



The Aerobic Capacity of Physically Disabled College Basketball Athletes

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Abstract

INTRODUCTION: Aerobic Capacity, otherwise known as maximal oxygen consumption, is the highest amount of oxygen consumed during maximal exercise in activities that use the large muscle groups in the legs or arms and legs combined. This occurs because as the heart becomes conditioned to breathing harder and more often, the heart muscle begins to hypertrophy. As the heart muscle hypertrophies, the muscle becomes stronger, allowing more oxygen to be transported to the lungs for gas exchange. A high $\dot{V}O_{2max}$ is beneficial for fitness because the more oxygen you can take in, the more oxygen gets delivered to working muscles (Devillard, 2007). $\dot{V}O_{2max}$ and heart rate are good methods in determining one's cardiovascular fitness. There is not a lot of laboratory research out there regarding wheelchair athletes most of it has been through field-based testing. The lack of laboratory testing is often due to the fact that few laboratories have the necessary equipment.

PURPOSE: The purpose of this study was to evaluate the aerobic capacity of physically disabled college basketball athletes.

METHODS: A total of sixteen physically disabled college basketball players from the University of Texas at Arlington, volunteered to participate in this study. The subjects were separated into their individual teams (men's and women's) and came in on two separate days to test their peak and scrimmage oxygen consumption. On the first day the athletes came in for their aerobic capacity testing, seven males and eight females from each team participated in a maximal oxygen consumption test on a large treadmill with the chair that they use daily. From this max test, peak $\dot{V}O_2$ data was collected using a portable metabolic machine made by Cosmed. For the next aerobic capacity test, nine male athletes and seven female athletes scrimmaged, in their natural playing environment, for roughly twenty minutes while also wearing a portable metabolic machine.

RESULTS: Once the men and women completed both of their aerobic capacity tests, mean oxygen consumption and heart rate (HR) values, were calculated from the peak $\dot{V}O_2$ data as well as scrimmage $\dot{V}O_2$ data. For the men's team, during their peak test, they had an average peak HR of 184 beats per minute (bpm) \pm 6.24 and an average peak $\dot{V}O_2$ of 27.144 ml/kg/min \pm 6.04. For their scrimmage $\dot{V}O_2$, they had a mean value of 20.109 ml/kg/min \pm 5.43, and an average HR of 151 bpm \pm 18.60. For the women's team, during their peak test, they had an average peak HR of 179 bpm \pm 7.15 and an average peak $\dot{V}O_2$ of 23.314 ml/kg/min \pm 4.45. For their scrimmage $\dot{V}O_2$, they had a mean value of 14.521 ml/kg/min \pm 2.66, and an average HR of 150 bpm \pm 12.02. The data was analyzed by using t tests. There were no significant differences between the men's and women's wheelchair basketball teams for the average peak $\dot{V}O_2$ ($p = 0.195$), the average scrimmage HR ($p = 0.973$) or the average peak HR ($p = 0.231$). However, the difference in $\dot{V}O_2$ between the men's and women's teams seen during the scrimmage was significant ($p = 0.019$).

CONCLUSION: The results indicated that there was no significant difference between men and women's scrimmage HR, peak HR, and peak $\dot{V}O_2$, but there was a significant difference between men and women's scrimmage $\dot{V}O_2$.

Purpose

The purpose of this study was to evaluate the aerobic capacity of physically disabled college basketball athletes.

Methods

Subjects

The sixteen subjects that participated in this study consisted of athletes from both the men's and women's wheelchair basketball team from the University of Texas at Arlington. On the men's team, the players are between the ages of 19 and 28 years old. On the female's team, the players are between the ages of 18 and 22 years old.

Procedure

The subjects came on two separate days to complete their aerobic capacity tests. One aerobic capacity test consisted of a 20 minute scrimmage where each player wore a portable parvo-metabolic cart. The second aerobic capacity test consisted of a max test on a large treadmill where each player used their daily chair and also wore a portable parvo-metabolic cart. $\dot{V}O_2$ data from both the scrimmage and max test were collected, and analyzed, as well as exercising heart rate values.

Methods (cont'd)

Statistical Analysis

The independent variable was the team (men's or women's) and the dependent variable was the aerobic capacity test. T-Tests were used to determine if there was any significant difference between men's average scrimmage $\dot{V}O_2$ and women's average scrimmage $\dot{V}O_2$, men's average peak $\dot{V}O_2$ and women's average peak $\dot{V}O_2$, men's average scrimmage HR and women's average scrimmage HR, and the last T-Test was men's average peak HR and women's average peak HR. The study design was one-way, between groups, measuring ANOVA. The alpha level was set at $p \leq 0.05$ to test for significance.

