



CORRELATION BETWEEN BODY FAT PERCENTAGE AND MAXIMAL EXERCISE (VO₂MAX) IN COLLEGIATE FEMALE TRACK ATHLETES.

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Background

A VO_{2max} test is used to determine the rate of utilization of oxygen which is a measure of cardiorespiratory endurance and aerobic fitness. A relative VO_{2max} is expressed according to body weight in milliliters of oxygen consumed per kilogram of body weight per minute. The amount of body fat we maintain is dependent on diet, exercise, and heredity. Body fat can be measured by several different methods. Hydrostatic weighing determines body fat percentage through the displacement of water and is considered the gold standard in most Exercise Science Programs.

Purpose

The purpose of this study was to determine if there was a correlation between body fat percentage and VO_{2max} in collegiate female track athletes.

Methods

Eleven women of the UTA track and field team volunteered to participate in the study. They specialized in running events ranging from 100meters to 5000meters. The participants were required to measure body fat percentage via a hydrostatic tank. The participants were also required to complete a maximal exercise test on the treadmill. Prior to testing subjects' age, weight, and height were recorded (age: 20.2±1.1, weight: 123±11.7lbs, height: 65.3±1.9in). The subjects then were scheduled to enter into the hydrostatic weighing tank for the measurement of body fat. Once completed, the subjects each performed a maximal exercise test. The VO_{2max} test followed the runner's protocol. A heart rate monitor was attached around the chest for measurement of the resting, exercise, and recovery heart rates.

Methods (cont'd)

A mouthpiece and tubing were used to collect expired gases. Time to exhaustion was measured and recorded in the computer along with expired gases. For further data analysis, subjects were divided into sprinters and distant runners. Data was recorded and analyzed using Microsoft Excel.

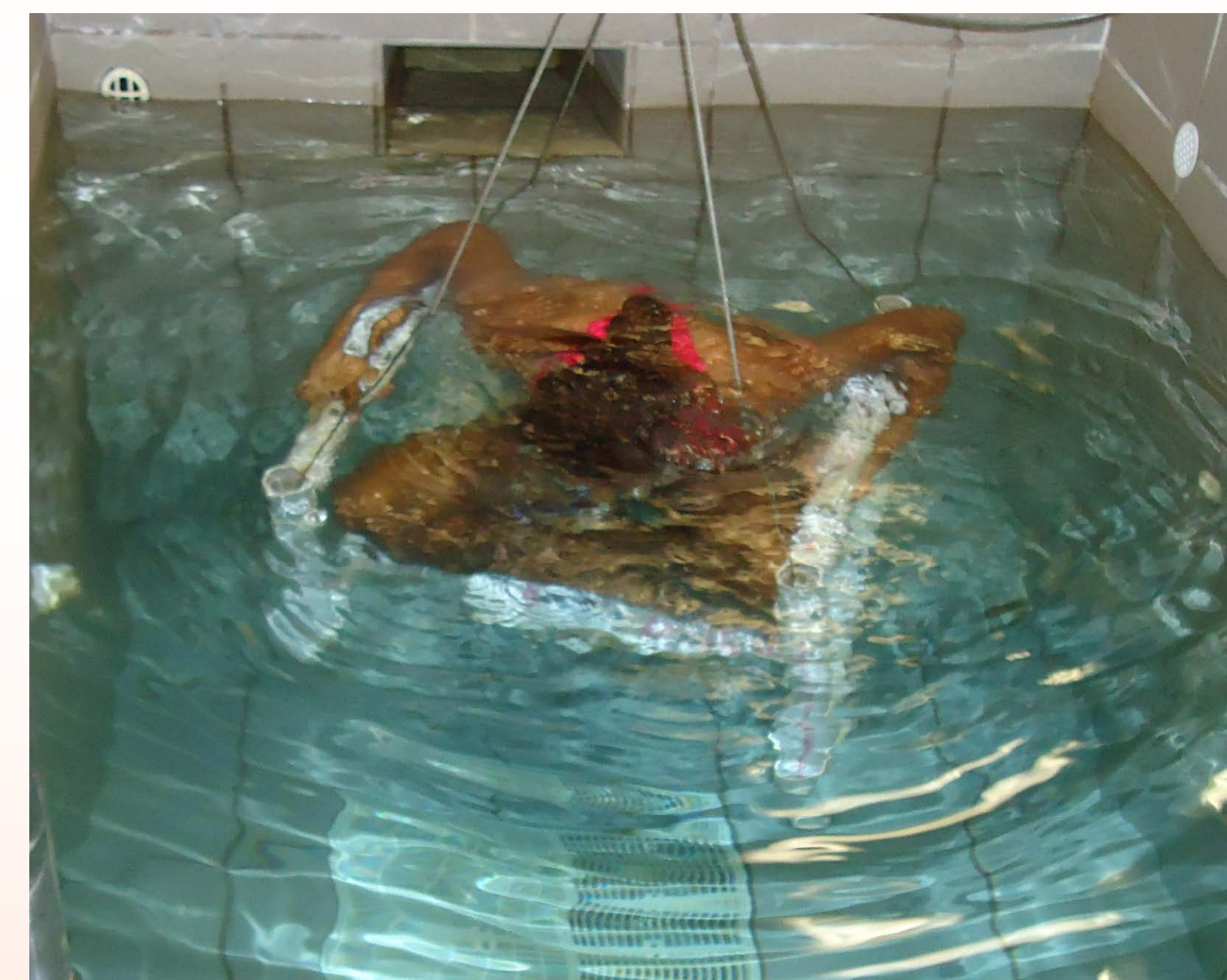


Image 1. Hydrostatic tank performing body fat percentage measurement.

