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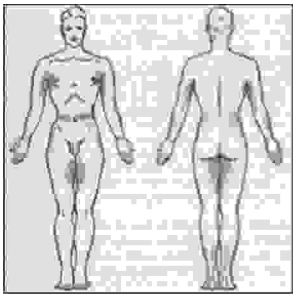

EXERCISE TOLERANCE TEST;

A SCREENING TOOL TO DETECT LATENT CAD IN ASYMPTOMATIC INDIVIDUALS WITH RISK FACTORS FOR CAD.

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ABSTRACT... ayyaz_ahmad@hotmail.com **Objective:** To ascertain the role of Exercise Tolerance Test as a screening tool for coronary artery disease, in asymptomatic men who had one or more risk factors for developing ischemic heart disease. **Design:** A descriptive study. **Place and Time Period:** Department of Medicine PAF Hospital Mushaf Sarghoda from March 2004 to March 2005. **Patients and Methods:** A total no of 100 asymptomatic men age 25-50 years with mean age of 38 years were included in the study. They were divided in to five groups according to number of risk factors they had for developing CAD. Following risk factors were included in the study (hypertension, diabetes ,smoking, obesity, hyper-lipidemia, family history of CAD.). All of them underwent E.T.T over treadmill using modified Bruce protocol. Test was considered positive if 2mm or more ST segment depression was noted .those tested positive had coronary angiogram done to confirmed IHD. **Results:** Seven out of 100 tested positive for IHD on E.T.T. Those tested positive underwent coronary angiography 6 out of seven showed significant narrowing of coronary arteries and 1 had normal angiogram. These results showed that E.T.T has a 76% sensitivity and 87% Specificity. **Conclusion:** E.T.T is an important, reliable and cost effective test to detect latent CAD in asymptomatic persons who had multiple risk factors for developing CAD.

INTRODUCTION

Atherosclerosis is a multi factorial process. Coronary artery disease with its various presentation is the dominant atherosclerotic clinical problem. Epidemiological studies have identified certain risk factors, which make an individual susceptible to atherosclerosis in general and coronary artery disease in particular. The control of coronary artery disease depends upon its prevention at an early age. This depends upon early diagnosis even in asymptomatic patients.

Exercise electrocardiography (Stress ECG test or exercise ECG test) is one of the most important and valuable noninvasive diagnostic test in the clinical evaluation and management of patients with suspected or known cardiovascular disease, particularly coronary artery disease. The exercise ECG test is also useful as a screening procedure for healthy individuals who are considered to be at possible risk of coronary artery disease. At a rough estimate 4 million exercise tests are performed each year in Europe. The prevalence of coronary artery disease among the tested patients can be estimated to be approximately 10%. According to meta analysis of Gianrossi et al (1989) consisting of 147 published reports the mean specificity and mean

sensitivity of the exercise ECG with conventional ST segment analysis are 77% and 68% respectively.

Generally, exercise electrocardiography alone is of limited Value when applied to a patient population with a low probability of coronary artery disease before the test.

But patients who have risk factors for developing coronary artery disease like hypertension, diabetes, smoking, obesity, hyperlipidemia, family history of CAD but are asymptomatic E.T.T has significant probability of finding those can have coronary artery disease events (angina, infarction, death) in the following years. The Lipid Research Clinics study found that 8 years mortality in asymptomatic men was 3.2% for subjects with a non ischemic response, 25.6% for those with a strongly ischemic response (>2 mm ST segment depression during E.T.T).

Non invasive tests such as exercise electrocardiography nuclear cardiology (thallium 201 scan), and dipyridamole echocardiography are the methods to detect coronary artery disease. The E.T.T is the most economical and widely available of the above three methods. Coronary artery disease is increasing in frequency in the general population as well in armed forces personals, with more patients presenting in younger age group. Because of the problem many studies have performed to evaluate the accuracy of exercise stress test of asymptomatic subjects in detecting latent coronary artery disease[1-4]. I selected 100 asymptomatic individuals who had risk factors for coronary artery disease and performed E.T.T to evaluate the probability of having coronary artery disease. The individuals tested positive had 2 to 4 folds higher chance of a coronary event like angina, infarction and death. But early intervention in modifying the risk factors can delay or prevent these coronary events.

