Diabetes Mellites and Echocardiographic Ventricular Function in Free Living Men and Women

Thesis

Submitted For Partial Fulfillment Of Master Degree In Cardiology
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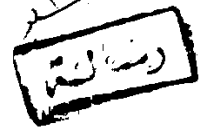

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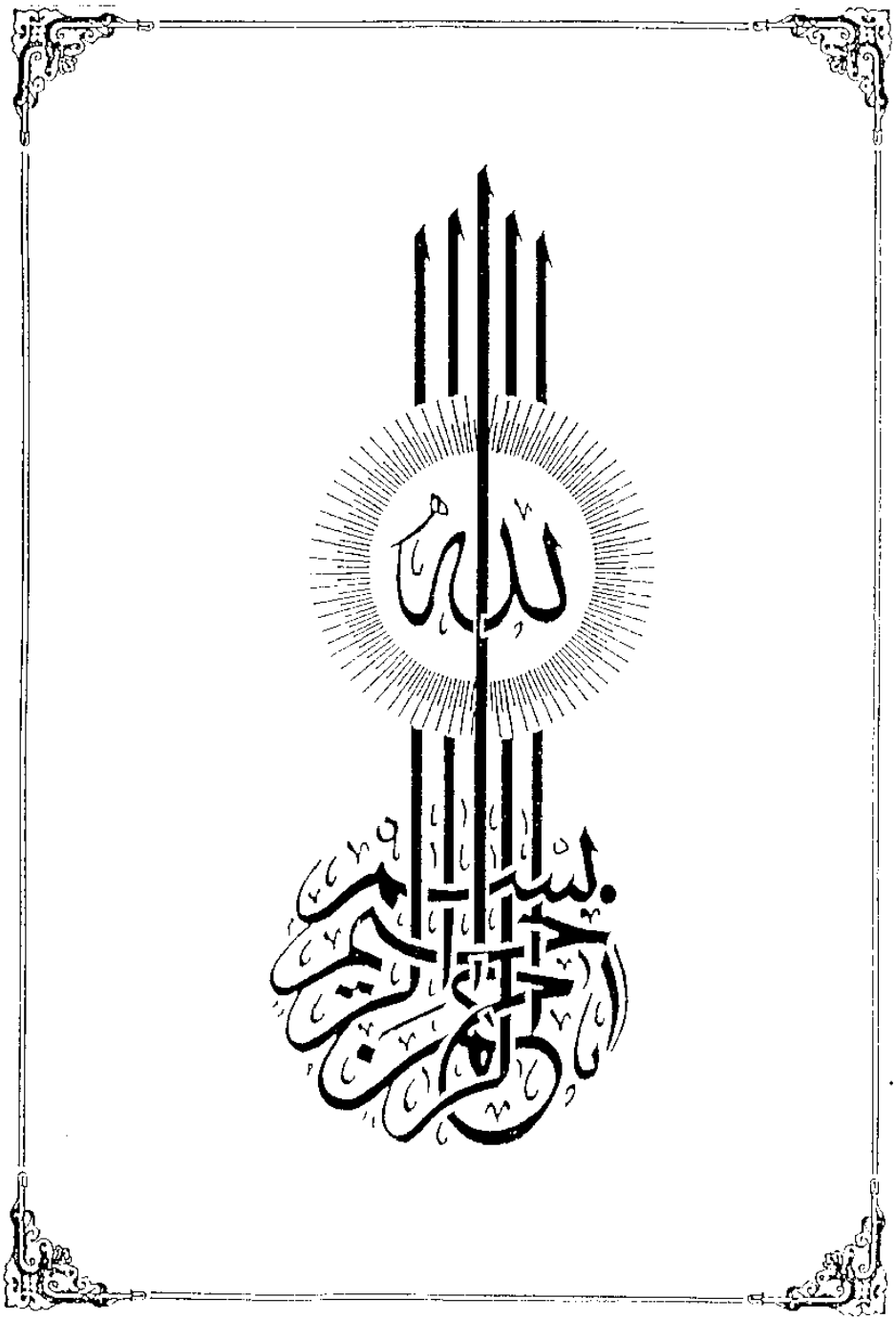
I can only pray to Allah to care all the patients involved in this study for their Co-operation and patience.



