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A STUDY OF HbA1C AND BLOOD SUGAR LEVEL AND ITS RELATION TO MICROANGIOPATHY IN CASE OF DIABETES MELLITUS TYPE 2 AT NMC, SASARAM, BIHAR

General Medicine

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ABSTRACT

Background : Diabetes is the leading cause of blindness, end-stage renal disease, and non traumatic amputations in adults. Because diabetes is a progressive disorder, the importance of early and appropriate treatment cannot be overemphasized.

Material and Methods: Patients of Newly diagnosed Type 2 Diabetes Mellitus attending the Out Patient Department (OPD) and indoor of Department of Medicine, Narayan Medical College, Sasaram, Bihar.

Result: Left ventricular hypertrophy and LVDD which are considered as earliest changes of diabetic cardiomyopathy were 16.7%, 25% respectively even in normotensive patients and a significant positive correlation was observed between HbA1C and prevalence of LVH and LVDD in the newly diagnosed cases of type2 diabetes mellitus.

Conclusion: HbA1C was significantly associated with complications including retinopathy, nephropathy, left ventricular hypertrophy and left ventricular diastolic dysfunction even in a symptomatic newly diagnosed cases of type2 diabetes mellitus.

KEYWORDS

INTRODUCTION

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Diabetes is a major lifestyle disorder, the prevalence of which is increasing globally. Asian countries contribute to more than 60% of the world's diabetic population as the prevalence of diabetes is increasing in these countries.

Symptoms of marked hyperglycemia include polyuria, polydipsia, weight loss, sometimes with polyphagia, and blurred vision. Impairment of growth and susceptibility to certain infections may also accompany chronic hyperglycemia. Acute, life-threatening consequences of uncontrolled diabetes are hyperglycemia with ketoacidosis or the nonketotic hyperosmolar syndrome.

The onset of type 2 diabetes (T2DM) is often silent and insidious. Pathogenic processes causing T2DM range from autoimmune destruction of cells of pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. Asymptomatic phase of hyperglycemia accounts for the relatively high prevalence of complications at initial presentation.

The higher incidence of diabetes is mainly due to changes in dietary patterns and decreased physical activity as evident from the higher prevalence of diabetes in the urban population. Even though the prevalence of microvascular complications of diabetes like retinopathy and nephropathy are comparatively lower in Indians, the prevalence of premature coronary artery disease is much higher in Indians compared to other ethnic groups. The most disturbing trend is the shift in age of onset of diabetes to a younger age in the recent years. This could have long lasting adverse effects on nation's health and economy.

Diabetes is the leading cause of blindness, end-stage renal disease, and non traumatic amputations in adults. Because diabetes is a progressive disorder, the importance of early and appropriate treatment cannot be overemphasized.

Type 2 diabetes is frequently not diagnosed until complications appear, and approximately one third of all people with the disease may be undiagnosed. Epidemiologic evidence suggests the relationship between diabetes and complications begins early in the progression from normal glucose tolerance to impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) to diabetes than previously thought. These observations indicate that early identification and management of individuals with diabetes and pre-diabetes have the potential to reduce both the incidence of diabetes and its related complications.

AIMS & OBJECTIVES

1. To assess the level of HbA1c in newly diagnosed type 2 diabetic patients.
2. To assess the prevalence of diabetic retinopathy and its association with HbA1C in newly diagnosed type 2 diabetic patients
3. To assess the prevalence of diabetic nephropathy (microalbuminuria/macroalbuminuria) and its association with HbA1C in newly diagnosed type 2 diabetic patients
4. To study the prevalence of left ventricular hypertrophy (LVH) and left ventricular diastolic dysfunction (LVDD) in normotensive newly diagnosed type 2 diabetic patients by using 2D echocardiography and its association with HbA1C.

MATERIALS AND METHODS

Patients of Newly diagnosed Type 2 Diabetes Mellitus attending the Out Patient Department (OPD) and indoor of Department of Medicine, Narayan Medical College, Sasaram, Bihar.

INCLUSION CRITERIA:

1. Patients diagnosed for the first time with Diabetes mellitus type 2 in accordance with ADA recommendations for diabetes mellitus.
2. Age group:30-60 years.
3. Gender: both males and females.

EXCLUSION CRITERIA:

1) Known case of diabetes mellitus type 1 and type 2 who are already diagnosed or on treatment.
2) Patient of known hypertension with or without treatment
3) Cardiac diseases (Ischemic heart disease, Cardiomyopathy, Valvular heart disease, Heart failure
4) Chronic pulmonary illness
5) Severe anaemia, Haemoglobinopathies.
6) Retinal artery occlusion, Retinal vein occlusion, Retinal vasculitis and Sickle cell retinopathy.
7) Pregnancy

INVESTIGATIONS
- Complete blood count
- Renal function test
- blood urea by kinetic UV test.
- serum creatinine was estimated by kinetic colour test (Jaffe method).
- Fasting lipid profile - Enzymatic colour test was used to determine HDL, LDL, Total Cholesterol and Triglyceride.
- Routine and Microscopic examination of urine.
- TSH.
- Chest X ray PA view- To look for cardiac enlargement.
- Ultrasonography whole abdomen for estimation of kidney size and assess changes of chronic kidney disease.

