Original Research Article

# Study of Prevalence of Anaemia in Patients with Type 2 Diabetes Mellitus

**Dr Manoj Gulati[1], Dr Navneet Agrawal[2]**

[1]Consultant Physician, Deptt of Medicine, Parivaar Hospital, Gwalior

[2]Diabetologist, Diabetes, Obesity & Thyroid Centre, Gwalior, Parivaar Hospital, Hospital Road Gwalior

**\*Corresponding author**

Dr. Navneet Agrawal

Email: navneetdotc@gmail.com

**Abstract:** In type 2 diabetes mellitus, anemia is progressively more recognized entity and can lead to serious morbidity in patients with diabetes. The present study was done to find out the prevalence of anemia in patients with type 2 diabetes mellitus. Additionally, prevalence of anemia was also evaluated according to glycemic control status and gender. The present study included 105 patients of Type 2 Diabetes in 6 months period, visiting Deptt. Of Medicine OPD, Parivar Hospital, Gwalior. Blood was collected from each patient to estimate the hemoglobin level and other glycemic parameters. All the data were analyzed using IBM SPSS- ver.20 software. Analysis was performed using independent sample t test and one way ANOVA. P values <0.05 was considered to be significant. In present study mean age of study population was 50.26±11.47 years. There was a male predominance (63.80%). Mean duration of diabetes was 6.32±10.27 years. Mean hemoglobin level was significantly higher in male (14.56±1.53 g/dL) population compared to females (13±1.40 g/dL) (p<0.05). The prevalence of anemia among the diabetic population was 18.09%. Anemia was more common in female (31.57%) compared to male (10.44%) diabetic population whose HbA1c was not controlled. Anemia was a common finding in type 2 Diabetics. Gender difference and patient's poor glycaemic control were linked to the prevalence of anemia in patients with diabetes mellitus.

**Keywords:** anemia, gender, glycaemic control, type-2 diabetes mellitus

## INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a metabolic disorder and one of the major health related problem in present society due to speedy industrialization and urbanization. T2DM accounts for high morbidity and mortality due to various micro and macro vascular complications [1].

Anemia is frequently found in patients with T2DM [2]. Different cross-sectional studies have reported that prevalence of anemia in patients with diabetes mellitus range between 14-23% [3]. Anaemias if not corrected, can lead to serious morbidity like exertional breathlessness and fatigue. But in patients with diabetes, anemia is an independent risk factor for the development of diabetic retinopathy [3].

Hence, present study was done to find out the prevalence of anemia in patients of T2DM, and anemia risk was also evaluated according to glycaemic control status and gender.

## MATERIALS AND METHODS

The present study included 105 patients of T2DM who were attending the OPD of Parivar Hospital, a referral multispecialty hospital at Gwalior.

Patients, who were taking ACE inhibitors (inhibits erythropoiesis, may exacerbate anaemia), [4] were having type 1 diabetes mellitus, were having malignancy or were alcoholic and post surgery patients were excluded from the present study.

The investigations done were part of comprehensive health check up of diabetic patients. Blood was collected from each patients and send to Thyrocare Lab Mumbai for estimation of parameters such as hemoglobin (HB), HbA1c, hematocrit (PVC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red cell distribution width - SD (RDWSD), red cell distribution width (RDWCV), iron, total iron binding capacity (TIBC) and percent transferrin saturation (% TS), lipid profile and renal parameters.

In present study, anemia is defined as hemoglobin values <13.0 g/dl for men and <12.0 g/dl for women. (Rathod GB, 2016). All the data were analyzed using IBM SPSS- ver.20 software. Analysis was performed using independent sample t test and one way ANOVA. P values <0.05 was considered to be significant.

**RESULTS:**

In present study, out of 105 patients (HbA1c ≥6.5%), 67 (63.80%) were male and 38 (36.20%) were female. Mean age of study population was 50.26±11.47 years and mean age of male and female was 52.60±9.7 and 52.00±8.8 years respectively (p>0.05). Mean duration of diabetes was 6.32±10.27 years.

In present study, mean HB, PVC, MCV, MCH, MCHC, RDWSD, RDWCV, iron, TIBC and % TS was 14.56±1.53 g/dL and 13±1.40 g/dL (p<0.05), 43.91±3.17% and 40.85±4.89% (p>0.05), 85.89±8.87 fL and 85.22±8.32 fL (p>0.05), 28.42±3.66 pq and 27.15±3.13 pq (p>0.05), 33.01±1.46 g/dl and 31.83±1.65 g/dl (p>0.05), 43±4.49 fL and 45.32±3.31 fL (p>0.05), 13.94±1.43% and 14.66±1.31% (p>0.05), 95.41±35.48 μg/dl and 63.94±24.19 μg/dl (p>0.05), 391.93±57.43 μg/dl and 404.99±45.04 μg/dl (p>0.05), and 25.49±12.1% and 16.03±6.24% (p>0.05) in males and females respectively.

