



## Role of Treadmill Test (Tmt) in Identifying Latent Myocardial Ischemia in Asymptomatic Patients With Risk Factors for Mi.

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### ABSTRACT

*Cardiovascular disease is the most common cause of death worldwide, accounting for approximately 30% of deaths, coronary heart disease being a dominant form of cardiovascular disease. India is experiencing an alarming increase in heart diseases and cardiovascular mortality with CHD representing more than 50% of all cardiovascular deaths. There are multiple risk factors involved in causation of CHD. Exercise electrocardiography (treadmill testing) is non invasive, diagnostic and prognostic tool for assessing patients with suspected or known ischemic heart disease*

**KEYWORDS: Exercise electrocardiography (treadmill testing), CHD**

### INTRODUCTION:

Cardiovascular disease is the most common cause of death worldwide, accounting for approximately 30% of deaths, coronary heart disease being a dominant form of cardiovascular disease<sup>1</sup>.

India is experiencing an alarming increase in heart diseases and cardiovascular mortality with CHD representing more than 50% of all cardiovascular deaths. There are many risk factors like hypertension, hypercholesterolemia, smoking, etc. involved in development of coronary heart disease which was first provided by Framingham Heart Study<sup>2</sup>.

Exercise electrocardiography (treadmill testing) is one of the important non invasive, diagnostic and prognostic tool for assessing patients with suspected or known ischemic heart disease. Exercise is a common physiological stress used to elicit cardiovascular abnormalities not present at rest and to determine the adequacy of cardiac function. Ease of availability, low cost and increased health awareness has summated the utility of exercise stress testing in modern cardiovascular practice as a good diagnostic and prognostic tool<sup>3,4</sup>.

### AIMS & OBJECTIVES:

- 1) To study the incidence of latent coronary artery disease in individuals with coronary risk factors.
- 2) To compare the prevalence of exertional myocardial ischemia in patients with multiple coronary risk factors with that in controls.

### MATERIALS & METHODS:

Present study was conducted at Shri M. P. Shah Medical College and Guru Govind Singh Hospital, Jamnagar during period of March 2009 to September 2010. 40 patients with one or more coronary risk factors attending OPD or indoor were included in study group. 20 subjects of comparable age and sex without any coronary risk factors with normal resting ECG were included in control group.

The Treadmill test was done using BRUCE Protocol, started at speed of 1.7 mph at 10 degrees. Baseline Pulse, Blood Pressure and Resting ECG were recorded.

Patients were observed continuously for ECG tracing and clinical parameters like pulse, Blood pressure, auscultation for gallop rhythm, appearance of murmur, crepitations and symptoms like chest pain, syncope, and fatigue. On achievement of 85% of THR patients were informed about termination of the test.

After completion of the procedure the patients were permitted to leave the stress test room only when all parameters were the same as that during the initial period. After completion of the exercise test, the computer generated data was carefully analysed. Every significant finding was manually confirmed.

### • Inclusion criteria:

- 1) Patients with one or more coronary risk factors.
- 2) Patients with no past h/o CAD.

### • Standard acceptance for risk factors:

- 1) Hypertension: blood pressure  $\geq 140 / 90$  mmHg or on antihypertensive.
- 2) Diabetes
- 3) Obesity: BMI  $\geq 30$  kg/m<sup>2</sup>

No.	RISK FACTORS	CASES
1	Hypertension	33 (82.5%)
2	Smoking	20 (50%)
3	Increased LDL	11 (27.5%)
4	Diabetes	10 (25%)
5	Obesity (BMI $\geq$ 30)	6 (15%)
6	Decreased HDL	4 (10%)

- 4) Dyslipidemia : LDL  $\geq 130$  mg/dl
- 5) HDL – C  $< 40$  mg/dl HDL – C  $> 60$  mg/dl was considered a negative risk factor and one factor was deducted from total count
- 6) Smoking h/o
- 7) Family h/o IHD

### RESULTS:

In present study, 60 patients were evaluated for inducible myocardial ischemia, 40 cases and 20 subjects being placed in control group. Out of 40 cases, 32 were males and 8 were females. 16 out of 20 controls were males and 4 were females.

