poor healing are incompletely understood. It is known that micro- and macrovascular disease, dysfunctional glycaemic control, polyneuropathy, foot deformity, altered biomechanics, active infection, inflammation and impaired immunity are of key importance and associated with poor outcome. Clinically, crucial aspects of therapy to promote wound healing include prompt revascularisation, offloading, and treatment of infection[4].

Healing in a patient with diabetic foot ulcer involves consumption of large quantities of energy by inflammatory cells and fibroblasts in the production of collagen and matrix. The protein status of the patient is indicated by albumin levels, and increased protein needs for malnourished persons have been correlated with depressed levels of albumin[5].Thus, early detection of nutritional deficiencies and their prompt treatment is imperative for the effective management of diabetic foot ulcers[6].The aim of the study was to investigate the prevalence of anemia and hypoalbuminemia in diabetic foot patients presenting at our institution.

Materials and Methods

Study design: The study design was prospective observational study.
Study period: The study period was 1 year.
Place of study: This study was carried out at Department of General surgery, Saveetha Medical College and hospital, Chennai, Saveetha Institute of Medical & Technical Sciences (SIMATS), Tamilanadu, India.
Sample size: The number of patients were 90.
Inclusion criteria: Patients above 18 years with diabetes mellitus with diabetic foot infections were included.

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Exclusion criteria: Patients below age 18 years and with non-diabetic ulcers were not included in the study.

90 patients presenting to with diabetic foot infections were included in the study after oral consent Patients fulfilling the criteria were chosen for the study by simple random sampling. The patient details such as age, sex, and duration of diabetes were collected. At admission, the patients underwent blood tests for hemoglobin, HbA1c and albumin among other tests. These data were collected and tabulated. A hemoglobin cut off level of 12 g/dl was chosen to detect anemia, and albumin levels below 3.5 g/dl were considered as hypoalbuminemia. HbA1c levels of more than 7 g/dl indicated poor glycaemic control. The tabulated data was analysed by descriptive tests such as mean and standard deviation.

Results

The patients ranged in age from 21-89 years, with a mean age of 57±16.72 years. 29 (16.57%) were less than 40 years of age while 146 were more than 40 years of age (83.42%) (Table 1). 33 (37.7%) patients were female while 56 (62.28%) were males. 10 of the 90 patients (11.42%) had type 1 diabetes mellitus and 80 patients (88.57%) had type 2 diabetes mellitus. The duration of diabetes in these patients ranged from 1 year to 25 years, with a mean duration of 10.75±6.17 years. The values of glycosylated hemoglobin ranged from 5.6 g/dl to 14 g/dl. The mean value of glycosylated hemoglobin was 8.5±2.03 g/dl. Of the 90 patients, 65 (72.57%) had poor glycaemic control with HbA1c levels of more than 7 g/dl while 25 (27.42%) had good glycaemic control.

Table 1: Age

S. No	Variables	Values
1	Range	21-89
2	Mean age	57±16.72
3	Less than 40	16.57%
4	More than 40	83.42%

Table 2: Hemoglobin

S. No	Parameters	Percentage patients with anemia (%)	Percentage patients with normal hemoglobin (%)
1	Total	66.24	33.50
2	Females	65.10	34.80
3	Males	66.90	33.15

The albumin levels ranged from 1.6 g/dl to 5.4 g/dl, with a mean of 3.3±1.06 g/dl. Of the 90 patients, 46 (53.14%) had hypoalbuminemia while 44 (46.85%) had normal levels of albumin. 9 of the 35 female patients (50%) had hypoalbuminemia while 17 (50%) had normal levels of albumin. 30 (55.04%) of the 56 male patients had hypoalbuminemia while 26 (44.95%) had normal levels of albumin (Table 3). 2 of the 14 (13.79%) patients below 40 years had hypoalbuminemia 45 of the 73 patients (60.9%) above 40 years had hypoalbuminemia.

Table 3: Albumin levels

S. No	Parameters	Percentage patients with albumin levels (%)	Percentage patients with low albumin levels (%)
1	Total	46.82	53.14
2	Females	50	50
3	Males	44.95	55.04

Discussion

The patients ranged in age from 21-89 years, with a mean age of 57±16.72 years. The duration of diabetes in these patients ranged from 1 year to 25 years, with a mean duration of 10.75±6.17 years. The values of glycosylated hemoglobin ranged from 5.6 g/dl to 14 g/dl. The mean value of glycosylated hemoglobin was 8.5±2.03 g/dl.

The hemoglobin values of the patients ranged from 6.5g/dl to 15 g/dl, with a mean of 10.5±2.3 g/dl. 60 (66.28%) of the 90 patients had anemia. Anemia was found to be more common among the male patients (66.97%) than the female patients (65.15%). Also, anemia was more common among patients above 40 years of age (71.91%) than patients below 40 years of age (37.93%). This is consistent with the findings of Imran Shaik et al who observed that Wagner grade 4 and 5 ulcers had significantly lower hemoglobin.7 Also, Ibrahim et al observed in their study that anemia was detected in 180 (53.6%) subjects with 88 (48.9%) of them requiring blood transfusion. Anemia was significantly associated with poor wound healing (p 61.5% of patients had hypoalbuminemia with a mean albumin level of 2.5 g/dl[8-10]

Conclusion

We are concluded that anemia and hypoalbuminemia are common occurrences in patients with diabetic foot ulcers, with males being more commonly affected by both than the females and older age group being more commonly affected than the younger age group. However, further studies on a larger scale are needed for better validation. Also, interventional studies are needed to ascertain the effect of correction of these abnormalities on the prognosis of the ulcer.

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