MATERIALS AND METHODS

This descriptive study was conducted in the department of medicine PAF Hospital Mushaf Sarghoda from March 2004 to March 2005. A total of 100 asymptomatic men between age 25 to 50 with mean age of 38were selected. They had one or more risk factors for developing CAD. They were divided in to five groups according to number of risk factors they had to develop CAD. Following risk factors were considered (hypertension, diabetes ,smoking, obesity, hyperlipidemia, family history of CAD) Detail history was taken physical examination was done , blood glucose and lipid profile of all the individuals were taken. The data collected is given as 35 were hypertensive, 30 diabetics, 56smokers,44were over weight, 26 had elevated serum cholesterol and 33 had positive family history of IHD. Resting ECG of all the individuals was done. All of them underwent E.T.T on treadmill using modified Bruce protocol. The end point was to achieve 100% target heart rate or if symptoms of fatigue or angina developed or E.T.T became positive. All of them safely performed the test with no morbidity. Those tested positive had coronary angiogram done to confirm CAD.

RESULTS

Out of 100 tested 90 completed the test 10 could not complete due to fatigue. Six individuals tested positive with 2mmor more ST segment depression and one had multiple VPC during exercise indicating ischemia. These seven individuals who tested positive had three or more risk factors ,all were above 35 years of age. These 7 who tested positive had angiography 6 showed significant CAD and one normal angiogram.

DISCUSSION

In Pakistan coronary artery disease has increased significantly. Not only in the civil but also in the army personnel particularly those who carries certain risk factors. In the West, the most prevalent degenerative diseases are those of the cardiovascular system. In 1988 , as in recent years, cardiovascular diseases accounted for 44% of total mortality, a great percentage than all other diseases combined. Included under the umbrella of cardiovascular .diseases are coronary artery diseases, of which heart attack and angina are a part, hypertension, heart failure and shock, and atherosclerosis. Of these approximately two- thirds of the cardiovascular deaths are attributed to myocardial infarction. More alarming is the conspicuous absence of prior evidence of coronary artery disease, in one out of

five cardiovascular deaths, death is the initial symptom[5].

Further complicating the problem is the fact that one in four heart attacks goes untreated, silent heart attacks noted during a subsequent medical examination[6].

More over while the victims of those of coronary artery disease are depicted as being middle aged or elderly males., over ten percent of these with coronary artery disease are younger than thirty five, and the incidence in the females is on the rise and is likely to increase further. Thus it appears that the major deterrents to longevity are a product of twentieth century life style that is diet high in saturated fats and calories, increased mental and emotional stress, cigarette smoking and sedentary living. Prevention therefore should be aimed at improving the life style.

It is our attempt in this small study to predict coronary artery disease in an individual based on our knowledge of known coronary risk factors and exercise stress testing. To find the role and value of E.T.T. in predicting the occurrence of coronary artery disease in an individual with C.A.D. risk factors.

Results of the study showed that 6 individuals had significant ST segment depression and one showed multiple VPCs ,and if it is also considered ischemic response the total positive tests are 7. All 7 underwent coronary arteriogram 6 showed significant coronary artery stenosis and 1 normal arteriogram. The specificity of the result is 87% the sensitivity is 76%. The predictive value of positive test is 83%. In 1989 Philbrick and colleagues did methodological review of 58 studies that included 7501 patients who have underwent both exercise testing and coronary angiography. These studies showed exercise testing to have a mean sensitivity of 67% and mean specificity of 72%.

