



ORIGINAL RESEARCH PAPER

Medicine

A STUDY ON SILENT MYOCARDIAL ISCHAEMIA/ OLD MYOCARDIAL INFARCTION IN PATIENT WITH TYPE-2 DIABETES MELLITUS

KEY WORDS: pelvis, sexual dimorphism, sciatic tubercle.

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ABSTRACT

BACKGROUND: Correlation between DM and cardiovascular disease, specially ischaemic heart disease is of immense importance. The cardiac autonomic neuropathy (CAN) due to diabetes is responsible for the reduced pain perception manifesting as silent myocardial ischaemia. The incidence of silent MI is much higher in diabetes population compared to their non-diabetic counterpart

AIM: To determine the prevalence of silent myocardial ischaemia in Type 2 Diabetes Mellitus patient.

MATERIAL AND METHODS: This Prospective study included patients with type 2 Diabetes Mellitus with age >30 years. A total of 100 patients with type 2 DM were included in the study. Control group comprised of 100 patients, age and sex matched, without history of or documentation of type-2 DM. The study was conducted from 4, May 2016 to 25 December 2018.

RESULT: Out of 100 patients with Type 2 DM, 25 (25%) had detectable silent myocardial ischaemia whereas 5 (5%) out of the 100 nondiabetic patients had silent myocardial ischaemia.

CONCLUSION: Silent myocardial ischaemia is more frequent in type 2 Diabetic Mellitus.

INTRODUCTION

Diabetes Mellitus (DM) is a common metabolic disorder with a prevalence that continues to climb. Two major forms of DM are Type 1 DM (formerly called insulin dependent or juvenile onset DM) characterized by an absolute deficiency of insulin production and type 2 DM (previously referred as noninsulin dependent DM) characterized by relative insulin deficiency and insulin resistance¹. Type 2 DM comprises nearly 90% of Diabetic population. World Health Organisation statistics show that the prevalence of DM is expected to increase from an estimated 155 million in the year 2000 to 300 million in the year 2025.

Epidemiological data have long demonstrated a correlation between DM & macrovascular / microvascular disease. Of this, correlation between DM and cardiovascular disease, specially ischaemic heart disease is of immense importance. Cardiovascular disease accounts for upto 80% of deaths in diabetes with about 75% of these deaths occurring as a result of ischaemic heart disease². A major contributory factor to high morbidity and mortality rates is due to premature development and accelerated progression of the macrovascular atherothrombotic disease. This is particularly true for type 2 DM (or non insulin dependent diabetes mellitus), which comprises approximately 90% of all diabetes³.

CAD manifests as myocardial ischaemia (MI). Myocardial ischaemia is defined as an imbalance between myocardial oxygen demand and oxygen supply, which may be diminished due to decreased coronary blood flow, decreased oxygen carrying capacity or increased myocardial oxygen consumption. Angina pectoris usually occurs as a result of severe flow – limiting stenosis to a major coronary artery, and has been classified as typical angina when there is substernal chest discomfort with a characteristic quality and duration that is provoked by exertion or emotional stress and that is relieved by rest sublingual nitroglycerine. Atypical angina is more prevalent in certain subgroups such as women, diabetic patients and elderly. Both symptomatic and asymptomatic myocardial ischaemia often coexist in a given patient⁴. Cohn recommended classifying patients into 3 subgroups.

- Type 1: Patients who are completely asymptomatic.
- Type 2 :Asymptomatic, post – Myocardial infarction patients with persistent painless ischaemia.
- Type 3: Patient with both angina and silent ischaemia (More frequent).

The cardiac autonomic neuropathy (CAN) due to diabetes is responsible for the reduced pain perception altered and very atypical symptoms of MI manifesting as silent myocardial ischaemia. The incidence of silent MI is much higher in diabetes population compared to their non-diabetic counterpart⁵.

MATERIALS AND METHOD

The present study was conducted in the departments of Endocrinology, General Medicine, Cardiology, of Institute Patna Medical College and Hospital, Patna Patients were examined in the outdoor and indoor sections of the above mentioned departments.

Inclusion criteria

The study included patients with type 2 Diabetes Mellitus (DM) with age >30 years. A total of 100 patients with type 2 DM were included in the study. Control group comprised of 100 patients, age and sex matched, without history of or documentation of type 2 DM. In the control group, non diabetic patients were recruited.

Exclusion criteria

Patients who had documented history suggestive of angina pectoris were excluded from the study.

Duration of the study

The study was conducted from 4, May 2016 to 25 December, 2018.

INVESTIGATIONS USED; 1. Resting ECG 2. Ambulatory ECG 3. Exercise tolerance test 4. Echocardiography 5. Coronary angiography.

Statistical Analysis: Statistical analysis was done by using descriptive statistics and inferential statistics, using chi-square test, odd's ratio, Pearson's correlation coefficient, and multiple regression analysis. The software used in this analysis were SPSS version 17.0 and Graph Pad Prism version 5.0. A p value <0.05 was considered as a level of significance.

RESULTS

Out of 100 patients with Type 2 DM, 25 (25%) had detectable silent myocardial ischaemia whereas 5 (5%) out of the 100 nondiabetic patients had silent myocardial ischaemia.

