ejpmr, 2016,3(11), 229-233

SJIF Impact Factor 3.628

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

SAFETY OF PREDISCHARGE EXERCISE TREADMIL TEST AFTER DIFFERENT TYPES OF ACUTE MYOCARDIAL INFARCTION

[1]Syed Fasih Ahmed Hashmi, [2]Sumaira Shaikh, [3]Anwar Shaikh, [4]Jamrose Durrani, [5]Zaheer Ahmed, *[6]Zulfiqar Ali Qutrio Baloch

[1]FCPS, FACC Assistant Professor Department of Cardiology Liaquat University Hospital Hyderabad / LUMHS, Jamshoro, Sindh Pakistan.

[2]Postgraduate (Resident) Department of Cardiology Liaquat University Hospital Hyderabad / LUMHS, Jamshoro, Sindh Pakistan.

[3]Dip. Card, MD Senior Medical Officer Department of Cardiology Liaquat University Hospital Hyderabad / LUMHS, Jamshoro, Sindh Pakistan.

[4]Department of Medicine Liaquat University Hospital Hyderabad.

[5]General Practitioner Medeor 24 X7 Hospital, Abu Dhabi.

[6]Brandon Regional Hospital, Brandon, Florida.

***Corresponding Author: Dr. Zulfiqar Ali Qutrio Baloch**
Brandon Regional Hospital, Brandon, Florida.
Zulfiqar.qutrio@gmail.com

Article Received on 16/09/2016 **Article Revised on 06/10/2016** **Article Accepted on 26/10/2016**

ABSTRACT

Objective: To assess the safety of performing pre-discharge treadmill after various type of acute myocardial infarction. **Patients and Methods:** This study of 3 months, starting from August to October 2015 was performed at Liquate University of Medical And Health Sciences Hospital, Hyderabad. The study population was the patients who were treated as the case of ST Elevation Myocardial infarction and diagnosed according to WHO criteria while the technique was used in the study was Non-probability Sampling more appropriately convenience sampling. The inclusion criteria of the study were ejection fraction > 40% before discharge, systolic blood pressure range i.e. 110 to 180mmHg, diastolic blood pressure range i.e. 90 to 110mmHg, ability to ambulate in the ward, absence of heart failure sign, absence of any orthopedic problems that preclude exercise, patients who received Streptokinase therapy after acute myocardial infarction. Exercise treadmill tests were performed with patients in fasting state on treadmill machine with modified Bruce protocol. The analyses were completed. In the analysis, data obtained from the ETT response of predischarge patients who have recent attack of MI and having certain risk factors. Accordingly on the basis of study a series of variables and chi-square statistical test was applied on categorical variables with p-value ≤0.05 was considered as significant. **Results:** The mean age was 47.87 in which 36.6% anterior MI, 56.1% inferior, 12.2% lateral MI, 14.6% posterior MI and 14.6% other types of MI. Different association was found between type of MI and results found during treadmill test, that was anterior MI with statistical significant (p-value 0.010) with Angina pain, Inferior MI with Statistical significant (p-value 0.010) with Angina pain and Lateral MI with statistical significant (p-value 0.027) with ST depression. Statistical correlations between Anterior MI and Angina pain was found with p-value of 0.009 with weak positive identity i.e. 0.402, similarly with inferior MI and Angina Pain with p-value of 0.009 with weak negative identity i.e. -0.402 and lastly statistical correlation was found between lateral MI and ST depression with p-value of 0.027 with weak positive identity i.e. 0.346. No any other statistical correlation was found between response to other type of MI and Risk factors. **Conclusion:** There is significant risk in lateral MI to perform treadmill because of ST depression. In case of Anterior MI the relation of Angina pain is much more diverse and showed a relative risk to perform treadmill.

KEYWORDS: discharge, systolic blood pressure range, ETT response.

