Original Research Paper

Medicine

A STUDY OF EXERCISE TREADMILL TEST IN DETECTING ASYMPTOMATIC CORONARY ARTERY DISEASE IN TYPE 2 DIABETES MELLITUS

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ABSTRACT

INTRODUCTION: Patients with type2 DM show a greater risk for CAD. But the risk stratification in asymptomatic CAD patients has not been established. This study investigated the prevalence of CAD in type2 DM patients since CAD accounts for 70-80 % of mortalities in diabetic patients. CAD risk for those with type2 DM is as great as that associated with a previous history of MI. However progressive CAD is asymptomatic in many cases of type 2 DM, which is difficult to diagnose at proper time.The diagnosis of asymptomatic CAD in type 2 diabetic patients is largely made based on the recommendations of ADA.The ADA recommends tat DM patients perform a treadmill exercise test(TMT) if they have additional cardio vascular risk factors.how ever clinically significant severe CAD is often discovered in patients with fewer risk factors

AIMS AND OBJECTIVES: 1. To assess the prevalence of coronary artery disease in type 2 diabetes without hyper tension with normal ECG & normal echo

2. To improve the long term survival of type 2 diabetic patients by early detection of coronary artery disease and timely institution of Treatment

MATERIALS&METHODS: The study was conducted among out patients from diabetology & cardiology departments of Government Rajaji Hospital, Madurai during the period of January 2016 to June 2016. The study included 100 diabetic patients who had no previous symptoms of any cardiac disease.
Subjects believed to fulfill all eligibility criteria, and none of the exclusion criteria were included in the study.

METHODOLOGY: A previously designed proforma is used to collect the demographic data ,history and clinical details of the patients.
A battery of diabetic profile tests are done in all cases to assess glycemic status . 12 lead ECG is taken to all patients .Those who are showing normal results are subjected to ECHO. If they show normal observation they will be subjected to exercise induced treadmill test in all patients for half an hour. Any exercise induced ischemia, MI, LBBB, any arrhythmias, are observed from the ECG which is recorded. Comparisons of inducible ischemia in blood sugar levels of fasting, Hba1c, BMI, ppbs are observed. Significance assessed by Students t test. Relation between age, sex, and duration of diabetes are assessed by Pearson correlation test.

STATISTICAL ANALYSIS: STUDENTS T TEST, PEARSON CORRELATION TEST, ONE WAY ANOVA ,CHI SQUARE TEST

RESULTS: The average age for study group was 54.92 years. Among the 100 patients studied 60 were males and 40 females . Among the cases studied 40 had inducible ischemia .Of these 40, 23 having 5-10 years duration of diabetes,9 cases having more than 10 years of diabetes. Rate of inducible ischemia was high in patients with high fasting, high BMI, high HbA1C compared to patients with good glycaemic controls patients .Among the cases rate of occurrence of ischemia was higher in those with poor glycaemic control than with good glycemic control .Occurrence of ischemia significantly high in patients even they are not having any symptoms of cardiac diseases. Based on TMT results we can observe that CAD risk is high even at the age of 40 and rate of ischemia occurrence is high if good glycemic control is not maintained.

CONCLUSION: Type 2 diabetic patients are more prone for CAD since it is a coronary equalent.
Hence all diabetics after the age of 40 should be subjected to TMT as a screening tool to diagnose early CAD .

KEYWORDS : CORONARY ARTERY DISEASE, TREAD MILL TEST, TYPE 2 DIABETES MELLLITUS

INTRODUCTION:

Approximately diabetes is present in 2-3% of rural population in India. In urban it constitutes 8-12%. NIDDM constitutes nearly 95-97% of total diabetic population. The maximum macro and microvascular complications are associatd with NIDDM. 75% diabetic deaths mainly due to macrovascular complications

Recent studies showed that CAD is independently associated with an increased HbA1c levels. More over mortality rates are higher in type 2 diabetic patients with CAD than general population. Patients with type 2 diabetes have a poor prognosis.

The diagnosis of CAD should be done early in type 2 diabetic patients, since diabetes itself is a coronary equivalent. The patients who are more than 40 years of age should be subjected to screening tests for early diagnosis and aggressive treatment.

