



## PREVALENCE OF VASCULAR COMPLICATIONS IN TYPE 2 DIABETES PATIENTS

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### ABSTRACT

A major headache with diabetes is that it is an Iceberg disease. The In apparent, the undiagnosed proportion of subjects with diabetes is on the increase in emerging parsimonies like India due to the less developed healthcare systems. The recent IDF atlas estimates that in India alone, around 36.0 million people are living undiagnosed with diabetes, which also has led to the increasing burden of complications which are irreversible in the long term like the vascular complications especially affecting the eyes, the heart, the kidneys and the nerves. But the number of studies conducted on the subject are relatively scarce from India. Since the pathophysiological mechanism of occurrence of chronic complications may differ between population groups, scientific knowledge based on studies conducted on native populations is extremely vital. This knowledge may enhance our understanding about the role of the association with various blood indices and may enable us to device appropriate therapeutic strategies. The current study an attempt to enhance our understanding on the subject.

**Key words:** Neutrophil, Type 2 DM NLR, Red blood cell, WBC.

### INTRODUCTION

Since there is no permanent cure for diabetes, a continuous medical care along with education is needed to prevent the complications arising as a result of diabetes, both acute and longterm.[1] A Good glycemc control has shown to decrease the incidence of Diabetic complications.[2]The most common cause of Hospital admissions due to Diabetes is poor glycemc control and its Complications. The level of Glycemc control in routine day to day practice is measured by HbA1c[3].

Not with standing this, accomplishing a good glycemc control in terms of lower HbA1chas always been a challenge in diabetic patients in the routine clinical scenario. Several studies(15, 16)have shown a significant association between the level of glycemc control and various hematological indices.[4] In Type 2 Diabetes Mellitus, there is a significant change in the immune system, characterized by an increase in acute phase proteins, cytokines that are proinflammatory which play a key role in stimulation of inflammation, tissue dysfunction

along with the development of Insulin Resistance. In the Pathophysiology of Type 2 DM, Leukocytosis(17)tends to perform a vital role. It also plays a significant role in the associated Atherosclerosis, metabolic syndrome.[5] The Immune responses are also accompanied by various physiological changes such as an increase in the Neutrophil count and also decrease in the number of lymphocytes.[6]

### RELATED WORKS

Diabetes significantly contributes to morbidity in the modern world through various microvascular and macrovascular complications.[7] As per ICMR-INDIAB study done at a national level, there are about 62.4 million people living with type 2 diabetes and 77 million people living with pre-diabetes in India at present.[8]Poorly measured diabetes can lead to a plethora of microvascular, macrovascular and metabolic complications.[9]

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Population-based studies have reported that the proportion of the diabetic population with retinopathy was 17.6% while the proportion of the population with microalbuminuria was 26.9% and neuropathy was 26.1%, the proportion with coronary artery disease was 21.4% and peripheral vascular disease was about 6.3% of the diabetic population. So, the healthcare burden faced by India is very high owing to the higher prevalence of Type 2 diabetes and the subsequent complications”.

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When calculated for the total population of India, this may interpret to millions of people with each complication of diabetes and also most of them suffering from multiple complications. The Expenditure spent in treating them also adds further to the health care burden of India. There has been unanimous reports which state that a strict and a tighter glycemic control maintained regularly helped to prevent complications of diabetes.[10]So, studies assessing the level of glycemic control in the population, burden of complications and resources available to meet these demands are the need of the hour since data on these important points of focus are very limited in developing countries like India. [11]

The on subjects aged between 20 and 85 years assessed the occurrence of no communicable diseases in South India in a classical farming village. They observed that the proportion of population classified, based on the HbA1c criteria as Diabetes and Pre diabetes was more than 50%. They also observed that in known hypertensive subjects, the proportion with suboptimal control were 40%. About one-third of the subjects had Elevated cystatin C levels, Dyslipidemia. In comparison with ICMR-INDIAB study in rural Tamil Nadu, the burden observed in their study was higher. They concluded that 1/3rd to 1/2 of this study population was at risk of cardiovascular disease, with poor regulator of previous cardiovascular risk factors.