INTRODUCTION

Decline in mortality of post-infarction is due to success of therapeutically proposals in clinical practice.[1] Exercise stress testing is optimal for noninvasive risk stratification and provides considerable prognostic information, assesses functional capacity and efficacy of medical therapy and can guide cardiac rehabilitation after discharge.[2] Former studies showed that a mean 1- year mortality rate of 19% to 25% in the patients with abnormal and normal results prior to hospital discharge respectively.[3,4] At that time due to lack of therapeutically resources the patients had worse prognosis and severe disease. The mortality rate after acute myocardial infarction decreased significantly but the use of treadmill test as a indicator of risk had been questioned already.[5] Now a day's exercise treadmill test

are routinely performed after an acute myocardial infarction if EF is > 40%. One of the indications is to identify high risk individuals for future coronary events i.e. reinfarction, unstable angina, heart failure & death.[6] Noninvasive stress testing is recommended before discharge in low & intermediate risk patients who have been free of ischemia at rest or have low-level activity and have been free of heart failure for a minimum of 12 to 24 hours.[7] The exact timing of exercise treadmill testing may vary, can be performed as predischarge (8-10days) or post discharge test (6-8weeks).[8] Many studies have been done on exercise tolerance test after myocardial infarction,[9,10] but very few data exists about its safety related to different type of acute myocardial infarction at predischarge level. The main objective of this research is to assess the safety of performing predischarge treadmill after various type of acute myocardial infarction.

PATIENTS AND METHODS

This study of 3 months, starting from August to October 2015 was performed in the cardiac department of Liquate University of Medical And Health Sciences Hospital, Hyderabad. The study population was the patients who were treated as the case of ST Elevation Myocardial infarction and diagnosed according to WHO criteria in Cardiac Department of Liquate University of Medical and Health Sciences Hospital, Hyderabad with no any other specific area of Hyderabad and interior Sindh. The technique was used in the study was Non-probability Sampling more appropriately convenience sampling.

The inclusion criteria of the study were

- Ejection fraction > 40% before discharge.
- A systolic blood pressure range i.e. 110 to 180mmHg.
- A diastolic blood pressure range i.e. 90 to 110mmHg.
- Ability to ambulate in the ward.
- Absence of Heart Failure sign.
- Absence of any orthopedic problems that preclude Exercise.
- Patients who received Streptokinase therapy after Acute Myocardial infarction.
- Consent obtained patient.

While the exclusion criteria were,

- Ejection fraction < 40% before discharge.
- Acute myocardial infarction (MI) (within 2 days)
- High-risk unstable angina
- Uncontrolled cardiac arrhythmias causing symptoms of hemodynamic compromise
- Active Endocarditic
- Symptomatic severe Aortic Stenos is
- Decompensated symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute noncardiac disorder that may affect exercise performance or be aggravated by exercise (e.g., infection, renal failure, thyrotoxicosis)
- Acute myocarditis or pericarditis
- Physical disability that would preclude safe and adequate test performance
- Inability to obtain consent
- Acute aortic dissection.

It was an observational Cross Sectional study, in which data was collected by the help of questioner (copy attached). After 5-6 days of admission, those patients who was falling in our inclusion criteria was went for treadmill test and different variables was observed and noted by us. In the questioner, we included demographic data, type of Myocardial Infarction that patient has faced, ST elevations, Angina pain, ST Depression, Abnormal blood pressure response, PVC>10, ventricular tachycardia, ventricular fibrillation, rate dependent bundle branch block, death related to test.

Predischarge test before hospital

Exercise treadmill tests were performed with patients in fasting state on treadmill machine with modified Bruce protocol. There were 3 mins stages beginning with 0% and 1.7mph. Stage 3 of this protocol was equal to 10.0 metabolic equivalents (METs). Routine medication were continued as advised by attending cardiologist beta blockers and calcium channel blockers were stopped 24 hours before treadmill test. The heart rate was monitored continuously using a computerized system. Blood pressure was monitored before exercise, after every 2 minutes during exercise & after exercise at rest. The continuous monitoring was done by 12 lead ECG, which was recorded before exercise, at the end of each stage of exercise, at the end of exercise and every 2min after completion of exercise up to 6mins or until the ST segment changes returned to baseline. The exercise test was terminated for limiting symptoms, new > 2 mm flat or down sloping ST segment depression in more than 2 leads (i.e. leads V1, V5 & avF), ST segment elevation in the non infracted leads or a >10 mmHg decrease in systolic blood pressure from the pre exercise standing blood pressure. All exercise treadmill test parameters of patients were recorded. There was no follow up studies.

