

Research Article

Association of anaemia in Type 2 DM in patients of Dhiraj General Hospital

Rinku Makadiya^{*1}, Vinayak Bhanvadia², Milav Bhavsar³, Rita M Shah⁴, Sarita Mangukiya⁵, Bhavita Patel⁶ and Jasmin H Jasani⁷

^{1,3}Resident, ²MD, Department of Cardiology, ⁴Prof & HOD, ⁵MD Biochemistry, ⁶PhD Student, Department of Biochemistry, SBKSMI & RC, Piparia,

⁷Associate Professor, Department of Pathology, SBKSMI & RC, Piparia

***Correspondence Info:**

Dr. Rinku Makadiya
Resident,
Department of Biochemistry,
SBKSMI&RC, Piparia, India.
E-mail: rvbhanvadia@yahoo.com

Abstract

Introduction: Diabetes is the leading cause of chronic kidney disease (CKD) and is associated with excessive cardiovascular morbidity and mortality. Anemia is common among those with diabetes and chronic kidney disease and greatly contributes to patient outcomes. Observational studies indicate that low hemoglobin levels in such patients may increase risk for progression of kidney disease and cardiovascular morbidity and mortality.

Objective: 1. Estimation of glycosylated hemoglobin (HbA1c) and hemoglobin level in patients with type II diabetes mellitus.

2. To determine the prevalence of anaemia in type 2 diabetes mellitus with or without chronic kidney disease.

Methodology: This is a descriptive analytical cross-sectional study carried out in Dhiraj Hospital, Piparia, Vadodara. A total no of 100 consecutive patients were enrolled; 25 patients having Diabetes, 25 patients having diabetes and chronic kidney disease, 25 patients having only chronic kidney disease but no diabetes and 25 patients neither having diabetes nor chronic kidney disease taken as a control group.

Results: Anemia was present in 37% diabetic patients, 17% in diabetic patients with chronic kidney disease, 3% in patients with only chronic kidney disease. Anaemia was significantly higher in patients with diabetes, chronic kidney disease and diabetes with chronic kidney disease.

Conclusion: Anemia was more prevalent in persons with diabetes and diabetes associated with chronic kidney disease compared to persons without diabetes. Therefore anemia may be particularly harmful in individuals with diabetes and chronic kidney disease. Correction of anemia may have a significant role in prevention of other diabetic complications.

Keywords: Glycosylated hemoglobin (HbA1c), Hemoglobin (Hb), type II diabetes mellitus (DM), chronic kidney disease (CKD).

1. Introduction

Anemia is relatively common in patients with diabetes mellitus, and low hemoglobin concentration contributes too many clinical aspects of diabetes mellitus or its progression. Low hemoglobin concentration in patients with diabetes mellitus is associated with a more rapid decline in glomerular filtration rate than that of other kidney diseases¹. The

pathogenesis of anemia in diabetes includes deficiency in erythropoietin synthesis and release, systemic inflammation, iron deficiency and probably iatrogenic factors, e.g., angiotensin converting enzyme (ACE) inhibitors².

Hemoglobin concentration is closely associated with diabetic profiles. Anemia in patients with diabetes increases susceptibility of the kidney to nephropathy. It is widely accepted that patients with diabetes are more vulnerable to the effects of anemia³. Al-Khoury *et al*⁴ demonstrated that for each CKD stage, hemoglobin is 1 g/dl lower in patients with diabetes than in the non-diabetic population.

Diabetes is the leading cause of chronic kidney disease (CKD) and is associated with excessive cardiovascular morbidity and mortality^{5,6}. The combination of anemia and CKD therefore may be particularly harmful in individuals with diabetes.

The aim of this study was to determine the prevalence of anemia in type 2 diabetics with or without CKD and to assess its association with other variables.

2. Material and Methods

The present study was conducted at the Dhiraj Hospital, Piparia, Vadodara after obtaining approval from the institutional ethical committee. The subjects for the study included 50 adult patients with age more than 30 years and having diabetes attending the OPD or admitted in ward (IPD) and 50 healthy subjects without diabetes for control group. Blood specimens were collected and processed for determination of blood glucose, serum creatinine, and hemoglobin, HbA1C. The patients with the following diagnosis were excluded from the study: Age <30 years, taking drugs like ACE inhibitors, Causes of CKD other than DM, Type 1 DM, Malignancy, alcoholic, Post surgery patient.

HbA1c was determined by FULLY-AUTOANALYSER (EM-200) through turbidometric method and serum creatinine was estimated by modified Jaffe's method. Hemoglobin was estimated by cell counter- SYSMEX through cyanmet hemoglobin method in central laboratory of Dhiraj Hospital. Diabetes was diagnosed by HbA1C >6.5%. Serum creatinine values were considered abnormal if values were >1.5 mg/dl for men and >1.3 mg/dl for women and considered as chronic kidney disease. Definition for anemia hemoglobin values <13.0 g/dl for men and <12.0 g/dl for women (7).

2.1 Statistical Methods

Statistical analyses were performed with the SPSS version 20. Descriptive analyses were used to characterize the study population by demographics, including sex, age, race/ethnicity, and by medical status, including mean hemoglobin, prevalence of anemia and of diabetes, and categories of kidney function. The associations of anemia prevalence or mean hemoglobin value with level of kidney function, stratified by diabetes status, were examined using chi-square statistics.