**Table 1: Distribution of different parameters among diabetic males and female**

| Parameters* | Male (n=29) | Female (n=19) |
|---|---|---|
| Age (years) | 52.60±9.7 | 52.00±8.8 |
| ABG (mg/dl) | 204.92±54.66 | 163.67±53.19 |
| HbA1c (%) | 8.21±1.87 | 7.35±1.93 |
| TC (mg/dl) | 186.24±35.53 | 182.08±39.76 |
| HDL (mg/dl) | 38.84±5.9 | 53.25±9.56 |
| TG (mg/dl) | 181.04±138.93 | 124.83±59.43 |
| LDL (mg/dl) | 137.48±63.32 | 114.67±37.74 |
| TC/HDL | 4.84±0.89 | 3.46±0.78 |
| LDL/HDL | 3.42±0.91 | 2.24±0.73 |
| VLDL (mg/dl) | 38.27±28.42 | 24.45±12.24 |
| Non HDL (mg/dl) | 147.30±33.56 | 128.89±37.83 |

Data is expressed as mean±SD,* for all the parameters P>0.05 between males and females, ABG; average blood glucose, HbA1c; glycated hemoglobin, TC; total cholesterol, HDL; high density lipoprotein, TG; triglyceride, LDL; low density lipoprotein, VLDL; very low density lipoprotein

In present study when blood parameters were compared with HbA1c within male group, hemoglobin [12.52±4.82 vs 14.56±1.53 (p=0.002)], PVC [39.25±13.98 vs 43.91±3.17 (p<0.001)], and TIBC [371.21±59.44 vs 391.93±57.43 (p=0.023)] were significantly high in diabetic patients whereas RDWSD [47.47±13.30 vs. 43±4.49 (p=0.006)] was significantly low in such patients. In female groups, all the blood parameters were similar in patients with HbA1c <7% and more than 7% (p>0.05).

Out of 67 males, 7 (10.44%) patients had hemoglobin level below 12 g/dl whereas, out of 38 female, 12 (31.57%) patients were having hemoglobin below 13 g/dl. The prevalence of anemia among the diabetic population was 18.09%.

**DISCUSSION**

Anemia in patients with type 2 diabetes is an increasingly acknowledged entity [5]. Association of both the risk factors is associated with enhanced risk of developing micro and macrovascular complications. It is also reported that life span of diabetic patients with anemia is less as compared to patients without anemia [6].

Different factors are responsible for the development of anemia in diabetes such as symptomatic autonomic neuropathy which can lead to efferent sympathetic denervation of patient's kidney, further leading to loss of required erythropoietin (Epo) production [7]. Diabetes patients taking metformin have high chances of B12 deficiency leading to clinical symptoms of anemia [8].

Rathod *et al.;* did a study on 200 patients and reported that prevalence of anemia in patients with diabetes was 18%, almost similar to the prevalence reported in present study (18.75%)[9].Prevalence of anemia among male and female was almost similar in the study done by Rathod *et al* but in present study, the prevalence of anemia was higher in female (31.57%) population as compared to males (10.44%) [9]. Griac *et al.;* performed a similar study and reported higher prevalence of anemia in male (17.8%) population as compared to females (11.8%), which was contrary to the findings of present study [10].

But study done by Sharif et al reported very high incidence of anaemia (63%) among diabetes patients compared to the incidence reported by present study, Adejumo *et al.;* (15.3%) and Bonakdaran *et al.;* (19.6%) [11, 12].

The possible reason for this high incidence given by author was that the included patients were from the Karachi, Pakistan and most of the patients were lacking proper nutrition, awareness and illiteracy and Karachi is a cosmopolitan place, where maximum population was migrants from rural areas [6]. Different factors like HbA1c levels, urinary albumin excretion rate and glomerular filtration rate are linked to the level of anemia in a patient with diabetes [13]. In present study when blood parameters were compared with HbA1c within male group, hemoglobin, PVC and TIBC were significantly high whereas RDWSD was significantly low in diabetic patients.

Also reports have shown that as compared to patients with similar renal impairment and iron stores among general population, the prevalence of anaemia is 2 to 3 times higher in diabetes patients [13, 14]. But in present study prevalence of anemia was higher in female compared to male diabetics which is contrary to reports by Thomas et al and Astor *et al.;* In present study mean iron level was higher in male (95.41±35.48 μg/dl) population as compared to females (63.94±24.19 μg/dl). In present study, further association was not found with other parameters; it may be due to small sample size of present study.

In present study, mean hemoglobin level was significantly higher in male (14.56±1.53 g/dL) population compared to female (13±1.40 g/dL) (p<0.05). Sharif et al did a study on 200 diabetic patients and reported that 71.5% of patients were having uncontrolled diabetes (HbA1c > 7.5%) whereas in present study 81.25% patients were having poorly controlled diabetes (HbA1c≥7%) [6].

Reports have shown a positive correlation between HbA1c and haemoglobin concentration in patients with iron deficiency anemia. Study done by Koga *et al.;* recommended taking caution while diagnosis in patients with low or high concentration of hemoglobin at HbA1c level close to 5.7% or 6.5% respectively [15].

The present study had few limitations like small sample size; a large randomized clinical trial is needed to confirm the present study findings.

## CONCLUSION

High prevalence of anaemia in patients with diabetes mellitus suggests that the patients of diabetes should also be screened for anaemia.

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