Research Article

CLINICAL STUDY OF PREVALENCE OF PATIENTS WITH ISCHEMIC HEART DISEASE IN PRESENCE OF TYPE 2 DIABETES MELLITUS

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ABSTRACT

The term "ischemic heart disease" describes a condition in which there is an inadequate supply of blood and oxygen to a portion of the myocardium; it typically occurs when there is an imbalance between myocardial oxygen supply and demand. The most common cause of myocardial ischaemia is atherosclerotic disease of epicardial coronary arteries. The Indian subcontinent is no exception to this epidemiological transition. Indians have three times higher risks of developing Coronary artery disease (CAD) as compared to Chinese and are twenty times more likely to die due to CAD compared to Asians and white South Africans. In India, 2.78 million deaths are due to CVD of which over 50% is due to CAD. It has been suggested that Indians have exaggerated insulin insensitivity in response to western lifestyle pattern that increases rates of Congestive Heart Disease (CHD) over stroke. In the present study one hundred patients of type 2 diabetes mellitus were evaluated in detail. After a through history and detailed clinical examination resting ECG was taken, patients with normal ECG pattern were further subjected to stress test and echocardiography for detection of latent coronary artery disease. The mean age of the study group was 56.11 years, males being 56.47 years and in females 55.68 years. The mean duration of diabetes mellitus was 8.66 years, males 8.95 years and in females being 8.23 years. The mean fasting blood sugar and post prandial blood sugar in the study group was 190.36 mg% and 262.78 mg% respectively. 41 out of 100 patients had ischemic heart disease, with a male to female ratio of 1.067: 1. Out of 25 patients with myocardial infarction 9 patients (36%) had atypical or silent myocardial infarction which was detected by routine ECG recording. 9 patients out of 25 patients of myocardial infarction died within one week of admission, immediate mortality being 36%. Four out of 100 patients (4%) had evidence of dilated diabetic cardiomyopathy. The predominant microvascular complications observed in the present study was retinopathy 46%, Nephropathy 11% and neuropathy 14%. Hypertension was observed seen in 43% of the patients and the incidence of IHD was higher among this group (68.3. Incidence of IHD among the smokers was 47.1. The mean BMI of males and females in the study group was 23.27 and 22.52 respectively. Incidence of IHD in patients with BMI > 25 was 23.8% , negatively significant association (p = 0.072). The mean total cholesterol LDL cholesterol HDL cholesterol and triglyceride level in the present study was 208.08 mg%, 117.88 mg%, 40.67 mg% and 163.65 mg% respectively. Mean total cholesterol, LDL Cholesterol and triglyceride were higher in patients with CAD and HDL Cholesterol was lower in patients with CAD, when compared with patients without CAD, which is statistically significant. Therefore the above mentioned factors are risk factors for CAD in patients with type 2 diabetes mellitus.

INTRODUCTION

Ischemic heart disease (IHD) is the leading cause of death in the developed world.[1] It causes more death (7.8 million deaths and 12.8 % of total deaths), disability and economic burden than any other issues in the developed world. The WHO has drawn attention to the fact that IHD is our modern "epidemic", i.e. a disease that affects population, not an unavoidable attributes of ageing. In United States, epidemics began in the early 1920 and in Great Britain in 1930.IHD is the most common, serious, life threatening illness in USA, where 13 million persons have IHD and 1.3 million are admitted to the hospital with unstable angina/NSTEMI each year and 3 lakhs

