CORRELATION OF GLYCATED HAEMOGLOBIN WITH SERUM IRON, FERRITIN AND TIBC IN IRON DEFICIENCY ANEMIA
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Abstract
Iron deficiency anemia is a common type of anemia — a condition in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to the body’s tissues. As the name implies, iron deficiency anemia is due to insufficient iron. HbA1c shows patient’s glycemic status of last 3 months. Some previous studies have been reported that iron deficiency anemia may increase the level of HbA1c.

AIM: To assess the status of HbA1c in patients of iron deficiency anemia & correlate HbA1c level with Serum Iron, Ferritin level.

MATERIALS AND METHODS: It is a cross sectional comparative study conducted in 1 yrs of duration. A total number of 60 subjects between the ages of 18 to 60 years were enrolled for the present study. Detailed medical history and relevant clinical examination data and written consent were obtained from all subjects by explaining the study procedure.

RESULTS: Haematological parameter like Hb, MCV, MCH, HCT and RDW were showed significantly difference in iron deficiency case and control groups. Total haemoglobin, MCV, MCH, HCT were significantly reduced in IDA case group whereas there is increase RDW level in case group as compare to control (p<0.001).

CONCLUSION: There is negative correlation of HbA1c with Haemoglobin, Serum Iron and ferritin level whereas positive correlation is detected with TIBC. The correlation of HbA1c is found to be significant with serum iron and MCH.

Keywords: Hb, MCV, MCH, HCT and RDW
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MATERIALS AND METHODS
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Considering the average of HbA1c value of 4.5 and allowable error of 1 at p<0.05 and power of the test 80%, estimated sample size is 60 which include 30 cases (clinically diagnosed patients of iron deficiency anemia) & 30 age and sex matched controls belonging to age group of 18 to 60 years were selected.

The cases included in present study were selected from patients attending outpatient department (OPD) and indoor patient department (IPD) of internal medicine. Samples were assessed at the Central Clinical Laboratory (CCL), Department of Biochemistry.

Inclusion criteria
Cases: Clinically diagnosed cases of IDA

Exclusion criteria
Patients having history of Impaired glucose tolerance, Diabetes Mellitus, Haemoglobinopathy, Hemolytic anemia, Chronic renal diseases, Chronic alcoholism, Pregnancy, Blood transfusion within a period of 6 months.

The following parameters were evaluated

i. Haematological parameters: HiCN and Electrical impedance method (10)
ii. Serum iron: Ferrozine method (11)
iii. TIBC: Ferrozine method (11,12)
iv. Serum ferritin: ELISA Method (13)

Above table No 2 showed the correlation of HbA1c level with total haemoglobin, serum iron, ferritin and TIBC were studied in present study. There is negative correlation of HbA1c with Haemoglobin, Serum Iron and ferritin level whereas positive correlation is detected with TIBC. The correlation of HbA1c is found to be significant with serum iron and MCH (p<0.05)

DISCUSSION
HbA1c is majorly affected by the blood glucose levels. However, certain studies showed that the HbA1c levels are altered by various other coexisting factors, along with diabetes, especially that of iron deficiency anemia, which is a major public health problem in world and developing countries like India too. Present study was
conducted to assess the status of HbA1c in iron deficiency anemia with euglycemic status and correlation of with serum iron, ferritin, TIBC and haemoglobin with HbA1c in IDA group.

Present study was conducted on 60 subjects with IDA (n=30) and age and sex matched healthy controls (n=30) groups. Diagnosis of iron deficiency anemia requires laboratory- confirmed evidence of anemia, as well as low iron stores (S. Iron, Ferritin).[16] Complete haematological study was assessed to recognize the indices of iron deficiency anemia (reduced Hb, Hct, MCV, MCH, MCHC and raised RDW) along with blood smear examination. Iron status was evaluated to confirm iron deficiency (reduced Serum iron, ferritin, and increase TIBC in IDA.).[17,18]

Ferritin is a storage form of iron, and it reflects the true status of iron [19]. Hence, in present study, its correlation with HbA1c was assessed, but there is no significant correlation was found. As explained previously, in iron deficiency anemia, ferritin is decreased with increase in the red cell life span, and increased red cell life span is associated with increased HbA1c. However, one of the studies did not show any significant correlation of serum ferritin levels and life span of red blood cell [20], indicating the lack of significant correlation between HbA1c and ferritin in our study. Various studies have shown elevated ferritin in diabetic population, though its mechanism is still not well cleared. In a study by Raj and Rajan[21], ferritin showed positive correlation with HbA1c in diabetic individuals. In addition, Canturk et al.[22] found that serum ferritin was elevated as long as glycemic status was not achieved, thus they found normal ferritin levels in diabetic individuals. Sharifi and Sazandeh[23] did not find any significant correlation between HbA1c and ferritin in diabetic population. We could not explain the lack of correlation of serum ferritin levels with HbA1c in present study. Our study did not show any significant correlation between hemoglobin and HbA1c (r = , P = ). When correlation for red cell indices and HbA1c in anemic subjects was studied, no significant correlation was found between HbA1c and MCV (r = , P = ), and borderline significant association was found between HbA1c and MCH (r = , P = ). Although association of elevated A1c with severity of iron deficiency anemia remains unexplained, its borderline association with red cell indices proves the role of erythrocyte morphology and lifespan in elevating A1C.

Though we tried to collect as much data as possible for inclusion and exclusion of subjects in our study, some data might have been missed. We could not conclude any effect of BMI on HbA1c levels due to the lack of sufficient data. We could not get the follow up data of patients after iron therapy, which might have given a new dimension to our study.

**CONCLUSION:**

This study found a positive correlation between iron deficiency anemia and increased HbA1c levels and we found that HbA1c is better glycemic marker for IDA. There is negative correlation of HbA1c with Haemoglobin, Serum Iron and ferritin level whereas positive correlation is detected with TIBC. The correlation of HbA1c is found to be significant with serum iron and MCH.

**REFERENCES**

9. Coban E, Ozdogan M, Timuragaoglu A. Effect of iron deficiency anemia on the levels of hemoglobin A1c