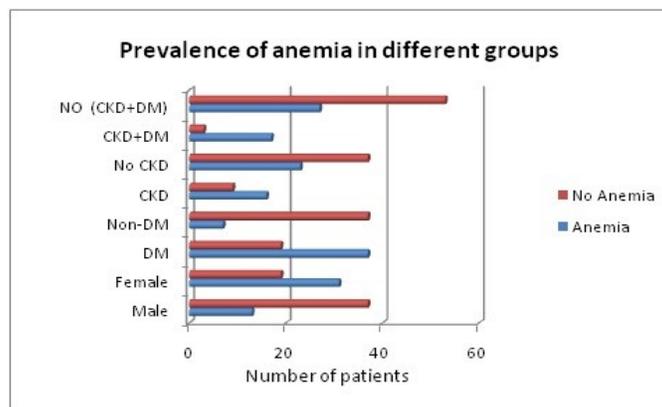
3. Result

A total of 100 patients were screened for anemia. Out of the total 100 patients, there were 50 men (50%) and 50 women (50%). Mean levels of Hemoglobin, HbA1c and age in 100 subjects were observed to be 10.15±1.7, 7.19±2.41 and 43.3±8.2 respectively. If <13mg/dl was taken as cut off for male and <11 mg/dl was taken as cut off for women, total 44 out of 100 subjects (44%) turned out to be anemic, which include 31 female and 13 male. According to our study female were more prone to anemia than male ($p < 0.05$).

Table 1 : Association of anemia with different variables.

Sr. No	Particular	Anaemia		Total No.	P Value
		Yes	No		
1	Male	13	37	50	<0.05
	Female	31	19	50	
2	DM	37	19	56	<0.05
	Non-DM	7	37	44	
3	CKD	16	9	25	<0.05
	No CKD	23	37	60	
4	CKD+ DM	17	3	20	<0.05
	Non(CKD+DM)	27	53	80	

According to our study, If HbA1c < 6.5% was taken as cut off for non-diabetic and > 6.5% was taken as cut off for diabetes, total 56 out of 100 subjects (56%) turned out to be diabetic. Among the diabetic 37 had anemia, and 7 non diabetic had anemia ($p < 0.05$). In our study 25 had chronic kidney disease and 60 had no chronic kidney disease. Among the chronic kidney disease group, 16 out of 25 had anemia whereas 23 out of 60 patients with no chronic kidney disease had anemia (table 1) ($p < 0.05$).



There were total of 100, out of which 20 had chronic kidney disease and diabetes and 80 had no chronic kidney disease with diabetes. Among the chronic kidney disease and diabetes group, 17 out of 20 had anemia whereas 27 out of 80 non chronic kidney diseases with diabetes had anemia ($p < 0.05$).

4. Discussion

We examined the prevalence of anemia across a broad range of kidney function according to diabetes status, among individuals at increased risk of kidney disease participating in a community-based screening program that targeted persons with risk factors for CKD. There were significant differences in the prevalence of anemia (and mean hemoglobin values) between persons with and without diabetes with impaired kidney function.

Present study of West Indian population ($n=100$) depicted that 37% of the total subjects (37 out of 100) had diabetes (HbA1c levels > 6.5%). It was observed that when cut off value was raised to 6.5%, 66% population was found to be anemic who were diabetic. S. Thomas *et al* found 83 of 204 patients (41%) with diabetes had anemia⁴. Tomas *et al*⁸ in another study on 722 diabetic patients reported that about 23.3% of all patients had anemia. Kazmi *et al*⁹ identified risk factors associated with severe anemia which includes age 65–74 years, hypertension, higher serum creatinine level and diabetes.

In present study anemia was observed in 13 men and 31 women suggesting that risk of anemia is affected by gender ($p < 0.05$). Shokoufeh Bonakdaran *et al*² also found that Females had more anemia than male patients but the difference was not significant ($P = 0.2$). Craig *et al*¹⁰ showed that 17.8% of male type 2 diabetic patients and 11.8% of females were classified as anemic. In the study by Cawood *et al*¹¹ it was reported that 11% of males and 16% of females from 270 type 2 diabetic patients were anemic.

Anemia in our diabetics also correlated significantly with renal insufficiency. In the present study, we showed an independent association between renal impairment and anemia, 16 out of 25 CKD patients had anemia. In the report by Li veachi *et al*¹² anemia was more prevalent in the diabetic patients with creatinine clearance < 60 ml/min. In most studies to date, impaired renal function and albuminuria are the predominant risk factors for anemia in diabetic patients¹³.

Our study also has several limitations. First, we defined CKD using serum creatinine from a single visit, whereas the National Kidney Foundation's Kidney Disease Outcomes and Quality Initiative guidelines require two estimates of glomerular filtration rate three or more months apart to classify a patient as having CKD¹⁴. Second, the number of patients with both anemia and diabetes were small.

5. Conclusion

The prevalence of anemia was increased in persons with diabetes and diabetes associated with chronic kidney

disease compared to persons without diabetes. Women with diabetes had increased prevalence of anemia than men. In patients with diabetes, anemia is primarily a risk factor for CKD. Correction of anemia may have a significant role in prevention of other diabetic complications. Nevertheless, these findings require confirmation in other cohorts that have more complete patient-level data, including information on medication exposures.

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