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patients with STEMI each year. The global rise in Cardiovascular disease (CVD) is the result of an unprecedented transformation in the causes of morbidity and mortality during the twentieth and twenty first centuries.[2] Known as the Epidemiological Transition, this shift is driven by industrialization, urbanization and life style changes that is taking place in the every part of the world among all races, ethnic groups and cultures. During this transition, it is been observed that the fifth stage of transition characterized by an epidemic of inactivity and obesity is surpassing the mortality and morbidity from infections and malnutrition. India is already a diabetes capital of the world. India alone is estimated to have 30.8 million inhabitants with diabetes, the most of any country worldwide and its going be even greater in future. Worldwide the number of cases with diabetes is estimated to be around 347 million of these more than 90% are type 2 diabetes mellitus (T2DM). The link between Type 2 DM and CVD is complex, but the two conditions appear to have similar pathophysiological routes which stem from insulin resistance. There are additional diabetes specific factors like glycoxidative stress, hyper/ hypoglycemia, hyperinsulinaemia which increases CVD risk further. India stands out as an anomaly with 30.4% and 39.1% of CHD patients reporting in known diabetics in national and international prospective registries respectively. Several studies (like Finnish, Framingham, MRFIT) showed that presence of diabetes increases the risk of CHD in those patients by 2-3 times. So, considering together these two conditions, it has been observed both are related to each other and increases the mortality and morbidity in individuals from global to regional populations. In Northeastern part of our country also, the incidence of ischemic heart disease in diabetic patients is increasing high. Therefore it is felt necessary to study the association between IHD and Type 2 DM which will help better insight into the problem and better management of the disorder.

This study aims to assess the prevalence of ischemic heart disease in patients with type 2 diabetes mellitus and to study the clinical profile of ischemic heart disease in patients with type2 diabetes mellitus.

METHODOLOGY

It is a Prospective, descriptive study conducted in Downtown hospital after obtaining clearance from the ethical/scientific committee of the hospital.

Sample size - 100 cases fulfilling the inclusion criteria, selected by simple random method.

Data Collection Technique

For primary data

History taking, physical examination, investigations.

For secondary data

Review of literature, text books and websites.
Tools

Direct observations, interview schedule, protocols, tests, examination of medical records, and collection of writing samples.

Inclusion criteria

Patients diagnosed to have type2 diabetes mellitus with irrespective of symptoms suggestive of ischemic heart disease (as diagnosed by WHO criteria).[1]

Exclusion criteria
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- Nondiabetic patient
- Age below 25 years.
- Refusal to participate in the study
- Patients with type1 diabetes mellitus
- Women with gestational diabetes mellitus
- Patients with pulmonary embolism/ Cor pulmonale
- Patients with Rheumatic heart disease/congenital heart disease
- Patients with acute pericarditis/ myocarditis.

A total of 100 patients attending the outpatient department or admitted to medical wards at Downtown hospital and fulfilling the inclusion criteria were evaluated clinically. A baseline Electrocardiogram (ECG) was taken in all cases, irrespective of clinical evidence of cardiac involvement. Patients with normal ECG pattern were further evaluated by Tread Mill Testing (TMT or stress test) for subclinical cardiac involvement. All the patients included in the study were subjected to the appropriate investigations.

Criteria for Selection of Patients

Diabetes Mellitus: The selection of patients was made as per WHO CRITERIA.

Ischemic Heart Disease

Angina: The patients with symptoms of angina with or without ECG changes. Asymptomatic patients with typical ECG changes for silent ischemia were also included.

Acute Myocardial Infarction

1. The patients with typical symptoms and signs of acute myocardial infarction with ECG changes.
2. Asymptomatic patients with ECG changes suggestive of acute MI (Silent MI).
3. In patients with typical symptoms of acute MI, but whose ECG is unequivocal, the diagnosis of acute MI was made based on the levels of cardiac enzymes.

Latent Coronary Artery Disease (Stress Test)

Modified Bruce Protocol was used for stress test as it can be used in old age patients and patients with decreased exercise capacity. Test was considered positive if following criteria's were satisfied.

1. Horizontal or down slopping ST depression of 1 mm or greater at 80 ms from J point (1.5 mm if it is up sloping).
2. ST segment elevation of 1 mm or more than the control tracing in any lad except avR.
3. In the presence of ST depression in the control tracing, additional depression of 1 mm more than the rest.
4. ST segment depression for greater than 5 min during recovery period.
5. Abnormal blood pressure response.
6. Ventricular arrhythmias.

