Prevalence of anemia in diabetes mellitus and chronic renal disease (Study of 100 patients)

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ABSTRACT

Background: prior to a substantial decrease in glomerular filtration rate (GFR), anemia is already a typical consequence of diabetic renal disease. **Setting**: Medical ward and outpatient clinic Hospital Subjects and Procedures: Hospital functioned as the study's outpatient clinic. From June 2017 to January 2019, the research team gathered data using a case series study approach. There were one hundred people who were patients. Seventy women (or 70%) and Thirty men (or 30%) participated in this study. Males make for 10% of the anemic population while females account for 20%. Diabetic individuals typically weighed in at a mean of 73.54 pounds (11.12 kg). **Conclusion** around 30% of patients suffered from anemia. Higher than 70% of patients with moderate to severe renal impairment also had anemia. **Aims of study:** is to calculate the prevalence of anemia in people with diabetes and chronic kidney disease

Keywords: Diabetic, Anemia, Renal Impairment, Prevalence, albuminuria

Introduction

Diabetes Mellitus (DM) is considered a major public health problem. Its frequency is increasing worldwide, particularly in the Western world and estimations suggest that 1 in 3 adults in the US is likely to suffer from diabetes in 2050. About 25% of diabetic patients is assumed to have anemia. The risk in diabetics to develop anemia is estimated to be 2-3 times higher then the general population, when comparing patients with similar glomerular filtration rate
(eGFR) and iron levels. It has been observed that prolonged duration of DM may increase the incidence of anemia in diabetics1,2. The etiology of anemia in diabetics is a complex, multi-factorial and often unrecognized issue (table)3,4.

Table. Possible causes of anemia in diabetics.

- 1. Chronic blood loss
- 2. Iron deficiency
- 3. B12 or follate deficiency
- 4 .Relative erythropoietin deficiency (EPO)
- 5. EPO resistance associated with chronic infection or inflammation
- 6 .Autonomic neuropathy

- 7. Converting enzyme inhibitors (ACEis) or angiotensin II receptor inhibitors (ARBs)
- 8. Nephrotic syndrome
- 9 Increased catabolism of HIF complex, associated with hyperglycemia
- 10. Decreased red blood cell survival time
- 11 .Hypothyroidism.

