

Study of glycemic control and prevalence of anemia in type 2 diabetes mellitus patients

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Abstract

Background: The problem of Diabetes in India is so concerned that, India is known as the capital of it. This life style related disease has emerged as a result of industrialization and urbanization. **Aims and Objectives:** To Study Glycemic control and prevalence of Anemia in type 2 Diabetes Mellitus patients. **Methodology:** This cross-sectional study was carried out in the Department of General Medicine, of a tertiary care teaching hospital during the one year period i.e. July 2017 to June 2018. All the type 2 Diabetic patients who were either present at OPD or admitted in IPD were screened for Anemia. Before starting this study, the pilot study was carried out for one month. In this period the prevalence of Anemia was 18%, the sample size for the study was calculated by the formula $n = \frac{4pq}{l^2}$, the final Sample size was 456 and the 456 type 2 Diabetic patients with written explained consent were included into our study, randomly during the One yearperiod. Information of all the patients like age, sex etc. was noted, all patients undergone HbA1C and Hb%. The statistical analysis was done by Chi-square test calculated by SPSS 19 version software. **Results:** In our study we have seen that the majority of the patients in the age group of 40-50 were 43.42%, followed by 30-40 were 21.49%, 50-60 were 14.69 %, >60 were 12.72%, 20-30 were 7.68%. The majority of the patients were Male 55.70% and Female were 44.30%. 43.27 % patients with poor Glycemic control, 37.50% patients with Moderate control, 14.42% patients with Good control, and Only 4.81 % patients with Excellent glycemic control were Anemic in comparison to 56.53% patients who were having Excellent glycemic control, 27.84% with Good control, 9.09% with Moderate control and 6.53% patients were having Poor glycemic control. From this it is clear that as the Level of HbA1C increases with respect to poor glycemic control, the prevalence of Anemia also increases. This difference is statistically significant ($\chi^2 = 168.1$, $df=3$, $p < 0.0001$). **Conclusion:** It can be concluded from our study that the prevalence of Anemia was high in the patients with poor glycemic control.

Key Words: Glycemic control (HbA1C), type 2 Diabetes, Anemia(Hb).

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INTRODUCTION

The problem of diabetes in India is so concerned that, India is known as the capital of it. This life style related disease has emerged as a result of industrialization and

urbanization.¹ Diabetes mellitus (DM) is a common metabolic disease,² which accounts for a high incidence of morbidity and leads to various events including micro and macro vascular complications.³ Anemia is a frequent condition in patients with type 2 Diabetes.^{4,5} This reflects the pivotal role of the kidney in the control of hemopoiesis, in sensing changes in tissue oxygenation, and subsequently in stimulating hemopoietic precursors in the bone marrow through the production of erythropoietin by peritubular interstitial fibroblasts of the renal cortex and outer medulla. Uremia is associated with a range of hemopoietic stressors including reduced red cell survival, occult blood losses, malnutrition, and systemic inflammation. However, the failure of the kidney to increase erythropoietin release in response to a decreasing hemoglobin (Hb) level appears to be the key

contributor to the development of renal anemia.^{6,7} Several studies suggest that anemia is twice as common in diabetics compared with non-diabetics.⁸ Anemia is unrecognized in 25% of the diabetic patients⁹, Anemia also develops earlier and is more severe in patients with diabetes than in patients with renal impairment from other causes¹⁰. Recent studies have linked anemia with relatively low serum erythropoietin in persons with either type 1 or type 2 Diabetes, even without advanced kidney disease or overt uremia¹¹. The etiology of anemia in diabetes is multifactorial and includes inflammation, nutritional deficiencies, concomitant autoimmune diseases, drugs, and hormonal changes in addition to kidney disease⁹. Anemia is found to contribute to the development and progression of micro- and macro-vascular complications of Diabetes, which has a negative impact on the quality of life and an additional burden on the health of the patients^{10,12}. So, we have studied the prevalence of Anemia in type 2 Diabetic patients with respect to Glycemic control.

MATERIAL AND METHODS

This cross-sectional study was carried out in the Department of Medicine, Gandhi Medical College, Musheerabad, Secunderabad, Telangana state, during the one year period i.e. July 2017 to June 2018. All the type 2 Diabetic patients which were either present at OPD or admitted in IPD were screened for Anemia. Before starting this study, the pilot study was carried out for one month. In this period the prevalence of Anemia was 18%, the sample size for the study was calculated by the formula $n = \frac{4pq}{l^2}$, n= sample size, p= Prevalence of Anemia in type 2 Diabetes, q= 100-p, l= allowable error 20% of p, the final Sample size was 456 and the 456 type 2 Diabetic patients with written explained consent were included, randomly into our study during One year period. Information of all the patients like age, sex etc. was noted, all patients undergone HbA1C and Hb%. The statistical analysis was done by Chi-square test calculated by SPSS 19 version software.

