THE STUDY OF HEART RATE RECOVERY

Emma Glosson
Cary Academy

ABSTRACT

The purpose of these experiments was to see how long it takes the heart-rate to come back to the original heart-rate plus fifteen after doing different exercises for different amounts of time and adding liquids to drink while recovering. Every single sport or form of exercise uses a muscle group to generate some sort of motion and there are three types of muscle which are skeletal, smooth, and cardiac. Mainly the method of all the experiments was to see how long it took for the heart-rate to recover to the original heart-rate plus fifteen while doing different exercises and seeing if different drinks helped recover faster. The results showed that when doing exercises for a longer period of time athletes have a faster recovery time than non-athletes. This is because the athletes are used to exercising for longer periods of time. Also when drinking different types of liquids while recovering, the recovery times varied by drink due to the fact that each drink had different amounts of salt and the amount of salt in the drink matters because athletes need a certain amount of salt while exercising.

INTRODUCTION

The heart is the organ that supplies oxygen and blood through the whole body. The weight is about 10.5 ounces and size is about the size of a clenched fist. Also it is cone-shaped. The heart is in the chest cavity right behind the breastbone, between the lungs. That has a fluid filled sac around it called the pericardium. Blood is pumped in the opposite direction of the heart into the arteries and returns to the heart through the veins. The Aorta is the body’s most important artery and the most important veins of the body are the vena cavae. The heart is separated into two halves by something called a septum, also known as partition. Plus the halves are separated into two chambers. The two chambers both have upper and lower parts. The two upper chambers of the heart are called atria. The two lower chambers are called ventricles. The atrium is the part that receives blood returning to the heart from the rest of the body and the ventricles pump blood from the heart to the body. Valves let blood flow in one direction in the middle of the chambers of the heart. The heart has cardiac muscle which allows it to
contract and allows the synchronization. There is a heart wall which contains three divided layers, the Epicardium, Myocardium, and Endocardium.

The heart has cardiac muscle which allows it to contract and allows the synchronization. Every movement a person makes relies on the muscles. Even if the movement is just opening eyes or something more complex as running high hurdles at track events. Muscle is one of the three main tissue types in the human body. Those are skeletal, smooth, and cardiac. Skeletal is the most used muscle and takes up the largest amount in the human body. Smooth muscle is in the walls of hollow organs, including the stomach, intestines, and bladder; the majority of blood vessels; the airways; and the diaphragm. Cardiac is only in the heart.

To be “in shape” has many aspects. Including endurance, speed, recovery, amount of muscle. To gain endurance, long distance running helps. Though speed can come naturally or from running often. Recovery is when a person gain strength or ability to breathe easier, back. To gain muscle in the arms people commonly lift weights, to gain muscle in legs, yoga, squats, cycling and quad exercises help. As I said before, people may not realize it but the human body relies on the muscles with every movement that is made.

**Heart rate** (also known as what makes the heart speed up and slow down) is the number of heartbeats per unit of time. This is commonly expressed as *beats per minute* or bpm). Heart rate can change as the body's need to absorb oxygen and excrete carbon dioxide changes, such as during exercise or sleep. The heart beats faster during continuing exercise to help pump blood to the muscles.

Every single sport or form of exercise uses a muscle group to generate some sort of motion. When exercising, either every system in the human body tries to help or shuts down. Also when exercising muscles take in a source of energy which is used to generate motion. Muscles are bio chemical motors that use adenosine triphosphate (a chemical) or ATP. During the process of ATP the muscles need oxygen because it helps produce ATP.
The human body also needs to get rid of any heat because just like a functioning motor, a functioning muscle generates unwanted heat. Though muscles don't need metabolic waste (carbon dioxide, lactic acid). To continue exercising the human body needs ATP. The more strenuous the exercise the more the body needs ATP and if that is not supplied the body will become exhausted and unable to continue. In general ATP is energy and when it falls apart it releases energy. Since ATP is very important the human body has several different systems that help create more ATP. Different forms of exercise use different types of systems. Also the environment affects the heart-rate and many other symptoms. If exercise is done in a hot or humid environment can result in heat stroke. Some symptoms of heatstroke include heart rate increases, sweating stops, and confusion and dizziness occur.

Sam Meyer at Cary Academy did experiments to determine how long it takes for the heart rate to come back to normal jogging in place for different amounts of minutes. He noticed when done an exercise that was more intense the longer the recovery time was or the higher the heart rate was, after jogging longer it took over 250 sec to recover, and after sprinting in place it took up to 180 sec to recover.
MATERIALS AND METHOD

Heart rate probe, water, Gatorade, cranberry juice, straws, chair, different exercises, three athletes and three non-athletes per experiment.

The method for the first experiment was that heart-rate was measured with heart-rate probe. Then volunteer ran in place fast for 60 seconds and heart rate went up. Right after volunteer finished exercises the timer was started. After the volunteers heart rate goes down to the original heart rate plus 15 the timer was stopped. That was the volunteer’s recovery time. This was for 3 athletes and 3 non-athletes. Then data was recorded.