Stress test was terminated if

1. Anginal pain is progressive.
2. Drop in Systolic blood pressure below the resting value or non-raising systolic BP with continued exercise.
3. Frequent VPC's developing in pairs or with increasing frequency as exercise increases or when ventricular tachycardia or ventricular fibrillation develops.
4. Onset of second of third degree heart block.
5. Marked ST segment depression (> 3 mm)
6. ST segment elevation of 2 mm or more.
7. Patients are unable to continue because of dyspnoea, fatigue or dizziness.
8. Development of bundle branch block that cannot be distinguished from ventricular tachycardia.

Congestive Cardiac Failure

1. The patients were selected with typical signs and symptoms like exertional breathlessness easy fatigability and clinical signs of cardiomegaly, pulmonary edema, tender hepatomegaly and raised JVP.
2. Patients with radiographic and or electrocardiographic / echo evidence of cardiomegaly.

Arrythmias: was based on ECG criteria.

Dilated Cardiomyopathy

The evaluation of dilated cardiomyopathy was done after excluding ischemic, valvular and hypertensive heart disease.

Cardiac Autonomic Neuropathy

The clinical tests for Cardiac Autonomic Neuropathy as described by Ewing (Table) were employed for selection of these patients.

Statistical Methods

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. [3, 4] Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups Inter group analysis) on metric parameters, Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. [5, 6]

RESULTS AND OBSERVATIONS

A Clinical study with 100 patients of Type II DM was undertaken. The present study shows majority of population seen in the age group 41-50 years group in both sexes (45% among males and 40% in females) followed by in the age group of 51-60 years. The majority of population in the study group is around the age of 55 years and BMI around 23 kg/m^2 in both gender. Parasthesia, weakness and polyuria are the most common complaints in both sexes whereas bladder and bowel disturbances are least common encountered complaints in the present study. Regarding duration of diabetes in years in both genders, it shows that diabetes and its complications are mostly seen in between 1-24 years of duration where majority of complaints seen during 1-6 years followed by 13-24 years of duration. In this study most of the diabetic patients seem to be on diet control and OHA and very low percentage of people were on combined therapy. Also the study shows that majority people had unsatisfactory diabetic control with such treatment history. The percentage of past cardiac history in this study shows that female population had significant history of past cardiac events as compared to the male population. Study reveals that male population is highly outnumbering the female population in case smoking habits and alcohol consumption**.** It is seen in the study that there is strong familial predisposition of DM, obesity and IHD. Diabetes (M=28.3%, F=42.5%) has shown more preponderance especially in case of female population as compared to obesity (M=11.7%, F=7.5%) and IHD (M=20%, F=12%) when familial predisposition was considered. Majority of the population in the study were found to have hypertension in both sexes (M=38.3%, F=50%) followed by cataract (M=38.3%, F=30%), pedal edema (M=17.5%, F=10%) and cyanosis (M=17.5%, F=10%). It is seen that female population in the study are more affected than the male population. Study shows that both fasting and postprandial blood sugar levels are found high in either of the sexes as per the criteria to diagnose DM.

