



A STUDY OF LEFT VENTRICULAR MASS AND ITS CORRELATION WITH HbA1C IN TYPE 2 DIABETES MELLITUS PATIENTS: EXPERIENCE FROM TERTIARY CARE CENTRE IN ROHILKHAND REGION BAREILLY.

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ABSTRACT **Aim-**A study of left ventricular mass and its correlation with HbA1C in type 2 diabetes mellitus patients presented to tertiary care centre.

Methods- The study involved patients with type 2 diabetes mellitus admitted in Shri Ram Murti Smarak Institute Of Medical Sciences Bareilly between December 2016 to December 2018.

Result-Hundred subjects were included and divided into 2 groups (case and control) having 50 in each group. Among 50 diabetic patients there were 38 male patients and constituted 76% of total diabetic group and female patients are 12 in number and constituted 24% of total diabetic group. LVM in diabetic patients increases with BMI, duration of diabetes (> 7 years), increasing HbA1c level. LVM is significantly higher in diabetic patients without albuminuria, parent ischaemic heart disease, hypertension as compared to healthy controls.

Conclusion-Our studies shows that higher the duration of diabetes (>7 years), patients who are obese and with increasing level of HbA1c with poor glycaemic control have strong association of developing high LVM which finally leads to LVH.

KEYWORDS :

INTRODUCTION

Diabetes mellitus is a worldwide health problem affecting millions in both developed and developing countries.¹ Cardiovascular diseases like congestive heart failure, coronary artery disease, MI, accounts for highest mortality in diabetic patient^{2,3}. There are 347 million diabetics worldwide.⁴

Left ventricular hypertrophy (LVH), which is a ominous prognostic sign and an independent risk factor for cardiac patients in type 2 DM patients. Echocardiography provides a reliable non invasive tool for detection of LVDD (left ventricular diastolic dysfunction) and left ventricular mass and has been proven more sensitive method for detection of left ventricular hypertrophy⁵ other than technique. So poor glycaemic control is also associated with more chances of having LVH. Impaired diastolic function is a widely reported finding in diabetic patients without evidence of heart disease caused by other factors. So the aim of the present study is to verify whether HbA1c detect pre clinical diastolic dysfunction in type 2 diabetes mellitus patients.

MATERIAL AND METHODOLOGY

This is prospective cross sectional observational study conducted on 100 patients (50 case and 50 control) admitted in department of medicine at Shri Ram Murti Smarak Institute Of Medical Sciences Bareilly Uttar Pradesh. The duration of study was of 2 years from December 2016 to December 2018.

Inclusion criteria

- Patients on oral or injectable anti diabetic therapy among already diagnosed diabetic patients with average duration of 7 years.
- Patients not on anti diabetic therapy but fulfilling the American Diabetic Association definition for diabetes mellitus.

Fasting blood sugar (FBS) equal to or greater than 126mg/dl

Random blood sugar \geq 200mg/dl

HbA1c \geq 6.5

Exclusion criteria

- Patients of known hypertension with and without drugs.
- Patients of known ischaemic heart disease, CHF, cardiomyopathy, thyroid disorder, and renal involvement and valvular heart disease.
- Known case with diabetes mellitus type 1.
- Not consenting to participate in the study.

In all the subjects other than routine investigations HbA1c was estimated and echocardiography was done to evaluate LVDD. M-mode and pulsed Doppler echocardiography were performed according to the recommendations of the American Society of

Echocardiography using Vingmed CFM725 equipped with a 3.25-MHZ transducer.

STATISTICAL ANALYSIS

Data was analyzed using Statistical Package for Social Sciences, version 23 (SPSS Inc., Chicago, IL). Results for continuous variables are presented as mean \pm standard deviation, whereas results for categorical variables are presented as number (percentage). Unpaired t-test and chi-square test was used. The level $P < 0.05$ was considered as the cutoff value or significance.

