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HEMATOLOGICAL PROFILE IN UNCOMPLICATED TYPE 2 DIABETES MELLITUS PATIENTS

General Medicine

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ABSTRACT

INTRODUCTION: Diabetes mellitus (DM) is a non-communicable disease with increasing prevalence worldwide.Poorly controlled diabetes leads to various complications such as nephropathy, retinopathy, neuropathy and oxidative stress causing oxidative damage to tissues and cells.The concentration of HbA1c depends on the concentration of glucose in the plasma and the duration of hyperglycemia and is an index of diabetic control for a period over past 12 weeks.Anemia, leucocytosis and thrombocytosis are common hematological finding in diabetic patients early evaluation of this parameter prevent complications.

METHOD: The case-control study was carried out for 3 months duration at L.G.Hospital, Ahmdabad. All uncomplicated type -2 DM patients visited to OPD or indoor were included in study. Hematological parameter of these patients compared with non-diabetics indivisuals.

RESULT: Statistically significant correlations observed in anemia($p<0.0001$) and thrombocytosis($p= 0.004$) between two groups. Mean WBCs (8382/cumm vs 7917/cumm)count higher in diabetics than non-diabetics group but was not statistically significant($p=0.29$).

CONCLUSION: Hematological profile in Diabetes patients is deranged and diabetics are more prone for anemia and thrombocytosis. Routine and regular screening for hematological profile initiate early prevention strategies and reduce the morbidity related to it. Hence hematological parameter should be done along with glucose profile for early assessment of disease progression and to prevent morbidity.

KEYWORDS

Anemia, HbA1c, Leucocytosis, Type2 diabetics, Thrombocytosis.

INTRODUCTION

Diabetes mellitus (DM) is a non-communicable disease with increasing prevalence worldwide.[1] Poorly controlled diabetes leads to various complications such as nephropathy, retinopathy, neuropathy and oxidative stress causing oxidative damage to tissues and cells.[2] India is the known to be diabetic capital of the world. By 2030, about 80 to 87 million people of India will be diabetic and 438 million people (7.8%) of the adult population are expected to have diabetes worldwide.[3]

Anemia is a common hematological finding in diabetic patients. Anemia is defined as a reduction in the haemoglobin concentration of blood, which consequently reduces the oxygen-carrying capacity of red blood cells such that they are unable to meet the body's physiological needs. Many research studies have reported that anemia mostly occurs in patients with diabetes who also have renal insufficiency.[4] A few other studies have also reported an incidence of anemia in diabetics prior to evidence of renal impairment.[5] Routine measurement of haematological parameters is done in diabetic patient.

Patients with diabetes mellitus show a significant derangement in various haematological parameters .[6] In fact, several haematological changes affecting the red blood cells (RBCs), white blood cells (WBCs), platelet and the coagulation factors are shown to be directly associated with DM.[7,8]

The quantitative and qualitative analysis of red cell parameters are measured by RBC count, Hematocrit(HCT), Mean Corpuscular Volume(MCV),Mean Corpuscular Hemoglobin(MCH) and Mean Corpuscular Hemoglobin Concentration(MCHC) which gives the indication of red cell deformability and hemorrheological state. The Red Blood cell distribution width(RDW) is a measurement of the size variation among the circulating red cells and is calculated as a part of routine complete blood count.RDW along with MCV is useful in the differential diagnosis of the causes of anemia.[9]RDW is now being considered as an inflammatory marker and an elevated RDW value is shown to be significantly associated with diabetic nephropathy in type 2 diabetes patients independent of traditional risk factors including diabetes duration and glycemic control.[10]

Systematic review and meta-analysis of cross-sectional and prospective studies have shown that the number of peripheral WBCs such as basophils, eosinophils and neutrophils increased with no change in the number of monocytes in patients with type-2 DM.[8]Other epidemiological studies have indicated a close relationship between the WBC count and components of metabolic syndrome.[11] These abnormalities have been shown to markedly increase blood viscosity that unfavourably affects the microcirculation, leading to microangiopathy.[12] It was revealed that higher WBC count, is one of the major components of inflammatory process that contributes to atherosclerotic progression and CVD.[11,13] Haematological indices are therefore important indicators for the evaluation of variations in size, number and maturity of different blood cells and for the assessment and management of patients with DM.[13,14]

A study suggested that high platelet activity enhances vascular complications in DM patients.[15] Mean platelet volume (MPV) is a marker showing platelet function and activation. Altered platelet morphology and function can be reflected as a factor for risk of microvascular and macrovascular diseases.[16,17] Several studies have reported that increased platelet reactivation in patients with diabetes may confer less cardiovascular protection with antiplatelet therapy, particularly aspirin.[18]

When plasma glucose is episodically elevated over time, small amount of hemoglobin A are nonenzymatically glycated to form glycated hemoglobin (HbA1c). HbA1c has glucose attached to terminal valine in each β chain. The concentration of HbA1c depends on the concentration of glucose in the plasma and the duration of hyperglycemia and is an index of diabetic control for a period over past 12 weeks. High levels of glycated hemoglobin have shown to impair endothelium mediated vasoactive responses, which can lead to

hypertension and vascular diseases in diabetic patients.[19]
Therefore, this study which is aimed at determining haematological indices among type-2 DM patients in comparison to non-diabetic indivisual.