MATERIALS AND METHODS:
STUDY POPULATION
This study is to be conducted in 100 type 2 diabetic patients attending DIABETOLOGY CLINIC at Govt Rajaji hospital, Madurai.

INCLUSION CRITERIA
1. All type 2 diabetic patients

EXCLUSION CRITERIA

Patients with
1.Previous CAD/CVA
2.Smokers
3.Previous Dyslipidemia
4.DM with Systemic hypertension
5.Patients with peripheral vascular disease.

ETHICAL COMMITTEE APPROVAL: Obtained.

STUDY PROTOCOL
A previously designed proforma will be used to collect the demographic and clinical details of the patients.Detailed history 45 pertaining to the present illness as well as a thorough history regarding other disease conditions were obtained.Each patient was inquired about previous drug intake for hypertension ,diabetes and any other co-morbid illness.

A thorough clinical examination and essential biochemical investigation was done to categorize the patients into diabetic and non diabetic, symptomatic and asymptomatic. An ECG was recorded in all patients and all of them were subjected to trans thoracic echocardiography. Who are all showing normal ECG and ECHO will be subjected to exercise induced treadmill test.

LABORATORY EVALUATION
HbA1C

If not done for the past 1 year
1. Overnight fasting blood sugar,post prandial blood sugar
2. Fasting lipid profile
3. LFT
4. Spot ACR
5. Serum creatinine and GFR
6. TSH in patients with dyslipidemia
7. 12 LEAD ECG was taken to all patients.Looked for any ischemic or infarct changes.
8. Trans thoracic ECHO was taken for all patients. Any regional wall motion abnormalities noted . If patients with normal echo will be subjected tread mill test.

HISTORY
Detailed history of previous CAD ,any chest pain, syncope previous hospitalisation have obtained.

STATISTICAL ANALYSIS
The data collected in the study was formulated into master chart in Microsoft office excel and statistical analysis was done with the help of computer by using SPSS software and sigma stat 3.5 version(2012) Using this software percentage ,mean, standard deviation and p value were calculated through one way ANOVA ,pearson correlation and chi square test and p value of < 0.oo5 was taken as significant.

RESULTS AND INTERPRETATION
In our study mean age is 54.96 (+/_) 10 years with minimum age of 40 years. Maximum age of 70 years.

MI WALL DISTRIBUTION
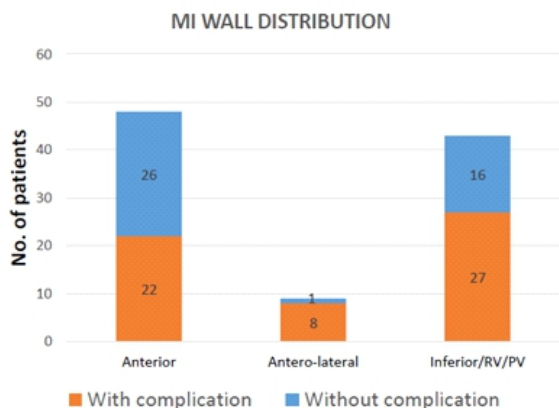
SHT	MPV(fL)	SD
No (74)	9.94	0.547
Yes (26)	10.492	0.545

COMMENTS
1. 7% of cases below 45 years of age.
2. 11 of study population above 65 years of age.
3. 82 % of cases between 46- 65 years of age.
4. Majority of study population were males (60%) while the remaining (40%) were females.
5. Among the study population 33% of cases are having less than 5 years of duration of diabetes.
6. 12 % of cases more than 10 years of duration of diabetes.
7. 55% of cases between 5-10 years of duration of diabetes.

In our study population patients 89% having fasting level of More than 100. Among these 40% showing TMT positive. Based on these patients with FBS of more than 100 having increased risk of CAD as compared to patients with fasting level of less than 100.

In our study population 42% showing Hba1c of >7 . Among these 40% showing positive results for TMT. Means that people with high HbA1C having significant risk of CAD.

In this study patients having FBS MEAN of 197.48. Based on these observation significant p value of <0.001 indicates that fasting blood sugar showing significant association with CAD risk.