RESULTS

In this study, 100 patients were included and divided into 2 groups (case and control) having 50 patients in each group. Among 50 DM patients, there were 38 male patients and they constituted 76% of the total diabetic group; female patients were 12 in number and they constituted 24% of the diabetic total group. The mean age of case patients was 55.72 \pm 8.63 year, range of age was 35-70 years. Haemodynamic parameters of the case and control group shows the non-significant difference except the heart rate which was found to be significant ($p < 0.05$) [table no 1]. All structural measurements of the left ventricle- left ventricular internal dimension in diastole (LVIDD), left ventricular posterior wall thickness (LVPWT), and interventricular septal thickness (IVST)- were higher in type 2 DM patients than control subjects and the difference was also statistically significant ($p < 0.001$) [table no.2]. In haematological profile only HbA1c was showing the significant difference ($p < 0.05$) [table no.3]. Higher the duration of diabetes mellitus (>7 years) higher will be the LVM. [table no.4]

Table no 1. haemodynamic parameter of case and control group

Haemodynamic parameters	Case (n=50)	Control (n=50)	p-value
SBP	130.12 \pm 9.68	125.34 \pm 20.16	0.134
DBP	85.08 \pm 13.19	81.42 \pm 13.71	0.177
Heart rate	85.78 \pm 26.83	74.88 \pm 3.5	0.005

Table no. 2 Echocardiographic profile of case and control subjects

Echocardiographic findings	Case (n=50)	Control (n=50)	p-value
LV mass (g)	175.16 \pm 28.55	128.25 \pm 28.13	<0.01
LVIDD (cms)	4.56 \pm 0.26	4.28 \pm 0.56	0.002
IVST (cms)	1.06 \pm 0.13	0.99 \pm 0.16	0.018
Post.wall thickness	1.08 \pm 0.14	0.96 \pm 0.17	0.0002

Table no.3 haematological profile of studied patients

Haematology	Case (n=50)	Control (n=50)	p-value
FBS (mg/dl)	121.46±12.82	118.44±13.72	0.281
PPBS (mg/dl)	259.76±63.29	275.3±54.16	0.178
HbA1c(%)	8.33±1.03	5.4±0.57	<0.01

Table no. 4 Relation between duration of DM and LVM in case

Duration of Diabetes	High LVM	Normal LVM
< 7 years	6 (12%)	18 (36%)
>7 years	21 (42%)	5 (10%)

DISCUSSION

In the present study the mean SBP of the cases was found to be increased 130.12±9.68 while DBP was 85.08±13.19 while the heart rate was recorded as 85.78±26.83 [Table No. 1] our data were comparable with Panchal N et al⁶ recorded SBP and DBP as 129.84 ±6.95 and 79.28 ±3.47 respectively also Alexander Stefanidis et al⁷ SBP as 144.0±19.0, DBP as 87.0±11.0 and heart rate 77.0±11.0 which were almost similar to our study. SantraS et al⁸ find SBP as 133.65 ± 6.03 and DBP as 82.21 ± 5.25. Almost similar results were depicted in comparable studies as in the present study as mentioned in the above table.

The present study showed the echocardiographic variables in which all the parameters were found to be higher than the normal range; mean LV mass in cases was found to be 175.16±28.55, LVID as 4.56±0.26, IVST 1.06±0.13 and posterior wall thickness as 1.08±0.14 and all the variables were found to be statistically significant ($p < 0.05$) [Table no. 2] while comparing with controls. The above findings were comparable with a study done by SantraS et al⁸ and all parameters were found to be higher than the normal range found the values as 177.34±43.39, 4.56±0.262, 1.09±0.134 and 1.06±0.15 respectively of LV mass, LVID, IVST and posterior wall thickness. All structural measurements of the left ventricle – left ventricular internal dimension in diastole [LVID(D)], left ventricular posterior wall thickness (LVPWT), and inter-ventricular septal thickness (IVST) – were higher in type 2 DM patients than control subjects and the difference was also statistically significant ($P < 0.000$). The present study depicts the hematology parameters like FBS (121.46±12.82), PP (259.76±63.29) and HbA1c (8.33±1.03) and HbA1c was found to be statistically highly significant ($p < 0.05$) and above the normal range. The data is comparable with SantraS et al⁸ and Panchal N et al as mentioned in the above table no.3.

