

**STUDY OF SILENT MYOCARDIAL ISCHAEMIA IN TYPE 2 DIABETES MELLITUS PATIENTS IN A TERTIARY CARE CENTER**<sup>1</sup>Patil Abhijit A. and <sup>2</sup>Redkar Vivek\*<sup>1</sup>Medicine Resident, Department of Medicine, Krishna Institute of Medical Sciences, Karad.<sup>2</sup>Associate Professor, Department of Medicine, Krishna Institute of Medical Sciences, Karad.

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**ABSTRACT**

**Introduction:** Silent myocardial ischemia is defined as objective evidence of myocardial ischemia without angina or angina equivalent. In Framingham study, 30% of myocardial infarcts were silent, diagnosed only by serial electrocardiography. There is increasing evidence that asymptomatic myocardial infarctions and silent ischemia occur more frequently in diabetic patients. **Materials and methods:** The present study was cross sectional, observational study carried out in 100 randomly selected patients of type 2 diabetes mellitus for more than 1 year, patients >18 years of age, who do not have any symptoms related to cardiovascular system. **Results:** Our study shows that the prevalence of silent MI among patients with DM was 27%. It was reported in the present study that the mean fasting and post prandial blood sugar among patients was  $164 \pm 15.18$  mg/dl and  $189.4 \pm 23.29$  mg/dl respectively. **Conclusions:** In our study majority of cases of silent myocardial ischemia were found in patients with age group of >50 years, female patients, patients with duration of diabetes mellitus of 5-10 years.

**KEYWORDS:** Diabetes Mellitus, Silent myocardial ischemia, myocardial infarctions, cardiovascular disorders.**INTRODUCTION**

Coronary artery disease has been called a modern epidemic because of its prevalence in different parts of the world. The manifestations of coronary artery disease embrace a wide spectrum from the benign minor coronary atherosclerosis without angina or ischemia to sudden death.<sup>[1]</sup> Silent myocardial ischemia is defined as objective evidence of myocardial ischemia without angina or angina equivalent. In Framingham study, 30% of myocardial infarcts were silent, diagnosed only by serial electrocardiography.<sup>[2,3]</sup> Cardiovascular diseases and particularly coronary heart disease (CHD) are the leading causes of death in patients with type-2 diabetes.<sup>[4,5]</sup>

Diabetic patients comprise a particularly high-risk group for subsequent cardiovascular events, with a propensity for silent myocardial ischemia.<sup>[6]</sup>

In one study, 12% of diabetic patients had silent ischemia, whereas 19% of the same patients had symptomatic ischemia.<sup>[7]</sup> Indeed, there is increasing evidence that asymptomatic myocardial infarctions and silent myocardial ischemia occur more frequently in diabetic patients.<sup>[8]</sup> The mechanisms for diminished angina in this group of patients include varying pain threshold sensitivity, autonomic neuropathy, and psychological factors.<sup>[9]</sup>

The present study was conducted to find out prevalence of silent myocardial ischemia in asymptomatic patients of type 2 diabetes mellitus and hence to analyze the ECG changes in silent myocardial ischemia/infarction in patients of type 2 diabetes mellitus.

**MATERIALS AND METHODS**

The present study was cross sectional, observational study carried out at tertiary care center in Western Maharashtra from January 2016 to June 2017. The present study was conducted to know the ECG changes present in 100 randomly selected patients of type 2 diabetes mellitus for more than 1 year, patients >18 years of age, who do not have any symptoms related to cardiovascular system admitted under Department of Medicine were included in the study. Patients with history of myocardial infarction, uncontrolled blood pressure and other chronic diseases, Patients with type 2 diabetes mellitus with duration of less than 1 year, Patients with previous coronary artery bypass surgery, Patients with type 1 diabetes mellitus or Patients suffering from cerebrovascular accident were excluded from the study. Informed consent was taken from all the patients. Cases (OPD and IPD) referred to department of Medicine, Krishna Institute of Medical Sciences, Karad were studied. Type 2 Diabetes mellitus patients with more than 1 yr duration with age more than 18 yrs who do not have any complaints related to cardiovascular

system were included in this study. All patients were assessed with detailed history, clinical examination and relevant investigations including resting ECG.

