Research Article

Changes of ST segment in lead II at rest and first stage exercise on tread mill

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Abstract

Exercise can elicit cardiovascular abnormalities not present at rest and can be used to assess the function of cardiovascular system. Stress testing is the most useful way to screen the patients with myalgic chestpain from silent coronary insufficiency. In the post myocardial infarction patients extent of rehabilitation in terms of physical strain can be assessed. A total of 50 male and female adult normal individuals were selected to assess ST segment changes in Lead II of ECG before and after treadmill exercise of stage one. There is a significant change in ST segment after tread mill exercise of stage one with p-value <0.0001**.**

Keywords: Lead II, ST segment, stage one exercise, Tread Mill Test, ECG.

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Received Date: 08/02/2015 Revised Date: 15/02/2015 Accepted Date: 19/02/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 20 February 2015

INTRODUCTION

Electro CardioGraphy has become an integral part of clinical assessment of cardiovascular diseases as is the testing of Pulmonary Function Tests in respiratory diseases. ECG is the most basic non-invasive fairly informative and routine modality of investigation which gives clear and accurate information regarding cardiac function enabling us to diagnose conduction defects, arrythmias and myocardial infarction. Assessment of cardiac function by ECG permits early detection of congenital defects and abnormalities associated with many cardiac diseases. ECG also provides valuable information in maintaining disease progression and response to treatment. ECG associated with exercise used as a screening procedure for detecting latent coronary artery diseases in asymptomatic patients with family history of diabetes mellitus, familial hyper cholesterolemia, myxoedema, in apparently healthy and asymptomatic young men. Now-a- days TMT is one of the exercise tests being effectively carried out as a screening procedure for cardiovascular diseases. TMT is the simple method of assessment with high sensitivity for morbidity, survival rate and the work efficacy of cardiovascular function.

MATERIALS AND METHODS

The present study was conducted in the department of Physiology, Kurnool Medical College, Kurnool, Andhra Pradesh for the selection of subjects. Prior to the commencement of the study consent was obtained from the College Ethical Committee and written consent was obtained from the subjects after explaining the exercise procedure of TMT including the complications they may face. Each subject was informed in detail of its objective, the aim of the research protocol and the method to be used. Subject's ECG was taken at rest and during stage one exercise on TMT. Subjects who are non-smokers, not suffering from cardiovascular, respiratory problems and metabolic disorders were selected and divided into two groups. TMT procedure was conducted between 9 AM

How to site this article: K Sarala, G Madhavilatha. Changes of ST segment in lead II at rest and first stage exercise on tread mill. *International Journal of Recent Trends in Science and Technology* February 2015; 14(1): 209-211 http://www.statperson.com (accessed 22 February 2015).

and 12 Noon. They are expected to stay in the treadmill room at least for half an hour to get accustomed to the environment. Then the electrodes are applied to the 12 Lead recording of the ECG. The input connections are made to the ADC and the computer is switched on. The pulse oximeter is connected to the right middle finger. The procedure is explained to the subject in detail and maximum co-operation in the procedure is sought. The resting ECG and HR are recorded. The subject is explained to undergo warm up period for 2 minutes by slowly walking on the treadmill in slow speed. After wards tread mill is run at 2.7 kms per hour at an inclination of 10 degrees. The subject walks on the treadmill for 3 minutes. Since the connections are already present the HR is noted and the ADC is switched on and 12 Lead ECG is recorded and stored in the computer, in the standing position of the individual. Subject's ST segment of ECG at rest and after stage one exercise on TMT was considered as control group case group respectively.

RESULTS

A total of 50 adult male and female subjects were examined. The recordings were tabulated after obtaining the computer analysis of data for periods and amplitudes. The ST segment position is noted according to data given by the computer in Lead II. The ST segment changes in Lead II are tabulated individually at rest and stage one exercise on TMT. Table showing comparison of ST segment changes at rest and after stage one exercise on TMT:

Table 1:

Parameter	Control group (MEAN±SD)	Case group (MEAN±SD)	p- value
St segment changes(mm)	-0.311 ± .177	-0.442±.199	< 0.0001

Mean and Standard Deviation of ST segment changes at rest and after stage one exercise on TMT were being compared in the table. The data obtained was analyzed by using unpaired student's t- test. There was a significant increase in ST segment depression during stage one exercise on TMT when compared to resting condition with p- value less than 0.0001.