Operational definitions

Treadmill ergometry Test

Electrically driven treadmill with a variety of accommodate body weights at least 157.5 kg (350 lb).[11]

Bicycle ergometry Test

An alternative of treadmill testing for those patients who have orthopedic, peripheral vascular or neurological limitations that restrict weight bearing.[11]

Statistical Analysis

The analyses were completed. In the analysis, data obtained from the ETT response of predischarge patients who have recent attack of MI and having certain risk factors. Accordingly on the basis of study a series of variables were taken as shown in (table.1.1). These variables belonged to the three categories: 1) name, age,

gender 2) Risk factors associated with cardiovascular disease. 3) Type of recent MI. 4) Responses of patient during ETT examination. 5) ECG changes. Except of risk factors, type of recent MI and response of patient during ETT all the responses were discreet and negative. In the ETT responses we only saw angina pain, ST elevation, abnormal blood pressure rise and ST depression and there was no data of other variables in ETT response.

An analyses were carried out to see the either ETT is safe in patient with recent MI or not and see any association or influence of risk factors upon responses that was found during ETT.

All the three categorized data that have some uniformity was analyzed into the stepwise in statistical package of social science 17.0 version to obtain best association. An Intel computer with windows 7 was used for analysis. The different categories of each variable were assigned numerical value because only numerical values were accepted for analysis by the program. The program calculate the different frequencies of number of patients that had different type of recent MI, number of patients that had different risk factors and number of patients that had different responses during ETT especially ST elevation, ST depression, Abnormal blood pressure changes, Angina pain and PVC>10. In which out of 41 patients the recent anterior MI and inferior MI has much more in frequency as compare to others with 36.6% and 56.1% respectively. In case of responses during ETT the angina and ST depression are much more in frequency as compare to others with 41.4% and 75.9% respectively.

Then we saw the associations between different categorized variables with the help of crosstabs. First we tried to find an association between risk factors to response but no any significance p-value was found then we tried to see any association with recent type of MI with response where we got significance p- value associations between recent anterior or inferior MI with angina pain and recent lateral MI with ST depression as compare to others.

Then we tried to see a correlation between significant associated data with the help of bivalent test (Pearson correlation) and find a weak positive relation b/w recent anterior MI and angina, recent lateral MI and ST depression and weak negative relation between recent inferior MI with angina.

We also found the relative risk and odd ratios among the risk factor and outcome through cross tabulations.

Table 1.1 The series of variables that used for analysis

Demographic data includes:
Name, age, gender
Risk factors includes
Age, male, hypertension, diabetic mellitus type II, smokers, dyslipidemia, family history
Type of recent MI includes:
Anterior, inferior, lateral, posterior, others type of MI
Cardiac markers at admission includes:
CkMB, LDH,CPK
ECG changes at rest:
ST segment, Q wave, T wave
Responses of patient during ETT includes:
Angina pain, ST elevation, St depression, Abnormal blood pressure response, PVC>10, ventricular tachycardia, ventricular fibrillation, rate dependent bundle branch block, death related to test.

RESULTS

The mean age was 47.87 in which 36.6% Anterior MI, 56.1% inferior, 12.2% lateral MI, 14.6% posterior MI and 14.6% other types of MI.

The frequencies of type of MI are shown in (table 1.2)

			Number of incidence	
Table 1.2			**frequency**	**Percent %**
Type of recent MI	Anterior MI	Total number of patients are 41	15	36.6%
	Inferior MI		23	56.1%
	Lateral MI		5	12.2%
	Posterior MI		6	14.6%
	Other MI		6	14.6%

The frequencies of patient with the type of risk factors are shown in (table 1.3)

	Age	male	hypertension	DMII	smoker	dyslipidemia	Family history
frequency	28	37	21	2	20	5	12
percent	68.3	90.2	51.2	4.9	48.8	12.2	29.3

The frequencies of response in patient during are shown in (Table 1.4)

Response of patient after ETT	Number of response	Percent of response	Percent of cases
PVC >10	4	8.5%	13.8%
Abnormal blood pressure	1	2.1%	3.4%
ST elevation	8	17.0%	27.6%
Angina pain	12	25.5%	41.4%
ST depression	22	46.8%	75.9%

Different association was found between type of MI and results found during treadmill test, that was anterior MI with statistical significant (p-value 0.010) with Angina pain, Inferior MI with Statistical significant (p-value 0.010) with Angina pain and Lateral MI with statistical significant (p-value 0.027) with ST depression. Other association was discreet and not statistical significant are given in (table 1.5) with p-values. There is no any statistical significant found with risk factors.