CONTENTS

LIST OF ABBREVIATION

(PAI)-I	Plasminogen Activator Inhibitor
2D echocardiography	2 Dimensional Echocardiography
2HPPS	2 Hour Post prandial Blood Sugar
A Acc	A Acceleration Time
A Dec	A Deceleration Time
AO	Aorta
ASE	American Society of Echocardiography
CAD	Coronary Artery Disease
CVD	Cardiovascular Disease
E Acc	E Acceleration Time
E Dec	E Deceleration Time
EDD	End Diastolic Diameter
EDV	End Diastolic Volume
EF	Ejection Fraction
EPSS	E Point Septal Separation
ESD	End Systolic Diameter
ESV	End Systolic Volume
FBS	Fasting Blood Sugar
FFA	Free Fatty Acid

HDL	High Density Lipoprotein
IDDM	Insulin Dependent Diabetes Mellitus
IGT	Impaired Glucose Tolerance
ISRT	Isovolumic Relaxation Time
LA	Left Atrium
LDL	Low Density Lipoprotein
LV	Left Ventricle
MI	Myocardial Infarction
NIDDM	Non-Insulin Dependent Diabetes Mellitus
PWT	Posterior wall thickness
RVIDD	Right Ventricular Diameter In diastole
RVIDS	Right Ventricular Diameter In systole
STIS	Systolic Time Intervals
SV	Stroke Volume
TAPSE	Tricuspid Annular Plane Systolic Excursion
TG	Triglyceride
VLDL	Very low Density Lipoprotein

INTRODUCTION

AIM OF THE WORK

INTRODUCTION

Diabetes mellitus is a major health problem all over the world. With recent advances in the treatment of diabetic coma, now nearly all the morbidity from diabetes mellitus is related to cardiovascular dysfunction ***(Marble 1971).***

Accelerated coronary artery and peripheral atherosclerotic disease are recognized as important outcome related to duration of diabetes and adequacy of blood sugar control ***(Wilson et al., 1990)-(krolowski et al., 1991).***

In the framingham study ***(Galderisi et al., 1991)***, the prevalence of left ventricular hypertrophy in absence of hypertension was found to be increased among women who either has glucose intolerance or frank diabetes.

Impaired left ventricle diastolic filling and reduced end-diastolic volume may accompany diabetes independent of ischaemic heart disease, heart rate or blood pressure ***(Paillole et al., 1990)***.

In study of ***(Lee et al., 1997)***, there is associated abnormal left ventricular wall thickness and diastolic filling abnormality in free living elderly diabetic persons.

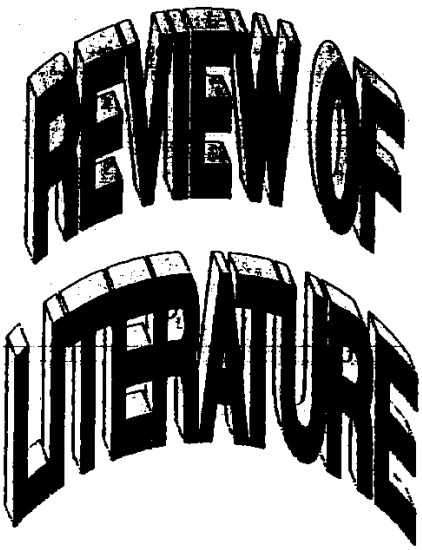
Arend et al., (1997) concluded that echocardiography is essential tool for detecting left ventricular dysfunction. Recent data from Framingham study have indicated that M-mode echocardiography determined left ventricular hypertrophy is an independent predictor of mortality and morbidity.

Various parameter of left ventricular global and segmental systolic function that can be evaluated by two-dimensional (2-D) echocardiography, such as decreased ejection fraction and abnormal segmental wall motion, have been associated with greater cardiovascular morbidity and mortality ***(Eker et al., 1989)***.

Appleton et al., (1988) concluded that despite the indirect method of estimation and certain limitations, mitral flow velocity recordings have clinical potential in assessing left ventricular diastolic function that merits further investigation.

AIM OF THE STUDY

The aim of this Study is to evaluate left and right ventricular functions in asymptomatic (from cardiac point of view) diabetic patients by echocadiography.



