DOI Number: 10.5958/2320-608X.2019.00057.X

Impact of Parental History of Hypertension on Heart Rate by Treadmill

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Abstract

The heart rate response to exercise is another determinant of the healthy cardiovascular system. Increased heart rate has been shown to be predictive of mortality and morbidity. A total of 100 subjects with parental history of hypertension were divided into two groups during pre exercise and post exercise period by tread mill. There was a significant decrease in heart rate after training. Heart rate variation has been shown to be predictive of mortality and morbidity in subjects with parental history of hypertension.

Keywords: *Heart rate Parental history Tread mill pre exercise post exercise*

Introduction

Hypertension is commonly asymptomatic, readily detectable usually easily treatable and often leads to lethal complications if left untreated. Given the health costs and potential importance of early detection of hypertension, several studies have examined the heart rate response to exercise as a risk factor for the development of hypertension.[1,2]

Family history of hypertension is a contributory risk factor for cardiovascular abnormalities. Exercise tests bring about changes in the haemodynamics of the cardiovascular system.[3]

Materials and Method

The study was carried out at Government Medical College Kurnool in the department of Physiology and cardiology of Government General Hospital Kurnool for the selection of subjects.

We have selected 100 male subjects in the age group of 18-30 years with normal BMI and divided each 50 subjects as control group with parental history of hypertension during pre exercise and case group with post exercise by excluding any acute illness, Diabetes Mellitus, Anti-hypertensive medication, History of chest pain, breathlessness, orthopnoea, Physical disability like arthritis of the knee, any recent illness during the past two weeks.

A brief history, general and systemic examination was performed. Subjects were interviewed on the previous day with a detailed description of the protocol of the study and written consent was taken from them.

Study was done in a quiet room during which subjects lay supine, awake and breathing normally. After instrumentation, subjects were given a 30 min mandatory rest period. At the end of 30 minutes rest period, the ECG (II lead) recordings were started along with Blood pressure recording every 5 minutes for the next 10 minutes. Least Basal Heart Rate and Blood pressure was determined.

The target Heart Rate was then calculated

Maximum Heart Rate = 220-Age

Heart Rate Reserve = Maximum Heart Rate – Basal Heart Rate

Target Heart Rate = 60% Heart Rate Reserve + Basal Heart rate

The subject was instructed to walk on treadmill for 3 minutes at a speed of 1.75 kmph and speed increased to 2.4.kmph for 3 minutes , speed increased to 5.4 kmph. The subject was told to walk till he reached the target heart rate and the stop watch was started. The ECG and the heart rate were recorded during this period. At the end of 6minutes of exercise he is instructed to stop.

Recovery period began from the cessation of exercise and lasted for 10 minutes. The heart rate was recorded during 1st min, 3rd min, 6thmin during the recovery period. The recording was stopped at the end of 10 minutes.

Results

Table 1. Comparision of heart rate changes in pre and post training of exercise in group with p/h of HTN

HEART RATE	WITH P/H OF HTN (n=50)	WITH P/H OF HTN AFTER TRAINING (n=50)
At 1st min	147. 83 ± 7.25	139.69±3.56
At 3rd min	150.61 ± 7.63	145.69±5.28
At 6th min	153.33 ± 4.42	150.38±4.09

There is significant decrease in heart rate during 1st min 3rd min and 6th min in the group with parental history of hypertension after exercise training with $p < 0.0001$

Discussion

Physical activity inhibits vagal nerve impulses to heart and increases sympathetic discharge. The concerted inhibition of parasympathetic areas and activation of sympathetic areas of the medulla on the heart results in an increase in heart rate and myocardial contractility. The tachycardia and enhanced contractility increases cardiac output. As a result there is an increase in heart rate and blood pressure[6].

Persons with high-normal resting blood pressure or unusually high blood pressure response to exercise are prone to develop hypertension[7] and elevated exercise systolic blood pressure response was also predictor of new-onset hypertension. Subjects with parental history of hypertension also show an exaggerated blood pressure response.

Individuals with dysfunctional autonomic heart rate responses may be more predisposed to lethal cardiac arrhythmias and thus increased mortality regardless of the presence or extent of coronary artery disease. An example of attenuated response is chronotropic incompetence. The increase in heart rate that accompanies exercise is due in part to a reduction in vagal tone. Attenuated heart rate response to exercise has been shown to be predictive of mortality and coronary heart disease risk[8].

Abnormal heart rate response to exercise is associated with a significantly increased risk of cardiovascular mortality after adjusting for age, exercise capacity, cardiovascular risk factors, and ST segment depression.

Conclusion

Physical exercise is associated with parasympathetic withdrawal and increased sympathetic activity resulting in increases in heart rate. So, isotonic exercise in young age is beneficial to prevent many diseases. Heart rate rises linearly with increasing grades of exercise and comes back to basal value within 5 -10 minutes. Normotensive young adults with a family history of hypertension will show an exaggerated heart rare response to exercise.

Conflict of Interest: No

Ethical Clearance: Taken from Kurnool Medical College, Kurnool, Andhra Pradesh committee

Source of Funding: Self

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