

# The prevalence and pattern of anaemia in diabetes and correlation of Haemoglobin with Glycated Haemoglobin

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**ABSTRACT**--HbA1c (glycated haemoglobin). It constitutes the HbA1 fraction of adult haemoglobin (HbA). It's concentration depends on the life span of RBC and blood glucose levels. HbA1c is first identified as an 'unusual hemoglobin among the patients with DM(diabetes) by Rahbar et al in the 1960s (1). Diabetic control was difficult before the discovery of HbA1c. After it's discovery small studies were done comparing HbA1c to blood glucose levels, with the thought that it could be used as a measure of diabetic control. In the 1980s it came to clinical use and became a base of clinical practice (2,3). The correlation between anemia and HbA1c received limited attention. Some of the studies suggest that iron-deficiency anemia may increase concentrations of HbA1c but these studies have very limited sample size. Aged erythrocytes tend to have higher exposure to hyperglycemia, younger erythrocytes are more numerous. HbA1c level is significantly higher in iron deficiency anaemia (IDA) patients and decreased after treatment.

**Keywords**--Anaemia, Diabetes, Glycated Haemoglobin

## I. INTRODUCTION

Reduced Hb concentration might lead to an increase in the HbA1c at a constant glucose level, because HbA1c is measured as a percentage of total Hb(Haemoglobin). In Iron deficiency anaemia, decreased RBC production leads to increased average age of erythrocytes and thus, increased HbA1c levels.

Rationale: we should be cautious when diagnosing and control of diabetes in people with increased or decreased Hb when the HbA1c level is near 6.5% or 5.7%, respectively, as changes in RBC turnover might alter the result.

There are very few studies that have researched the prevalence and pattern of anaemia and its correlation with HbA1c levels in diabetes in India (4).

## II. OBJECTIVES

To study the Prevalence of anaemia in diabetes mellitus.

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To study the Pattern of anaemia (iron deficiency/ haemolytic/ megaloblastic)

To correlate haemoglobin level on glycated haemoglobin in diabetic patients with and without anaemia

### III. METHODOLOGY

Study setting : The study will be conducted on Medicine department of Acharya Vinoba Bhave Rural hospital (AVBRH), a tertiary care teaching hospital situated in rural area of Wardha district.

Study design: This will be a cross-sectional study

Sample size: Patients from OPD and IPD previously diagnosed as DM type II or recently diagnosed as DM

#### ***TYPE II***

Inclusion criteria:

Cases: Persons who have been diagnosed with Diabetes mellitus.

Age: more than 18 years.

Gender: both male and females.

Consent: Relatives capable of giving consent and voluntarily allowing to investigate their patient for study.

Exclusion criteria: 1) Serum creatinine >1.5 mg/dl or eGFR <60ml/min

2) Undergone major Surgery in last 3 months

3) Acute blood loss in last 3 months

4) Pregnancy

5) Recent history of malaria

### IV. DATA COLLECTION

1) Informed consent and approval from ethics committee.

2) All the population will be interviewed as per proforma and then examined.

SAMPLE SIZE: Margin Error 5% Confidence Level 95% Prevalence of Anaemia in Diabetes 50% (As It Gives Maximum Sample Size) Sample Size 378 (Diabetic Patients Are To Be Studied):

#### ***Variables:-***

chi-square, t-tests were calculated.

#### ***Quantitative variables:-***

HbA1c: High performance liquid chromatography method approved by NGSP (5).

#### ***Haemoglobin :***

Automated cell counter (Sysmex – automated haematology analyser KX-21N will be used which will provide with the haemoglobin (Hb) values.

#### ***Blood Cell Count: -***

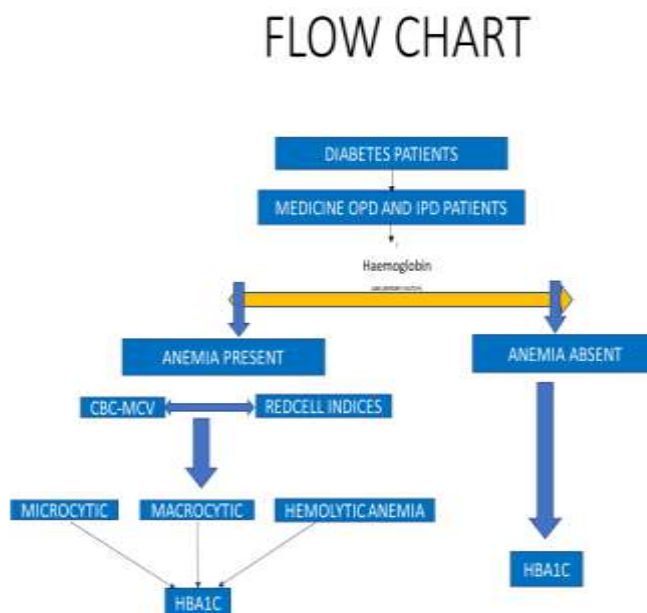
A blood cell count of all the patient will be achieved by drawing samples aseptically in bulbs and tested within 1 hour (6) .

**Statistical methods:-**

Chi-square test is used to obtain the correlation between haematological parameters and HbA1c.  
T-test is used for comparison of HbA1c mean in Diabetic patients with and wit out anaemia.

**V. EXPECTED OUTCOMES/RESULTS**

Participants:- A total of 376 diabetic patients participated in the study. The mean age was  $47.5 \pm 15.83$  The prevalence and type of anaemia is observed in each groups by WHO Indian definition of anaemia.HbA1c were examined for both groups with and without anaemia. Mean and SD is calculated and t-test is used to compare the mean of HbA1c, Hb , MCV among Anemia and non anaemic groups. Correlation test will be used to determine the correlation between HbA1C and Hb of the diabetics.



**VI. DISCUSSION**

Mean Hb,Mean cell volume,mean cell hemoglobin concentration were lower side in anaemic group compared to non-anaemic diabetic patients. HbA1c was on lower side in anaemic group compared with the non-anaemic diabetic patients. Relevant related studies in this region were explored for additional information related to geographic context (7-28). Few studies related to other related non-communicable entities(29-56) and sociocultural aspects (57-75) were reviewed. The results of this study will be compared with relevant.

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