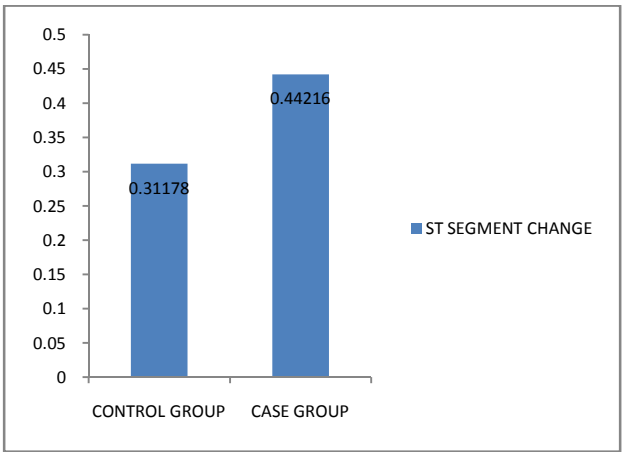

Figure 1: ST Segment Change

DISCUSSION

Exercise testing elicits the body's reaction to measured increase in acute exercise. Any protocol of exercise testing provides the subject to undergo a graded increase in exercise so as to show a graded response in terms of HR, Systolic Blood Pressure and ECG changes. ST segment is the interval between the end of ventricular activation and the beginning of ventricular recovery. When resting ECG was normal, exercise induced ST segment elevation is due to severe ischemia although accompanying ST segment depression is reciprocal. Increase in myocardial oxygen consumption during exercise is a very important factor coupled with electrical changes in heart. The velocity of electrical changes depends upon a number of factors like oxygen consumption, SBP and coronary blood flow during exercise. Thus if ST segment changes are correlated with HR the sensitivity of the test can be improved. Therefore quantification of ST segment depression n Lead II is very important in the estimations during exercise. Coronary disease exists only when ST depression crosses1mm level and not before. Progressive repolarization abnormality occurs because observed ST depression throughout the test depends not only on the extent of underlying coronary obstruction but also on the metabolic severity of

myocardial ischemia as it increases on going cardiac work.HR adjustment of ST segment depression also can improve the value of extent for the identification of anatomically and functionally extensive disease. Relating the magnitude of ST segment depression change to HR change during peak efforts by linear regression could improve the performance of the exercise ECG.

CONCLUSION

The location of ST depression in Lead II along with other Leads gives an idea of the location and extent of damage in myocardial infarction. ST segment depression increases with increasing gradation of exercise along with the heart rate which is directly related to the quantum of exercise. ST segment depression of more than 0.1mm occurs in the first stage exercise on tread mill when compared to normal individuals at rest. Stress activity is the most useful method of assessing the extent of decreasing coronary insufficiency related to myocardial contractility. Subjects complaining of chest pain, with coronary insufficiency cannot complete the stages of testing and the ST depression is more pronounced in these patients, thus screening of occult coronary insufficiency can be ruled out. Correlation of ST segment depression with heart rate and ST/HR index gives better sensitivity in identifying the potentiation of myocardial insufficiency.

REFERENCES

1. WILLIAM F Ganong- Review of Medical Physiology- 20th edition.
2. Van Tellingen, C, Ascorp, CA, and Rijneka, RD; On the clinical value of conventional and new exercise ECG criteria. Int J cardiol 5-689, 1984.
3. Arthur C Guyton,John and Hall, Text book of Medical Physiology, 19th edition, V.B. Saunders and Company.
4. Bobbio M Detamo R. A lesson from the controversy about HR adjustment of ST depression, Circulation, 1991:84:14-3
5. RAUNWALD- HeartDisease- A Text Book of cardiovascular medicine 4 thedition- W.B. Saunders.
6. Chaitman BR, Housan J S. Comparative sensitivity and specificity of exercise electrocardiographic lead systems. AM J Cardiology 1981:47:1335-49.
7. Ellestad MH etal: The predictive value of the time course of ST depression during testing in patients referred for angiograms. Am Heart J 123’ 90908, 1992.
8. Detrano, R etal: Exercise electrocardiographic variables: critical appraisal. J Am Coll Cardiol 8:836-847, 1986.
9. Elamin MS Mary DA SG, Smith DQ Linden RJ. Prediction of severity of CAD using slope of submaximal ST segment /HR relationship
10. Cardiovascular Res 1980, 14: 681-91.
11. GALBO.H, Hormonal and Metabolic adaptations to Exercise. Newyork: Thienie -Stratton; 1983[
12. ZIERLER et al. Effect of exercise on Blood glucose concentration in physical trained subjects. Am.J.Physiol Endocrinol Metab 276 (3); E 409- E 415; 1995.

Source of Support: None Declared
Conflict of Interest: None Declared