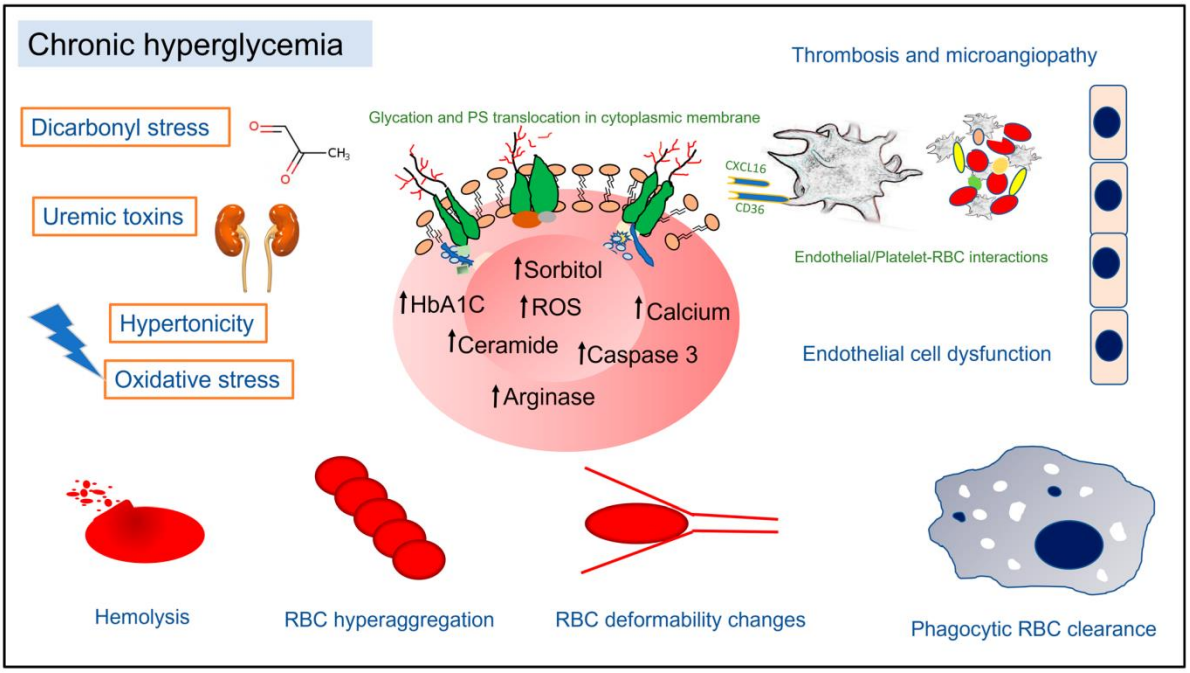
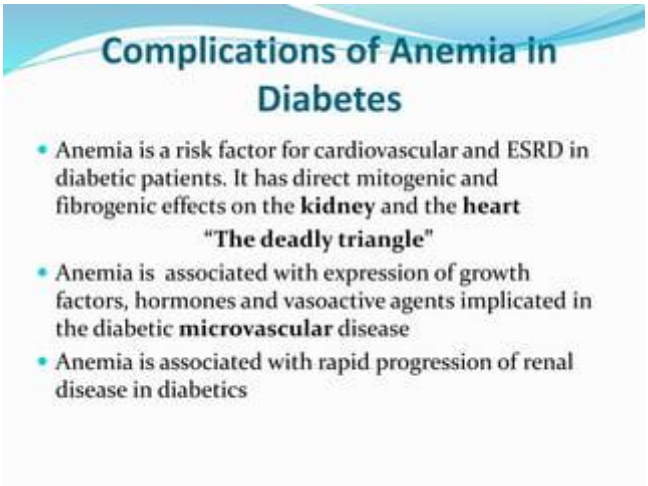


Fig.1.show effects of chronic hyperglycemia

In diabetics with an eGFR less than 60 ml/min, anemia is observed in 29%, while in diabetics with an eGFR higher than 60 ml/min only in 9%5. Hepcidin, a peptide hormone released by the
liver, seems to be the key regulator of iron homeostasis and could be possibly used as an index of anemia, iron status and inflammation, as well as a therapeutic target. It inhibits ferroportin, a protein responsible for the intestinal absorption of iron, leading to a consequent
reduction of iron's absorption. Additionally, hepcidin increases
the difficulty for iron to be released from its storages in macrophages and hepatocytes (leading to functional iron deficiency). In CKD —due to decreased clearance of hepcidin through kidneys— its levels are increased and this partly explains the iron deficiency in diabetic patients with CKD6. In addition the effect of antidiabetic drugs on circulating hepcidin has not been explored so far; it is only established that metformin treatment is not associated with reductions in hepcidin, but hypocaloric diet could be involved in it7. Glycosylated hemoglobin (HbA1C), which is an irreversible nonenzymatic process that depends on the glucose concentration in red blood cells, is used as an important diagnostic index to assess glycemia and has low intraindividual variability. The association between anemia and concentrations of HbA1C has received limited attention. HbA1C constitutes the measurement of the non-enzymatic glycosylation of the beta-chain of the Hb molecule, whose levels are affected by a variety of genetic, hematologic
and disease-related factors. The most important factors are coexistence of hemoglobinopathies, coexistence of various anemias and disorders related to acceleration of the regeneration rate of the red blood cells. Every situation that contributes to increased erythrocyte turnover (anemia of chronic disease, hemolytic anemias, anemia after acute blood loss), results in falsely low HbA1C8. In contrast, iron deficiency anemia may lead to a false increase in HbA1C, causing