AIMS & OBJECTIVES

1. To study hematological parameters in type 2 diabetics patient in comparison to non-diabetic indivisual.
2. To establish to role of hematological parameter as early prevention stratergy.

MATERIALS AND METHOD

The case-control study was carried out for 3 months duration at L.G.Hospital, Ahmdabad.

Inclusion criteria:

All uncomplicated type -2 DM patients visited to OPD or indoor were included in study.

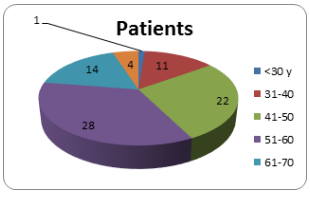
Exclusion criteria:

Type-2 DM patients with macro or micro vascular complications were not included in study.

Collection of data done by patient evaluation which was done by taking detailed history, clinical examination and laboratory investigations like HbA1c, creatinine and complete blood count.
Analysis of data done by comparing diabetic patients (group1,N=80) data with non-diabetic indivisuals (group 2 , N=80).

Results and Observations

The study was carried out at L.G.Hopsital, Maninagar,Ahmedabd for 3 months duration.In the study, 80 type 2 diabetes subjects and non-diabetic subjects (controls) were included. Mean age of diabetics was 53.4 years and non-diabetics was 52.98 years.



Age wise distribution of type2 diabetics patients

Table1. Gender wise comparison between two groups

	Group1(N=80)	Group2(N=80)
Male	33	49
Female	47	31

In diabetics mean hemoglobin was 12.2± 1.82 (g/dl) and in nondiabetics 13.65±0.92 (g/dl). Similarly, other haematological parameters are shown in Table 2. In diabetics mean haemoglobin, RBCs and MCV was significantly lower than in non-diabetics. Whereas mean Pletelets count and MPV was significantly higher in diabetics compared to non-diabetics. Mean WBCs count was higher in diabetics than in non-diabetics but it was not statistically significant. This shows that diabetics are prone for anemia , thrombocytois and large platelets.

Table2. RBC parameters comparison between two groups

	Group1(N=80)	Group2(N=80)	P value
Hb g/dl	12.2±1.82	13.65±0.92	<0.0001 S
RBC millions	4.48±0.68	4.76±0.57	0.005 S
MCV fl	81.72±8.49	86.04±3.89	<0.0001 S
RDW	14.2±2.35	13.06±0.81	<0.0001 S

Table 3. WBCs and Platelets comparison between two groups

	Group1(N=80)	Group2(N=80)	P value
WBCs	8382.1±3281	7917±2209.2	0.29 NS
PC	2.73±0.99	2.358±0.59	0.004 S
MPV	10.39±1.01	9.95±0.8	0.002 S

DISCUSSION

Diabetes prevalence has seen a steady increase globally. Due to its complex multifactorial etiology, leads to progressive deterioration of beta cell function and causes insulin resistance.In the study, 80 type 2 diabetes subjects and non-diabetic subjects (controls) were included. Mean age of diabetics was 53.4 years and non-diabetics was 52.98 years. There was no significant difference between the age distribution of two groups. Similar profile observed in the study by Harish kumar S. et al,[20] Mean age of diabetics was 55.7±3.6 years and non-diabetics was 56.2±3.5 year.

Present study showed that diabetics had mean hemoglobin of 12.2± 1.82 (g/dl) and in non-diabetics 13.65±0.92 (g/dl). In diabetics mean haemoglobin, RBCs and MCV was significantly lower than in nondiabetics. This shows that diabetics are prone for anemia. Similar observations were made by Al Salhen KS et al in T2DM had lower haemoglobin concentrations.[21] In T2DM patient's PCV, whole blood haemoglobin, RBCs and MCV values were significantly lower than in controls with percent differences of 27.7, 19.2, 23.5 and 5.4%, respectively.

Present study showed that diabetics had higher mean WBCs (8382±3281) than in non-diabetics (7917±2209.2) but statiscally insignificant(p=0.29) in contrast to Belete Biadgo et al[22] study showed p=0.000.

Present study showed statistically significant increments in MPV (P=0.002) and PC (P=0.004) in diabetics than nondiabetics. Similary Belete Biadgo et al[22] study showed statistically significant increments in MPV (P=0.001) and PDW (P=0.000) in T2DM patients as compared to the control group for platelet indices.

CONCLUSION

Hematological profile in Diabetes patients is deranged and diabetics are more prone for anemia and thrombocytosis. Hence routine and regular screening for hematological profile is recommended in diabetic patients to initiate early prevention strategies and to reduce the morbidity related to it. In future therapeutic prevention of anemia in diabetes can retard the progress of diabetic nephropathy and its complications and control of platelets count reduces cardiac complication.

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