CHAPTER I
DIABETES MELLITUS

Definition:

Diabetes mellitus is a syndrome characterized by chronic hyperglycaemia and disturbances of carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion and or insulin action ***(Bennett, 1994).***

Diabetes mellitus is one of the most common chronic diseases. Throughout the world, about 30 million people are thought to be affected by diabetes. However, diabetes is not only a problem of morbidity but also of mortality since it is one of the leading causes of death in the developed countries ***(Schimake, 1980).***

In its fully developed clinical expression, it is characterized by fasting hyperglycaemia and in the majority of long standing patients by microangiopathic vascular complications, especially in the eye and kidney, by an increased frequency of macrovascular disease such as coronary heart and peripheral vascular disease and by neuropathy. ***(Stefan, 1990).***

Classification and pathogenesis of diabetes mellitus:

The most widely accepted classification of diabetes mellitus was devised initially by the National Diabetes Data Group (NDDG) in the United States and subsequently became the basis for WHO classification of diabetes. This classification was first adopted by WHO in 1980 and modified in 1985.

A) Clinical Classes:

I- Diabetes mellitus:

- Insulin dependent diabetes mellitus

- Non insulin dependent diabetes mellitus:-

  a) Non-obese b) obese

- Malnutrition related diabetes mellitus.

- Other types of diabetes mellitus associated with certain conditions and syndromes.

  1) pancreatic disease.

  2) Disease of hormonal aetiology.

  3) drug or chemical-induced conditions.

  4) Abnormalities of insulin or its receptors,

  5) certain genetic syndromes,

  6) Miscellaneous.

II- Impaired glucose tolerance:

a) Non obese

b) obese

c) associated with certain conditions and syndromes.

III- Gestational diabetes.

B) Statistical Risk-Classes:

Normal glucose tolerance but substantially increased risk of developing diabetes:

* Previous abnormality of glucose tolerance.

* Potential abnormality of glucose tolerance. ***(Bennett, 1994)*** .

Diagnosis of Diabetes Mellitus

The diagnosis of symptomatic diabetes is not difficult. The symptoms of increased thirst, polyuria, polyphagia, and weight loss coupled with an elevation of the plasma glucose level are pathognomonic.

When diabetes is suspected in an asymptomatic patient, the primary diagnostic test is measurement of the fasting plasma glucose concentration. If the value is not elevated, an oral glucose tolerance test can be done. Other procedures are of less value. ***(Unger and Foster, 1992).***

I- Fasting plasma glucose:

The gold standard for the diagnosis of diabetes is an elevated glucose concentration in the plasma after an over-night fast.

The diagnostic value usually cited is 7.8 mmol/L (140 mg/dl) or above on at least two occasions ***(NDDG, 1979).***

II- Oral glucose tolerance test (GTT):

Tolerance test is indicated in individuals with fasting plasma glucose level of less than 140 mg/dl and who need diagnostic testing. This test is performed in the morning after a fast of 10 to 14 hours. To achieve international standardization both the NDDG ***(1979)*** and ***WHO (1980, 1985)*** recommended the use of an oral 75 gram glucose load (dissolved in 300 ml of water) for adults, or a load of 1.75g/Kg Ideal body weight up to a maximum of 75g to be used for children.

Timing of the GTT is begun after the first swallow of the glucose solution, which should be consumed over 5 minutes Blood samples are obtained in the fasting state and at o.5, 1, 1.5 and 2 hours after beginning of glucose ingestion.

A normal test result consists of a fasting level <115mg/dl peak level <200 mg/dl and a 2-h level <140 mg/dl. If the plasma glucose level at 2 hours is > 200 mg/dl and at least one value between zero and 2 hours is also > 200 mg/dl the diagnosis of diabetes is established *(NDDG, 1979).*

- Impaired glucose tolerance (IGT):

Individuals with a fasting plasma glucose level of <140 mg/dl, a 2-h value between 140 and 199 mg/dl and an intervening value of ≥ 200mg/dl *(NDDG, 1979).*

Table (1): A Comparison between the new and old criteria for diagnosing diabetes.

	Venous plasma glucose levels.	Old criteria (NDDG 1979)	New criteria (Expert committee 1997)
Fasting value	Normal	<115mg/dl	<110mg/dl
	Impaired fasting glucose (IFG)	N/A	110-125 mg/dl
	Diabetes	≥140 mg/dl	≥ 126 mg/dl
2- Hour value (after 75g glucose)	Normal	<140 mg/dl	No change
	Impaired gluose tolerance (IGT)	140-199 mg/gl	No change
	Diabetes	≥200 mg/dl	No change
Random value (with symptoms of diabetes)	Diabetes	≥200 mg/dl	No change

Diagnosis of gestational diabetes:

During pregnancy, the oral glucose tolerance is performed using 100 gram of glucose.