This difference in prevalence of silent myocardial ischaemia

between Type 2 diabetic patients & non diabetic patients was statistically significant. ($z = 4.13, p < 0.05$). statistical significance is given in Table 1.

DISCUSSION;

Coronary artery disease (CAD) is the leading cause of death in patients with diabetes . Myocardial ischemia in patients with diabetes is often asymptomatic and frequently in an advanced stage when it becomes clinically manifest . Once CAD is symptomatic in diabetes, morbidity and mortality are high and significantly worse than in patients without diabetes⁶.

The Detection of ischaemia in asymptomatic diabetics (DIAD) study reveals that silent myocardial ischemia occurs in greater than one in five asymptomatic patient with type 2 diabetes. Traditional and emerging cardiac risk factors were not associated with abnormal stress test, although cardiac autonomic dysfunction was a strong predictor of ischemia⁷.

Chest pain is certainly the predominant symptom of ischemic heart disease. However, several studies suggest that many individuals with severe coronary artery lesions do not have angina pectoris⁸. In these patients, episodes of transitory myocardial ischemia may be "silent", although abnormal asymptomatic ST changes may be recorded during AECG monitoring. The silent ischemic events considerably outnumber the symptomatic ones, and it is generally accepted that nearly 75% of the transient ischemic episodes recorded during AECG monitoring are asymptomatic in patients with stable angina pectoris..

Evidence accumulated in recent years demonstrated that asymptomatic myocardial infarction or asymptomatic myocardial ischemia occurs more frequently in diabetic patients. In fact, the Framingham study reported that in diabetic patients, the incidence of painless myocardial infarction was higher than that in nondiabetic patients.

The reported higher incidence of painless myocardial infarction stimulated many studies that used AECG monitoring and exercise stress testing to evaluate the presence of asymptomatic episodes of myocardial ischemia. In fact, some evidence suggests that diabetic patients may have a high incidence of transient silent ST changes. In a well- controlled patient population, Nesto and associates 27 also demonstrated that only 28% of the diabetic patients with positive thallium scintigraphy experienced angina pectoris during the treadmill test compared with 68% of nondiabetic patients.

There could be several explanations for the different patterns of symptoms in patients with diabetes mellitus, including different thresholds of pain sensitivity, psychological denial, or the presence of autonomic neuropathy leading to sensory denervation⁹. The latter seems to be more likely in diabetic patients, because autonomic nerve fibers were demonstrated histologically in diabetic patient who died after painless myocardial infarction.

The relevant incidence of autonomic dysfunction in diabetic patient is also suggested by the absence of a peak incidence of myocardial ischemia in the morning hours. Finally, diabetic patients with or without signs of autonomic neuropathy have a decreased vagal activity (and hence a relatively higher sympathetic activity) during night hours and at the same time of the day during which a higher frequency of cardiovascular accidents has been reported.

Prevalence of Silent Myocardial Ischaemia in Type 2 DM patients.

In the present study, out of 100 patients with Type 2 DM, 25 of them are detected to have silent MI. So, the prevalence of silent MI in Type 2 DM patients is 25% according to this study whereas in the nondiabetic population the prevalence is 5% .This difference in incidence of silent MI between Type 2 DM & non diabetic patients was statistically significant. ($Z= 4:13, P < 0.05$).

Similar finding has been reported in the DIAD study by Wackers FJ et al in which out 1123 patients a total of 113 patients (22%) were detected to have silent MI.

al in which 22 % of Type 2 DM patients had silent MI.

In case of non diabetic patients similar incidence have been reported by koistinen MJ in 1990.

CONCLUSIONS

InSilent myocardial ischemia i.e. documented episodes of ischaemia not associated with any typical or any atypical symptoms usually occur among patients with demonstrable obstructive coronary artery disease which is more frequent in type 2 Diabetic Mellitus.

Resting electrocardiograph, Holter monitoring, echocardiography are not the reliable test for documentation of silent ischemia in type 2 DM patients.

However, stress ECG is comparatively more sensitive & specific for demonstration of silent ischaemia in Type 2 Diabetics. Autonomic dysfunction & evidence of symptomatic cardiac denervation, high threshold for pain, linkage between baroreceptor function & pain perception, dynamic gating in pain perception within the cerebral cortex & spinal tract & effect of duration & severity of ischaemia are the putative mechanisms of silent myocardial ischaemia. Duration of diabetes, poor glycaemic control, presence of more risk factors like hypertension, obesity, dyslipidaemia, smoking are the leading contributors for silent myocardial ischaemia in Type 2 Diabetes Mellitus.

Therefore with instrumental and pharmacological progresses in treatment of coronary artery disease the potential therapeutic benefit of an early diagnosis of silent MI definitely reduces the cardiac morbidity and mortality in diabetic patients.

In asymptomatic diabetic patients an early screening for silent MI should be performed in obese, hypertensive dyslipidemic and smokers as these are leading contributions of silent myocardial ischaemia in type 2 diabetes.

Stress electrocardiography is one solitary investigation in screening silent MI with high specificity and sensitivity.

Table -1 Prevalence of SMI in Type 2DM and in non diabetic patients.

Presence of SMI	Type 2 DM	Non Diabetic patients
SMI Present	25	5
SMI Absent	75	95
Total	100	100

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