Proportion was noted in percentage. Chi Square T Test was used for Qualitative Analysis. Unpaired t test was used for quantitative analysis. P value <0.05 was considered as significant.

## RESULTS

The present study was conducted among 100 asymptomatic patients of type 2 diabetes mellitus admitted under department of medicine in a tertiary healthcare center to study clinical presentation of silent myocardial ischaemia. We found that majority of patients were in age group 51-60 years (46%) followed by 41-50 years (27%) (Table 1) and female patients (56%) outnumbered male patients were 44% (Figure 1). It was noted that majority of patients were having DM since 5-10 years (46%). The patients with DM with duration of >10 years were 20% (Table 2). We assessed past history and personal history of study subjects. It was observed that majority of patients were having dyslipidemia (22%), while 12% cases had family history of diabetes mellitus. 36% study participants were consuming various types of tobacco products (Figure 2). We recorded their anthropometric measurements and found that majority of patients were overweight (40%), followed by obesity class I (22%) (Figure 3) It was reported in the present study that the mean fasting and post prandial blood sugar among patients was  $164 \pm 15.18$  mg/dl and  $189.4 \pm 23.29$  mg/dl respectively (Table 3). It was observed that mean LDL, HDL, VLDL, total cholesterol and triglycerides levels among patients was  $118.14 \pm 24.2$  mg/dl,  $42.60 \pm 5.12$  mg/dl  $35.68 \pm 7.09$  mg/dl  $204.96 \pm 28.76$  mg/dl,  $166.17 \pm 31.92$  mg/dl respectively (Table 3). Our study shows that the prevalence of silent MI among patients with DM was 27% (Table 4). This study reports the prevalence of silent MI among DM patients was major in age group 51-60 years (13%) followed by age group >60 years (8%) (Table 5) and shows female preponderance (15%) over male cases (12%) (Figure 4).

As one of the objective of this study, we assessed ECG changes among subjects. It was observed that majority of silent MI patients had ST depression with symmetrical T wave inversion (77.77%) The new onset left bundle branch block (LBBB) was observed in 11.11% patients. ECG changes suggestive of ST elevation were not found (Table 6).

**Table 1: Distribution of cases according to age.**

Age group	Number of patients	Percentage
< 30	1	1
31-40	6	6
41-50	27	27
51-60	46	46
>60	20	20
<b>Total</b>	100	100

**Table 2: Distribution of patients according to duration of diabetes Mellitus.**

Duration of DM (years)	No. of Patients	Percentage
1-5	34	34.00
5-10	46	46.00
>10	20	20.00
<b>Total</b>	100	100

**Table 3: Distribution of patients according to investigations.**

Investigations	Mean	± 2SD
FBS (mg/dl)	164.0	15.18
PBS (mg/dl)	189.4	23.29
Hb1Ac %	7.38	0.72
LDL (mg/dl)	118.14	24.11
HDL (mg/dl)	42.6	5.12
VLDL (mg/dl)	35.68	7.09
Total cholesterol (mg/dl)	204.96	28.76
Triglycerides (mg/dl)	166.17	31.92

**Table 4: Distribution according to prevalence of silent MI among patients.**

Silent MI	No. of Patients	Percentage
Present	27	27.00
Absent	73	73.00
<b>Total</b>	100	100

**Table 5: Distribution according to age prevalence of silent MI among patients.**

Age Group (years)	No. of Patients	Percentage
<b>Upto 30</b>	00	00.00
31-40	01	01.00
41-50	05	05.00
51-60	13	13.00
>60	08	08.00
<b>Total</b>	27	27.00

**Table 6: Distribution according to ECG changes in silent MI among patients.**

ECG Changes	No. of Patients (n=27)	Percentage
ST depression + Symmetrical T wave inversion	21	77.77
Pathologic Q waves	03	11.11
New onset Left Bundle branch block	03	11.11

