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Cardiac Manifestations of Diabetes Mellitus:Findings From A Tertiary Care Hospital.

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Abstract:
Introduction: *Diabetes with cardiac complications is a well-known global problem.Coronary Artery Disease is more prevalent, more severe and occurs early indiabetics than non-diabetics.*
Methods:*One hundred patients admitted or attending outpatient clinics of Sri Venkateswara Ramnarain Ruia Government General Hospital andfulfilling the inclusion criteria (mentioned below) were evaluated clinically. A baseline ECG was taken in all cases irrespective of cardiac involvement. Patients withnormal ECG pattern are further evaluated with stress test for latent coronary arterydisease.*
Results:*The maximum numbers of patients were found to be in the age group of 41-60 years(73% of patients) and majority (64%) were males. In this study forty percent of patients had evidence of Ischemic Heart Disease. 36%of patients had cardiac autonomic neuropathy. 10% of patients developedCongestive Cardiac Failure and 4%of patients had Dilated Cardiomyopathy.Among 40 patients of Ischemic Heart Disease 18 patients had Angina and 22patients had Myocardial Infarction. Among 36 cases of cardiac autonomic neuropathy, Parasympathetic involvement (n=22) was more common than sympathetic involvement (n=14).*
Conclusion*: With the present study it can be concluded that there is a high occurrence ofCoronary Artery Disease with Coronary risk factors in patients with DiabetesMellitus. Even modifiable risk factors like smoking are present in a significantproportion of patients. All patients with Diabetes Mellitus should be screened forlatent Coronary Artery Disease.*
Keywords*: diabetes mellitus, cardiac manifestations, Ischemic Heart Disease, cardiac autonomic neuropathy*

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I. Introduction

Diabetes with cardiac complications is a well-known global problem. There are threemajor types of diabetes: type 1 diabetes, type 2diabetes, and gestational diabetes. Diabetes if left untreated will lead to microvascular and macrovascular complications which can eventuallycause heart disease, stroke, kidney disease,blindness, and nerve damage to nerves in thefeet [1,2]. Ageing populations, increasingurbanization, dietary changes, reduced physicalactivity and unhealthy behavior are the rapidcultural and social changes, which causes DM toincrease. In India, a greater degree of insulinresistance and a stronger genetic predispositionto diabetes prevails and the trend will continue toexist in low- and middle-income countries[3,4].

According to International Diabetes Federation, India is one of the 6 countries of the IDF South East Asian region. 425 million people have diabetes in the world and 82 million people in the SEA Region; by 2045 this will rise to 151 million. There were over 72.946.400 cases of diabetes in India in 2017. The prevalence of diabetes in adults in India is 8.8%[5].

Coronary Artery Disease is more prevalent, more severe and occurs early indiabetics than non-diabetics. Higher incidence of Angina Pectoris, MyocardialInfarction (Including Silent M.I.) and Congestive Cardiac Failure has beenreported in Diabetes Mellitus. Early recognition of Coronary Artery Disease inDiabetes Mellitus patients may therefore be important for management andprognostic purposes.

Objectives of the present study were to study the various cardiac manifestations in Diabetes Mellitus like, to evaluate the Associated risk factors in patients with DiabetesMellitus and Cardiac diseases and to find the correlation between cardiac disease and duration of Diabetes Mellitus.

II. Material & Methods

Source of data:

Patients admitted to medical wards and ICCU or attending outpatient clinics of Sri Venkateswara Ramnarain Ruia Government General Hospital, Tirupati over a period from May 2018 to October 2019.

Method of Collection of Data:

One hundred patients admitted or attending outpatient clinics of Sri Venkateswara Ramnarain Ruia Government General Hospital andfulfilling the inclusion criteria (mentioned below) were evaluated clinically. A baseline ECG was taken in all cases irrespective of cardiac involvement. Patients withnormal ECG pattern are further evaluated with stress test for latent coronary artery disease. All the patients subjected to the following investigations.

1) Fasting blood sugar level
2) Postprandial blood sugar level.
3) Blood urea.
4) Serum creatinine
5) Lipid profile
6) Cardiac enzymes (is necessary)
7) Echocardiography (if necessary)
8) Glycosylated haemoglobin

INCLUSION CRITERIA

I. Patients above the age of 18 years
II. Patients with Type 1 Diabetes mellitus.
III. Patients with Type 2 Diabetes mellitus.

EXCLUSION CRITERIA

I. Patients with Hypertensive heart diseases
II. Patients with Cor pulmonale.
III. Patients with Rheumatic heart disease and congenital heart disease.
IV. Patients with Gestational diabetes mel1itus.