Study reveals severe dyslipidaemia in the population with slight preponderance in case of females as compared to males. Total cholesterol (M=48.3%, F=57.5%) and triglycerids (M=36.7%, F=47.5%) levels are higher in majority of the population as compared to the other components of lipids with slight female preponderance. The mean fasting blood glucose level in this study was 190.36 (±9.49) mg% [males 183.53 (±60.47) mg% and females 200.25 (±60.03) mg%]. The mean post prandial blood sugar level at the time of presentation among the study group was 262.78 (±64.24) mg% [males 255.98 (±66.63) mg% females 273.09 (±59.95) mg%]. Females outnumbered the males in this study, which correlates with the study reported by Jean-O-Partamian and Robert F Bradley in their series. 13 out of 25 patients had evidence of anterior / anterolateral infraction (52%). 5 patients (20%) had evidence of inferior wall myocardial infarction. 2 patients had evidence of inferior wall myocardial infarction with right ventricular extension. The immediate mortality (within 1 week) in the present study among the 25 patients with myocardial infarction was 36%.
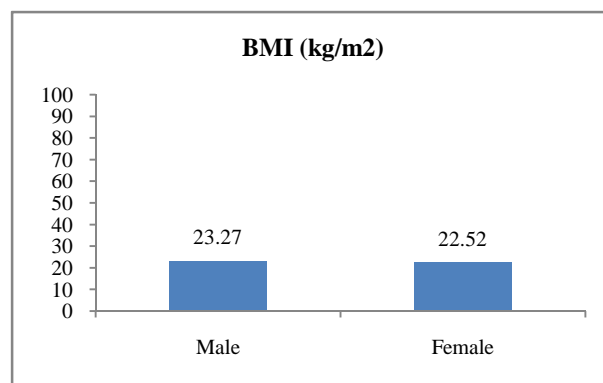

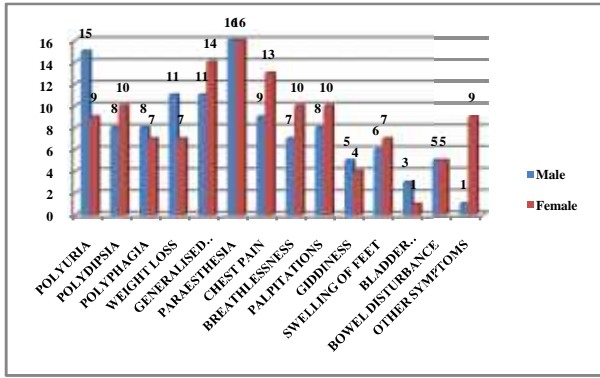**Figure 1** Bar diagram representing BMI in the Present study

Figure 2 Bar diagram representing Presenting Complaints in the present study

Table 1 Investigations

| Investigations	Total number of patients	Number of patients having event	Investigations %
1.Urinc albumin	100	14	14.0
2.Urinc sugar	100	89	89.0
3.Urine Ketone bodies	100	3	3.0
4.Blood urea >30mg/dl	88	17	19.3
5.S. creatinine >1.4 mg/dl	92	4	4.3
6.Total cholesterol >200 mg/dl	100	52	52.0
7.HDL <35 mg/dl	100	3	3.0
8.LDL >150 mg/dl	100	2	2.0
9.Trig1ycerides >160 mg/dl	100	41	41.0
Electrocardiogram (abnormal)	100	27	27.0
X-ray (abnormal)	91	11	12.1
Fundoscopy (abnormal)	50	51	50.5
TMT	92	31	33.7
Echocardiography	63	34	53.9
Angiogram	100	10	10.0
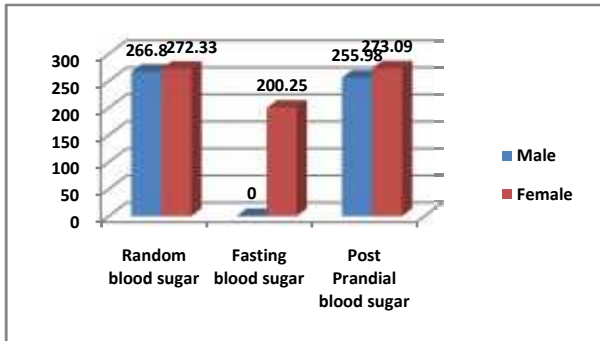
Figure 3 Bar diagrams representing mean Random Blood sugar, Fasting blood sugar and Post Prandial blood sugar between male and female in the present study.

