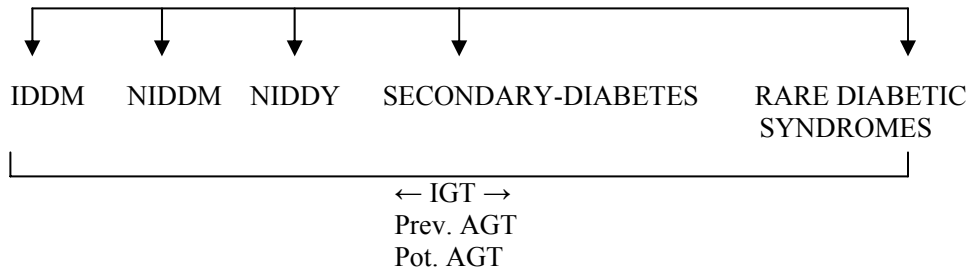# DIABETES AND HEART

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Introduction

Diabetes mellitus is defined as a metabolic-cum-vaseular disorder with specific affection of micro and macrovasculature due to absolute or relative insulin deficiency, associated with hyperglycemia.

Various clinical types of diabetes are :

IDDM   NIDDM   NIDDY   SECONDARY-DIABETES   RARE DIABETIC SYNDROMES

$\leftarrow$ IGT $\rightarrow$
Prev. AGT
Pot. AGT

In all the clinical and statistical classes of diabetes cardiac involvement can occur and can be recognised. It is most prominent in NIDDM and IGT at all stages. Even in IDDM some form of cardiac involvement is present even in early stages.

The fourfold approach in Cardio Diabetology is :

(1) Diabetes and Coronary heart disease.

(2) Specific diabetic Cardiomyopathy
(Metabolic - microangiopathic and mixed forms.)

(3) Diabetic Autonomic neuropathy

(4) Effect of heart disease on carbohydrate metobolism.

In 1, 2 & 3 we observe the effect of the diabetes on the heart whereas the 4th is referred to as the effect of heart disease on Carbohydrate metabolism viz stress hyperglycemia during acute myocardial infarction, etc.

Coronary artery disease is more common in diabetics compared to nondiabetics. Diabetics have a minimum of more than two-fold chances of getting myocardial infarction compared to the non-diabetic counterparts. Women who enjoy the protection from coronary heart disease during childbearing age are devoid of this unique protection once they become diabetic. Heart-failure is more common in women. Recurrent CCF is an indicator of diabetic cardiomyopathy especially in women.

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Diabetic Cardiomyopathy has been accepted to-day as a definite entity. It manifests in the early stages as left, ventricular dysfunction even in asymptomatic diabetics and can be assessed by non-invasive techniques like 2D and M mode Echocardiogram, systolic time intervals, etc. Later it may manifest as CCF due to the stiff heart syndrome. This may be superimposed on CAD in the same individual. Even in the infant of the diabetic mother there is a temporary cardiomyapathy in the form of thickening of the interventricular septum which again is an Echo diagnosis:

Diabetes and Autonomic Neuropathy : both the sympathetic and parasympathetic nervous systems may be involved. There are various tests to assess cardiac autonomic dysfunction like changes in heart rate (parasympathetic) changes in BP (sympathetic) etc. Today 24 hour Holter monitoring is an important way to assess ANS affection in diabetics. Various other cardiopulmonary tests are also available.

Effect of Cardiac Diseases on Carbohydrate Metabolism : This may occur in various forms of which stress hyperglycemia is the most important. It occurs during MI in some cases. This may also occur in other stressful conditions like pregnancy, stroke, surgery, head injury, etc. Stress ketosis also is well known which may occur even in a non-diabetic: Chronic stress hyperglycemia is however a separate entity which is supposed to operate in peripheral vascular disease. The relationship between hyperglycemia and CCF and angina is well known.

In this connection I would like to present a brief review of the work which was done at the Cardio-diabetology division, Government Royapettah Hospital, Madras on stress hyperglycemia.

87 patients admitted into the ICCU were studied: Known diabetics, patients with shock and deaths in ICCU were excluded from the study.

Table l
GROUPING CRITERIA

Groups	Random blood, glucose (mg %)	HBA_1C	Fasting blood glucose (mg %)	2 hr Post glucose blood glucose (mg %)
I n38	<140	<7%	<140	<200
II n38	> 140	<7%	<14O	<200
III n11	>140	>7%	>140	>200

Table 2

Results-Mean Values

Group	Random blood glucose mg%	HBA$_1$C	Fasting blood glucose mg%	2 hr Post glucose blood glucose mg%
I n-38	105.68	5.67%	89.78	125.13
II n-38	225.52	6.26%	86.57	125.10
III n-11	333.45	14.25%	156.90	254.63

    I   -Normoglycemics
    II   -Stress hyperglycemics
    III -Undetected diabetes

On admission blood was drawn for random blood glucose and HBA$_1$C. Before discharge from the institution on all these patients a fasting blood glucose was done and also a blood glucose after 75 gms glucose load.

On analysing the results the patients fell into 3-groups:

Group. I   38 cases. All of them on admission had a random blood glucose (RBG) of less than 140 mg. % HBA$_1$C less than 7% and a normal fasting random blood glucose (FBG) and 2 hou,r PGBS.

Group II   38 cases has RBS more than 140 mg%; HBA$_1$C less than 7% and a normal FBG and 2 hour PGPD at the end of 3 weeks, qualifying for a stress hyperglycemic status.

Group III had a raised -RBS on admission and HBA$_1$C of > 7% and abnormal FBS & 2 hours PGBS at the end of three weeks. It is obvious that these were undiagnosed diabetes who were diagnosed to have carbohydrate metabolism abnormality during their hospitalisation for acute mycardial infarction.

Estimation of glycosylated hemoglobin is an important tool in evaluating stress hyperglycemia: Stress'hyperglycemia can reach very high levels:

The study of diabetes and heart is an important sub-speciality in diabetology. This is possible by physicians who are interested both in diabetology and cardiology. The study has been made much easier with the advent of non- invasive diagnostic procedures. It will be ideal to screen every diabetic for cardiac involvement but this may not be practicable due to the huge number of patients attending our diabetic OPD. Hence we have a policy to screen atleast newly detected untreated diabetics for cardio vascular affection by doing a routine ECG; a stress ECG, M Mode and 2D Echocardiogram and systolic and diastolic time intervals by multi channel recordings. Thanks to instrumental non-invasive cardiology, the sub speciality of cardio diabetology has come to stay.