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Effect of one month Aerobic Exercise on Heart Rate

Dharmendra Kumar[1], Raj Kapoor[2]
[1](Physiology, VMMC & Safdarjung Hospital/ Guru GobindSingh Indraprastha University, India)
[2](Physiology, VMMC & Safdarjung Hospital/ Guru GobindSingh Indraprastha University, India)
Corresponding Author: Dharmendra Kumar

Abstract:
The rise of cases of Non-Communicable Diseases (NCDs) such as hypertension and diabetes in developing countries is due to the sedentary lifestyles.
Aims and Objectives: *The aim of this study was to assess the effect of 4-week treadmill exercise on the heart rate during resting state and during running of young adult males.*
Methods:*50 young healthy adult male who joined the grid iron gym was selected for the study. The mean heart rates during resting state and during running of the subject were takenpre and post 4 weeks treadmill exercise for the comparison.*
Results: *This study shows that the 4-week treadmill exercise was effective in significantly reducing mean resting heart rate and mean heart rate during running by 6.4 and 18.6 beats per minute respectively.*
Conclusions: *The present study shows that physical activity has the ability to decrease the heart rate in healthy adults. After training physical activity reduce the risk of heart diseases*

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I. Introduction

The rise of Non-Communicable Diseases (NCDs) in developing countries is driven by increasing sedentary lifestyles due to economic development and urbanization. In contrast to developed countries, in India, the evidence base on implementing physical activity interventions is sparse. Approximately 70% of India's population lives in rural areas with resource-poor settings, where the increasing prevalence of NCDs is becoming an added burden. In India, the prevalence of hypertension was estimated to be 159.46 per thousand[1] (20 –.40% in urban adults and 12 – 17% among rural adults) affecting an estimated 118 million inhabitants in 2000[2]. This number is projected to almost double, that is, 214 million, in 2015[3]. In 2003, the prevalence of CHD was 3 – 4% in rural areas and 8 – 10% in urban areas[4].

An inactive lifestyle accounts for 3.3% of all deaths and 19 million Disability Adjusted Life Years (DALYs) worldwide[5]. Physical inactivity accounts for more than one-fifth of Coronary Heart Diseases (CHD) and has been identified as the fourth major modifiable risk factor of CHD[6]. It carries an increased risk of 1.2 to 2.89 times for Hypertension and Stroke, 1.05 to 2.63 for CHD, and 1.08 to 2.63 for Diabetes[7]. The World Health Assembly (2000) affirmed physical inactivity as a key risk factor, and the Global Strategy on Diet, Physical Activity, and Health (DPAS) was adopted in 2004[8]. Levels of inactivity are high in virtually all developed and developing countries. At least 60% of the world's population fail to complete the recommended amount of physical activity required to induce health benefits. The biological mechanisms responsible for the beneficial effects of physical activity are the lowering of BP, elevation in high density lipoprotein levels, increased insulin sensitivity, improved endothelial function, and reduced atherogenic cytokine production[9]. Worldwide, several public health recommendations have been put forward, based on the available evidence of health benefits of physical activity. The World Health Organization recommends at least 30 to 45 minutes of regular, moderate intensity physical activity on most days of the week for the prevention of hypertension, Cardiovascular Diseases (CVD), and Diabetes, respectively[10].

Primary prevention of hypertension and CVD requires the understanding of a population approach to the reduction of major modifiable risk factors such as, physical inactivity. The goal of a population approach in the primary prevention of hypertension is to shift the community distribution of BP toward lower levels of 'biological normality'. Even a small reduction in the mean BP of a population will produce a large reduction in the incidence of complications such as CHD and stroke[11].Most of the studies report that aerobic exercise enhances autonomic control of the heart, as indicated by training induced reductions in heart rate and blood pressure[12].

II. Material And Methods

This study was carried out on new person joining the Grid Iron Gym at Arjun Nagar, New Delhi,from February 2017 to January 2018. A total 50 adult male subjects of age 18 to 30 years were included in this study.
Study Design: Non Randomized Control trial
Study Location: Grid Iron Gym, Arjun Nagar, Safdarjung Enclave, New Delhi.
Study Duration: February 2017 to January 2018.
Sample size: 50 Adult male at Grid Iron Gym.
Subjects & selection method:
Selection of cases: Subjects for the study were selected from newly joined male candidate at Grid Iron Gym, New Delhi. A total of 50 young male subjects were selected who satisfied the inclusion and exclusion criteria after a well informed consent obtained from them.

Inclusion criteria:
1. New candidate joined the gym.
2. Young and healthy adult male in the age group of 18 to 30 years.

Exclusion criteria:
1. Female subject.
2. Subject suffering from any type of disease or on treatment.
3. Sportsperson or the subject who often involved in sports activity.

III. Procedure Methodology

The purpose of this study was to assess the effect of 4-week treadmill exercise on the heart rate of young adult males. Heart rate during resting state and during running on treadmill was taken at the time of joining the gym and after every week the heart rate was measured, the heart rate at the time of joining the gym and the heart rate after completion of 4 weeks of treadmill exercise was selected for the comparison. Heart rate was recorded by palpating the radial pulse per minute.

The subjects were briefed about the purpose and significance of the study. The training was done 5 days/week for a period of 4 weeks. All the subjects were tested before and after, their completion of 4 weeks of treadmill exercise.

The treadmill exercise schedule was explained to the subjects as per the schedule given below in the table.

Table: 1: Treadmill exercise schedule

	Duration (minutes)	Speed (km/hour)
Week 1	10	5
Week 2	15	7
Week 3	20	9
Week 4	25	11

Statistical analysis

Data was analyzed using the SPSS Version 13. A level of $P< 0.05$ was considered as statistically significant, 'before and after 4 weeks treadmill exercise (without controls) design' was adopted in this study. Changes in Heart rate(pre- and post- exercise values) were compared using the Paired't' test.

IV. Result

Table: 2: Changes in mean heart rate during resting and running after 4 weeks of treadmill (n = 50)

PARAMETER	Heart Rate (Beats / minute)		P Value
	BEFORE	AFTER	
Resting	78.50 ± 8.67	72.10 ± 6.32	0.001
Running	158.43 ± 11.32	139.83 ± 12.67	0.001

Mean heart rate during resting state was reduced from 78.50 per minute to 72.10 per minute at 4 weeks. A significant reduction of 6.4beats per minute was observed (P = 0.001).
The mean heart rate during running fell from 158.43 per minute at to 139.83 at 4 weeks. A significant reduction of 18.6 beats per minute was observed (P = 0.001).

V. Discussion

This study shows that the 4-week treadmill exercise was effective in significantly reducing mean resting heart rate and mean heart rate during running by6.4 and 18.6 beats per minute respectively.

During walking and running involves muscular activities sympathetic nerve that pass impulses to vasoconstriction area which acts as a cardio acceleratory centre situated in the reticular formation of medulla in the floor of 4th ventricle. After training heart rate creates an imbalance between the isotonic activity of sympathetic accelerator and parasympathetic depressor. Neurons in factor of greater vagal dominance in sympathetic activity and small decrease in sympathetic discharge. Training also decreases the intrinsic firing rate of sinoatrial node[13].

Many studies has shown that with regular physical exercise and aerobic exercise not only the heart rate and BP decreases significantly but there is significant reduction of body weight, BMI, blood sugar and cholesterol level in the blood[14].

VI. Conclusion

The risk of stroke and CHD is directly related to heart rate and BP throughout the normotensive and hypertensive range[15]. By reducing the heart rate, SBP and DBP by life style modification and proper exercise we can reduce the case of mortality and morbidity due to hypertension, stroke and CHD.

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