The method for the second experiment was that heart-rate was measured with heart-rate probe. Then volunteer did jumping jacks fast for 60 seconds and heart rate went up. Right after volunteer finished exercises the timer was started. After the volunteers heart rate goes down to the original heart rate plus 15 the timer was stopped. That was the volunteer’s recovery time. This was for 3 athletes and 3 non-athletes. Then data was recorded.
The method for the third experiment was that heart-rate was measured with heart-rate probe. Then volunteer did jumping jacks fast for 60 seconds and heart rate went up. Right after volunteer finished exercises the timer was started. While the volunteer’s heart rate went down to the original heart rate plus 15 the volunteer drank water and when it reached the original heart-rate plus 15 the timer was stopped. That was the volunteer’s recovery time. This was for 3 athletes and 3 non-athletes. Then data was recorded.

The method for the fourth experiment was that heart-rate was measured with heart-rate probe. Then volunteer did jumping jacks fast for 60 seconds and heart rate went up. Right after volunteer finished exercises the timer was started. While the volunteer’s heart rate went down to the original heart rate plus 15 the volunteer drank cranberry juice and when it reached the original heart-rate plus 15 the timer was stopped. That was the volunteer’s recovery time. This was for 3 athletes and 3 non-athletes. Then data was recorded.

The method for the fifth experiment was that heart-rate was measured with heart-rate probe. Then volunteer did jumping jacks fast for 60 seconds and heart rate went up. Right after volunteer finished exercises the timer was started. While the volunteer’s heart rate went down to the original heart rate plus 15 the volunteer drank red Gatorade and when it reached the original heart-rate plus 15 the timer was stopped. That was the volunteer’s recovery time. This was for 3 athletes and 3 non-athletes. Then data was recorded.
RESULTS AND DISCUSSION

In the first experiment it proved that athletes have a faster recovery time after running in place for 60 seconds, which means the heart-rate went down to the original heart rate plus 15 faster than the non-athletes. In theory this is because non-athletes aren't used to exercising for longer periods of time without rest.

![Bar graph showing recovery time for athletes and non-athletes.](image)

Figure 1: This shows that athletes recover faster than non-athletes after running in place for 60 sec

In the second experiment it proved that athletes have a faster recovery time after doing jumping jacks for 60 seconds, which means the heart-rate went down to the original heart rate plus 15 faster than the non-athletes. Again in theory this is because non-athletes aren't used to exercising for longer periods of time without rest.
In the third experiment it proved that athletes have a faster recovery time after doing jumping jacks for 30 seconds and then drinking water while recovering, which means the heart-rate went down to the original heart rate plus 15 while drinking water, faster than the non-athletes. Drinking water while recovering caused the heart-rate recovery time to be faster than drinking cranberry juice but slower than drinking red Gatorade. This could be because salt doesn’t provide all the sodium that an athlete needs while exercising.
In the fourth experiment it proved that athletes have a faster recovery time after doing jumping jacks for 30 seconds and then drinking cranberry juice while volunteer was recovering, which means the heart-rate went down to the original heart rate plus 15 while drinking cranberry juice, faster than the non-athletes. Drinking cranberry juice while recovering caused the heart-rate recovery time to be much slower than drinking water and red Gatorade. This could be because salt doesn't provide all the sodium that an athlete needs while exercising.

Figure 4: This shows that athletes recover faster than non-athletes after doing jumping jacks for 30 sec and cranberry juice
In the fifth experiment it proved that athletes have a faster recovery time after doing jumping jacks for 30 seconds and then drinking red Gatorade while was recovering, which means the heart-rate went down to the original heart rate plus 15 while drinking red Gatorade, faster than the non-athletes. Drinking red Gatorade while recovering caused the heart-rate recovery time to be faster than drinking water and cranberry juice. This could be because it provides all the sodium that an athlete needs while exercising.

![Figure 5](image.png)

*Figure 5: In this experiment it shows that athletes recovered faster than non-athletes after doing jumping jacks for 30 sec then drinking red gatorade while recovering.*

**CONCLUSION**

Athletes recovered faster than non-athletes in each experiment because athletes are used to doing exercises for longer periods of time with no breaks and athletes hearts are conditioned to recover quicker, overall athletes are more fit. The results are important to the world because it educates athletes and non-athletes on fitness tips such as which drinks are better to drink while recovering and how exercising for longer periods of time increases the heart-rate more. The hypothesis was correct because athletes had a faster recovery time than non-athletes in each experiment which is because non-athletes aren’t used to exercising for a longer period of time and that was important in the experiments because the volunteers would need more fitness, which the non-athletes did not have. Some follow-up experiments would be are boys or girls more fit, do different energy drinks affect the recovery time and do different energy bars.
Citations


Bailey, Regina. “The heart” *About.com Biology*

Myer, Sam. The Study of The Time It Takes For The Heart Rate To Slow Back Down To Normal After Jogging In Place For Different Amounts of Min.Cary Academy. Web.