(TABLE 1.5) WITH STATISTICAL SIGNIFICANCE [P-VALUES]

Response in ETT	Anterior MI	Inferior MI	Posterior MI	Lateral MI	Other MI
Angina pain	**0.010**	**0.010**	0.813	0.107	0.463
ST elevation	0.952	0.698	0.846	0.240	0.463
ST Depression	0.055	0.139	0.846	**0.027**	0.463
Abnormal blood pressure	0.183	0.252	0.675	0.706	0.675
PVC>10	0.641	0.467	0.767	0.673	0.767

Statistical correlations between Anterior MI and Angina pain was found with p-value of 0.009 with weak positive identity i.e. 0.402, similarly with inferior MI and Angina Pain with p-value of 0.009 with weak negative identity i.e. -0.402 and lastly statistical correlation was found between lateral MI and ST depression with p-value of 0.027 with weak positive identity i.e. 0.346. No any other statistical correlation was found between response to other type of MI and Risk factors. By performing relative risk and odd ratio among those who produced statistical significant in cross tabulation. Angina response in Recent Anterior MI, we found out of 41, only 15 patients have recent Anterior MI and out of 15, only 8 patients who were responding with during treadmill test with angina pain with odd ratio 6.286 (i.e. the ratio between those who showed angina pain to those who didn't show angina pain) and relative risk of 3.467 (ratio of show angina pain due to treadmill test) and 0.552 who didn't show any pain due to treadmill. Inferior MI with Angina pain the odds ratio is 0.150 with relative risk of 0.261 for those who showed pain and 1.739 for those who didn't show any pain. Lateral MI with ST depression the relative risk value is 2.118 for those who showed ST depression. Every patient with lateral MI produced ST depression.

DISCUSSION

It has been claimed that early exercise testing is safe, provides useful information that can be used for future prognostication, helps in the psychological and physical rehabilitation and provides objective evidence on which to base the post infarction activity prescription.[12] This type of study was needed in Pakistani population because mostly patients come from rural areas and are illiterate. Heart rate remained within normal limits during and after treadmill testing among all the patients except 1 patient who showed abnormal blood pressure response. 15 out of 41 patients who had anterior M.I, 8 among them showed angina response during exercise treadmill testing. Angina occurring in anterior MI because it involves large territory of left anterior descending artery, during exercise as workload increases there is an increase in myocardial oxygen supply and demand, which can lead to mismatch in an already infarct area. 12 out of 41 with inferior MI in which only 3 patients was showing angina response towards exercise treadmill testing and 5 out of 41 with lateral MI and all of the patients was showing ST depression response towards treadmill testing. ST elevation was observed in 8 patients in those leads which were involved in underlying myocardial infarction. ST depression of equals to or more than 1mm was seen in 22 patients among them some had angina and others were free of developing any symptoms. Patients who had infracted territory involving small area like inferior and posterior wall of heart didn't show any abnormal response during treadmill test.

Our patients were remarkably free of arrhythmias during exercise treadmill testing which contrasts with the experience of others.[13-15] We can offer no explanationfor this except perhaps stricter patient selection. exercise was discontinued either by achieving 85% of heart rate or due to fatigue. No serious complication was seen during or after the exerise so it is

worth saying that exercise tredmmill testing is safe among the selected group of patients. All the patients are now living a normal life as before myocardial infarction. Patients are on full anti-ischemic treatment and are being on regular followups in cardiac OPDs. while during followups it was observed that no patient had reinfarction, re-hopitalization or any mortality. The benefits and usefulness of early treadmill testing may replace the conventional exercise test that are done after 6 weeks or months after myocardial infarction.

