THE EFFECTS OF COMPRESSION SLEEVES ON BLOOD LACTATE DURING AN ARM ERGOMETER MAX TEST

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Introduction

Among athletes, the use of compression sleeves has been widely used with the intentions of increased flexibility, improved blood circulation, and increased muscle oxygenation. Therefore, the performance enhancements provided by compression sleeves could affect the amount of lactic acid accumulated within the muscle. Lactic acid builds up in the muscles as a byproduct of anaerobic activity, which dissociates into lactate and H^+ resulting in a decrease in pH and is thought to lead to muscle fatigue.

Purpose

The purpose of this study was to determine if compression sleeves help reduce the amount of blood lactate that accumulates in the arm during exercise.

Methods

The subject arrived at the Cardiovascular Research Laboratory on two designated testing days. Each subject participated in the test twice, with one of the tests being completed with the use of compression sleeves. On arrival, each subject signed the necessary consent forms that allowed participation in the test. The duration of each test conducted, including preparation and recovery time, lasted between 20 and 30 minutes. On testing days each subject was asked to eat a light meal, avoid highly caffeinated beverages, strenuous exercise and to wear athletic clothing where a short-sleeved shirt was required. A heart rate (HR) monitor was then placed on the subjects chest that transmits a signal to a digital watch that ready heart rate in beats per minute (bpm). The subject then took proper positioning on the Sci Fit Pro 1 arm crank ergometer. Blood was the drawn from the subjects finger to get an initial lactate reading from a handheld device that records in millimoles per liter (mmol/l). A resting heart rate was obtained before the onset of the test. The subject then gripped the handles and began to paddle, which initiated the first stage of the test and the timer began. The test consisted of 4 stages with each stage lasting 3 minutes long. The first stage began with a level 2 resistance and increased 2 levels with each stage. During the last minute of each stage heart rate and perceived exertion (RPE) was recorded. The peddling rate was held at a steady rate of 70 ± 2 rpm throughout the entire test. After the last stage was completed an immediate RPE and HR was recorded as well as a blood lactate reading. The subject then went into a 5-minute recovery/cool down stage while final data was being collected. If the subject did not endure the entire test the was recorded witing the current stage at the moment termination. If the test was terminated early, immediate RPE, HR, and blood lactate was recorded followed by a 5-minute recovery/cool down stage. Data for HR, RPE, Blood Lactate, and Time of exercise was collected and analyzed using SPSS 16

Methods (cont'd)

Results

10 male subjects participated in this study with an average age of 19.7 ± 1.15 years old. Each subject had prior training in resistance exercise. There was a significant difference found in the blood lactate readings between the use of compression sleeves and non-use of compression sleeves with a value of p=0.02. The blood lactate reading without use of compression sleeves was 10.9 ± 2.44 mmol/L and with compression sleeves was 9.97 ± 2.46 mmol/L. There was no significant difference in HR, Time, and RPE. Heart rate with compression was 173.6 ± 16.45 bt/min and without compression was 178.00 ± 14.16 (p=0.31). RPE with compression was 17.5 ± 2.22 and without compression was 17.7 ± 2.31 (p=0.51). Time of exercise with compression and without compression sleeves was similar (11.90 ± 0.316 min).

Results (cont'd)

FIG. 1: HR without compression of 178.00 ± 14.16 bt/min; HR with compression of 173.00 ± 16.45 bt/min and the p value of p=0.31.
FIG. 2: RPE without compression of 17.70 ± 2.31; RPE with compression of 17.50 ± 2.22 and the p value of p=0.50.
FIG. 3: Blood Lactate without compression of 10.90 ± 2.44 mmol/L ; Blood Lactate with compression of 9.97 ± 2.46 mmol/L and the p value of p=0.02.

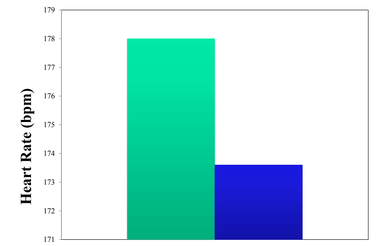

Figure 1: Heart Rate In Non-Compression vs. Compression

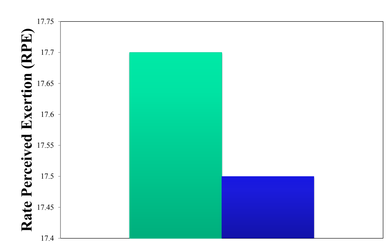

Figure 2: Rate of Perceived Exertion In Non- Compression vs. Compression

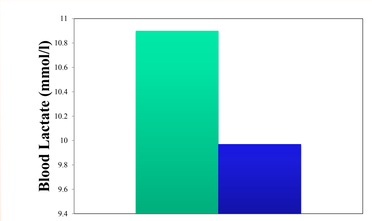

Figure 3: Blood Lactate In Non-Compression vs. Compression

Conclusions

Although the values of HR, Time, and RPE were not significantly different with the use of compression sleeves, the values of blood lactate did show a significant difference. Thus, the use of compression sleeves appeared to delay the onset of muscle fatigue by reducing the amount of blood lactate that accumulated in the arm.