RESULTS

Table 1: Distribution of the patients as per the Age

Age	No.	Percentage (%)
20-30	35	7.68
30-40	98	21.49
40-50	198	43.42
50-60	67	14.69
>60	58	12.72
Total	456	100.00

The majority of patients in the age group of 40-50 were 43.42%, followed by 30-40 were 21.49%, 50-60 were 14.69 %, >60 were 12.72%, 20-30-7.68%.

Table 2: Distribution of the patients as per the sex

Sex	No.	Percentage (%)
Male	254	55.70
Female	202	44.30
Total	456	100

The majority of patients were Male 55.70% and Female were 44.30%

Table 3: Distribution of the patients as per the Glycemic control and prevalence of Anemia

Glycemic control	Anemic	Normal	Total
Excellent control	5(4.81)	199(56.53)	204
Good control	15(14.42)	98(27.84)	113
Moderate control	39(37.50)	32(9.09)	71
Poor control	45(43.27)	23(6.53)	68
Total	104(100)	352(100)	456

$(\chi^2 = 168.1, df=3, p < 0.0001)$

43.27 % patients with poor Glycemic control, 37.50% patients with Moderate control, 14.42% patients with Good control, and only 4.81 % patients with Excellent glycemic control were Anemic in comparison to 56.53% patients who were having Excellent glycemic control, 27.84% with Good control, 9.09% with Moderate control and 6.53% patients were having Poor glycemic control. From this it is clear that as the Level of HbA1 C increases with respect to poor glycemic control, the prevalence of Anemia also increases. This difference is statistically significant ($\chi^2 = 168.1, df=3, p < 0.0001$).

DISCUSSION

Several trials conducted of treating anemia in Diabetics suggest that correction of anemia leads to improved quality of life in Diabetic patients¹³. Same scenario was seen in our Study. Anemia is frequently seen in Diabetes and very often remains undiagnosed, WHO reports global prevalence of anemia in general population to be 24.8% (12.7 in males and 30.2 in females)¹⁴. With respect to the global prevalence, the greatest absolute increase in the number of people with diabetes will be in India, with a projected estimate of 366 million in the year 2030 from 171 million in 2000¹⁵. Another chronic condition which affects the quality of life is anemia. The occurrence of anemia in diabetics was earlier attributed to renal pathology but studies have shown that anemia develops earlier in patients with Diabetes when compared to patients with renal involvement due to other causes¹⁶. Observational studies also indicate that low hemoglobin levels in diabetics may increase the risk for progression of kidney disease and cardiovascular morbidity and mortality^{17,18}. In our study we have seen that the majority of patients in the age group of 40-50 were 43.42%, followed by 30-40 were 21.49%, 50-60 were 14.69 %, >60 were 12.72% and 20-30 were 7.68%. The majority of patients were Male 55.70% and Female patients were

44.30%. 43.27 % patients with poor Glycemic control, 37.50% with Moderate control, 14.42% with Good control, and Only 4.81 % patients with Excellent control were Anemic in comparison to 56.53% patients who were having Excellent glycemic control, 27.84% Good control, 9.09% Moderate control and 6.53% patients were having Poor glycemic control. From this it is clear that as the Level of HbA1 C increases with respect to poor glycemic control, the prevalence of Anemia also increases and this difference is statistically significant ($\chi^2 = 168.1$, $df=3$, $p < 0.0001$). These findings are similar to Gunvanti B. Rathod¹⁹ *et al*, they found Anemia was present in 18% patients of diabetes. The prevalence of anemia was almost similar between women (18.60%) and men (17.54%). 74% of anemic patients had a serum creatinine $< 110 \mu\text{mol/l}$ and 72% of anemic patients had a calculated creatinine clearance of $> 60 \text{ ml/min}$. This supports the increased prevalence of Anemia in Type 2 Diabetes Patients, if glycemic control is poor, and this may be due to complications of diabetes affecting kidneys in the patients of CRF as there is deficiency of erythropoietin and it affects heme synthesis. Vitalis F. Fete²⁰ also found that a total of 636 patients who were examined, included 263 (prevalence rate 41.4 %) who had anemia. The prevalence of anemia increased significantly with deteriorating kidney function, although up to 31.9 % of patients with normal kidney function had anemia. Compared with their non-anemic counterparts, anemic Diabetic patients were older, had longer duration of Diabetes, lower eGFR, higher prevalence of proteinuria and diabetic retinopathy($p < 0.05$). In multivariable logistic regressions, eGFR ($p = 0.001$) and presence of retinopathy ($p = 0.023$) were the independent determinants of prevalent anemia.

CONCLUSION

It can be concluded from our study that the prevalence of Anemia was high in the patients with poor glycemic control.

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