

Correlation of Serum Hba1c Levels With Grades of Diastolic Dysfunction in Asymptomatic Type 2 Diabetic Individuals

Dr. S. Sivaramkannan^{*}, Dr. D. Damodaran^{**},

^{*} Associate professor of medicine, Madras medical College.

^{**} Assistant professor of medicine, Madras Medical College.

Corresponding Author: Dr. D. Damodaran

Abstract: Cardiovascular disease is frequently encountered in patients with type 2 diabetes mellitus. In this study we are going to see the co relation between Hba1c and diastolic dysfunction in type 2 diabetes without systemic hypertension and coronary artery disease. **Objective:** To study the correlation between HbA1C levels with grades of diastolic dysfunction in asymptomatic type 2 diabetic individuals. **Methods:** The study was conducted at the Institute Of Internal Medicine, Rajiv Gandhi Government General Hospital, and Madras Medical College, Chennai from March 2017 to February 2018. Study subjects included type 2 diabetes under 60 yrs. Exclusion includes hypertension, coronary artery disease, pregnancy, other diabetic micro vascular and macro vascular complications. **Results:** It was found that the correlation between mean serum glycated hemoglobin levels and grades of diastolic dysfunction was statistically significant with a p value of < 0.001. As the level of Hba1c rises there is proportionate increase in diastolic dysfunction. Similarly there was statistical significance between hba1c and duration of diabetes, left ventricle mass and left atrial size.

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I. Introduction

Type 2 diabetes mellitus is the most common endocrinopathy commonly encountered in clinical practice. It is a group of diseases characterized by absolute or relative lack of insulin ultimately resulting in increased blood glucose or simply hyperglycemia.

Cardiovascular disease is frequently encountered in patients with type 2 diabetes mellitus. In fact, it contributes to significant morbidity and mortality in such patients up to the tune of 80 %. The economic burden in managing type 2 diabetic patients with co existent cardiovascular disease is very high. Various cardiovascular manifestations can occur in patients with type 2 diabetics notably coronary artery disease. Also, on a comparative viewpoint patients with diabetes have increased risk for development and also of dying from coronary artery disease than non-diabetics. Diabetic cardiomyopathy is not an old concept, it is fairly new and a distinct entity. It was in 1972 that for the first time in the history of medicine fascinating observations were made. Four patients were found to have diabetes and heart failure without any evidence of systemic hypertension or coronary artery disease. The dissection of the heart revealed startling facts. There was evidence of LV hypertrophy and fibrosis without atheroma of coronary blood vessels or another substrate responsible for the above mentioned finding. This clinical entity was baptized with the terminology "Diabetic Cardiomyopathy". Thus, it is defined as myocardial dysfunction in patients with diabetes mellitus in the absence of hypertension, coronary artery disease or other known cardiac disease. This concept was brought to light in lieu of various experimental, epidemiological, pathological and clinical studies. The studies highlighted the presence of various myocardial changes - both structural and functional in patients with diabetes with no other co morbid illnesses. These include myocardial damage, hypertrophy of left ventricle, myocardial small vessel changes, cardiac autonomic neuropathy, etc.

The etiology and pathogenic mechanisms implicated in diabetes are multifactorial. Sustained hyperglycemia has been found to cause disturbances in ionic channels like sodium – potassium ionic channel, generation of reactive oxygen species, deposition of advanced glycation end products, inflammatory reaction, myocardial fibrosis etc., all of which play a crucial role in the genesis and maintenance of diabetic cardiomyopathy. In our study we are going to see the co relation between HbA1C and diastolic dysfunction in asymptomatic diabetic patients.

II. Aims And Objectives

1. To study the correlation between HbA1C levels with grades of diastolic dysfunction in asymptomatic type 2 diabetic individuals.
2. To study the prevalence of diastolic dysfunction in asymptomatic type 2 diabetic individuals in relation to duration of diabetes, differences in sex.

III. Materials And Methods

The study was conducted at the Institute Of Internal Medicine, Rajiv Gandhi Government General Hospital, and Madras Medical College, Chennai from March 2017 to February 2018. Patients attending the outpatient department of Institute of Internal Medicine and also patients admitted under Institute of Internal Medicine who satisfy inclusion and exclusion criteria. The sample size was 100 patients (male 46, female 56) and it was an observational study.

INCLUSION CRITERIA:

Type 2 diabetics – newly detected and of any duration with or without treatment who are less than 60 years of age.