Criteria for selection of Patients:

Criteria for selection of DIABETIC patients: The selection of patients for Diabetes mellitus was made as per AMERICANDIABETIC ASSOCIATION CRITERIA.

Criteria for selection of IHD patients: The patients with symptoms of angina and or unstable angina, with or without ECGchanges. Asymptomatic patients with typical ECG changes for silent ischemia werealso included.

III. Results

One hundred patients of Diabetes mellitus Type 1 and Type2 attending theoutpatient clinics and admitted in ICCU and medical wards who satisfied theinclusion criteria were studied and the following observations were made.

The maximum numbers of patients were found to be in the age group of 41-60 years (73% of patients). Majority (64%) were males. Majority (43%) were suffering from diabetes between 5-10 years duration.The mean body mass index of male patients in this study group was 22.6 and that offemales was 23.1. Body mass index of females was higher. 13 males and 5 femaleshad B.M.1 above 25.

Smoking and Alcoholism

16 males (25%) and one female (2.7%) among the study group were chronicsmokers (Biddies and or Cigarettes). Eighteen males (28.12%) consumed alcohol;none of the female patients were alcoholics.

Lipid profile:

The mean total cholesterol level was higher in females compared to males (214.8 Vs200.4 mg %). The mean triglyceride level was again higher in females (163.5 mg %Vs 161.5 mg %). HDL-Cholesterol was less in females compared to males (40.3 mg% Vs 40.9 mg %).

Blood Glucose levels:

Fasting blood glucose at the time of presentation found that 46% of patients had FBS between 120-180 mg%. 30% had between 181-250 and 14% had more than 250 mg%.

Post prandial blood sugar level at thetime of presentation showed that 65% of patients had blood sugar level between 200-400 mg % followed by 21% in the range of 200-300 mg%. 16% of the patients had <200 mg%.

Most common presenting complaint was chest pain and palpitation in 18% patients each, followed by breathlessness in 14%, swelling of feet in 10% and dizziness in 14%.

Clinical presentation:

In this study forty percent of patients had evidence of Ischemic Heart Disease. 36%of patients had cardiac autonomic neuropathy. 10% of patients developedCongestive Cardiac Failure and 4%of patients had Dilated Cardiomyopathy.

Pattern of IHD:

Among 40 patients of Ischemic Heart Disease 18 patients had Angina and 22 patients had Myocardial Infarction. Out of 18 patients of angina only 4 had typical Ischemic changes on resting ECG, rest of the 14 patients had latent Coronary Artery disease, which was detected by stress test.

Table 1: Varied Clinical Manifestations Inthe Present Study

Pattern	Males	Females	Total	Percentage
Angina	9	9	18	18%
Myocardial infarction	10	12	22	22%
Cardiac Autonomic Neuropathy	20	16	36	36%
Congestive cardiac failure	4	6	10	10%
Dilated cardiomyopathy	2	2	4	4%
Sudden cardiac death	0	0	--	--

Pattern of Myocardial Infarction:

36.36 % of patients in this study presented with atypical symptoms or SilentMyocardial Infarction, which was detected on routine ECG recording.

Four patients out of 22 patients presenting with myocardial infarction had atypical presentations. 4 out of 22 (18.20 %) patients with myocardial infarction were totally silent detected on routine ECG.

With regards to pattern of infarction, anterior or antero-lateral infarction was seen in 55.54% cases. Inferior wall infarction and Non-Q wave MI was seen in 18.18% patients. Inferior wall infarctionwith right ventricularextension was seen in 2 cases.

Among 36 cases of cardiac autonomic neuropathy, Parasympathetic involvement (n=22) was more common than sympathetic involvement (n=14).The most common symptoms of Autonomic neuropathy in this study were PosturalGiddiness (22.2%), Impotence (15%), and Bowel disturbances.

Four patients (2 Males and 2 Females) who presented with congestive cardiac failure were evaluated with echocardiography. All four patients had dilated chambers andFour patients (2 Males and 2 Females) who presented with congestive cardiac failurewere evaluated with echocardiography. All four patients had dilated chambers anddecreased ejection fraction. Diagnosis of diabetic cardiomyopathy was madeexcluding other causes of dilated cardiomyopathy.

IV. Discussion

In the present study one hundred patients of Diabetes Mellitus were studied andfollowing observations were made:

AGE: The mean age of the study group was 55.54 years (males-55.73 years and females55.19 years). The mean age group of the study group by Bhuyan AKet al[6] was53.3 ± 10.37 years (range: 36–72 years).

