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Title :

Left ventricular mass in diabetic youngs patients and healthy young with diabetic parents .

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IN THE NAME OF GOD

TO MY PARENTS

TO MY FAMILY

SPOUSE

MOHAMMAD

CHILDREN

MAHSA AND MAHDI

WITH A LOT OF KIND OF

Dr . HASHEMI

Abstract

Back ground:

The increased left ventricular mass (LVM) is a strong risk factor for cardiac mortality. Although the relationship between diabetes mellitus (DM) and LVM in adults is established, it is not universally accepted in young diabetic patients.

We sought to determine LVM in young diabetics, healthy youngs with diabetic parents and healthy youngs.

Methods:

This was a descriptive case- control study. The non probability convenience sampling was done to choose 30 young insulin dependent diabetics (group I), 30 healthy young with history of DM in one of his or her parents (group II) and 30 healthy young without history of DM in his or her parents (group III).

The LVM of these 3 groups were measured by two dimensional echo cardiography and mean of LVM in 3 groups were compared by ANOVA.

Results:

The mean age of patients was 14.3 ± 2.3 years. ANOVA showed significant difference between LVM in three groups. (F=5.005 p=0.009). According to scheffe test the difference between group II and group III is significant while there is no siginficant difference between group I and other groups.

Conclusion:

This study showed that offsprings of diabetic patients have significantly higher LVM than normal healthy groups but diabetic patients have mildly elevated LVM versus control group. The higher LVM in healthy youngs with diabetic parents must be noted and more studies must be performed on this group who might be benefit from risk factor modification.

Key words: left ventricular mass, Diabetes, young, diabetic parents, Isfahan

Introduction:

The degree of increased myocardial muscle mass is a strong and independent risk factor for cardiac morbidity and mortality.[1,2] In addition, the risk of ventricular arrhythmia is increased at least two fold in the presence of left ventricular hypertrophy (LVH)[3].

Although many variables such as hypertension, obesity, volume load, renin-angiotensin activity and whole blood viscosity correlate with LVH[4,5] , but also close correlation between diabetes mellitus (DM) and LVH have been established .[2,6,7,8]

Postmortem studies in non-insulin dependent diabetic (type II) subjects that died from heart failure revealed increased left ventricular mass (LVM), myocardial and perivasculer fibrosis [9]. Insulin–dependent diabetes mellitus (IDDM) also associated with increased LVM [6], that may occurs before the onset of hypertention [10].

In previous studies the relation of DM, microalbuminurea creatinine clearance and glycosylated hemoglobin (HbA_1c) with LVH has been evaluated and they found the correlation between these variables and increased LVM. [6,11] Many factors such as hypertension, diabetic nephropathy, obesity, hyperinsulinemia, disautonomia and genetic abnormalities are suggeted that contribute to increased LVM in DM[16, 19, 20, 21, 22]. Since genetic abnormalites probably have influence on LVH, we sought to determine left ventricular mass in healthy youngs with diabetic parents and diabetic youngs.

Methods and materials:

This study was a descriptive case control survey. The study population consist of 30 insulin dependent diabetic patients (group I),30 healthy youngs with history of NIDDM in one of his or her parents (group II) and 30 healty matched individuals (group III).

Non-probability convenience sampling method was applied to choose 60 subjects from patients of Isfahan Endocrine and Metabolism Research Center and offsprings of diabetic patients in that center, in 2003. the control group were healthy volunteers that were referred from Isfahan schools.

The age of participitants was in the range of 10-19 years. IDDM was defined as requiring daily insulin administration to prevent the metabolic cascade of diabetic ketoacidosis.[17]

The participitants underwent a medical history and physical examination. Resting blood pressure (BP) was obtained in a sitting position and non of them had clinical or echocardiographic evidence of structural heart disease.

Inclusion criteria were: history of IDDM for less than 6 years in group I, history of DM in one parents in group II, Body Mass Index<25, BP below 95 percentile, absence of diabetic nephropathy according to urinary protein excretion level<200 mg / 24[18] hr.

The weight (wt) and height (ht) of participitants were measured and body mass index was calculated in according to following formula[6]:

Body mass index (Quetlet index)= wt (kg)/ht(m)^2

The patients with IDDM also had a blood sample obtained for glycosylated hemoglobin (HbA1C) assay.

All subjects underwent echocardiography by using ultrasound imaging system (wingmed model 800 A) by an expert cardiologist in the Isfahan Heart Research Center.