Table 2 Comparison of Lipid levels between male and female

Lipid parameters	Male	Female	Total	P value
Total cholesterol	205.47± 128.35	214.08±145.51	208.02±136.23	0.251
HDL	41.0513.05	40.1113.80	40.6713.39	0.173
LDL	116.43112.37	120.05112.ll	117.88112.33	0.152
Triglycerides	161.13150.25	167.43148.53	163.65149.42	0.536

Table 3 Association of Incidence of hypertension with CAD

Incidence of CAD Hypertension	CAD	
	Absent	Present
Present	15(25.4%)	23(68.3%)
Absent	44(74.5%)	13 (31.7%)
Total	59(100.0%)	4l(l00.0%)
Incidence	Incidence of hypertension is significantly associated with CAD with p<0.00l **	

Table 4 Association of Incidence of CAD with BMI

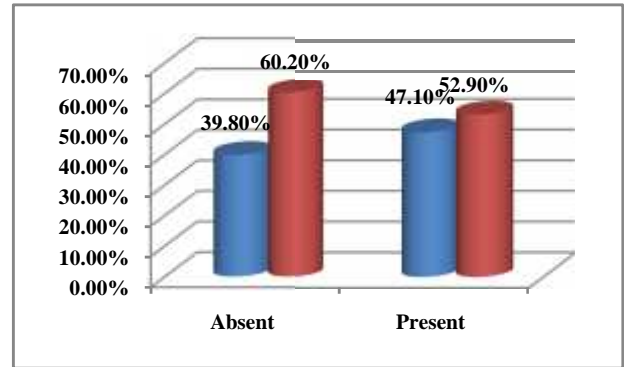| Incidence of CAD	BMI (kg/m^2)	
	<25.0	>25.0
Present	36 (45, 6%)	5 (23.8%)
Absent	43(54.4%)	l6 (76.2%)
Total	79(100.0%)	2l (100.0%
Inference	Incidence of CAD is negatively significantly associated with BMI>25.0kg/mz with P=0.072+	

Figure 4 Association of Incidence of CAD with Smoking status

Table 5 Association of Incidence of CAD with Alcoholic (males)

Incidence of CAD	Alcoholic (male patients)	
	Absent	Present
Present	9 (20.9%)	7 (4l.2%)
Absent	34 (79.1 %)	l0 (58.8%)
Total	43(100.0%)	17 (100.0%)
Inference	Incidence of CAD is positively associated with alcohol with P=0.l93	

Table 6 Mean lipid parameters patients with CAD and without CAD

Lipid parameters	CAD		P value
	Absent	Present	
Total cholesterol (mg/dl)	l95.44±132.26	228.22±213.306	<0.001**
LDL (mg/dl)	ll5.03±111.28	121.98±112.77	0.005**
HDL (mg/dl)	41.85±13.29	38.98±12.76	<0.001**
Triglycerides (mg/dl)	145.24±137.51	190.15±152.78	<0.001**

DISCUSSION

In the Present study 100 patients of diabetes mellitus where studied and the following observations were made. The mean age of the study group was 56.11 ($\pm$10.89) years [males 56.47 ($\pm$11.66) years and females 55.68 ($\pm$9.75) years]. The mean age group in the study group by Meenu Walia *et al.* was 53.21 (+ 8.12) years for males and 52.61 (+ 7.05) for females. The age range in this study group is 39-82 years. The CREATE Registry, a study conducted in 89 centers from 10 regions in 50 different cities in India on 20,468 patients of ACS also reported the highest number of patients in the intermediate age group (56.7%), quite similar to our study. The mean age of this study was 57.5 years. In the present study group of 100 patients 60 were male patients and 40 were female's patients. The ratio of male to female is 1.5: 1. The CREATE Registry also reported majority (76.4%) male patients as like us. The mean duration of diabetes mellitus in this study was 8.66 years 8.95 years being in males and 8.23 years in females. The mean fasting blood glucose level in this study was 190.36 ($\pm$9.49) mg% [males 183.53 ($\pm$60.47) mg% and females 200.25 ($\pm$60.03) mg%].