changes to the shape of Hb molecule promoting glycation of the terminal valine or by lowering the erythrocyte turn over, thus allowing more time for glycation of Hb9,10. The haematologic status should therefore always be taken into account for a correct interpretation of the HbA1C result. According to the guidelines of the National Academy of Clinical Biochemistry, it is recommended for all samples of HbA1C to be remeasured by the laboratory, when values lower than the reference interval (<4%) are detected. Should they be confirmed, the clinician is adviced to check for a variation of the patients Hb (hemoglobinopathy)



or an indication of increased red cell destruction11,12. It should be strongly noted that HbA1C should only be used for glycemia assessment in the absence of anemia. The recurrent measurement of Hb, iron, and HbA1C is vital to correctly assess the glycemia status in order to avoid misclassification between diabetes and prediabetes. People with anemia who appear on the border of the diagnostic threshold of diabetes may require the use of another diagnostic method, such as fructosamine or glycated albumin (excluding situations where protein metabolism is amended)12. Furthermore, red blood cell transfusion can complicate the interpretation of HbA1c values in diabetic patients, because it introduces haemoglobin molecules exposed to glucose concentrations that may have been different from the glucose concentrations in the diabetic transfusion recipient13. The ADA recommendation is to measure HbA1c in all hospitalized diabetic patients who have not had an HbA1c measurement taken within the previous 60 days, and the American Joint Commission has adopted this recommendation as a standard for inpatient diabetes care14. Treatment of anemia in DM lacks clear targets and specific therapy is not well defined. Recent studies on the correction of anemia in diabetic patients (ACORD, CREATE, CHOIR, TREAT), in contrast to the clinical practice so far, showed that therapeutic interventions concerning anemia with EPO administration or intravenous iron, should be attempted at an early stage of DM and not only at the CKD phase15-18. However, both erythropoietin analogs (epoetin-A and darbepoetin) and iron are not without side effects. At high doses, EPO is implicated in hypertension, thrombotic and cardiovascular events and in inducing the growth of various neoplasms. Hypertension occurs 2-16 weeks after starting treatment and does not depend on the Ht increase, but on the increase of intracellular calcium, which both inhibit the

vasodilating action of nitric oxide (NO) and cause direct vasoconstriction in arterioles. EPO effect on hemostasis is mediated by a quantitative increase and consequent improvement of platelet function, in addition to a reduction in proteins C and S19. Moreover, iron administered in a high dosage may cause hemosiderosis and increase the sensitivity of the body to infections20. Target hemoglobin concentration is now lower and a trial of iron therapy alone is advised before decision for EPO administration, which is recommended in diabetic anemic patients, only when CKD coexists, in order to achieve Hb levels between 10,0- 12,0 g/dl, but not higher. Of course, the benefit from the early treatment of anemia in diabetics should be considered versus the cost of the treatment for the patient and the health system21 Up until now it is well established that HbA1c levels can be affected by conditions such as anemia. There are very few population-based studies, with

small sample size examining the differences in the prevalence of diabetes and prediabetes according to categories of anemia versus normal Hb. Additional studies with larger numbers of participants with anemia would be helpful in examining the impact of anemia and its correction on measurements of HbA1C.