## MATERIALS AND METHODS

**Study design:** The current study was a prospective study

**Study setting:** The study was conducted in the Department of General Medicine, Chennai.

**Study population:** The study population was included, patients with Type 2 diabetes mellitus, presenting to the outpatient and inpatient services of department of general medicine. All the patients were assessed by detailed clinical history and examination following learned printed consent. The relevant data concerning socio-demographic variables, diabetes-related information, and physical examination parameters were documented. Under aseptic

precautions, 5 ml of venous blood was drawn and sent to the laboratory for necessary investigations. The parameters liked glycemic control like FBS, PPBS, HbA1C, an entire battery of hematological parameters was assessed. Composite hematological parameters like PLR, NLR were calculated using standard definitions.

## RESULTS AND DISCUSSIONS

Diabetes mellitus (DM) comprises a diverse group of conditions which are described by an increase in blood glucose levels, with multiple ailments including disturbances at the metabolic and cellular level leading to various vascular complications.

Evaluating the baseline characteristics of the population studied, the majority of study population was aged 50 and above. About 38.75% of the subjects were over 60 years of age, and more than 50% of subjects were in the age group of 40 to 59 years. This is in comparison to the study on the population of Chennai (CURES Study), in which the prevalence of DM was found to be highest in the age group of 50-59 years (33.6%), followed by 40-49 years of age (29.7%). In studies done on diabetes and hematological profile, reported a mean age of  $49.09 \pm 8.1$  years. on association of hematological indices with diabetes, impaired glucose regulation and microvascular complications of diabetes observed that the mean age of the subjects with Type 2 DM was  $50.8 \pm 8.5$  years. The cross sectional study also observed the mean age of subjects with Type 2 DM was  $55.85 \pm 8.82$  years.

In the present study, 81 females and 79 males were included. The female population contributed to 50.63% of the study population which was nearly equal to the male population of 49.38%. This is in concordance with the reported data from Chennai that the prevalence of DM had no gender variation. In contrast, included more females than males; of the total 148 T2DM patients in their study, 39.9% were males and 60.1% were females. The study included 183 females and 124 males.

The comparative cross-sectional study on 296 participants with 148 diabetic cases and 148 controls, from February to April 2015 evaluated the various hematological indices and their level of agreement with FBS and anthropometric measurement in subjects with type 2 DM by comparing them with subjects who are healthy. They recorded their FBS levels and hematological indices. They found a significant difference in the RBC distribution width ( $47.3 \pm 2.6$  fL vs  $45.2 \pm 3$  fL) while comparing the subjects with diabetes and their controls.

Total white blood cells, the absolute lymphocyte count and the absolute count of neutrophils was significantly increased in subjects with diabetes patients compared to their controls. The mean platelet volume and the width of platelet distribution were increased significantly in the subjects with diabetes ( $P < 0.05$ ).

There was a significant correlation between various anthropometric measurements and indices of white blood cell, platelets. They concluded that hematological indices can be used as valuable pointers of vascular complications, glycemic control in subjects with type 2 DM. In subjects with type 2 DM without atherosclerosis, resting levels of acute phase reactants were higher when compared with healthy subjects. Cytokine release from macrophages is stimulated by advanced glycation end products, which along with insulin deficiency, insulin resistance act together to produce an acute phase response.

## CONCLUSION

Finally this work concludes that a positive correlation between NLR and triglycerides have also been reported implying the development of insulin resistance through the release of inflammatory cytokines such as Interleukin 1, TNF alpha because of increased triglycerides. These cytokines cause an increase in inflammatory cells and contribute to the persistence of inflammation ultimately leading to consequent progression of Type 2 Diabetes

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