In one of studies in which work up bias was lessened the sensitivity was 40% and specificity was 96%. Hollenberg and coworkers proposed treadmill exercise score that considers all ST segment measurements made during exercise and recovery and combines them with heart rate and METs. They reported that treadmill exercise score gave the exercise test a sensitivity of 85% and specificity of 95%. The exercise electrocardiography test is the most feasible, cost effective, noninvasive test presently available in clinical practice for prognostication. For patients both with and without previous myocardial infarction, the association between exercise ST changes and subsequent markedly varies among different studies Among asymptomatic subjects, an ischemic response to exercise testing identifies a subgroup with an increased risk (twofold to 20 folds) of developing coronary artery disease events (angina, infarction and death) in the following years[7]. Lipid Research Clinics Study found that 8-years mortality in asymptomatic men was 3.2% for subjects with a non-ischemic response, 25.6% for those with a strongly ischemic response (2mm or> ST segment depression or the appearance of ST segment depression in less than or equivalent to stage 2 of the modified Bruce protocol), and 12.6% for those with less serious electro-cardiographic abnormalities[8] . Similarly, Giagnoni et al found a five fold increase in risk for cardiac events in normotensive subjects with exercise induced ST segment depression compared with those without ST segment depression[9].

Forty nine individuals in our series were between the ages of 41-50 years. Five individuals who showed evidence of coronary artery disease were aged 35, 37,45,48 and 49 years respectively. In our series of hundred subjects family history of coronary heart disease was present in 36 cases while family history of diabetes mellitus was present in 42 subjects.

All seven individuals who tested positive were above 35 years of age and had at least two risk factors for coronary artery disease. One individual had five risk factors the mean being three risk factors. Non of the 32 individuals tested positive of the first group who had one risk factor. The predictive value of maximal exercise testing in asymptomatic healthy middle age men in detecting latent coronary artery disease has been advocated by other investigators[10-16].

The predictive value of exercise testing in individuals with

low probability of coronary artery disease (less than 35 and with no risk factors) is low as the first group In our study. Bruce et al in his Five Years Experience Of the Seattle Heart Watch Study found that four variables obtained from the response to limited maximal exercise testing were significantly associated with subsequent primary coronary heart disease events. These predictors where chest pain during maximal exertion, duration of exercise less than 6 minutes with Bruce protocol, failure to attain at least 90 percent of the age predicted maximal heart rate and ischemic ST segment depression. When the conventional risk factors and the exercise predictors are both considered in asymptomatic men, maximal exercise testing identified a group who had the highest 5 year probability of primary coronary heart disease. This group had one or more conventional risk factors and two or more exercise predictors identified. The probability in those with conventional risk factors but with less than two exercise predictors was 0.015. The population who had no risk factors the 5 year probability in this group was 0.01. Exercise testing was of no predictive value I this group.

In our study 6 % of the tested subjects test positive with exercise testing and later on confirmed with angiography. This mean 60 out of 1000 asymptomatic individuals with risk factors for coronary artery disease can be identified, who have latent coronary artery disease and risk factors can be modified so that coronary events can be delayed or reduced. In a comparative study done by Erminia Giagnoni et al and colleague studied prospectively 135 asymptomatic subjects with exercise induced ST segment depression of 1 mm or more and compared them with 379 controls. At least two controls with negative responses on exercise test were selected for each case and matched for age, sex, work, community and coronary risk factors index.

The end points considered were the following coronary events; angina pectoris, myocardial infarction, and sudden death. After a median follow up period of 6 years for the cases and 6.4 for the controls, the relative risk was 5.55 (95 per cent confidence limits 2.75 to 11.22). Coronary events occurred significantly earlier in the cases than in the controls. Their data also suggest that the exercise ECG response is a particular good prognostic indicator for myocardial infarction. Their analysis has confirmed the predictive roles of age, smoking, blood pressure and the coronary risk factors index and suggests that the exercise ECG response is an additional risk indicator for coronary events.

In the end, in light of my results I would like to emphasize that exercise tolerance test has a good predictive value in detecting latent coronary artery disease in asymtomatic individuals. This is particularly true in those over 35 years of age and have multiple risk factors for ischemic heart disease.

CONCLUSION

1. Exercise Tolerance Test has screening role for latent coronary artery disease.

2. Its predictive value is low in asymtomatic individuals below 35 years and with low risk for coronary artery disease.

3. It has good predictive value in individuals over 40 years with multiple risk factors for coronary artery disease.

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Well organized; Well rewarded.

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