Results

Table 1: Relative $\dot{V}O_2$ During the Scrimmage

	Mean	SD
Men	20.109	± 5.43
Women	14.521	± 2.66

Table 2: Heart Rate During Scrimmage

	Mean	SD
Men	151	± 18.60
Women	150	± 12.02

Table 3: Peak Relative $\dot{V}O_2$

	Mean	SD
Men	27.144	± 6.04
Women	23.314	± 4.45

Results (cont'd)

Table 4: Peak Heart Rate

	Mean	SD
Men	183	± 6.24
Women	179	± 7.15

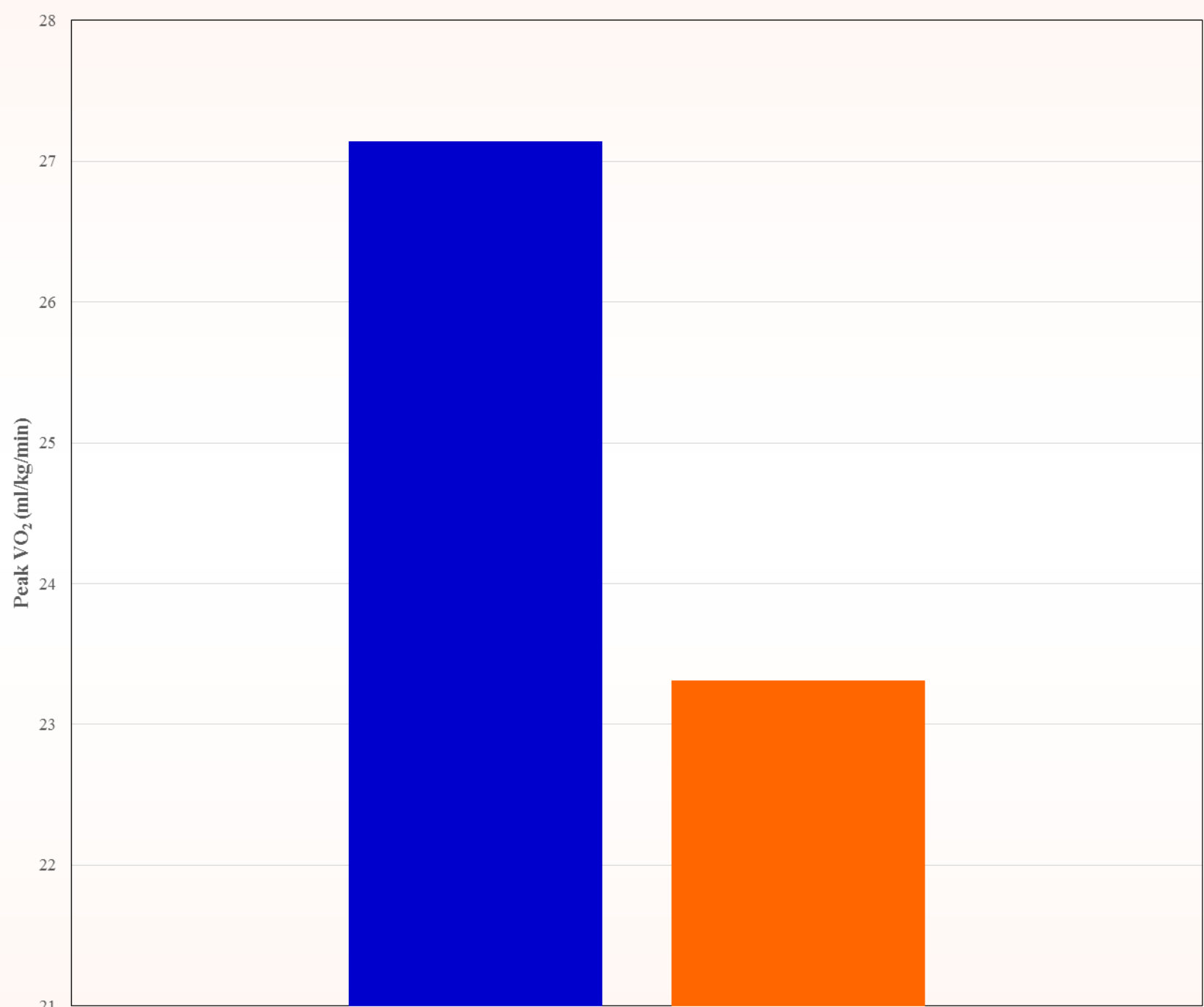


Figure 1: The Comparison of Peak Oxygen Consumption Between Male And Female College Wheelchair Basketball Players During an Exercise Test

