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Original Research Article

Prevalence of anaemia and its correlation with glycosylated haemoglobin among patients with type 2 diabetes mellitus: an observational study

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ABSTRACT

Background: Anaemia and type 2 diabetes mellitus are two sides of a coin affecting the quality of life of the patients. Anaemia associated with diabetic status of the patients disturbs the exercise capacity, increases fatigue, anorexia, depression, cognitive dysfunction and decreased libido. Hence, we conducted a study to find the prevalence of anaemia among patients with type 2 diabetic patients and its correlation with glycosylated haemoglobin.
Methods: An observational study was conducted in the department of medicine in a tertiary care hospital in Maharashtra. The data was collected from patients with type 2 diabetes attending the outpatient department during a span of 5 months (September 2020 to February 2021). The patients with pre-existing hypertension, chronic renal failure, congestive cardiac failure, stroke and other haematological disorders were excluded from the study. Patients on hormonal therapy, pregnant and lactating patients were also excluded from the study. Prior to the start of the study necessary permissions were taken from the institutional ethics committee. Relevant statistics were used to analyse the data.
Results: The prevalence of anaemia in the present study was 45 (56.25%). Among these 45 patients 37 patients had normocytic normochromic anaemia, 6 cases of microcytic hypochromic anaemia and 2 cases of macrocytic anaemia. The mean haemoglobin levels among patients with Hba1c more than 7% was 9.7±1.12 and among Hba1c less than 7% was 12. 23±1.08 and this difference was statistically significant.
Conclusions: About half of the patients were anaemic in the present study. Normochromic normocytic anaemia was the most common type of anaemia. There was significant association with levels of anaemia with Hb1ac in the present study.

Keywords: Hba1c, Anaemia, Type 2 diabetes

INTRODUCTION

Increasing prevalence of diabetes has become a public health concern across the world.[1] It is expected that by 2030 around 448 million people will be affected with this non communicable disease.[2] Developing countries like India are on high risk since they are tackling a double edged burden of non-communicable disease like diabetes and nutritional issues like anaemia.[3-5] Approximately 40% of the diabetic subjects are affected with kidney disease.[5,6] Undermining production of erythropoietin in cases with diabetes contribute to increased anaemic framework in such individuals.[5-7] Anaemia represents another global health problem which affects the quality of life and drainage of economic resources. Anaemia associated with diabetic status of the patients disturbs the exercise capacity, increases fatigue, anorexia, depression, cognitive dysfunction and decreased libido.[8-10] With this background, we conducted this study to find the prevalence of anaemia among patients with type 2 diabetic

patients and its correlation with glycosylated haemoglobin.

METHODS

An observational study was conducted in the department of medicine in a Dr Panjabrao Deshmukh Memorial Medical college, Amravati, Maharashtra. The data was collected from patients with type 2 diabetes attending the outpatient department during a span of 5 months (September 2020 to February 2021). Patients with type 2 diabetes were included in the study. The patients with pre existing hypertension, chronic renal failure, congestive cardiac failure, stroke and other haematological disorders were excluded from the study. Patients on hormonal therapy, pregnant and lactating patients were also excluded from the study. Prior to the start of the study necessary permissions were taken from the institutional ethics committee.

A study conducted by Al Dallal SM et al inferred that the prevalence of anaemia among type 2 diabetes patients in their study was 29.3%. Using this, with 95% confidence interval and 10% absolute error, we found the minimum sample size to be 80. This sample size was calculated using formula for sample for single proportion.[11] So we included 80 patients with type 2 diabetes in the present study. Sampling was done based on convenience sampling.

Data was collected using a case record form which had demographic particulars, clinical and physical examination of the patients. Physical examination included considering anthropometric parameters like height, weight and body mass index. Fasting blood sugars, post prandial blood sugars, glycosylated haemoglobin, complete blood count, serum creatinine were done in all the patients and noted. World health organisation guidelines for classification of anaemia were used to classify anaemia.[12]

Statistical analysis

The data was collected, compiled, and analyzed using EPI info (version 7.2). The qualitative variables were expressed in terms of percentages. The quantitative variables were expressed in terms of mean and standard deviations. The difference between the two proportions was analyzed using chi-square or Fisher exact test. Difference between the two means was tested using student t test. All analysis was 2 tailed and the significance level was set at 0.05.

RESULTS

We included 80 study subjects in the present study.

The mean age of the study subjects was 55.67±8.23 years with male preponderance.

In the present study, 45 (56.25%) had anaemia and rest had normal haemoglobin.

Table 1: Demographic particulars of the present study.