EXCLUSION CRITERIA:

Patients with -

- Hypertension,
- Coronary artery disease,
- Pregnant women,
- Preexisting heart disease,
- Clinical evidence of macro vascular disease like stroke, MI, peripheral vascular disease,
- Clinical evidence of micro vascular disease.

DATA COLLECTION AND METHODS:

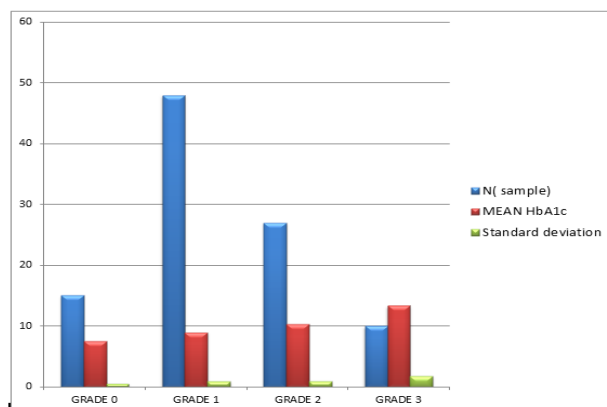
Relevant history was obtained from the subjects as per the questionnaire and the patient is also subjected to detailed physical examination. Age, duration of diabetes, medication status, past history of coronary artery disease, peripheral vascular disease or strokes were obtained from self-report. Blood pressure was recorded using standardized sphygmomanometer. Investigations collected included renal function tests include electrolyte panel, liver function tests, complete hemogram, lipid profile and urine routine. Electrocardiograph and echocardiograph were performed. HbA1c levels were also obtained.

STATISTICAL ANALYSIS:

Analysis was done using SPSS Version 20. Significance was assumed with a p value of 0.05. Association between two categorical variables was done using chi square test.

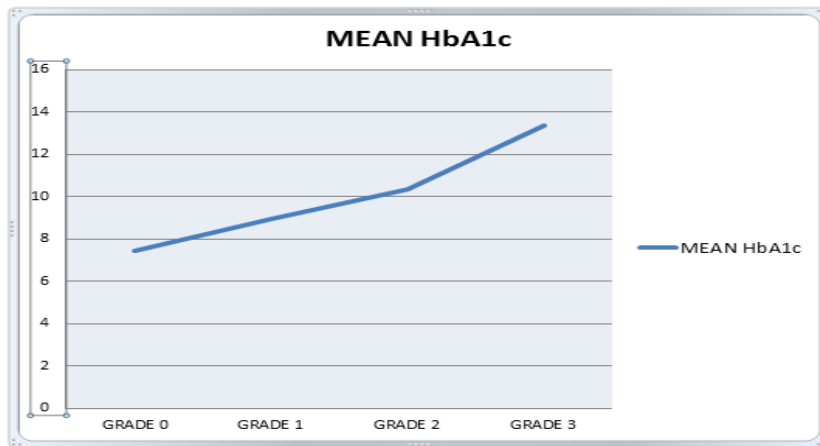
IV. Observation And Results

CORRELATION BETWEEN HbA1c LEVELS AND GRADES OF DIASTOLIC DYSFUNCTION

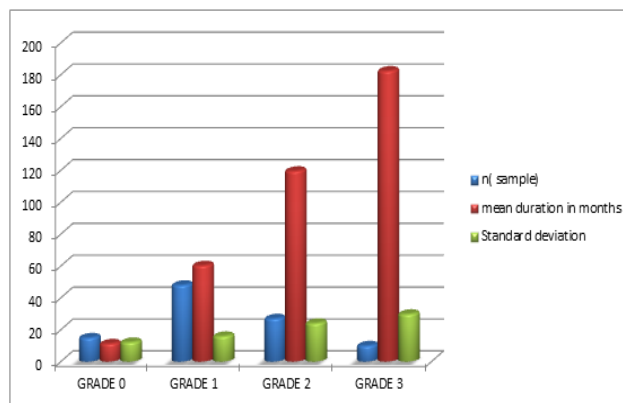


Bar diagram indicating mean HbA1c levels and grades of diastolic dysfunction.

