Effect of Running in Place on Blood Pressure

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Abstract

Blood pressure measures the force exerted against blood vessel walls as the heart pumps blood throughout the body. The purpose of this experiment is to observe how exercise will affect blood pressure. In this lab, resting blood pressure is taken and serves as the control variable. Then blood pressure is measured after running in place for a minute. One trial of resting blood pressure was normal with it being 117/61 mmHg. After running in place for a minute, the blood pressure was found to be approximately 175/108 mmHg. This dramatic increase in blood pressure is due to the heart having to work harder to supply the body's working muscles with oxygen. The results from this experiment point to a general trend; exercising will immediately increase blood pressure.

Introduction

Blood pressure is caused by blood traveling through the vessels, veins, and arteries in your body. It measures the force exerted against the arterial walls as the heart pumps blood. Since the heart alternately contracts and relaxes, blood pressure is reported as two values. The first value is systolic pressure, the pressure in the arteries when the ventricles are at maximum contraction. The second value is diastolic pressure, the pressure in the arteries when the ventricles are relaxing. Normal blood pressure is under 120/80 mmHg. According to The Canadian Journal of Cardiology (2006), it is very important to monitor your blood pressure because

chronic high blood pressure, referred to as hypertension, can cause strokes, heart attacks, and heart and kidney failure. One factor that can raise blood pressure is exercise. During exercise, the body's working muscles need more oxygen. The heart then works harder to pump more oxygenated blood throughout the body, progressively increasing systolic pressure (Raymond, 2013). In this experiment, resting blood pressure will be taken and then compared to blood pressure taken after running in place for a minute to investigate the immediate effect of exercise on blood pressure. This experiment will test the hypothesis that blood pressure will increase immediately following exercise.

Methods

Materials needed for this experiment include the following: computer with Logger Pro software, LabQuest Mini, Vernier blood pressure sensor, sphygmomanometer, lab journal, and a timer.

Before beginning the experiment, the equipment must first be set up. Start the Logger Pro software on a computer. Open the folder titled Human Physiology with Vernier and open the program titled 07 Blood Press Vital Sign. Obtain a LabQuest Mini and connect it to the computer using the USB cable. Obtain a blood pressure sensor and connect it into CH 1 of the LabQuest Mini.

Have Partner 2 wrap the blood pressure cuff snugly around Partner 1's upper arm. Be sure that the arrow on the cuff is pointing toward the index finger and that the tubes run down the inside of the elbow. Have Partner 1 sit and rest their arm on the table while relaxing for a few minutes before testing. Once Partner 1 is relaxed, click the green Collect arrow in the top toolbar. It is imperative that Partner 1 doesn't move while their resting blood pressure is being taken. Any slight movement can cause the heart to beat faster and have a stronger contraction when pumping blood, which would make the systolic pressure higher than it should be. Partner 2 should quickly squeeze the rubber bulb to pump the cuff up. Once the gauge or the program shows the pressure reaches 160 mmHg, stop pumping. Allow the cuff to release pressure automatically; do not use the release valve. The systolic pressure, diastolic pressure, and pulse will be calculated and displayed on the computer screen as the cuff pressure continues to decrease. The program will automatically stop calculating blood pressure after the cuff pressure drops below 50 mmHg. Now data collection can end by clicking the red Stop button. Release any pressure left in the cuff but don't remove the cuff from Partner 1's arm. Under the Experiment menu, click Store Latest Run and then record the systolic and diastolic pressures in the lab journal. Before taking a second reading, have Partner 1 stay seated for a few more minutes to ensure their blood pressure returns to normal. Once Partner 1 is relaxed and ready, repeat the procedure to take a second reading of their resting blood pressure. By clicking the Next Page button in the toolbar, the data from each trial can be viewed plotted on a graph. Copy and paste this graph into a Word document to print out and paste in the lab journal.

Partner 1 will repeat the experiment, but this time blood pressure will be found after exercising. Partner 1 will run in place for one minute while Partner 2 times them. After one minute of running in place, Partner 1 will sit down and Partner 2 will quickly wrap the cuff around their arm, pump up the cuff to a pressure of 160 mmHg, and begin taking measurements. Following the same procedure as above, complete the trial. Be sure to record the measurements in the lab journal and to print out the graph.

Results

In Run 1, Partner 1's resting blood pressure was 132/80 mmHg meaning their systolic pressure was a little high but not too high to be concerned about (Table 1). In Run 2, Partner 1's resting blood pressure was 117/61 mmHg, which is normal (Table 1). These two runs act as a control group, showing that Partner 1 has a normal blood pressure to compare the findings of the experiment to.

