



EFFECT OF EXERCISE ON CIRCULATORY SYSTEM

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Abstract: In order for the body to stay alive, each of its cells must receive a continuous supply of food & oxygen. At the same time, carbon dioxide and other materials produced by the cells must be picked up for removal from the body. This process is continually maintained by the body's circulator system. The primary circulatory system consists of the heart and blood vessels, which together maintain a continuous flow of blood through the body delivering oxygen and nutrients and removing carbon dioxide and waste products from peripheral tissues. A subsystem of the circulatory system, the lymphatic system, collects interstitial fluid and returns it to the blood. The heart pumps oxygen- rich blood from the lungs to all parts of the body through a network of arteries, and smaller branches called arterioles. Blood returns to the heart via small venues, which leads to the larger veins. Arterioles and venues are linked even smaller vessels called met arterioles.

Keywords: Exercise, Circulatory system, Heart, Blood

Introduction:

An average, our body has about 5 liters of blood continually through it by way of the Circulatory system. The heart, the lungs, and the blood vessels work together to form the complete Circulatory part of the Circulatory system. The pumping of the heart forces the blood on its journey.

The body's Circulatory system has three distinct parts; pulmonary circulation, coronary circulation, and systemic Circulatory i.e. the lungs (pulmonary), the heart (coronary), and the rest of the system (systemic). Each part must be working independently in order for them to all work together.

Any system of Circulation requires three components:-

- A pump i.e. heart.
- A system of channels i.e. the blood vessels.
- A fluid medium i.e. blood.

The major functions of circulatory system fall into five categories:-

- Delivery:-** Circulatory delivers oxygen and nutrients to every cell in the body
- Removal:-** Circulatory system removes carbon dioxide and metabolic waste products from every cell in the body.
- Transport:-** Circulatory system transport hormones from endocrine glands to their targets receptors

d) **Maintenance:-** Circulatory system maintains body temperature and the bloodbuffering capabilities help control the body's pH

e) **Prevention:-** The Circulatory system maintains appropriate fluid levels to prevent dehydration and help prevent infection from invading organisms. It also protects against blood loss through the clotting mechanism.

Effects of exercise on Circulatory system

1. **Heart rate increases during exercises:-** Heart rate (number of Heart beats in one minute) increases with intensity (speed) of exercise. The normal resting heart rate is 60-70 beats per minutes and can rise up to 180-200 beats per minute.

2. **Effects on basal heart rate due to repeated bouts (chronic) of training load:** As a result of chronic (repeated bouts) training programmer, heart rate decreases. In the world class athletes, the basal heart rate even comes between 40-45 beats per minute. This decrease of heart rate is due to the fact the stroke volume in trained athlete is higher than normal value.

3. **Stroke volume during exercises:-** The normal stroke volume (amount of blood ejected from heart in single beat) is between 70ml to 80ml .per beat. During vigorous exercise it may reach up to even 160 to 170 ml. per beat and in highly trained athlete it can even go up to 200 ml per beat.

4. Stroke volume due to repeated bouts (chronic) of training program:- Due to chronic training programme, stroke volume increase. In training programme, stroke volume increase in trained person as compared to untrained. In untrained persons, the normal stroke volume is 70-75 ml. per beat whereas endurance trained athletes have of 100-115 ml per beat.

5. Cardiac output: - Cardiac output is the amount of blood pumped by heart in one minute and it is equal to heart rate x stroke volume. During exercise, Cardiac output increases with work load. Normal Cardiac output is approx. 5litres/ min (i.e. 70 beats / minute x 70 ml. /beat). The maximum Cardiac output during exercises in untrained person is about 25 liters/ min & in highly trained sport man it may reach up to 40litres per min.

Cardiac output = stroke volume * heart rate

6. Cardiac hypertrophy:- With the chronic training programme heart hypertrophy takes place . In endurance trained athlete Cardiac hypertrophy is found is more. Bigger heart is also called athletic heart. Increases in size of heart takes place by the thickening of the left ventricle.

7. Blood distribution during exercise:- During resting condition , blood distribution in the muscles is about 15% & 60% to the visceral (abdomen) organs like kidneys , liver , Stomach, Intestines etc. Remaining 25 % of blood is distributed to other important organs such as brain, eyes etc. During exhaustive exercise, muscles receive 80- 85% of blood depending upon the intensity or load of exercise. This shift in blood to the muscles is accomplished primarily reducing blood flow to kidneys, liver, stomach & intestines. Because of shifting of the blood from gastro intestinal (visceral) tract to the muscle, it is advisable that one should not involve in sport activities immediately after meals –as it cause gastro intestinal disorders .

8. Blood pressure:-When examining differences in blood pressure during exercise, we must distinguish between systolic & diastolic pressure.

a) Systolic pressure: - When left ventricle of heart contracts and pushes the blood into aorta, it is known as systolic blood pressure

.The normal value of systolic pressure is 120mmHg. It can exceed 200mmHg at exhaustion & in highly trained athletes even up to 240-250mmHg.

b) Diastolic blood pressure: - Diastolic blood pressure reflects the pressure in the arteries. When the heart is at rest or in a relaxation phase. The normal value of Diastolic blood pressure is 80mmHg. Diastolic blood pressure changes little during endurance exercise. However increase in Diastolic blood pressure of 15 mmHg or more is considered to be one of the severe indications for immediately stopping an exercise.

9) Blood volume: - Physical exercise particularly endurance results increase in blood volume which is mainly due to increase in blood plasma volume (liquid portion of the blood) No of red blood cells (the cells in the blood which contain hemoglobin and carrying oxygen) also increases. Increased blood plasma decreases blood thickness that can improve circulation of blood & oxygen availability .Highly trained athletes may have more than 7 liters of blood volume as compared to untrained individual have less than 5.6 liters of total volume.

10) Increase in number of R.B.C:- The number of R.B.Cs or erythrocytes is increased, when exercises are taken on regular bases .These R.B.C are the carriers of the nutrients, including hemoglobin & oxygen to the muscles

11) Increased in number of W.B.C :- It has also been noted that regular exercises increase the number of WBCs or leucocytes.

12) Lowers cholesterol levels :- Exercise helps in lowering the cholesterol levels in the body helping to reduce risk the arteries “furring up” & prevent heart diseases

13) Quick recovery :- With training , the period needed for the heart rate to return to normal after exercise is reduced , thus recovery period becomes faster .

14) Increase rate of blood supply, oxygen and nutrients:- With training , the network of capillaries in muscle will increase thereby increase the supply of blood , oxygen and nutrients to working muscles

15) Good and more effective redistribution of blood:- Due to physical training there is

good and more effective redistribution of blood . Due to increase in blood plasma the thickness of the blood decreases which improves proper circulation of blood.

Conclusion:

From the above points it can be pointed that by doing regular exercises the efficiency of the heart increases due to which the demands of the body can be fulfilled during chronic exercises.

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