Our study shows that when the duration of diabetes increases the prevalence of LVM also increases and in our study 42.0% were having high LVM as the duration of diabetes was more than seven years (table no.4)

CONCLUSION

LVM was significantly higher in type 2 diabetic patients without hypertension, albuminuria, and parent ischemic heart disease as compared to healthy controls. LVM in diabetic patients increases with the duration of diabetes. So patients with a longer duration of diabetes have more chances of having LVH. LVM in diabetic patients also increases with the HbA1c level. So a poor glycemic control was also associated with more chances of having LVH. HbA1c is seems to be reliable predictor of Left Ventricular Diastolic Dysfunction. Our Study demonstrated a very significant positive correlation between level of glycosylated hemoglobin (HbA1C) and frequency of LVH and Left Ventricular Diastolic Dysfunction in the already diagnosed cases of type 2 diabetes mellitus.

REFERENCES

1. N. Kochupillai, Diabetes Mellitus – A National health problem with major socioeconomic implications; INT. J. DIAB. DEV. COUNTRIES 2016;18:69-70.
2. Vokonas PS, Kannel WB Diabetes mellitus and coronary heart disease in the elderly. Clin Geriatr Med 1996;12:69-78.
3. Saunders J, Mathewkutty S, Drazner MH, McGuire DK: Cardiomyopathy in type 2 diabetes: update on pathophysiological mechanisms. Herz 2008;33:184-90, Review.
4. Hirayamma H, Sunago M, Abe N, Yonemochi H, Makino N as determination of left ventricular mass by echocardiography in normotensive diabetic patients. Jpn Circ J.2000;64:921-4.
5. Isaz K, Thompson A, Ethevenot G, Cloez JL, Bremilla B, Pernot C: Doppler echocardiographic measurement of low velocity motion of the left ventricular posterior wall. Am J Cardiol 1989;64(1):66-75
6. Panchal N, Thakral S, Modwal R. A Study of Left Ventricular Dysfunction in Patients with Diabetes Mellitus. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) Volume 14, Issue 10 Ver. X 2015; PP:01-06
7. Alexander Stefanidis, Stavros Bousboulas, John Kalafatis, Kyriaki Baroutsis, Panagiotis Margos, Komminos Komminos, Stavros Pappas, and Evaggelos Papasteriadis; Left ventricular anatomical and functional changes with ageing in type 2 diabetic adults; European Journal of Echocardiography 2009;10: 647–653

8. Santra S, Basu AK, Chowdhury PR, Banerjee R, Singhania P, Singh S, Datta UK; Comparison of left ventricular mass in normotensive type 2 diabetes mellitus patients with that in the nondiabetic population; Journal of Cardiovascular Disease Research: 2011;2(1): 50-56.
9. Sanjeev Kumar, G K Aneja, Arvind Trivedi, V Atam, Abhishek Singh, Neetu Verma Ajay Panwar, Pradeep Kumar; Glycosylated Hemoglobin (HbA1c) is a reliable Predictor of left ventricular hypertrophy (LVH) and left ventricular diastolic dysfunction (LVDD) in newly diagnosed type 2 diabetic patients of western Uttar Pradesh; International Journal of Scientific and Research Publications, Volume 4, Issue 12, December 2014; ISSN :2250-3153
10. Santra S, Basu AK, Chowdhury PR, Banerjee R, Singhania P, Singh S, Datta UK; Comparison of left ventricular mass in normotensive type 2 diabetes mellitus patients with that in the nondiabetic population; Journal of Cardiovascular Disease Research: 2011;2(1): 50-56. Case Reports in Pathology, vol. 2016, Article ID 5060964, 4 pages, 2016. <https://doi.org/10.1155/2016/5060964>.