



## FURTHER STUDIES INTO ANAEMIC PROFILE IN DIABETIC PATIENTS IN PATIENT GROUP IN RESOURCE-LIMITED TERTIARY CARE CENTRE IN SOUTH-INDIA.

### Pathology

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### ABSTRACT

Diabetes is a heterogeneous group of metabolic disorders characterised by, most infamously, hyperglycaemia. It is one of the most pertinent cause of morbidity & mortality all over the world in health care scenario, especially due to its associated morbidities of nephropathy, retinopathy and infection. Anaemia is a common blood disorder. It is increasingly being considered as a key indicator of chronic kidney disease in diabetic patients. To this regard, a preliminary study was conducted at our institution, to estimate the prevalence of anaemia in diabetic patients. As the results of the study revealed a large proportion of the diabetic population to be anaemic, it was felt further studies were mandated to underscore the relations and interplay of various factors underlying these two important diseases. The present study is first such in the series and emphasises the interplay of type of diabetes and gender in prevalence of anaemia.

### KEYWORDS

Anaemia, Types, Duration, Diabetes

### INTRODUCTION

Diabetes is a chronic disease & is a major cause of morbidity & mortality world-over. It comprises a heterogeneous group of metabolic disorders, the most infamous being hyperglycaemia, which is what lent the disease its name [1]. Anaemia, on the other hand, is a common haematological disorder [2]. As the process of erythropoiesis is dependent on proper renal function, it is being increasingly recognized in patients with diabetes mellitus where it is considered as a key indicator of chronic kidney disease [3]. Anaemia in diabetics also forms an indicator of eye disease, and is an important cardiovascular risk factor [4].

The importance of diabetes as a factor for anaemia can be understood by noting that in patients with similar degree of renal impairment, those with diabetes are twice as likely to develop anaemia. [1] This is notwithstanding that a number of diabetic patients without renal impairment develop anaemia.

Various hypotheses that have been proposed to explain relation between diabetes and anaemia include tubulo-interstitial disease, chronic renal hypoxia, hyperglycaemia, systemic inflammation, symptomatic autonomic neuropathy causing efferent denervation of the kidney & loss of erythropoietin production, altered iron metabolism, inhibition of erythropoietin release & drugs [2]. While vascular complications of diabetes include nephropathy, retinopathy, neuropathy, impaired wound healing & macrovascular disease, anaemia can further complicate the clinical picture by inflicting chronic hypoxia on the already ongoing microangiopathic process. [5] Thus, anaemia along with diabetes is a condition that must raise concern in health-care providers because of increased risk of developing eye disease, heart disease, or a stroke in such patients[6].

Anaemia is primarily due to poor iron and dietary supplements in the diet. This may be even more important in cases of female patients considering various social, economic and cultural factors that tend to deprive them of optimal nutrition. Furthermore, lack of proper dietary control habits among patients with diabetes may further complicate the picture and patients may tend to become overly abstinent in diet due to their misguided attempt at dietary control, tipping balance of haematopoiesis towards anaemia.

### MATERIALS AND METHODOLOGY

A cross-sectional study involving the patient attending the special diabetic OPD in Madha Medical College & Research Institute, Chennai was performed. All previously diagnosed patients of DM attending the OPD between January 2017 and March 2017 were included in the study. Both type I and type II diabetes mellitus patients were included. Patients with gestational diabetes were excluded from the study. Blood samples were collected from the subjects by the trained phlebotomists under aseptic conditions by standard

phlebotomy technique. Blood samples were collected into sodium fluoride & tripotassium ethylenediamine tetraacetic acid anticoagulants for haemoglobin, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration measurements respectively. Presence of anaemia was diagnosed by WHO criteria as haemoglobin level <13gm/dl for men & <12gm/dl for women.

A moderation and interaction statistical model was developed and data was analysed using SPSS 23.

### RESULTS

A total of 147 patients were studied. Of these 84 were male and 63 were female. Patient with type I diabetes were 22 in number while 125 had type II diabetes. Among patients with type I DM, 5 were females and 17 were males; among those with type II DM 58 were females and 67 were males. Among all patients, 47 had DM of less than 2 years duration, 26 had DM for 2-4 years, 39 for 4-6 years and 35 for more than 6 years.

Anaemia was found in 67 patients (59 in DM type II group and 8 in type I group), while 80 did not have anaemia (66 in type II group and 14 in type I group). Among female patients, 40 out of 63 had anaemia, whilst 27 out of 84 male patients had anaemia. Thus, anaemia was significantly higher in cases of females (p-value <0.05).

Interestingly, this significant difference in prevalence of anaemia between two genders was absent when factoring in type of DM. We believe that this "ironing out" of difference may be due to the relatively lesser no. of type I DM female patients in the study, but we understand the need of a more detailed study in this regard. The presence of such low nos. of female type I DM in South-Indian population may itself be needed to be further studied.

### DISCUSSION

In comparison to general population, anaemia is more common in diabetics [7]. Anaemia predisposes to hypoxic insult and this may further contribute to complications of diabetes, which are microangiopathic in nature and chronic ischaemic in pathology. This harmful synergism has been particularly well documented in cases of albuminuria and retinopathy, two microvascular complications of diabetes [7]. Anaemia has a negative impact on patient survival, and is considered to be an important cardiovascular risk factor. Understanding various correlations of anaemia with diabetes is the first step in developing interventions to optimize outcomes in these patients and prevent additional complications due to anaemic hypoxia over and above those due to diabetes[8]. In our previous study, 45% of the diabetic patients were found to be anaemic in contrast to the previously reported incidence of 15.3%-19.6% [9,10] Diabetic autonomic neuropathy is the primary cause of anaemia in setting of

diabetes due to decrease in production of erythropoietin[10,11]. In a study anaemia was found to be a common problem to diabetic patients with albuminuria or reduced renal function [6]. The majority of patients have normocytic, normochromic anaemia. A small no. may have microcytic & megaloblastic anaemia [12].

In our study, significantly higher no. of females had anaemia in setting of type II DM. We propose a reduced intake of dietary iron, consequent to socio-economic factors and to overly eager self-imposed dietary restrictions in addition to the usual deficiency of erythropoietin leading to hypo-proliferative anaemia to be the lead-in cause [13]. This study demonstrated that not only anaemia is an early and common complication of diabetes but that female patients at greater risk of anaemia.

Microcytic hypochromic anaemia, which made up approximately 16% of the study population in our previous study could probably be due to iron deficiency consequent to such measures as proposed.[9] In addition, iron deficiency anaemia is linked to the upregulation of inflammatory mediators primarily cytokines & sub-optimal tissue response to erythropoietin, thus inhibiting transport of iron from tissue stores to erythroblast for erythropoiesis [14].

Metformin, the drug of choice for type II diabetes, is known to interfere with the absorption of vitamin B12, leading to B12 deficiency, causing megaloblastic anaemia [15]. This may further be complicated by self-imposed poorly regulated dietary restrictions.

## CONCLUSION

From the obtained result, it is concluded that while the type of DM and duration doesn't significantly affect the prevalence of anaemia in these patients, the female gender is definitively more prone to anaemia. This may be a result of poor dietary habits especially in setting of socio-economic-cultural factors.

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