SEX

In the present study group of 100 patients 64 were male patients and 36 were femalepatients. The ratio of male: female is 1.7: 1. Similar findings were observed in Bhuyan AK et al[6] where 60% were males and 40% females.

DURATION OF DIABETES MELLITUS

The mean duration of diabetes mellitus in this study was 9.00 years. 9.07 yearsbeing in males and 8.86 years in females. Bhuyan AK et al[6] observed mean duration of diabetes was 9.03 ± 6.4 years ranging from 6 months to 25 years.

LEVELS OF HYPERGLYCEMIA

The mean fasting blood glucose level in this study was 185.9 mg % (males-184.5mg % and females-188.55 mg%). The mean post prandial blood sugar level at the time of presentation in the studygroup was 263.3 mg % (males 264.15 mg% and females-261.89 mg %). Shettyet al[7]reported 46% of patients had FBS between 120 and 180 mg%. 65% of patients had blood sugar level between 200 and400 mg%.

ISCHEMIC HEART DISEASE

In this study of one hundred patients of diabetes mellitus 40 patients had ischemicheart disease.Out of 40 patients of ischemic heart disease 18 patients had angina pectoris. Only 4patients had typical history of chest pain correlating with angina pectoris and restingECG was showing ischemic changes. Rest of 14 patients (17.94 %) had latentcoronary artery disease which was detected by thread mill test. Shetty et al[7] reported 40% of patients in their study had evidence of Ischemic heart disease.Among 40 patients of IHD 18 patients had angina and22 patients had MI. Out of 18 patients of angina, only 4had typical ischemic changes on resting ECG, rest of the14 patients had latent coronary artery disease, which wasdetected by stress test. Various other studies report widely variable prevalence ofcoronary heart disease among diabetics in India (6.6 to 33%) .

MYOCARDIAL INFARCTION

Among 22 patients with myocardial infarction in the present study 10 patients weremale and 12 patients were females. Females outnumber males in this study, whichcorrelates with the study reported by Jean-o-Partamian and Robert F Bradley in theirseries[8].

In this series of 22 patients with myocardial infarction 18 patients (36.36%) ofpatients presented with atypical manifestations or silent infarction which wasdetected during routine electrocardiographic recording.

James R Morgolis et al reported 23% of silent infarctions in their study[9]. Otherauthors have estimated the occurrence of unrecognized myocardial infarctionbetween 0 to 60 %.

The immediate mortality (within one week) in this series of 22 patients was 31.2 %.Seven patients died within one week of admission. Four died within 24 hours ofadmission. Three died between 24 hours to one week. Partamian and Robert FBradley have reported immediate mortality in their patients at 38% (immediatemortality was arbitrarily defined as 2 months of attack in their study)[8].Two patients out of four who died within 24 hours presented with Cardiogenicshock (systolic BP. less than 90 mm Hg).

Two patients who died between 24 hrsand 1 week had diabetic ketoacidosis and one patient developed fatal ventriculararrhythmias.

PATTERN OF MYOCARDIAL INFARCTION

Twelve out of 22 patients had evidence of anterior/ anterolateral infarction (55.54%). Four patients (18.18 %) had evidence of inferior wall myocardial infarction.Two patients had evidence of inferior wall myocardial infarction with rightventricular extension. Four patients had subendocardial infarction (18.18 %).

CARDIAC AUTONOMIC NEUROPATHY

Thirty-six out of one hundred patients studied had evidence of cardiac autonomicneuropathy (36 %). In our study parasympathetic involvement was more common than sympatheticinvolvement. Predominant symptoms of patient with autonomic neuropathy in our series werepostural giddiness (22.22%), constipation (19.45%), and impotence (15%).

Behera BK et al.[10] study on cardiac autonomic neuropathy in diabetes mellitus patients found that 57.5% of patients with DM had CAN and its incidenceincreased with severity of hyperglycemia, duration of DM, BMI and age of the patient.Allcases had some form of autonomic disturbance. Dizzinesson standing was the most common symptom. Dysphagiawas seen only in one case

V. Conclusions

With the present study it can be concluded that there is a high occurrence ofCoronary Artery Disease with Coronary risk factors in patients with DiabetesMellitus. Even modifiable risk factors like smoking are present in a significantproportion of patients. All patients with Diabetes Mellitus should be screened forlatent Coronary Artery Disease (as it has prognostic implications). Also all patientswith prolonged history of DM should be screened clinically with simple tests for thepresence of Cardiac Autonomic Neuropathy and managed accordingly.

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