Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Original research article

A STUDY OF EFFECT OF EXERCISE ON BLOOD PRESSURE, HEART RATE, RESPIRATORY RATE AND PHYSIOLOGICAL BLOOD PARAMETERS

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Abstract

Hypertension, a prevalent medical illness, is linked to a higher occurrence of mortality from all causes and cardiovascular diseases. Endurance-based exercise programmes can prevent the onset of hypertension and reduce blood pressure in adults who have a balanced blood clotting system, with an increase in both platelet activity and fibrinolytic activity.

Keywords: Physiological parameters, blood parameters, exercise

Introduction

The phrase "exercise" refers to organised, structured, repetitive, and deliberate physical activity. The primary goal of physical exercise is to enhance or sustain one or more aspects of physical fitness.

The study of exercise physiology has gained significant importance in both research and discourse. The work of pioneers in cardiovascular rehabilitation centres has brought significant prominence and notoriety to the field. These pioneers have demonstrated the therapeutic effects of exercise in aiding the recovery of cardiac and other patients.

Disease can occur in persons who are at risk or susceptible to it, often owing to a lack of physical activity. The scientific validity of exercise today is supported by studies conducted in the fields of physical education, exercise physiology, and medicine.

Interventions including physical exercise have successfully reduced both systolic and diastolic blood pressure in adults with hypertension [1]. These interventions may also be useful in adolescents [2-4]. Given that blood pressure values throughout adolescence have the potential to persist into adulthood, it is important to assess this likelihood [2]. Performing gentle physical activities, when done regularly according to a specific

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

exercise plan, can lower systolic blood pressure by 10-15 mmHg, resulting in antihypertensive benefits. The precise process by which blood pressure is reduced has not yet been fully understood. However, there is evidence of a correlation between sodium depletion, reduction in blood volume, and the decrease in blood pressure. It is also likely that the prolonged time of exercise therapy may have caused sweating, leading to a depletion of salt reserves. Exercise is a valuable addition to sodium restriction and diuretics in treating simple moderate hypertension.

Caspersen *et al*. (1985) provided a definition of physical activity that consists of three distinct components:

1. Voluntary motion generated by the musculoskeletal system.
2. Energy expenditure that fluctuates between low and high levels.

There is a direct relationship between physical fitness and the variable being measured.

Caspersen *et al*. (1985) sought to differentiate physical activity from exercise by examining potential sub-elements of "activity". Their definition of exercise was:

1. Voluntary motion generated by the contraction of skeletal muscles.
2. Energy expenditure varies across a range from low to high.
3. Exhibits a strong positive correlation with physical fitness.
4. Systematic, organized and recurring physical motion.
5. The goal is to preserve or enhance physical fitness [5].

In terms of health outcomes, the intensity, frequency, and duration of exercise should be at a level where metabolic energy expenditure is consistently higher than at rest [6]. Furthermore, new research has shown that standing, which involves activating major muscle groups in the core and lower body, can have positive effects on health [7].

Edward M. and his colleagues, in their investigation, provided the following definitions and phrases that are designed to respect scientific standards and correspond to the International System of Units (SI): The primary purpose of muscle is to generate force by contracting and seeking to reduce its length. Exercise is a possible disturbance to the body's balance, known as homeostasis, caused by muscle activity. This muscle activity might be exclusively concentric, eccentric, or isometric, or a combination of these types. The term "intensity of exercise" is recommended to be used instead of "workload" or "work rate" to describe the physiological, psychological, or biomechanical demands placed on a person during exercise [8].

There is a universal consensus that the first response to exercise is an elevated propensity for blood clotting. The elevation in platelet count occurs due to the mobilisation of platelets from deposits in the peripheral circulatory pool, triggered by the secretion of catecholamines. Increased platelet stickiness is a contributing factor to the altered clotting tendency that leads to a higher risk of heart attack during and after exercise in older individuals and those with coronary artery disease (C.A.D.). From a preventive medicine perspective, it is crucial to note that while exercise initially increases the tendency for blood clotting, long-term response actually reduces the likelihood of blood clot formation within blood vessels. This is due to a balanced increase in clotting tendency and fibrinolytic activity. In younger individuals, hypertension frequently arises from an elevated cardiac output, while in older individuals, hypertension is more commonly caused by heightened peripheral vascular resistance and hardening of major arteries [10, 11]. Due to variations in the causes of

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

hypertension related to age, it remains uncertain if the current exercise guidelines for hypertension are completely applicable to older individuals [12].