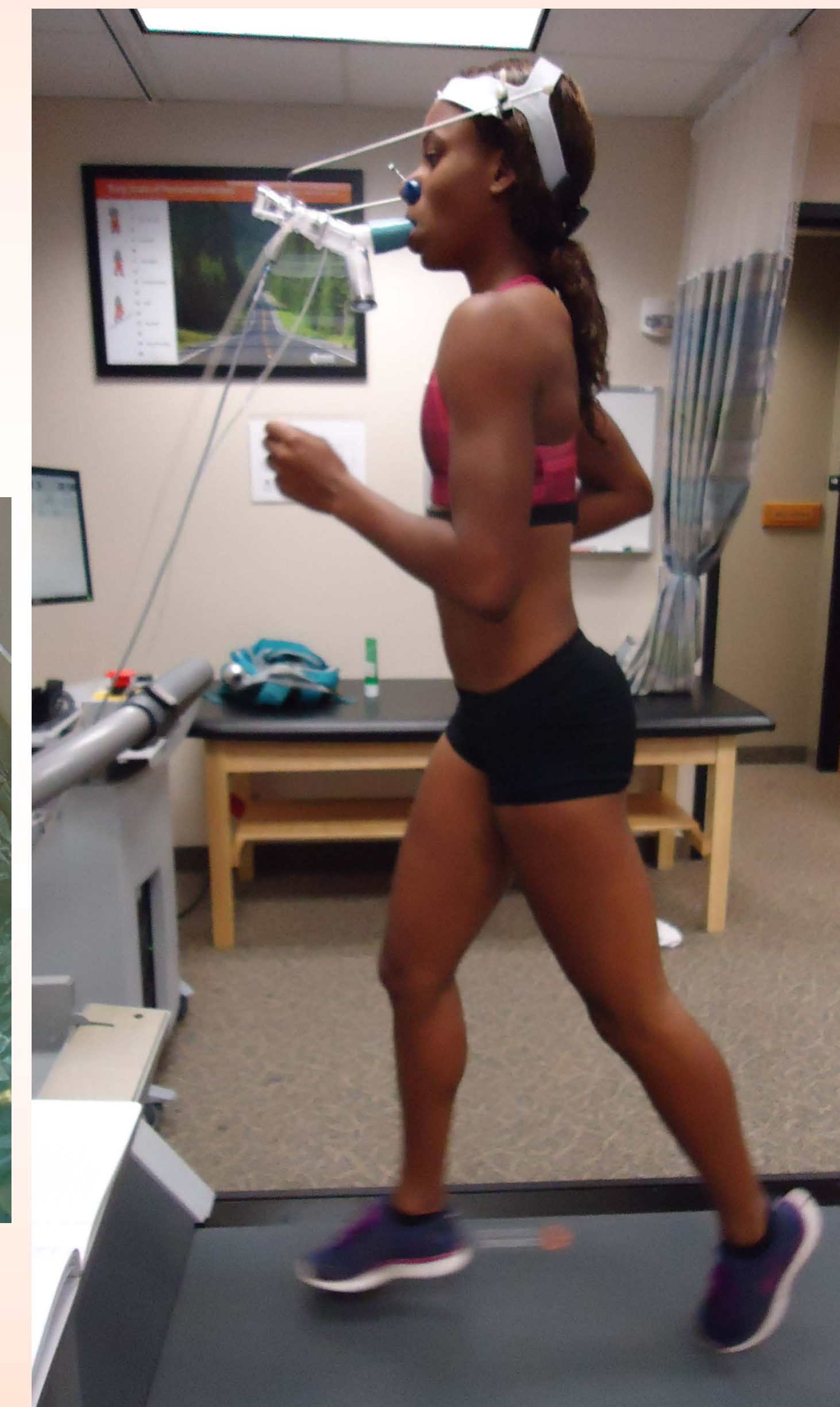


Image 2. Maximal exercise test performed on the treadmill

Results

Analysis of the data showed a moderate correlation ($r = 0.41$) between body fat percentage ($10.98 \pm 4.72\%$) and VO_{2max} (45.96 ± 6.36 ml/kg/min). When the participants were grouped as sprinters and distant runners the results for the VO_{2max} (s: 40.16 ± 2.18 ml/kg/min, d: 50.80 ± 3.93 ml/kg/min) were significantly

Results (cont'd)

different ($p = 0.0004$). However, no significant difference in percent body fat was found ($p = 0.23$) between the two groups (s: $9.04 \pm 4.51\%$, d: $12.59 \pm 4.62\%$). The time to exhaustion (s: 7.40 ± 1.14 min, d: 9.83 ± 1.33 min) was significantly longer ($p=0.01$) and the one minute heart rate recovery (s: 162.80 ± 10.47 bpm, d: 138.50 ± 16.72 bpm) was significantly faster ($p= 0.02$) in the distance group.

