

Pathology & Cancer Epidemiology 2018- A study of the effect of iron deficiency anemia on HbA1c in Diabetes

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Diabetes mellitus is characterized by hyperglycemia resulting from defects of insulin and is associated with longterm damage of various organs. Glycated hemoglobin is widely used as a gold standard for monitoring glycemic control over the previous three months but it may be affected by genetic, physiological, hematological and illness-related factors. Two known factors which can modulate the glycation of proteins are the prevailing concentration of glucose and the half life of the proteins. Eventhough, HbA1c is a precise diagnostic tool for diabetic patients there are different factors like iron deficiency anemia (IDA) which can give false result of HbA1c. Aim: The aim is to study the effect of iron deficiency anemia on levels of HbA1c in diabetic patients. Methodology: Fifty diabetic, iron deficient anaemic patients (cases) and 50 age-matched diabetic patients (controls) were enrolled. The patients with haemoglobinopathies, haemolytic anaemia, chronic alcohol ingestion and chronic renal failure were excluded. Haemato-logic investigations, fasting glucose and HbA1c levels were measured. Results: The mean HbA1c in cases was 7.91 ± 1.20 and in controls was 7.11 ± 0.89 , which was significant statistically as the p value was 0.0003 (< 0.05). There was a significant difference between the values of hemoglobin between the cases and controls and no difference between the fasting glucose levels. Conclusion: Iron deficiency anemia is the most prevalent nutritional anemia in India. Our study showed that IDA spuriously elevates HbA1C levels in the diabetic patients independent of plasma glucose concentration. Hence, it is important to exclude iron deficiency anemia and correct it before making any diagnostic/ therapeutic decision in a patient of diabetes mellitus.

Keywords: HbA1c, Iron deficiency anemia, Diabetic mellitus

Back ground: Hemoglobin A1C (HbA1c) is the overwhelming hemoglobin found in HbA1 portions and it establishes 5% of the absolute hemoglobin in everyday grown-ups and up to 15% in patients with diabetes mellitus. Hgb A to HbA1c transformation happens during the whole life expectancy of the red platelet and the pace of this response is progressively speedy in diabetics in light of the higher winning glucose fixation, bringing about a higher grouping of HbA1c.

Red platelets (RBC) are liberatingly penetrable to the plasma glucose atoms, and hemoglobin is basically presented to indistinguishable glucose fixations from plasma. Thusly, HbA1c level is legitimately corresponding to average blood glucose fixation over the point of reference 4 weeks to 3 months or the normal life expectancy of the erythrocyte.

There are various strategies accessible to gauge glycated hemoglobin like immunoturbidimetry, particle trade elite fluid chromatography (HPLC), boronate liking, and enzymatic technique. HbA1c level of $\geq 6.5\%$ is plentifully delicate and unmitigated to distinguish people who are in danger for creating retinopathy and who ought to be analyzed as diabetic. HbA1c examine is as an exact and exact proportion of incessant glycemic levels as it relates well with the hazard of diabetes difficulties for a similar explanation it is prescribed to depend on HbA1c for diagnosing diabetes.

Regardless of its advantage, HbA1c is influenced by an assortment of hereditary, physiological, hematological and sickness related elements. Duplicitously climbed HbA1c focuses are experienced when there is augmented flowing erythrocyte life length (decremented red cell leeway) or weakened reticulocyte engenderment. Then again, deceptively decremented HbA1c level is optically observed in conditions

with a shortened erythrocyte life length (increased hemoglobin turnover) or where a sizably voluminous number of reticulocytes are caused.

Methods

Study area and study period

Tikur Anbessa Specialized Edifying Hospital is the most cosmically huge enlightening emergency clinic in Ethiopia. It offers determination and treatment for roughly 370,000–400,000 patients per year. The emergency clinic has various units and centers that give specific settlement to patients. The diabetes facility is among the particular units in the emergency clinic which offers housing for around 70–90 diabetic patients for every day. Study structure Facility based Comparative cross-sectional study design was implemented.

Source population: All diabetic patients who visited Tikur Anbessa Specialized Teaching Hospital.

Questionnaire and clinical examination

Socio-segment attributes were gathered utilizing organized polls. An Enrollment structure containing past clinical history relating to incessant illnesses, for example, kidney sickness, heart related issue, skin infections, blood coagulation issue and other clinical grievances were finished for each person. All patients were approached to give a nitty gritty history and were exposed to a physical assessment. The degrees of hemoglobin, MCH, hematocrit, MCV, MCHC, platelet check, all out leucocyte tally (TLC), and differential leucocyte tally (DLC) were estimated.

Data analysis: Data was entered into Microsoft Excel, exported to SPSS version 21 and analyzed by the

same. Frequency and summary statistics were used to describe the distribution of age, sex among the IDA and the control group. Pearson's Chi-square test was used to determine the association between hematological parameters and HbA1c. Independent t-test was calculated for comparison of the hematological parameters and HbA1c mean between the IDA and non-IDA Diabetic patients. A P-value of < 0.05 was taken as statistical significant.

Comparison of HbA1c and hematological parameters among IDA and non-IDA group

All hematological parameters, serum ferritin and HbA1c were examined for both groups. Mean \pm SD was calculated and Independent t-test was used to compare the mean of RBC, Hgb, HCT, MCV, MCH, MCHC, HbA1c among IDA and non-IDA groups.

Association between RBC, red cell indices and HbA1C

The mean RBC, MCV, MCH, MCHC, RDW were 3.45 ± 0.8 , 88.57 ± 8.56 , 29.89 ± 4.04 , 32.97 ± 2.19 , 3.45 ± 0.80 respectively. Pearson correlation test was used to determine the association between HbA1C and hematological parameters of the IDA patients.

Discussion: HbA1c has risen as a marker of glycemic control, glycemic hazard and indicator of diabetic complexity and as screening apparatus for determination of DM. Weakness may either increment or lessen the HbA1c esteems because of changes in the half-existence of RBC. Various investigations have been directed on the impact of iron lack paleness on HbA1c in diabetic patient or non-diabetic patients and various outcomes have been gotten yet there is no reasonable clarification on component how iron-inadequacy influences HbA1c.