**Table 1: Results of treadmill testing (TMT)**

Test Result	CASES	CONTROLS	Total
Positive	16	2	18
Negative	24	18	42
Total	40	20	60

Chi-square	5.71
p value	0.01*

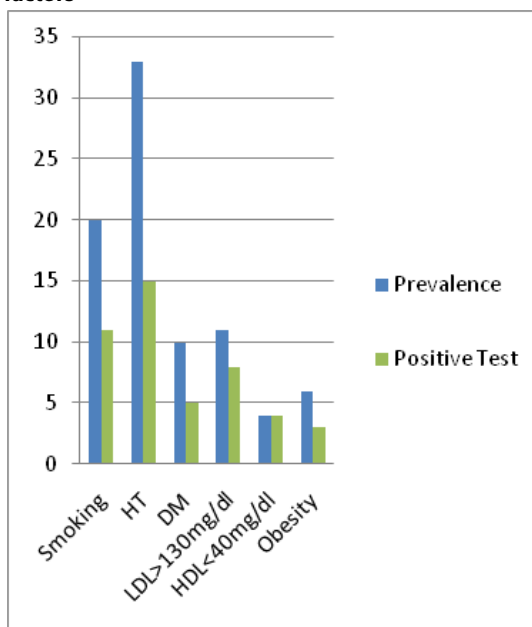
\*=statistically significant, p ≤ 0.05

In present study, 16 (40%) out of the 40 cases tested positive for exertional myocardial ischemia by treadmill testing whereas 2 (10%) out of the 20 controls were positive.

**Table 2: Prevalence of Risk factors**

Most common risk factor observed in cases was hypertension (82.5%) followed by smoking (50%), increased LDL cholesterol (27.5%), diabetes (25%), obesity (15%) and decreased HDL (10%).

**Figure 1: Incidence of positive TMT with individual risk factors**



Maximum incidence of inducible ischemia was found in patients with HDL-C < 40mg/dl (100%), followed by patients with LDL-C > 130mg/dl (72.33%) and smoking (55%). Incidence with diabetes, obesity and hypertension were 50%, 50% and 45% respectively.

Amongst 40 cases, 8 (20%) patients had 1 risk factor, 12 (30%) patients had 2 risk factors, 11 (27.5%) patients had 3 risk factors, 5 (12.5%) patients had 4 risk factors and 4 (10%) patients had 5 risk factors.

Incidence of exertional ischemia in patients with ≤ 2 risk factors was 25% whereas in patients with 3 risk factors incidence was 36.3%. In patients with 4 risk factors incidence was 60%, while in patients with ≥ 5 risk factors incidence was 100%.

Incidence of complications during TMT was rare. Only one case had arrhythmia in form of non sustained ventricular tachycardia.

**DISCUSSION:**

In present study, 18 (30%) out of the 60 patients tested positive for exertional myocardial ischemia by treadmill testing while 28% patients were positive in Gauri et al<sup>5</sup> study and 29% patients were positive in study conducted by Moss et al<sup>6</sup>.

In our study, incidence of positive TMT amongst smokers was 55%. i.e. 11 out of 20 smokers tested positive for exercise induced ischemia, which was comparable to previous study conducted by Nayak et al<sup>7</sup> (45%). Smoker has a shorter duration and lower exercise capacity than non-smokers. So, smoking is more frequently associated with CAD. In our study 5 out of 10 diabetics (50%) tested positive for exertional ischemia which is slightly higher than in studies conducted previously by Munshi et al<sup>8</sup> (38.3%). In present study 15 out of 33 hypertensives (45%) were tested TMT positive, which was slightly higher than those observed in previous study like Gauri et al<sup>5</sup> (28%).

In present study, the incidence of complications was rare. Only one case had arrhythmia in form of non sustained ventricular tachycardia. The incidence of complications was comparable to previous study like Malani et al<sup>9</sup> (Hypotension-0.2% & severe rhythm disturbances-0.9%). Hence, TMT is a safe diagnostic procedure.

**CONCLUSION:**

- Of the 40 cases 16 patients had positive test where as 2 out of 20 controls tested positive (p value = 0.01) which corroborates the association of studied risk factors and the incidence of coronary artery disease. So for the prevention of CHD, risk factors should be corrected.
- The most common risk factor observed in study was hypertension followed by smoking.
- The strongest association was found with low HDL-C (<40mg/dl) followed by increased LDL-C (>130mg/dl) and smoking. So CHD can be prevented by reducing LDL and increasing HDL through diet control and lifestyle modification.
- Analysis of test with respect to number of risk factors showed increased incidence with increase in number of risk factors. Significant increase in incidence was found in patient with more than 3 risk factors (p value = 0.01) which indicates that multiple risk factors favour the development of coronary heart disease.
- Treadmill test is useful, non invasive and cost effective approach for diagnosis and prognosis of coronary artery disease.
- We concluded that TMT is a safe procedure as complications observed during TMT were rare.

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