LIMITATIONS OF THE STUDY

1. Sample size is small.
2. The study population involved patients seeking medical care in our hospital which is a tertiary care center and hence they may not represent the general population.
3. Patients with osteo arthritis and any deformities in lower limb can not undergo exercise test.
4. Patients may develop sudden MI during test.so keen observation needed.
5. ICU and good cardiac care must be available before doing TMT. Because any time patient may collapse.
6. Further investigations needed to go invasive procedure Because it is just a screening tool.

DISCUSSION
The study was conducted in the patients who attended Diabetology clinic, at Govt Rajaji hospital, Madurai. Diagnosis of Diabetes Mellitus was made according to AMERICAN DIABETES ASSOCIATION, STANDARDS OF MEDICAL CARE IN DIABETES-2016. CAD risk is assessed according to ACC/AHA guidelines. Only newly diagnosed asymptomatic diabetic naïve patients are taken in our study. After applying exclusion criteria 100 patients are selected for study.

Out of 100 patients 60 patients were male and 40 patients were female (1.5:1). It is consistent with previous studies because nature of disease is more common in male as compared to female.

Out of 100 diabetic patients 33 patients were 5 or less than 5 years duration of diabetes, 55 patients were 5-10 years of duration of diabetes and 12 patients >10 years duration of diabetes.More number of positivity seen between 5-10 years duration of diabetes.

Mee Kyoung Kim and his colleagues,selected diabetics with more than 60 years of age,but in our study we have taken even 40 years of age.so our study detecting ischemia even yearly than previous studies.so we can decrease the diabetes related morbidity and improve the longevity of diabetic patients.

Won Sang Yoo et al ., have conducted a study with 114 diabetic patients with .They are conducted the study with 2 groups :divided into group A(>2 risk factors), group B with (<1 risk factor). Patients are diagnosedas diabetics by oral glucose tolerance test (OGTT) . TMT was performedaccording to Bruce protocol using 12 lead ECG.This study proved that Type 2 DM patients had a greater risk for CAD if they are old, have a longer duration of diabetes.

Positive family history of CVD even if they were asymptomatic. Based onthis study they recommend TMT to be performed to detect CVD in these asymptomatic patients.

But in our study, we have conducted with patients without any risk factors like hypertension, CKD, previous CVD, smoking, dyslipidemia, patients with peripheral vascular disease.Only pure diabetics were selected and subjected to TMT study.

Based on our study we concluded that even pure diabetics without other comorbities (like SHT, CKD, dyslipidemia,smoking) having the CAD risk since it is a coronary equivalent.The risk is diagnosed early in significant proportion by exercise test. It is diagnosed earlier by TMT when it is used as a screening tool.

SUMMARY
This prospective observational study was conducted to identify the prevalence of asymptomatic coronary artery disease in type 2 diabetes mellitus by using tread mill test as a screening tool. With 100 patients were selected carefully and were evaluated on clinical and laboratory aspects after an institutional ethical clearance with an informed consent. The data were entered in Microsoft Excel spread sheet and analysed statistically.

Occurrence of inducible ischemia is commonly seen in patients with high fasting blood sugar , high Hba1c ,high BMI, patients with 5-10 years of duration of diabetes .It is diagnosed early even in newly detected patients of type 2 diabetes . The risk is significantly seen at the age of 40 years in these patients, since it is a coronary equivalent .Strict glycemic control and duration of disease is found to be important key factor in the occurrence of coronary disease

CONCLUSION

In our study high fasting blood sugar ,high Hba1c, obesity(high BMI), high PPBS 89%,42%,51%, were seen respectively.

Long duration of disease and high fasting blood sugar, increased BMI, poor glycemic control,lack of physical activity are important risk of factor for coronary artery disease.

Increased fasting blood sugar, increased BMI carries high risk of cardiovascular disease. Early diagnosis of CAD by screening tool like TMT and early introduction of treatment will reduce disease related complications.

By controlling fasting blood sugar and reducing the weight we can reduce risk of CAD, we can improve long term survival of diabetic patients.

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