Other necessary investigations for work up of Diabetes mellitus.

1. ECHOCARDIGRAPHY MACHINE USED IN OUR STUDY

2. ELECTROCARDIOGRAPHY MACHINE USED IN OUR STUDY.

RESULTS AND ANALYSIS
Statistical Analysis was performed with help of Epi Info (TM) 3.5.3 which is a trademark of the Centers for Disease Control and Prevention (CDC).

Using this software, basic cross-tabulation and frequency distributions were prepared. 2χ test was used to test the association between different study variables under study. Z-test was used to test the significant difference between two proportions. t-test was also used to compare the means. Odds ratio (OR) with 95% Confidence Interval (CI) was calculated to measure the different risk factor. Significance level was set at 0.05 and confidence intervals were at 95 percent level.

Also One Way Analysis of variance (ANOVA) followed by post hoc Tukey's Test was performed with the help of Critical Difference (CD) or Least Significant Difference (LSD) at 5% and 1% level of significance to compare the mean values p $\leq$0.05 was considered statistically significant.

This was a hospital-based, cross-sectional observational study. 84 cases of newly diagnosed T2DM were studied for the prevalence of Retinopathy, Nephropathy, left ventricular hypertrophy and left ventricular diastolic dysfunction and their relationship with HbA1C.

Out of 84 cases, 17 cases were found to haveRetinopathy out of which 13 patient had Mild NPDR and 4 patient had moderate NPDR. Hence, there was high prevalence of Retinopathy in newly diagnosed diabetes type 2 in our study (21.3%).

The mean age (mean ± s.d.) of the patients was 47.46±8.20 years with range 30 - 60 years and the median age was 47.0 years. Most of the patients were with age between 41-60 years (77.4%) which was significantly higher (Z=7.74; p<0.0001).

The mean age (mean ± s.d.) of the males was 48.86±7.80 years with range 30-60 years and the median age was 49.0 years. The mean age (mean ± s.d.) of the females was 46.36±8.42 years with range 32 - 60 years and the median age was 47.0 years.

The mean BMI (mean ± s.d.) of the patients was 27.01±1.87 kg/m^2 with range 24.34-33.31 kg/m^2 and the median was 26.62 kg/m^2. Most of the patients were with over weight (88.1%) which was significantly higher (Z=11.11;p<0.0001). 9.5% of them were having Class-I obesity.

Presence of Microvascular complications (Diabetic retinopathy, nephropathy) and cardiovascular changes (LVH, LVDD) are very common in T2 DM even in newly diagnosed cases.

Diabetic retinopathy was present in 20.3% of patients with Mild NPDR being the most common form of diabetic retinopathy and a significant positive correlation was observed between level of HbA1C and prevalence of diabetic retinopathy in the newly diagnosed cases of T2 DM.

Diabetic nephropathy was present in 19.1% of cases with predominant Microalbuminuria. Only 3.6% cases had macroalbuminuria and a significant positive correlation was observed between HbA1C and prevalence of diabetic nephropathy in the newly diagnosed cases of T2 DM.

Left ventricular hypertrophy and LVDD which are considered as earliest changes of diabetic cardiomyopathy were 16.7%, 25% respectively even in normotensive patients and a significant positive correlation was observed between HbA1C and prevalence of LVH and LVDD in the newly diagnosed cases of type2 diabetes mellitus.

CONCLUSION
Diabetes is fast gaining the status of a potential epidemic in India. Diabetes Mellitus is a major public health problem in India. HbA1c is an index of the level of glycaemic control over the preceeding 2 to 3 months; it can be used as a marker of chronic glycaemia and play a critical role in the management of the patient with diabetes, since it correlates well with both microvascular and to a lesser extent, macrovascular complications.

HbA1C was significantly associated with complications including retinopathy, nephropathy, left ventricular hypertrophy and left ventricular diastolic dysfunction even in a symptomatic newly diagnosed cases of type2 diabetes mellitus.

Our study can suggest that estimation of HbA1C should be done in all newly diagnosed Type 2 diabetes mellitus cases so that we can easily assess the degree of chronic hypergycaemia and also to assess the presence of earliest fundus changes in eye, renal and cardiac changes as an early markers of diabetic blindness, chronic renal dysfunction, diabetic cardiomyopathy respectively to prevent the further progression of these complications by optimum glycaemic control (HbA1C <7%) since the establishment of diagnosis & regular follow up there after.

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