

Assessment of Hemoglobin, Total Leucocyte Count and Platelet Count in Type II Diabetes Patients and Non-Diabetes Group - A Case Control Study

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Abstract: *Diabetes mellitus is a global public health problem and associated with metabolic, cellular and blood disturbance leading to vascular complications. It is a metabolic disorder characterized by chronic hyperglycemia. Diabetes mellitus is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Hematological changes encountered in type II diabetes mellitus patients include changes in structure, function and metabolism of red blood cells, white blood cells, platelets and coagulation systems. These changes may cause anemia due to decreased hemoglobin level compared to non-diabetic individuals. Hematological parameters such as hemoglobin estimation, platelet count, total leucocyte count, differential count was performed on 30 diabetes and 30 non-diabetic (control) samples, which show variations in parameters such as hemoglobin, platelets, total leucocyte count and only a slight variation in differential count of type II diabetes patients.*

Keywords: Diabetes mellitus, Total leucocyte count, Differential count, Hemoglobin

1. Introduction

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The significance of insulin as an anabolic hormone leads to anomalies in the metabolism of proteins, lipids, and carbohydrates. It is a condition where blood glucose levels are not adequately controlled. Type 1, type 2, gestational diabetes, newborn diabetes, maturity-onset diabetes of the young (MODY), and steroid-induced diabetes are the different types of diabetes. Type I and type II diabetes are the main subtype [1].

Type 1 diabetes is usually inherited and cannot be prevented. Type 1 diabetes affects 5–10% of those with diabetes. Although type 2 diabetes is more common in older adults, it can still strike children. Insulin must be administered daily to treat type 1 diabetes, often referred to as insulin-dependent, juvenile, or childhood-onset diabetes, which is characterized by insufficient insulin production. The way your body uses sugar, or glucose, for energy is impacted by type 2 diabetes. If left untreated, it prevents the body from utilizing insulin as it should, which can result in elevated blood sugar level [2].

Both types of diabetes have certain signs and symptoms, such as weariness and hunger during or soon after meals, reduction in weight when eating more, intense thirst, vision distortion, bruises and cuts heal slowly. Hematological changes encountered in type II diabetes patients include the Changes in the functions and structure and metabolism of red blood cells, white blood cells, platelets and coagulation systems [3],[4].

The routine hematological parameters like hemoglobin

estimation count, platelet count, differential count etc. have changes during diabetes mellitus. There was a statistically in the hematological parameters like hemoglobin estimation, total leucocyte count, platelet count of type II diabetes mellitus patients compared to non-diabetes control group. Compared to patients with other kidney diseases, those with diabetes mellitus experience a faster decline in glomerular filtration rate when their hemoglobin concentration is low. Low hemoglobin levels are more likely to occur in people with diabetic nephropathy and diabetic retinopathy. Patients with diabetes mellitus frequently suffer from anemia, and low hemoglobin concentration is linked to several clinical features of the disease or its progression. Deviations from normal white blood cell function can heighten the likelihood of developing insulin resistance, which is the fundamental issue in individuals with diabetes or prediabetes. Increased leukocyte counts are linked to both macro and microvascular problems in diabetes as well as insulin resistance. Because hyperglycemia causes non-enzymatic glycosylation of the proteins on the platelet surface, it can raise platelet reactivity. This kind of glycation raises the likelihood that platelets will activate and reduces membrane fluidity. To conclude the purpose of this study is to access the hematological parameters of type II diabetes patients and non-diabetes control group [5]-[7].

2. Method

The study was conducted in Department of Pathology. The blood sample taken from 30 diabetic patients and 30 non-diabetic individuals and analyzed. Patients with type II diabetes between the age of 40-55 were selected. Patients with type I diabetes mellitus, chronic disease, smoking, alcoholic, pregnant women, Patients below the age of 18 and above the age of 65 not allowed. Hemoglobin estimation,

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platelet count, total WBC count, differential count was obtained by EDTA samples. MINDRAY BC1800 was used for determination.

3. Result

3.1 Mean hemoglobin value of cases and controls

Group	Mean Hb (g/d)
Diabetic	9.8
Non-Diabetic	13.4

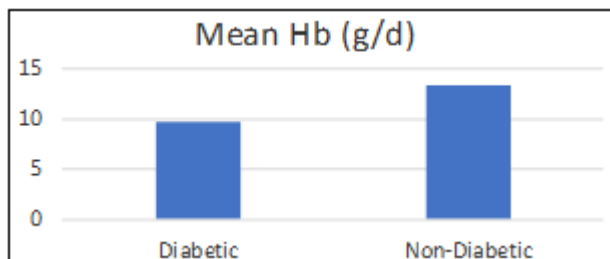


Figure 1: Mean hemoglobin value of cases and controls

3.2 Mean Platelet count of cases and controls

Group	Mean Platelet count(lakhs/cumm)
Diabetic	8,59000
Non-Diabetic	2,51660

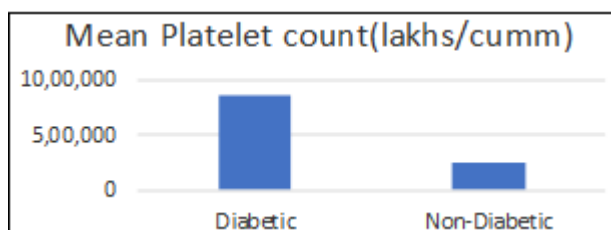


Figure 2: Mean Platelet count of cases and controls

3.3 Mean Total Leucocyte Count of cases and controls

Group	Mean Total Count (Cells/cumm)
Diabetic	12,860
Non-Diabetic	6700

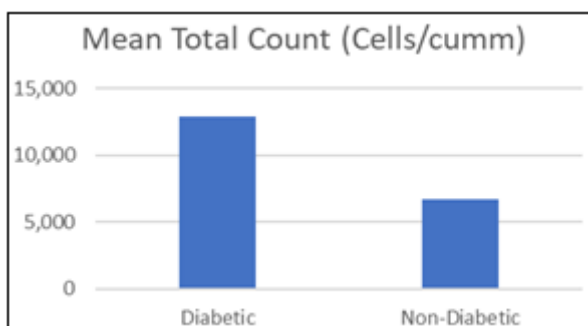


Figure 3: Mean WBC of cases and controls

4. Conclusion

The current study found that platelet count was significantly higher in type II diabetic patients as compared to non-diabetic group. The hemoglobin was lower in type II

diabetes patients, the WBC count of diabetes patients showed an increase of value when compared to the control group. When the deferential count is done cells showed only a slight variation in the case of diabetes patients. Mainly parameters such as hemoglobin, platelet count and total WBC counts are valuated.

In the case of type II diabetes patients 90% of patients show decreased hemoglobin value. In the case of platelet count 90% of patients show an increased platelet value. The WBC count shows an increase of 87%. Differential count gives 40% variation in diabetes patient with neutrophil value (Neutrophil count increase in 36%), 46% decrease in monocyte, 43% increase of lymphocyte and 13% of eosinophil. A total of 77% abnormality was observed in differential count. In case of non-diabetes control group hemoglobin, platelet count and WBC counts are normal for 93% of individual and differential count gives 97% normal result.

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