F value – 102.036, P value – < 0.001



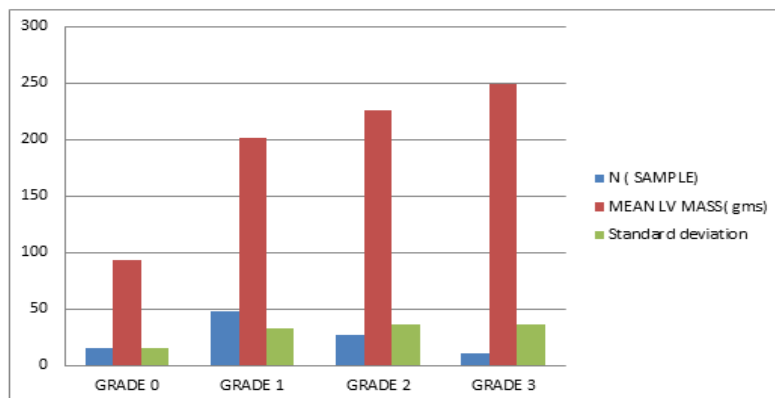
Line diagram indicating correlation between HbA1c levels with grades of diastolic dysfunction. Bar diagram indicating mean duration of type 2 diabetes in months and grades of diastolic dysfunction. F value – 209.379 and p value <0.001



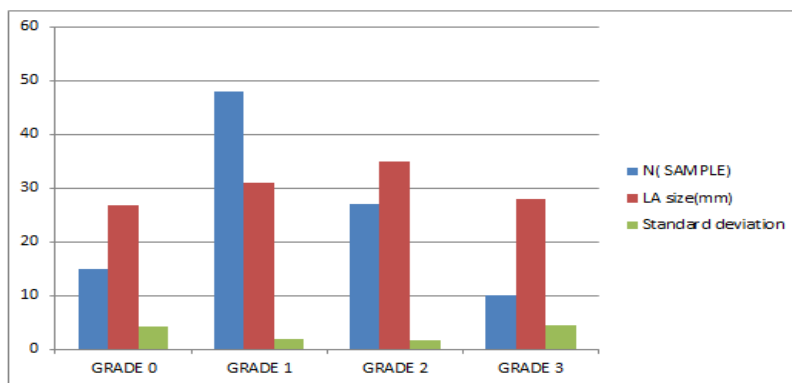
LV MASS (LINEAR VIEW) AND DIASTOLIC DYSFUNCTION F value -73.276 and p value <0.001

LV MASS (LINEAR VIEW) AND DIASTOLIC DYSFUNCTION

F value -73.276 and p value <0.001



LA SIZE AND GRADES OF DIASTOLIC DYSFUNCTION F value -34.966 and p value <0.001



V. Discussion

1. Correlation of serum glycated hemoglobin levels and grades of diastolic dysfunction in asymptomatic type 2 diabetics:

It was found that the correlation between mean serum glycated hemoglobin levels and grades of diastolic dysfunction was statistically significant with a p value of < 0.001 . The study was similar to other studies which demonstrated a direct correlation between HbA1c levels and grades of diastolic dysfunction¹

2. Correlation between mean duration of diabetes in months and grades of diastolic dysfunction:

It was found that around 48 patients with type 2 DM –both males and females included had a mean duration of diabetes for 60 months and grade 1 LVDD, likewise 27 patients had mean duration of diabetes for 119.55 months and grade 2 LVDD. 10 patients who had grade 3 LVDD had diabetes for a mean duration of 182.4 months.

3. Correlate LA size and LV mass with grades of diastolic dysfunction.

The normal LV mass depends on the age and sex of the patients. Usually it is between 67 -162 grams in women and 88 -224 in men.

It was however noted that there existed a statistically significant correlation between LV mass and grades of diastolic dysfunction. The results were found to be statistically significant with a p value of less than 0.001. A study performed by Voulgeri CH, Tentolouris N, Moyssakis I et al revealed similar results²

Thus it was concluded that poorly controlled hyperglycemia had a poor outcome with respect to cardiovascular function.

VI. Conclusions

The study revealed the following conclusions:

Type 2 diabetics with a poorly controlled blood sugar levels had poor cardiovascular function. This is revealed in the form of:

1. Statistically significant correlation between mean HbA1c levels and grades of diastolic dysfunction.
2. Statistically significant correlation between duration of diabetes and grades of diastolic dysfunction.
3. Statistically significant correlation between LV mass and grades of diastolic dysfunction.
4. Statistically significant correlation between LA size and grades of diastolic dysfunction.

The study in turn highlights the fact that screening of patients with diabetes mellitus at the incipient stage and constant motivation of diabetics towards good sugar control may help preventing adverse cardiovascular outcomes.

Bibliography

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- [2]. Voulgari CH, Tentolouris N, Moyssakis I, et al. Spatial QRS-T angle:association with diabetes and left ventricular performance. *Eur J ClinInvest.* 2006;36:608–613.

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