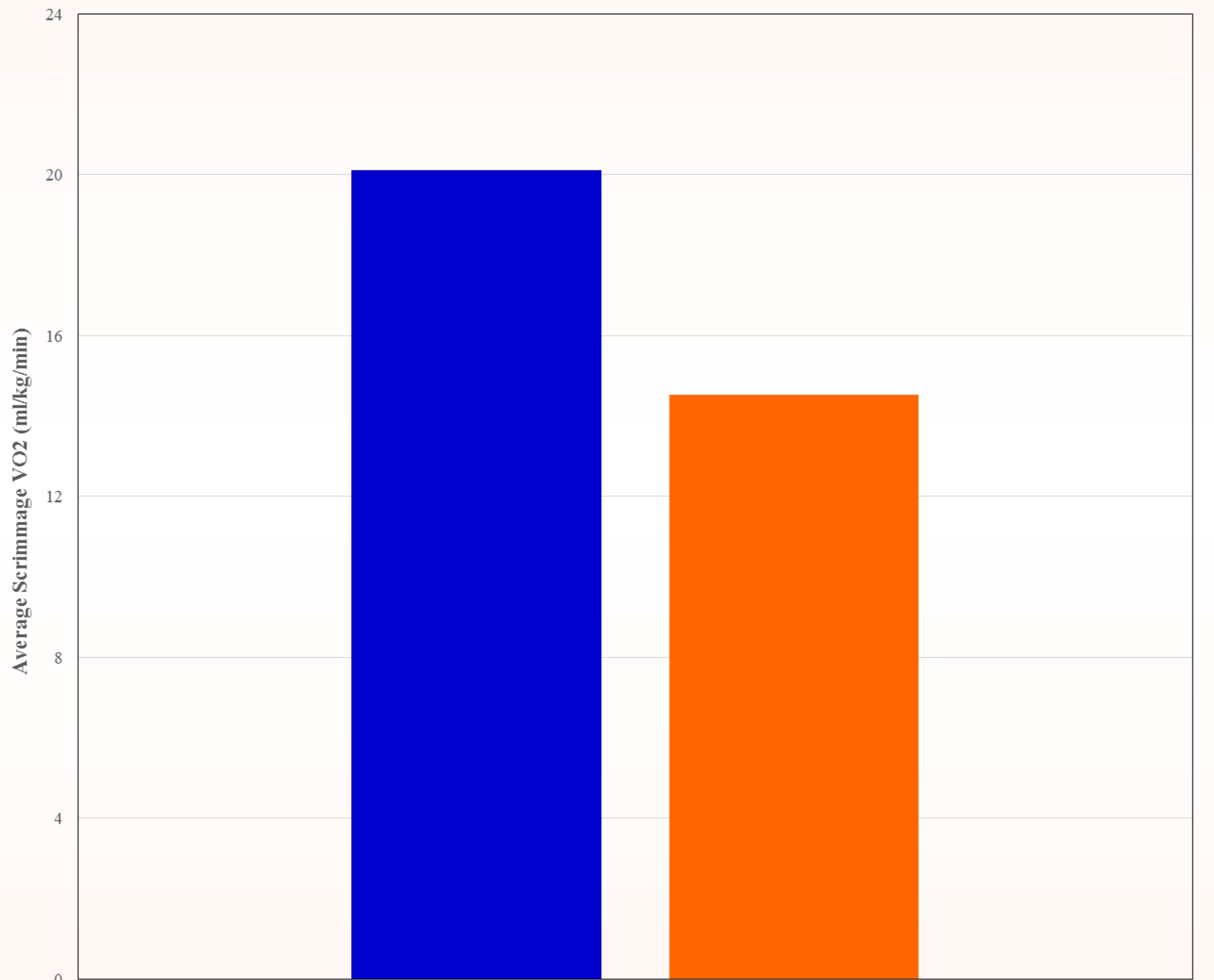


Figure 2: The Comparison of Average Oxygen Consumption Between Male And Female College Wheelchair Basketball Players During a Scrimmage

The data was analyzed using t tests. The difference between men's average scrimmage $\dot{V}O_2$ and women's average scrimmage $\dot{V}O_2$ was significant ($p = 0.019$). The results of the t tests for men's average peak $\dot{V}O_2$ and women's average peak $\dot{V}O_2$ ($p = 0.195$), men's average scrimmage HR and women's average scrimmage HR ($p = 0.973$), and the men's average peak HR and women's average peak HR ($p = 0.231$) were not significantly different.

Conclusions

The results indicate that there were no significant differences between men and women's scrimmage HR, peak HR, and peak $\dot{V}O_2$, but there is a significant difference between men and women's scrimmage $\dot{V}O_2$.