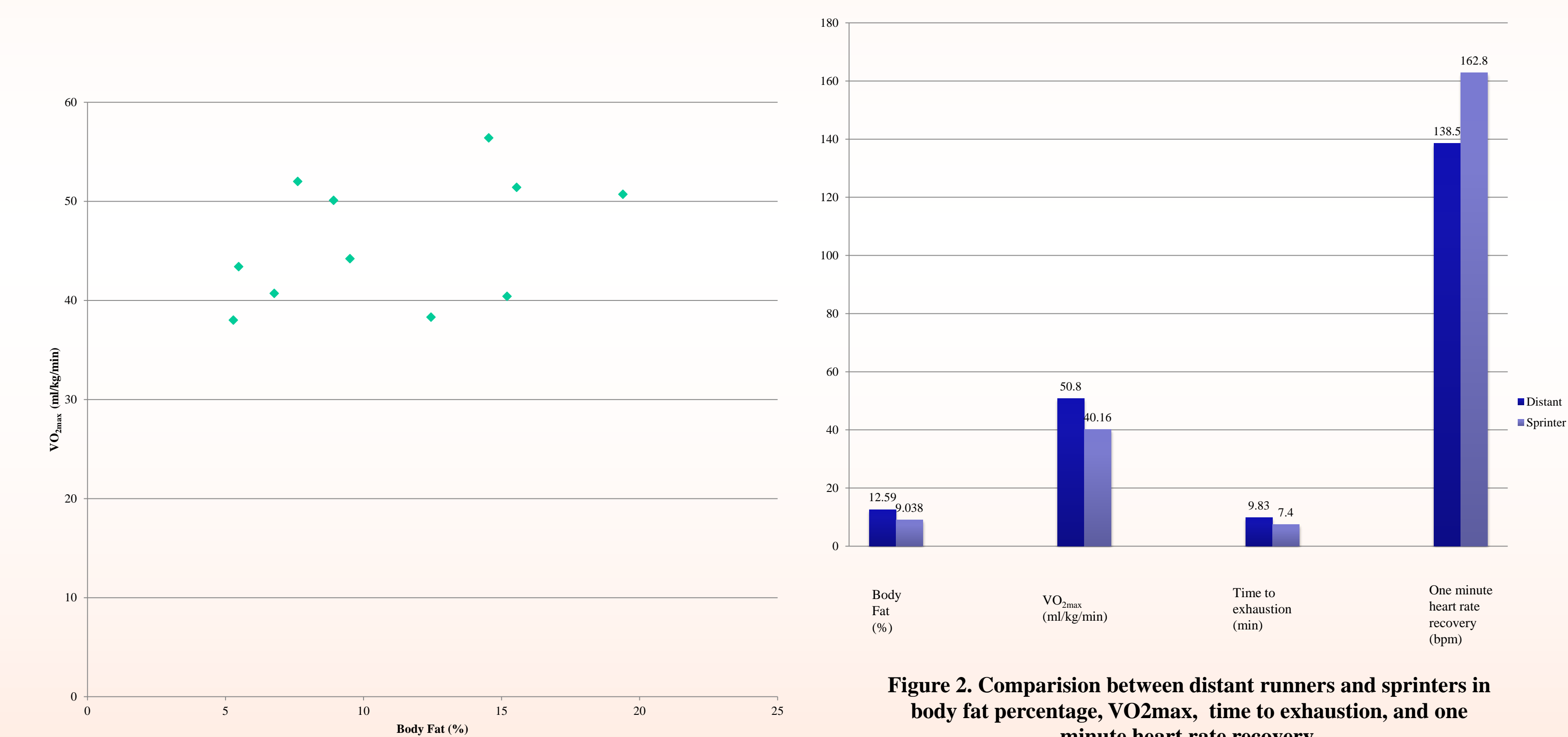


Figure 1. Body fat percentage vs VO_{2max} (ml/kg/min) in collegiate track and field female athletes.

Figure 2. Comparison between distant runners and sprinters in body fat percentage, VO_{2max}, time to exhaustion, and one minute heart rate recovery.

Conclusions

These results showed that there is a weak correlation between body fat percentage and VO_{2max} test in collegiate female track athletes. When divided the group into sprinters and distant runners a significant difference was found in VO_{2max}, time to exhaustion, and one minute heart rate recovery.