

Heart rate variability in trained athletes and sedentary individuals- A Comparative study

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Abstract

Background: Pursuing physical activities like sports, exercises such as walking, jogging, swimming or yoga can help in achieving efficient cardio respiratory functions and is thus helpful in prevention of lifestyle diseases

Methods- A cross sectional study was conducted on 200 subjects taken as sample size . They were selected in the age group of 21 to 50 years.

Result: It was observed that there exists a significant statistical difference in the resting pulse and DBP between trained athletes (group I) and sedentary individuals (group II).

Conclusion: These indicate parasympathetic (Vagal) dominance in trained athletes which is beneficial to cardiovascular system. Therefore this information can be used to make recommendation to the masses to follow exercise regime regularly to help prevent lifestyle diseases.

Keywords: Heart Rate, Exercise, Life style.

Introduction

Pursuing physical activities like sports, exercises such as walking, jogging, swimming or yoga can help in achieving efficient cardio respiratory functions and is thus helpful in prevention of lifestyle diseases. Specifically, it

has been found that exercises alter cardiac autonomic functions of the body. ¹ Autonomic nervous system plays pivotal role in the regulation of cardiovascular activities. ² The autonomic functions of the heart can be measured by Heart Rate Variability. Heart rate variability is beat to beat variability of heart rate. Decrease in Heart Rate Variability indicates autonomic dysfunction. Heart Rate Variability also has prognostic significance for cardiovascular diseases. ³

Several studies have been conducted previously to know the modulations in autonomic functions due to exercise. It is documented that athletes have resting bradycardia. However sympatho-vagal balance is by moderation of sympathetic system or by enhancement of vagal tone is not very clear. Also, long duration of training by athletes has not been studied extensively to know long term effects of athletic training on individuals. ⁴

Hence the present study, to assess and compare the Heart Rate Variability in trained athletes and sedentary individuals.

Materials and Methods

A cross sectional study was conducted. A total of 200 subjects taken as sample size. They were selected in the age group of 21 to 50 years.

Group I - Consisted of 100 apparently healthy trained athletes who have regularly run for at least the past 6 months. Regular practice was defined as running 5Kms in 30- minutes at a speed of 10 kmph for a minimum of three sessions per week. 1,5 Running could take place in any setting (indoor or outdoor) under supervision of a trainer.

Group II - Consisted of 100 apparently healthy individuals of sedentary lifestyle who carried out only their daily chores and did not do any form of extra physical exercise to improve their physical fitness. This non exercise regimen was continued for six months.

Individuals with any history of substance abuse like smoking, consumption of alcohol or a history of any known chronic systemic disease were excluded.

All subjects were explained in detail about the purpose and methodology of the study.

To collect required information from eligible patients a pre-structured pre-tested proforma was used. For data analysis Microsoft excel and statistical software SPSS will be used and data was analyzed with the help of frequencies, figures, proportions, measures of central tendency. Chi-square test was use for qualitative data and t-test was used for quantitative data.

Observations

Table 1: Mean distribution of age, sex, BMI in the two study groups

Parameters	Group-I		Group-II		p-value
	Mean	SD	Mean	SD	
Age	35.22	7.12	36.24	7.98	>0.05
Sex(M:F)	88:12		87:13		>0.05
BMI	21.8	1.32	23.21	0.61	<0.05

BMI in athletes were $21.8 \pm 1.32 \text{ Kg/Mt}^2$ and in sedentary individuals were $23.21 \pm 0.61 \text{ Kg/Mt}^2$. The difference was statistically significant.

Table 2: Comparison of resting pulse, SBP, DBP in the two study groups

Parameters	Group-I		Group-II		p-value
	Mean	SD	Mean	SD	
Pulse	70.38	2.87	77.21	6.12	<0.05
DBP	71.28	3.42	75.62	6.40	<0.05
SBP	123.42	8.14	122.44	5.68	>0.05

It was observed that there exists a significant statistical difference in the resting pulse and DBP between trained athletes (group I) and sedentary individuals (group II).

Discussion

Globally, the number of cases of lifestyle diseases has increased drastically. The main factor responsible for this significant increase in lifestyle diseases is decrease in physical activity. It has been observed by Lown et al that there exists a significant relationship between the autonomic nervous system and cardiovascular morbidity and mortality.⁵ Autonomic dysfunction to certain extent was noticed in sedentary individuals that in future could pave way to lifestyle diseases. Similar findings were noticed by Noll G et al⁶.

In the present study, as expected significant lower resting pulse rate was seen in trained athletes in comparison to sedentary individuals. This is because, at rest the heart rate is determined by balance between high parasympathetic (Vagal) influence and low sympathetic activity.⁴ Physiological bradycardia in trained athletes is said to be mainly due to long endurance training which

increases the “vagal tone”.² In our study mean value of Diastolic BP is significantly lower in trained athletes in comparison to sedentary individuals. The findings of our study are in line with the observations made by Sawane MV et al in 2015 which says that physical exercises are known to modulate or ‘condition’ the autonomic nervous system⁷. The results of our study indicate that regular exercise training reduces resting diastolic BP perhaps due to changes in sympathetic/parasympathetic activation, with alterations in cardiovascular autonomic reflexes.

Conclusion

These indicate parasympathetic (vagal) dominance in trained athletes which is beneficial to cardiovascular system. Therefore this information can be used to make recommendation to the masses to follow exercise regime regularly to help prevent lifestyle diseases.

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