Left ventricular end-diastolic dimension, septum and posterior wall thickness of left ventricle at the end of distole were measured, and LVM calculated according to deveroux[15] formula in grams.

$LVM_{(g)}= 1.04\ [(LVID_{ED} + PWT_{ED} + IVS_{ED})^3 - (LVID_{ED})^3]. 0.8 + 0.6$

values are presented as mean ± SD.

These measurements include the interventricular septal thickness (IVS), the internal diameter of the heart (LVID), and the posterior left ventricular wall (PWT) in centimeter, all measured at end diastole in the left para–sternal long-axis view.

Data analysis was performed with SPSS software package and data of three groups were statistically compared by analysis of variance (ANOVA) method.

Data of each group were compared to other group by scheffe test.

The relation between BMI and LVM was evaluated by Pearson correlation coefficient.

Results:

The study population consisted of tree groups. First, 30 patients with IDDM (15 boys and 15 girls; mean ± 1 SD age 14.3 ± 2.8 years, mean duration of DM 3 ± 2.1 years). The second, 30 healthy youngs with history of DM in one of his or her parents (15 boys and 15 girls; age 14.7 ± 2.3 years). The third, 30 healthy individuals (15 boys and 15 girls; age 13.4 ± 1.6).

There was no significant statistically difference between three groups about BMI (F=0.873, P=0.421). Pearson correlation coefficient showed that LVM was directly associated with increased BMI in each group (r=0.61, p=0.002, r=0.54, p=0.002, r=0.56, p=0.001)

Analysis of variance showed significant difference in LVM between three groups. (F=5.005, P=0.009). According to scheffe test the difference of LVM between the first and third groups was significant, while comparing between the second and third groups, the first and second groups was not significant.

The average BMI and LVM have shown in table 1.

LVM was no significantly correlated with glycosylated hemoglobin level in diabetic patients. (table 2)

Table 1: The averages BMI and LVM in three groups

Variable	Group	N	Mean ± SD		F	P-value
BMI	Diabetic patients	30	19.7	4.2	0.873	0.421
	Healty youngs with diabetic parents	30	20.3	3.7		
	Healty youngs	30	19.1	3.2		
LVM	Diabetic patients	30	74.4	32.4	5.005	0.009*
	Healty youngs with diabetic parents	30	82.1	24		
	Healty youngs	30	61	21.5		

* P<0.01

Table 2: relation of HbA1C and LVM

HbA1C / LVM	Meant ± SD	t	P-value
<7	68.2±45.6	0.576	0.569
>7	76.3±28.3		

* P<0.05

Discussion:

Although the relation of diabetes mellitus and increased LVM is established,[2, 6, 7, 8] the presence of cardiac abnormalties and left ventricular hypertrophy in young diabetic patients is not universally accepted[6]. kimball showed that diabetic young patients have significantly increased LVM compared with control subjects.[6]

In our study, there was no significant difference in LVM between diabetic young patients and control group, the reason might be short duration (mean, 3 ± 2.1 years) of diabetes in our patients group versus Kimbal study.(9 ± 5 years) Also Chen and his colleagues found that there was no significant diference between LVM in diabetic young patients and control group.

Because of short duration of IDDM (4.02 ± 4.07 years) which is similar to our findings.

Lind and his colleagues have shown that LVM was only marginally and not significantly elevated in diabetic patients.[4]

In our research, we also found that the significant difference of LVM between healthy youngs with diabetic parent and control group which must be noted because increased LVM is associated with increased cardiovascular morbidity and mortality,[1,2] and its early diagnosis and prevention is important and drug therapy can cause regression of LVH, improvement of left ventricular function and decreases cardiovascular morbidity.[13]

The high prevalence of LVH in this group, strengthens the case for echocardiographic screening who might benefit from cardiovascular risk

factor interventions.

In this regard we suggest that in future study offsprings of diabetic patients evaluate for other risk factors of LVH such as hyperlipidemia, hypertension and albuminuria.

Multiple regression analyses demonstrated that LVM was associated with increased BMI (a measure of obesity).

The relation of LVM to obesity has been well documented.[13, 14] and this relationship in other studies has been confirmed.[6, 8, 11]

In our study, LVM did not significantly correlate with HbA1C level in diabetic young patients. This result was agreed with chen.[7] and Hirayama[1] studies. But, kimball showed that HbA1C had significant correlation with left ventricular mass.[6]

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