Demographic profile	Frequency	Percentage
Age group		
<40	4	5.00
41 to 50	23	28.75
51 to 60	37	46.25
>60	16	20.00
Gender		
Female	34	42.50
Male	46	57.50
Time since diabetes		
<5 years	61	76.25
>5 years	19	23.75

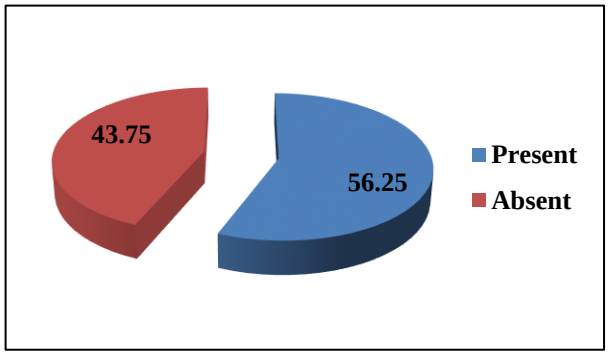

Figure 1: Distribution of subjects based on the prevalence of anaemia.

Table 3: Distribution of the anaemic patients based on the type (n=45).

Type of anaemia	Frequency	Percentage
Normocytic normochromic anaemia	37	82.23
Microcytic hypochromic anaemia	6	13.34
Macrocytic anaemia	2	4.44

Among these 45 patients 37 patients had normocytic normochromic anaemia, 6 cases of microcytic hypochromic anaemia and 2 cases of macrocytic anaemia.

Table 4: Correlation of glycosylated haemoglobin with haemoglobin levels.

Hb	Hba1c >7%		Hba1c <7%		P value
	Mean	SD	Mean	SD	
	9.70	1.12	12.23	1.08	<0.001

The mean haemoglobin levels among patients with Hba1c more than 7% was 9.7±1.12 and among Hba1c less than 7% was 12. 23±1.08 and this difference was statistically significant.

DISCUSSION

Presence of anaemia in patients with type 2 diabetes hampers the quality of life.13,14 Anaemia is a preventable disease if detected early and helps in the overall management of the patient. Anaemia in patients with type 2 diabetes has not only being attributed to nephropathy but other micro vascular complications also.[13-17] The present study highlights the prevalence of anaemia and its correlation with the glycosylated haemoglobin.

Of the 80 cases studied in the present study 56.25% cases had anaemia. In a study conducted by Al Salman, 55.55% of the type 2 diabetes mellitus patients had anaemia.[18] Further, they also concluded that the proportion of anaemia was higher in patients with renal complications and other micro vascular complications of diabetes. Another study conducted by Awofisoye et al reported that the mean haemoglobin levels among the diabetics were significantly lower when compared to control population.[19] In their study, 45.2% of diabetics were anaemic. Bekele and colleagues reported that 34.8% of their cases had anaemia.[20] Thambiah et al reported the prevalence of anaemia in their patients to be 39.4%.[21] Another study reported the prevalence in their cases was 35.2%.[22] Some more studies done by Kaushik et al, Sajid et al and Pathak et al, reported 63%, 35.2% and 45.2% as their prevalence respectively.[23-25] The prevalence of our study was in concordance with many other studies conducted across the world. Urgent attention to screening of anaemia is required in the patients with type 2 diabetes which will further assist in early diagnosis and management of the patients.

Among these 45 patients 37 patients had normocytic normochromic anaemia, 6 cases of microcytic hypochromic anaemia and 2 cases of macrocytic anaemia. Thambiah et al reported that among the 65 cases who had anaemia, 52 cases were normocytic normchromic, 11 cases were microcytic and two cases were macrocytic.[21] Among the 65 cases found anemic in a study by Rathore et al, 11 cases were normocytic, 22 cases were microcytic, 26 cases were macrocytic and 6 cases were dimorphic on peripheral smear.[22] The mean haemoglobin levels among patients with Hba1c more than 7% was 9.7±1.12 and among Hba1c less than 7% was 12. 23±1.08 and this difference was statistically significant. Glycemic control was one of the factors which affected the anaemic status in the patients with type 2 diabetes in a study conducted by Bekele et al.[20] Fasting blood sugars of the patients who were anaemic was significantly lower when compared to non anaemic patients in a study conducted by Thambiah et al.[21] In a meta-analysis conducted by Mokgalaboni et al the haematological parameters were significantly lower in the patients with uncontrolled diabetes when compared to controlled diabetes.[26] Uncontrolled sugars among the patients with type 2 diabetes are a concern and risk for anaemia which can be postulated by different studies conducted across the world.

The present study had some limitations. This was a cross sectional study; longitudinal studies would yield more precise results. Secondly, it was a single center study. Multi centeric studies would yield more generalizable results. Nonetheless, this study will add to the pool of research related to the present hypothesis.

CONCLUSION

More than half of the patients in the present study had anaemia and majority of them were normochromic and normocytic type on peripheral smear. There was a significant correlation between the haemoglobin and hba1c in the present study. This uncovers the relationship of uncontrolled blood sugars in increasing the risk of anaemic and need for screening for haematological parameters in the patients with type 2 diabetes. Further follow up studies are recommended in this regard to substantiate the effects of various stages of disease and its association with anaemia.

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