Materials and Methods

The research was carried out on a sample of 150 medical students. The volunteers were exclusively of male students within the age range of 18 to 22 years. They underwent thorough screening to identify any notable deviations from normal baseline health measurements. The participants were instructed to engage in physical activity for a duration of 30 minutes, and the subsequent data was documented.

Anthropometric data collection:

a) Age.
b) Height.
c) Weight.
d) Body Surface Area.

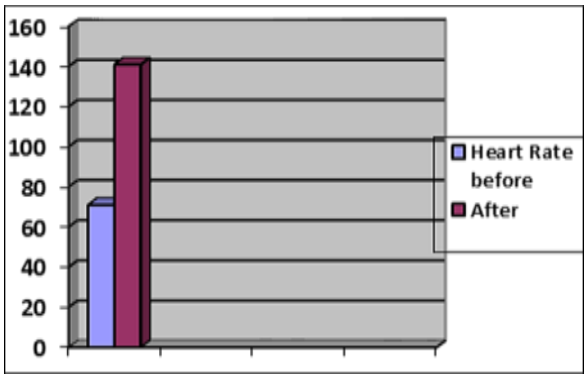
Measurement of Physiological parameters:

a) Cardiac rhythm.
b) Arterial pressure.
c) Breathing rate.
d) Haemorrhage duration.
e) Coagulation duration.
f) White blood cell count.
g) Platelet count.

Results

Table 1: Demographic Data

Parameters	Mean	SD±
Age (years)	21.33	2
Height (cms)	164.48	11
Weight (kgs)	67.93	13
BSA (m2)	1.81	0.2



Graph 1: Heart rate before and after exercise

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Table 2: Change in Respiratory Rate before and after exercise

Parameters	Mean	SD±
Before Exercise	16	1
After Exercise	24	2

Table 3: Change in Systolic BP before and after exercise

Parameters	Mean	SD±
Before exercise	116	5
After exercise	148	6

Table 4: Changes in bleeding time before and after exercise

Parameters	Mean	SD±
Before exercise	1.7	0.3
After exercise	1.5	0.4

Table 5: Changes in Clotting time before and after exercise

Parameters	Mean	SD±
Before exercise	3.5	0.3
After exercise	3.2	0.6

Table 6: Changes in Platelet Count in lakhs before and after exercise

Parameters	Mean	SD±
Before exercise	3.5	0.6
After exercise	3.2	0.67

Table 7: Changes in WBC Count before and after exercise

Parameters	Mean	SD±
Before exercise	7584	353
After exercise	8564	63

Discussion

The purpose of investigating the impact of physical activity on blood clotting in individuals without any health issues is justified. Prior research has indicated that more than 25% of all instances of new myocardial infarction and 14% of all instances of sudden cardiac fatalities are attributed to random episodes of heightened physical activity. Due to the increasing prevalence of exercise therapy, many patients who have

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

suffered from myocardial infarctions have received this treatment in recent years.

The paramount focus of the physician should always be on disease prevention and the treatment of individuals afflicted by it, regardless of its manifestation. Effective prevention and treatment of these ailments rely on comprehending their causes and identifying the detrimental variables. As a result, the scope of modern medical study and investigation has expanded to encompass all scientific fields.

Science has made significant advances to improving health and conquering diseases. The eminent physicians have consistently displayed a comprehensive fascination with human anatomy and physiology. They have been highly aware of the impact of human activities on one's well-being. Prior to the establishment of scientific foundations for solid advice, many observers empirically advised that exercise, rather than rest, was more effective in maintaining and restoring health. A study was undertaken to determine whether physical activity and training increases the risk of thrombo-embolism. The study showed that there occurs a slight increase in thrombocytic activity, simultaneously with a beneficial increase in fibrinolytic activity.

Conclusion

The study's findings can be utilised to enhance an individual's health by improving their foundational health and optimising their performance during subsequent physical exercise. Customised, scheduled, and prescribed exercise will certainly elicit a positive physiological reaction, which can be harnessed to enhance the functional capability of every system in the human body.

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ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

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