CONCLUSION

There is significant risk in lateral MI to perform treadmill because of ST depression. In case of Anterior MI the relation of Angina pain is much more diverse and showed a relative risk to perform treadmill. On the other hand the relation of inferior MI with Angina pain is discreet and there is no much relative risk performing treadmill (required more studies). The risk of performing treadmill in posterior and others type of MI showed no risk factors, so performing tread mill will be safe.

REFERENCES

1. Cairns JA, Connolly SJ, Gent M, Roberts R. Post-myocardial infarction mortality in patients with ventricular premature depolarizations. Canadian Amiodarone Myocardial Infarction Arrhythmia Trial Pilot Study. Circulation. 1991 Aug; 84(2): 550-7.
2. Sharma K, Kohli P, Gulati M. An update on exercise stress testing. Curr Probl Cardiol. 2012 May; 37(5): 177-202.
3. Banerjee A, Newman DR, Van den Bruel A, Heneghan C. Diagnostic accuracy of exercise stress testing for coronary artery disease: a systematic review and meta-analysis of prospective studies. Int J Clin Pract. 2012 May; 66(5): 477-92.
4. Paolillo S, Farina S, Bussotti M, Iorio A, Perrone Filardi P, Piepolil MF, et al. Exercise testing in the clinical management of patients affected by pulmonary arterial hypertension. Eur J Prev Cardiol. 2012 Oct; 19(5): 960-71.
5. Kanthan A, Tan TC, Zecchin RP, Denniss AR. Early exercise stress testing is safe after primary percutaneous coronary intervention. Eur Heart J Acute Cardiovasc Care. 2012 Jun; 1(2): 153–157.
6. Theroux P, Marpole DG, Bourassa MG. Exercise stress testing in the post-myocardial infarction patient. Am J Cardiol. 1983 Oct 1; 52(7): 664-7.
7. Hill J, Timmis A. Exercise tolerance testing. BMJ. 2002 May 4; 324(7345): 1084–1087.
8. Marchionni N, Fattirolli F, Fumagalli S, Oldridge NB, Del Lungo F, Bonechi F, et al. Determinants of exercise tolerance after acute myocardial infarction in older persons. J Am Geriatr Soc. 2000 Feb; 48(2): 146-53.
9. Stevenson R, Umachandran V, Ranjadayalan K, Wilkinson P, Marchant B, Timmis AD. Reassessment of treadmill stress testing for risk stratification in patients with acute myocardial infarction treated by thrombolysis. Br Heart J. 1993 Nov; 70(5): 415–420.
10. Gordon DJ, Ekelund LG, Karon JM, Probstfield JL, Rubenstein C, Sheffield LT, et al. Predictive value of the exercise tolerance test for mortality in North American men: the Lipid Research Clinics Mortality Follow-up Study. Circulation. 1986 Aug; 74(2): 252-61.
11. Pina IL, Balady GJ, Hanson P, Labovitz AJ, Madonna DW, Myers J. Guidelines for clinical exercise testing laboratories. A statement for healthcare professionals from the Committee on Exercise and Cardiac Rehabilitation, American Heart Association. Circulation. 1995 Feb 1; 91(3): 912-21.
12. Lear SA, Brozic A, Myers JN, Ignaszewski A. Exercise stress testing. An overview of current guidelines. Sports Med. 1999 May; 27(5): 285-312.
13. Lahav D, Leshno M, Brezis M. Is an exercise tolerance test indicated before beginning regular exercise? A decision analysis. J Gen Intern Med. 2009 Aug; 24(8): 934-8.
14. Faisal AW, Abid AR, Azhar M. Exercise Tolerance Test: a comparison between true positive and false positive test results. J Ayub Med Coll Abbottabad. 2007 Oct-Dec; 19(4): 71-4.
15. Minardi G, Boccardi L, Pennestri F, Tanzi P, Ghilardi P, Bianconi L, et al. Comparison between holter dynamic ECG and exercise stress test in the evaluation of ventricular arrhythmias in patients with ischaemic heart disease. G Ital Cardiol. 1981; 11(8): 1063-71.