As shown in Figure 2, the blood pressures dramatically increased after running in place for one minute. After exercising, Partner 1's blood pressure increases to approximately 175/108 mmHg (Figure 2). Comparing this approximation of blood pressure after exercise to the blood pressures in Table 1, it can be seen that both systolic and diastolic pressures increase. The measurements from this experiment point to a general trend; exercising will immediately increase blood pressure.

Table 1:

Partner 1's Resting Blood Pressures

Trial	Systolic Pressure	Diastolic Pressure
Run 1	132 mmHg	80 mmHg
Run 2	117 mmHg	61 mmHg

Figure 1:

Partner 1's Resting Blood Pressures

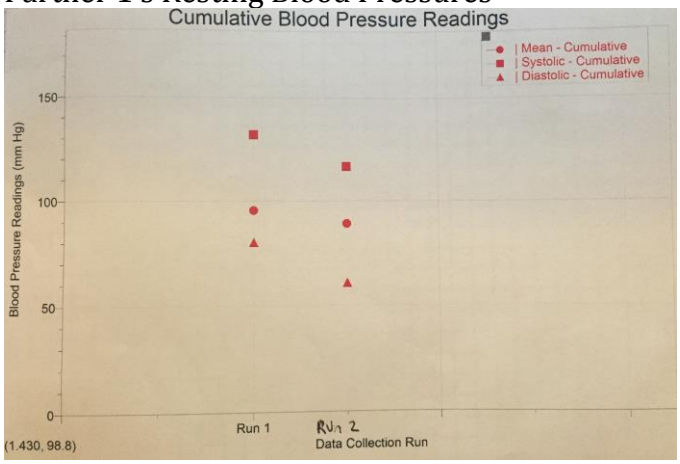
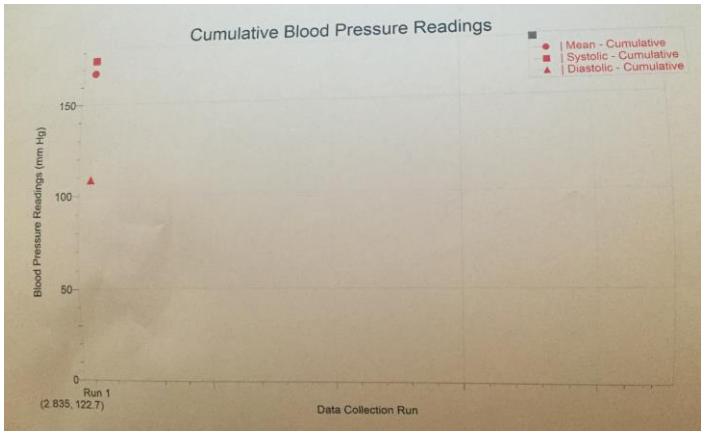


Figure 2:

Partner 1's Blood Pressures After Exercise



Discussion

After performing the experiment and analyzing the resulting data, it was seen that exercising immediately increases blood pressure. In the second reading, Partner 1's resting blood pressure was 117/61 mmHg (Trial 1). This reading shows that Partner 1 has a normal resting blood pressure and this will act as the control group for the experiment. Right after running in place for a minute, Patient 1's blood pressure dramatically increased to approximately 175/108 mmHg (Figure 2). This huge incline in blood pressure is due to the heart having to work harder to supply the body's working muscles with oxygen. When researching other similar experiments, it was noticed that other researchers found the same trend of a dramatic increase in blood pressure after exercise. This allows for this experiment's results to be reliable to conclude that exercising causes an immediate spike in blood pressure.

Even though this finding does support the original hypothesis, a second trial of taking blood pressure after exercising should've been performed to reaffirm the first findings and supply additional credibility. Also, critics of this experiment could argue that after exercising, each person's blood pressure is affected differently. To counter that, both Partner 1 and 2 should've performed the experiment to show that the trend is common between different people. Having multiple trials would give more data to use to support the general trend that blood pressure increases after exercise. The last error in this experiment was not having the exact measurements

of blood pressure after exercising. Logger Pro closed out before the exact blood pressure values could be recorded in the lab journal. Even though estimations of these values could be made from analyzing the graph that was printed, it isn't as credible without the exact data.

Based on the results, it was found that running in place for a minute will increase blood pressure.

Sources

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Raymond, Diane. (2015). *How Does Blood Pressure Change During Exercise?* Retrieved from http://www.livestrong.com/article/27512-blood-pressure-change-during-exercise