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STUDY OF ANAEMIA IN PATIENTS OF TYPE II DIABETES MELLITUS AND TO CORRELATE IT'S ASSOCIATION WITH VARIOUS COMPLICATIONS

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ABSTRACT

The objective of this study was to evaluate the prevalence of anaemia in patients of type II diabetes mellitus and to correlate it with various complications. This is a hospital based prospective study spanning over a period of 2 months. 30 out of 50 patients with DM II were found to be anaemic. 23 of these patients were diagnosed with complications of diabetes. So, prevalence of anaemia is high in patients of DM II. Anaemia affects quality of life of diabetic patients and is associated with disease progression, development and comorbidities that contribute significantly to increase the risk of other diseases.

KEYWORDS: Diabetes mellitus type II, complications, Awareness, Anaemia.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder of great impact worldwide and it's increasing prevalence has become a major public health concern. Studies show that in 2015 there were 415 million people suffered from diabetes worldwide which is about 8.3% of the adult population. From 2012 to 2015 approximately 1.5 -5 million deaths occurred each year due to diabetes. The disease is characterised by hyperglycemia. Hyperglycemia causes increased expression of proinflammatory cytokines such as IL-6 and TNF-α.[1] The elevation of proinflammatory cytokines plays an essential role in insulin resistance and cause cardiovascular complications, kidney disease and anemia. By increasing especially IL-6, antierythropoietic effect is seen.[1,2] This cytokine causes anaemia by changing the sensitivity of erythropoietin and also promoting apoptosis of immature erythrocytes. Nephropathy is another complication of DM which reduces the renal production of erythropoietin, also contributing to anemia. According to Escorcio et al.[3] approximately 40% of diabetic patients are affected by kidney disease. The decreased renal function and proinflammatory cytokines are the most important factors in determining reduction of haemoglobin levels in patients. The inflammatory situation created by kidney disease also interferes with intestinal iron absorption and immobilization.[4] Diabetes is a highly disabling disease, which can cause blindness, amputations, kidney disease, anemia, and cardiovascular and brain complications, among others, impairing the functional capacity and autonomy and individual quality of life.[5]

The objective of the study is to postulate the need for screening of anemia in patients of type 2 diabetes mellitus, to assess these complications and correlate anemia with diabetes mellitus type 2 and to determine the need for evaluating this population for anemia related complications.

Therefore, diabetic patients with kidney disease have the highest risk for developing anaemia. Anaemia is an emerging global health problem that negatively impacts quality of life and requires an ever-greater allocation of healthcare resources.[6] Anaemia causes reduced exercise capacity, fatigue, anorexia, depression, cognitive dysfunction, decreased libido and may contribute to the pathogenesis and progression of cardiovascular disease, chronic kidney disease, retinopathy among others.[7] It therefore depreciates the quality of life. Thus, anaemia is an important predictor of progression of complications in patients of type 2 diabetes mellitus.

This study focuses on the need to postulate for screening of anemia in patients of type 2 diabetes mellitus, to assess these complications and correlate anemia with diabetes mellitus type 2 and to determine the need for evaluating this population for anemia related complications.

MATERIAL AND METHODS

This hospital based study was carried out at a tertiary care hospital on patients of type 2 diabetes mellitus admitted for various complaints spanning over a period of 2 months.

The study is was carried out with due approval from the institutional ethics committee. [IEC]

A total of 50 subjects were selected randomly for the study after taking written informed consent from each of them.

The following criteria for selection of the subjects were used-

Inclusion criteria

- Subjects suffering from type 2 diabetes belonging to age group 20-50 years
- Subjects admitted for various complaints associated with complications of diabetes

Exclusion criteria

- Subjects suffering from type 1 diabetes mellitus
- Pregnant women suffering from diabetes

Complete history was taken. Physical and general examination was done which includes a record of vital parameters- Pulse rate, blood pressure, respiratory rate, pallor, icterus, nail deformities, condition of Tongue, lymphadenopathy, signs of insulin resistance in the form of acanthosis, nigricans & skin tags, petechial spots, spider naevi, skin ulcerations, greying of hair, RS, CVS, P/A, CNS exam.

Laboratory investigations

1. Hb count
2. Haematocrit value
3. RBC count
4. Random blood sugar
5. Glycosylated haemoglobin(HbA1C)
6. Serum creatinine (Cr)

Presenting complaints and other investigations pertaining to complaints were noted.

Diabetes is defined as per American Diabetic Association criteria as FBS ≥ 126mg/dl or HbA1c ≥ 6.5% or 2-hour post-meal sugar ≥ 200mg/dl. Pre diabetes was defined as FBS between 100 - 125mg/dl (impaired fasting) or HbA1c between 5.7- 6.4% or 2-hour post-meal sugar between 140 -199mg/dl.

According to World Health Organisation (WHO) gender specific criteria **ANEMIA** is defined as Hb level <130g/L in men and <120g/L in women. Anaemia was defined as normocytic with a mean corpuscular volume of 80 to 100 fL microcytic if <80 fL and macrocytic if >100 fL.