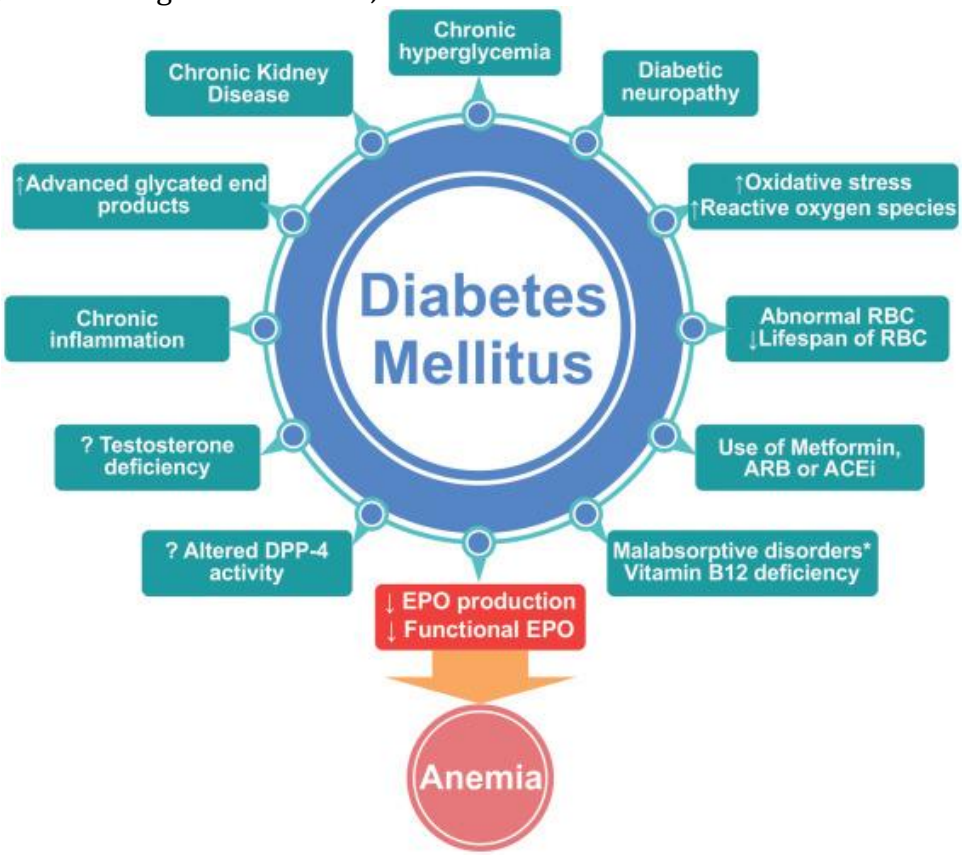


Fig.2. .D.M AND ANEMIA

Patients And Methods

Hospital was the study's Medical Ward and Outpatient clinic.From June 2017 to January 2019, the research team employed a case series study technique to collect data.

Study Subject Selection one hundred patients with diabetes who match the World Health Organization's criteria for the condition (fasting blood sugar >126, random blood sugar >200). Anemia WHO's definition applies to this case.in which the hemoglobin level is below 13 g/dl. With a particular emphasis on men with hemoglobin levels < 12 g/dl.Data collection A questionnaire was given to the sample population (n = 100) to collect demographic information (name, age, sex, weight, presence of symptoms, duration of DM, other disease as IHD).Patients often inquire about HTN, CBP, and RBC morphology.GUE albumin RFT. Creatinine clearance (CCr) was determined using the Cockroft-Gault formula and expressed as a per square meter of exposed skin. A creatinine clearance rate (CCr) of less than 90 ml/min/1.73m is considered mild renal

impairment. Moderate renal impairment is defined as a CCr of 30 ml/min 1.73 m or less; severe renal impairment is defined as a CCr of less than 30 ml/min 1.73 m or more.

Reasons not to qualify.Smokers, people with acute renal failure, people with a history of malignancy, including hematological malignancies, and people with recent histories of blood loss, cytotoxic therapy, erythropoietin therapy, intravenous iron therapy, blood transfusion, or other forms of renal replacement therapy were all included.

Statistical analysis

The demographics of the study population were described using descriptive analysis; this included sex, age, the incidence of hypertension, stroke, and cardiovascular disease in connection to anemia and renal function. Data was tabulated according to variables of interest and provided as frequencies, percentages, means, and standard deviations. We considered statistically significant a p-value less than 0.05. The correlation between the categorical variables was analyzed using chi-square statistics. After being double-checked by hand, the data were coded, entered, and sent to IBM SPSS version 22.0 for analysis.