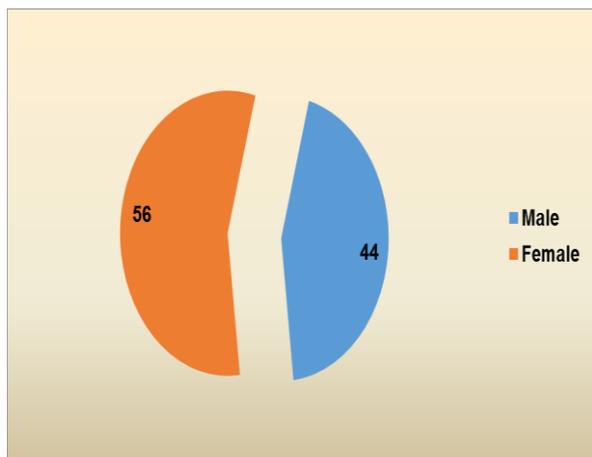


Figure 1: Distribution of patients according to sex.

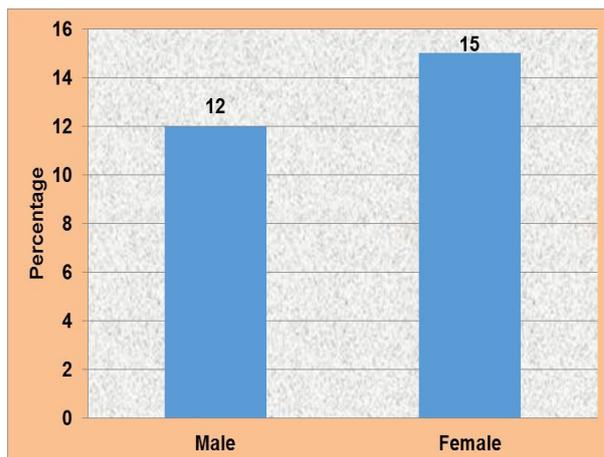


Figure 4: Sex prevalence of silent MI among patients.

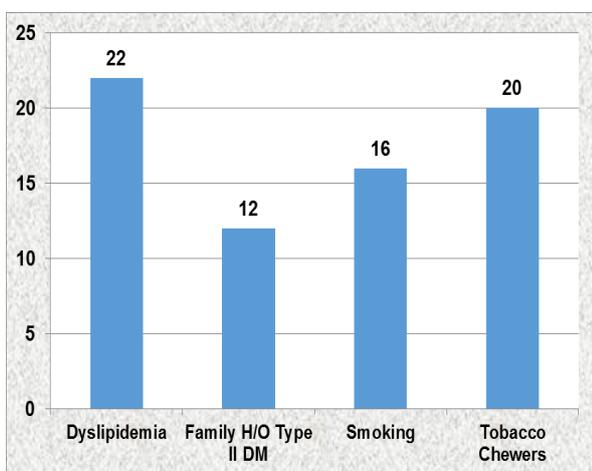


Figure 2: Co-morbidity and risk factors.

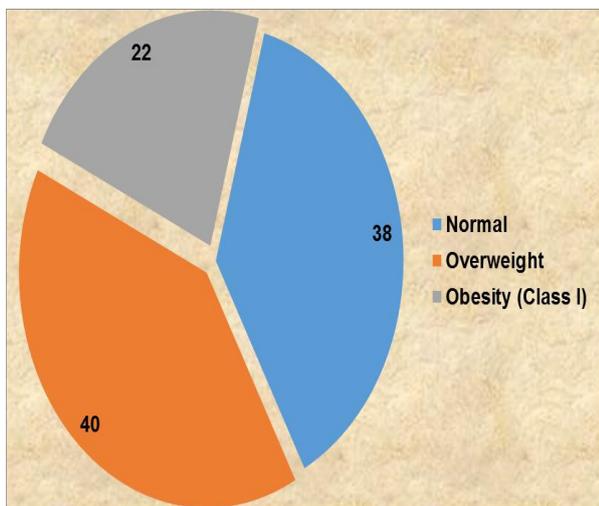


Figure 3: Distribution of patients according to BMI.