In girls >14 years –
Mild anaemia ->11-11.9 g/dl
Moderate anaemia -> 8-10.9 g/dl
Severe anaemia -> <8 g/dl
In boys >14 years
Mild anaemia -> 11-12.9 g/dl
Moderate anaemia -> 8-10.9 g/dl
Severe anaemia -> <8 g/dl

- **Hypertension** defined according to the Joint National Committee 7 report as systolic blood pressure ≥ 140mm Hg & diastolic pressure ≥ 90mmHg & whereas isolated systolic hypertension was defined as systolic blood pressure ≥ 140mm Hg with diastolic pressure < 90mmHg.
- Normal levels of **Creatinine** in the blood are approximately 0.6 to 1.2milligrams (mg) per decilitre (dL) in adult males and 0.5 to 1.1milligrams per decilitre in adult females.
- Moderately increased albuminuria, **Microalbuminuria** (ACR 30-300 mg/g) refers to albumin excretion above the normal range but below the level of detection by tests for total protein. Severely increased albuminuria, is **Macroalbuminuria**, (ACR >300) refers to a higher elevation of albumin associated with progressive decline in glomerular filtration rate.

RESULT

50 patients with DM2 were selected to participate in the study.
30 out of 50 patients with DMII were found to be anaemic which corresponds to 60 %. 23 of these patients were diagnosed with complications of diabetes (76.66%).

Of the remaining 20 patients without anaemia, only 8 (40%) had developed complications from diabetes.

The results suggest that anaemia has a significant adverse effect on quality of life of diabetic patients and has a role to play in the progression of the disease ad other related comorbidities.

Table 1: Biochemical and hematological variables in patients with DM2 according to the presence of anemia.

Variable	With Anaemia	Without anaemia
Haemoglobin	9.36 ± 1.46	13.92 ± 1.3
RBS	175.47 ± 67.5	247.15 ± 110.77
HbA1c	8.10 ± 1.44	9.52 ± 2.24
Haematocrit	31.52 ± 5.87	42.39 ± 4.93
RBC count	3.83 ± 0.83	5.00 ± 0.49
Serum Creatinin	1.32 ± 0.90	0.883 ± 0.32

Table 2: Severity of anaemia in patients with anaemia and DM II.

Mild	Moderate	Severe
11	17	2
36.66 %	56.66 %	6.66 %

Table 3: Correlation of presence of Anaemia in diabetic patients (type 2) who have developed complications.

Sr. no.	Anaemia	Complication developed
1	Present	-
2	Present	Chronic pain in legs, peripheral vascular disease
3	Present	Peripheral neuropathy
4	Present	Diabetic foot
5	Present	Necrotising Fascitis with gangrene of right 2 toes
6	Absent	Diabetic foot
7	Absent	-
8	Absent	-
9	Present	-
10	Absent	Both eyes diabetic cataract
11	Absent	-
12	Absent	-
13	Present	Chronic hypertensive disease with diabetic cataract
14	Absent	Left foot diabetic ulcer
15	Present	Left foot diabetic ulcer
16	Present	-
17	Present	H/O below the knee amputation of rightleg due to diabetic ulcer + cellulitis of left great toe
18	Present	Cellulitis with h/o diabetic cataract of right eye
19	Present	Peripheral neuropathy
20	Present	Diabetic retinopathy
21	Present	Chronic kidney disease
22	Present	Hypertensive emergency+ chronic kidney disease + h/o previous myocardial infarction
23	Present	-
24	Absent	-
25	Absent	Right eye diabetic cataract
26	Present	-
27	Absent	Diabetic cataract left eye
28	Absent	-
29	Absent	Lacunar infarcts of he left thalamus Intracranial atherosclerosis
30	Absent	-
31	Present	Right eye cataract
32	Present	-
33	Present	Diabetic Cataract of both eyes
34	Present	Peripheral neuropathy
35	Absent	-
36	Absent	-
37	Present	Left leg necrotising fascitis with diabetic ulcer of great toe
38	Present	-
39	Present	Diabetic retinopathy - blindness
40	Absent	Chronic ischaemic heart disease
41	Present	Cellulitis and diabetic ulcer left leg
42	Absent	Diabetic ulcer , right foot
43	Absent	-
44	Present	Chronic kidney disease
45	Absent	-
46	Absent	-
47	Present	Fracture with history of previous myocardial infarction
48	Present	Chronic Ischaemic heart disease
49	Present	Diabetic ulcer on left foot
50	Present	Newly detected DMII with diabetic ketosis and hypovolumic shock

Complications developed-
Peripheral nerve disease-3 cases
Peripheral vascular disease-1 case
Diabetic ulcer-10 cases
Chronic kidney disease-3 cases
Eye dieases-9 cases
Chronic heart disease-5 cases

According to the observations Relative Risk for development of complications of diabetes in anaemic patients is 3:2.

Attributable Risk for development od complications of diabetes in anaemic patients is 33.33%.