Results

100 Diabetic patients 70 women (70%), 30 men (30%), mean age 55.062, mean weight 76.43%, mean creatnine clearance In DM terms, the average lifespan is 69.62 years. Albuminuria prevalence by chronic renal disease stage and patient count (32%). how often renal impairment is mild or severe which 47% of people with a creatinine clearance of less than 60 ml/min/1.73 m2) fall under. thirty percent of patients have anen.common cases of anemia Albuminuria occurs in over 58% of individuals with moderate to severe renal impairment and in over 30% of patients with albuminuria.

Table.1.Show characteristic of patients in this study.

numbers of patients	**100**
age means (years)	55.4
male	30 (30%)
female	70 (70%)
mean duratian of DM (years)	11.12 years
Wt. mean t.(kg)	73.54
cr.cl mean (ml min)	101.6

Table.2.Numbers of patients classified according kidney function.

Stage	**CKDS1**	**CKDS2**	**CKDS3**	**CKDS4**	**CKDS5**
numbers of patients	28	24	34	14	0

Table.3.prevalence and distribution of anemia

numbers of patients	**30(3%)**
MALE ANEMIC	10(10%)
FEMALE ANEMIC	20(20%)

Table.4.Relation between renal impairment , albuminuria with anemic.

	Number	Anemic	SD	P.value
Moderate and sever renal impairment	48	28	0.50361	0.0000
Albuminuria	36	12	0.48507	0.01

Discussion:

Although anemia is a common complication of diabetes, its true incidence depends on the criteria employed to detect it and the precise demographic for whom it is used. If your hemoglobin (Hb) level is less than 120 g/l (for women) or 130 g/l (for men), the World Health Organization recommends you get checked for anemia [12]. Using this criterion, almost one-quarter (23%) of those with type 1 or type 2 diabetes should be evaluated for anemia[9-11]. When the hemoglobin level is less than two standard deviations below the mean for the general population, adjusted for age and sex (i.e. 115 g/l in adult female patients, 135 g/l in adult male patients younger than 70, and 120 g/l in adult male patients older than 70), anemia is present, according to the European Best Practice Guidelines for the Management of Anemia in Patients with Chronic Renal Failure [13]. Furthermore, it has been shown that the risk associated with dropping Hb levels is continuous, even across the normal Hb range [7], rendering any definition of anemia arbitrary. Anemia acts similarly to albuminuria in this sense, with random stages working to stratify the linked risk. The anemia problem was the driving force for this study. Our findings show that anemia is a significant problem for patients with diabetes, the great majority of whom have type 2 diabetes mellitus, at the time of referral to a nephrology or diabetes mellitus clinic. Anemia affected 30% of the population. At a given Cr.Cl, diabetics are more likely to be anemic than other patients with chronic renal failure, as shown in studies by Bosman (3), Ishimura (4), and Osama El Minshawy et al. (5). Anemia was reported in 39% of Egyptians with diabetes. The anemia rate in Iran was determined to be 20% in a different study.Thomas et al. (9) observed that 20% of 2,125 patients with anemia. 17% of males with type 2 DM were anemic, according to a study by Crige et al. One in eighteen females (15) have anemia. Tomas et al. (11), the authors, Anemia affected 23% of 722 patients with type 2 diabetes.While 16.1% of women were anemic, just 11.7% of males were, according to research by Cawed et al.Patients with diabetes and anemia exhibited lower GFR (67.1+3.0 vs. 87+5.4 ml/min) and higher serum creatinine levels (1.4+0.1 vs. 1.0+0.03 mg/dl, p 0.001), as reported by Ezenwaka et al. (22). It was 1.73 ml/min/1.73 m2 (p 0.001). compared to others who don't have diabetes.

Conclusion

Thirty percent of diabetics also had anemia, which is more common in those with moderate renal impairment and albuminuria. As a side effect of diabetes mellitus or as a risk factor for the development of diabetic complications, anemia is still not given the attention it deserves.

Recommendation.

Improve the quality of life and final prognosis for patients with diabetic anemia by screening them earlier, even with normal eGFR, and treating the condition more aggressively.

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