Meenu Walia *et al.* reported a fasting blood sugar values of 155.67 (+ 53.92) mg% in males and 173.61 (+ 71.70) mg% in females. The values in our study correlates with the above mentioned study. The mean post prandial blood sugar level at the time of presentation among the study group was 262.78 (±64.24) mg% [males 255.98 (±66.63) mg% females 273.09 (±59.95) mg%]. Meenu Walia *et al.* reported a post prandial blood sugar value of 258.40 (+ 53.82) mg% in males and 210.23 (+ 75.51) mg% in females. The present study correlates with the above values. Peterson *et al* (circulation 2010) in his study of 5744 CAD patients with same cut off value found 44.3% hyperglycemic patients. Ana Jover *et al* (cardiol 2011) found hyperglycemia in 66.2% of her ACS patients with mean FBS of 130.7.

In this study out of one hundred patients of diabetes mellitus 41 patients had ischemic heart disease. Out of 41 patients of ischemic heart disease 16 patients had angina pectoris. Meenu Walia *et al.* reported prevalence of coronary artery disease among type 2 diabetes patients to be 15.57%, the present study correlates with the above mentioned studies only 3 patients had typical history of chest pain co-relating with angina pectoris and resting E.C.G. was showing ischemic changes. Rest of 13 patients (31.7%) had latent coronary artery disease, which was detected by thread mill test. Gupta and Pandit R.B. have reported in their study a prevalence of 36.3% of latent coronary artery disease. Among 25 patients with myocardial infarction in the present study 10 patients were male and 15 patients were females. Females outnumbered the males in this study, which correlates with the study reported by Jean-O-Partamian and Robert F Bradley in their series. 13 out of 25 patients had evidence of anterior / anterolateral infraction (52%). 5 patients (20%) had evidence of inferior wall myocardial infarction. 2 patients had evidence of inferior wall myocardial infarction with right ventricular extension. 5 patients had subendocardial infarction (20%). Out of the 25 patients with myocardial infarction 9 patients (36%) presented with atypical manifestations / silent infarction which was detected by serial electrocardiographic recording. James R Morgolis *et al.* reported 23% of silent infarctions in their study. This study correlates with the above studies. Other authors have estimated the occurrence of unrecognized myocardial infarction between 0-60%.The immediate mortality (within 1 week) in the present study among the 25 patients with myocardial infarction was 36%. 9 patients died within 1 week of admission out of them 5 died within 24 hours of admission. Partamian and Robert F Bradley have reported immediate mortality among their patients to be 38% correlating with the present study. Thirty seven out of one hundred patients studied had evidence of cardiac autonomic neuropathy (37%). S.R. Tankliwale *et al.,* have need an incidence of 30% in a study of type 2 diabetes mellitus patients.

The incidence of cardiac autonomic neuropathy in other series varies from 17-68%. In our study parasympathetic involvement was more common than movement of sympathetic involvement, which co-relates with Tankliwale S.R. etc., al., study.

CONCLUSION

From this study it can be concluded that diabetes mellitus has a real impact on ischemic heart disease. Early detection of ischemic heart disease and its associated risk factors and initiation of their treatment on time are of prime importance to prevent the morbidity and mortality in diabetic patients. Hypercholesterolemia, hypertriglyceridemia, low HDL cholesterol levels should be considered seriously in such patients and should be tried to control either by nonpharmacological or pharmacological treatment as soon as they are detected. Even modifiable risk factors like smoking and alcoholism should be prevented with proper counseling and lifestyle modification techniques as because they are highly associated with causation of both diabetes and ischemic heart disease. All diabetic patients should always be screened for latent coronary artery disease as because of their prognostic implications. Also patients with long standing diabetic patients should be screened for all other microvascular and macrovascular complications and treatment should be started as soon as possible. As good control over diabetes within normal range is shown to prevent the complications, so more emphasis should be in that direction is always recommended.

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