Therefore anaemia is an important predictor of progression of complications in patients of type 2 diabetes mellitus.

DISCUSSION

The goal of this study was to highlight the high prevalence of anemia among patients of diabetes and the adverse effect on quality of life of diabetic patients and association with the progression of the disease; The high prevalence of mortality due to diabetes in India is also due to lack of measures for primary prevention of risk factors, poor control of existing risk factors, lack of awareness, inadequate access to treatment & lack of rehabilitative measures for those who have diabetic complications. Chronic diseases, such as DM, are often accompanied by mild-to-moderate anemia, often called anemia of inflammation or infection or anemia of chronic disease.[8] It has been found that diabetic patients with anemia exhibit increased expression of proinflammattory cytokines as compared to diabetic patients.[9] Only in anemic patient increase in IL-6 production, as well as B cell activity, has been confirmed which reinforces the association between IL-6 and antierythropoietic action. In this study, it was found that the prevalence of hypertension in diabetic patients that were anemic was significantly higher when compared to nonanemic ones.

This association is of concern considering that hypertension in diabetic increases the risk of cardiovascular complications such as heart failure, stroke, tissue inflammation, and atherosclerosis.[5] According to Ximenes et al.[10] anaemia is a prevalent comorbidity in patients with hypertension and when present, patients have more severe symptoms and worse functional capacity as well as increased mortality. The knowledge that anemia worsens the symptoms of hypertension is not new, but, in recent years, the magnitude of the anemia associated with this disease has become more evident. The main causes that contribute to anemia in patients with hypertension are nutritional deficiencies especially iron deficiency and chronic inflammation.[10] It was observed in the present study that there are decreased values of hemoglobin, hematocrit and red blood cell cells in anemic patients, which can be associated with a normocytic normochromic anemia, characteristic of an anemia of chronic disease (ACD).

CONCLUSION

The study suggests that the incidence of development of complications is greater in diabetic patients with anaemia than the patients without anaemia.

Regular monitoring of Hb level in DM patients together with early detection of anemia and timely intervention will help reduce the further complications and decrease the need for hospitalisations therefore improving the well being and quality of life. There is a dire need to bring about **mass awareness** regarding diabetes mellitus and the significance of early detection of anaemia in prevention of further complications.

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REFERENCES

1. Angelousi and E. Larger, “Anaemia, a common but often unrecognized risk in diabetic patients: a review,” Diabetes & Metabolism, View at Publisher · View at Google Scholar· View at Scopus, 2015; 41(1): 18–27.
2. S. Fava, J. Azzopardi, S. Ellard, and A. T. Hattersley, “ACE gene polymorphism as a prognostic indicator in patients with type 2 diabetes and established renal disease,” Diabetes Care, View at Publisher · View at Google Scholar · View at Scopus, 2001; 24(12): 2115–2120.
3. C. S. M. Escorcio, H. F. Silva, G. B. S. Junior, M. P. Monteiro, and R. P. Gonçalves, “Evaluation of anemia treatment with EPO and oral and iv iron in patients with chronic kidney disease under hemodialysis,” RBSA, View at Google Scholar, 2010; 42(2): 87–90.
4. Weiss and L. T. Goodnough, “Anemia of chronic disease,” The New England Journal of Medicine, View at Publisher · View at Google Scholar · View at Scopus, 2005; 352(10): 1011–1059.
5. P. M. S. B. Francisco, A. P. Belon, M. B. A. Barros, L. Carandina, M. C. G. P. Alves, and C. L. G. Cesar, “Self-reported diabetes in the elderly: prevalence, associated factors, and control practices,” Cadernos de Saúde Pública, View at Publisher · View at Google Scholar, 2010; 26(1): 175–184.

a. MacCiò and C. Madeddu, “Management of anemia of inflammation in the elderly,” Anemia, vol. 2012, Article ID 563251, View at Publisher · View at Google Scholar · View at Scopus, 2012; 20.

6. T. D. Moreira and M. A. Mascarenhas, Avaliação da prevalência de anemia em grupos diabéticos e não diabéticos e sua relação com insuficiência renal crônica, 62nd edition, 2004.

7. M. C. Carvalho, E. C. E. Baracat, and V. C. Sgarbieri, "Anemia ferropriva e anemia de doença crônica: distúrbios do metabolismo de ferro," Revista Segurança Alimentar e Nutricional, View at Google Scholar, 2006; 13(2): 54–63.
8. M. Andrews and M. Arredondo, "Ferritin levels and hepcidin mRNA expression in peripheral mononuclear cells from anemic type 2 diabetic patients," Biological Trace Element Research, View at Publisher · View at Google Scholar · View at Scopus, 2012; 149(1): 1–4.
9. R. M. O. Ximenes, A. C. P. Barretto, and E. P. Silva, "Anemia in heart failure patients: development risk factors," Revista Brasileira de Cardiologia, View at Google Scholar, 2014; 27(3): 189–194.
10. http://www.who.int/mediacentre/factsheets/fs138/en/.