### DISCUSSION

The present cross sectional study was conducted in rural population of Western Maharashtra, Satara District to know the ECG changes present in patients of type 2 diabetes mellitus who do not have any symptoms related to cardiovascular system. We assessed their clinical history, examination findings and carried out required investigations.

Our study reports that the majority of patients were in age group 51-60 years (46%) followed by 41-50 years (27%). In a study done by Sahil Gupta et al.<sup>[10]</sup> on evaluation of ECG abnormalities in patients with asymptomatic type 2 Diabetes Mellitus observed mean age of asymptomatic diabetic patients was 50.3±11.90 years (Age range 25-75 years).

This study finds 40% subjects as overweight (40%) followed by obesity Class I (22%) and 22% prevalence of dyslipidemia (22%). It was observed that mean fasting and post prandial blood sugar among patients was 164 ±15.18 mg/dl and 189.4 ±23.29 mg/dl respectively while mean LDL, HDL, VLDL, total cholesterol and triglycerides levels among patients was 118.14 ±24.2 mg/dl, 42.60±5.12 mg/dl, 35.68±7.09 mg/dl, 204.96 ±28.76 mg/dl, 166.17±31.92 mg/dl respectively. In a study done by Sahil Gupta et al.<sup>[10]</sup> it was observed that mean fasting blood sugar among patients was 205 ±91mg/dl, mean HDL levels 39.66 ±10.17mg/dl.

In the present study, it was observed that the prevalence of silent MI among patients with DM was 27%. In a study done by Sahil Gupta et al.<sup>[10]</sup> on evaluation of ECG abnormalities in patients with asymptomatic type 2 Diabetes Mellitus observed 26% asymptomatic diabetics had ECG abnormalities. Motoji Naka et al.<sup>[11]</sup> compared diabetic patients with non-diabetic control subjects with respect to the prevalence of silent myocardial ischemia observed 31% prevalence of silent myocardial ischemia diabetic patients.

The ECG changes in silent MI among DM patients showed that majority of silent MI patients had ST

depression and symmetrical T wave inversion (77.77%) new onset left bundle branch block (LBBB) was observed in 11.11% patients. In a study done by Sahil Gupta *et al.*<sup>[10]</sup> on evaluation of ECG abnormalities in patients with asymptomatic type 2 Diabetes Mellitus observed most common abnormality observed was ST-T changes (12%) followed by LAE(6%), LVH (4%), LBBB (2%) and RBBB (2%). In a study by Sellers MB *et al.*<sup>[12]</sup> on African Americans, the variants and prevalence of ECG abnormalities detected were as follows: prolonged QTc (25.5%), T wave changes (22%), LVH (18.5%), sinus tachycardia (15.5%), Ischaemic Heart Disease (IHD) (9%), conduction defects (7%) and ectopic beats (4%). ECG abnormalities among older diabetics were high and included prolonged QTc, LVH, IHD and conduction defects.

Diabetes mellitus (DM) has been known for many years to be associated with poor cardiovascular prognosis. Due to the sensory neuropathy, the coronary artery disease in diabetic patients is frequently asymptomatic. Other cardiac investigations are also studied for silent myocardial ischemia.

## CONCLUSION

Diabetes mellitus has been known for many years to be associated with poor cardiovascular prognosis. Diabetes mellitus causes both microvascular and macrovascular complications. Due to the sensory neuropathy, the coronary artery disease in diabetic patients is frequently asymptomatic.

In our study majority of cases of silent myocardial ischemia were found in patients with age group of >50 years, female patients, patients with duration of diabetes mellitus of 5-10 years.

In this respect, regular monitoring of ECG might be relatively useful and cheap tool in myocardial ischemia detection in asymptomatic diabetic patients.

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