



The Anaerobic Ability of Elite Female Ice Hockey Players

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Introduction

There are very few studies done on female ice hockey players, especially studies that look at shaping the game positively. Setting standards for athletes is important in improving a specific sport. The game requires both aerobic ability and anaerobic ability from the athlete. The National Hockey League states the duration of a shift averages about 45 to 60 seconds. The short shift allows for the athlete to go all out without tiring. Strength and Conditioning Coaches at the professional and collegiate level utilize the Wingate Anaerobic Bike Test (WAnT) to determine the strength and weakness of the athletes' power output. Studies such as Powers et al. (2012), have determined that the WAnT is a reliable method to determine an athletes ability of producing enough power on the ice.

Purpose

The purpose of this study was to describe the anaerobic ability of elite female ice hockey players by producing power through their lower extremities.

Methods

Subjects

The study consisted of ten elite female ice hockey players ranging in age from 14 to 30 years old. They had been playing ice hockey an average of 9.9 (± 6.8) years, and all had competed in higher levels of hockey including collegiate NCAA Division I level and at the national level in their age groups.

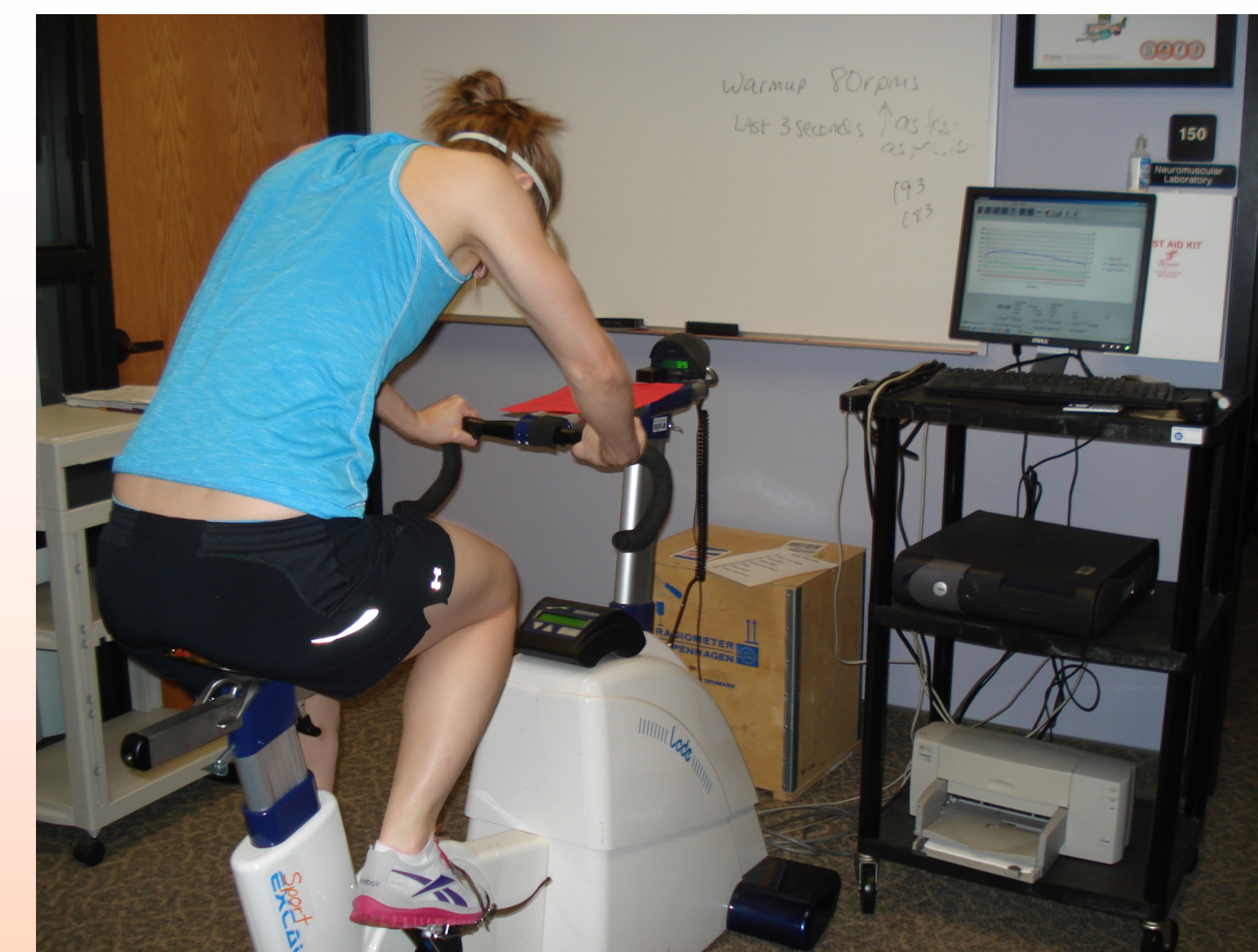
Protocols and Procedures

Anthropometric Measures. The athletes' height and weight was measured with a stadiometer and a calibrated electronic scale, respectively. Height was taken in centimeters (cm) and weight taken in kilograms (kg). Body Mass Index (BMI) was computed using the height and weight of the athletes (kg/m^2). Along with height and weight, the Seven-Site Skinfold Method was used to find the athletes' body fat percentage (BF%).

Methods (cont'd)

This body composition method uses skinfold calipers to measure the thickness (mm) of the skin and fat that is being pinched at each site. Measurements will be taken on the right side of the body at the points located on the tricep, subscapular, chest, midaxillary, abdominal, suprailliac, and at the thigh. Each site was measured twice and the results averaged. Using the Siri equation (Siri, 1961) BF% was calculated with the data from the skinfolds.

Wingate Anaerobic Bike Test (WAnT). The bike seat was adjusted to each subject's height, and a two minute warm-up began. At five seconds left in the warm-up the subject was then instructed to start speeding up and going as fast as possible for the next 30 sec and not stand up at any point during the test. A resistance of 7% of their body weight was added to the bike within 3 seconds of the test. At the end of the 30 seconds the resistance was taken off and the subjects stayed on the bike for a cool-down, which lasted for however long they needed.



Results

These ten female athletes are all very active with healthy BMIs and BF %. Only one female is considered overweight, but that is because the individual is new mother. The physical characteristics and demographics of the subjects are listed in Table 1. The WAnT results showed that these women are able to produce a considerable amount of power from their lower extremities. Which is well within the 90th percentile of the average population's peak power output (Maud and Shultz, 1998). Results from the Wingate test are listed in Table 2.

Results (cont'd)

Table 1: Demographics (mean \pm SD) of the female ice hockey players (n = 10)

Age (y)	18.2 \pm 5.03
Height (cm)	161.4 \pm 9.4
Weight (kg)	62.2 \pm 8.6
BMI (kg/m^2)	23.95 \pm 3.41
Body Fat (%)	23.35 \pm 7.62
Years Playing (y)	9.9 \pm 6.3

Table 2: Results (mean \pm SD) from the performances of the WAnT.

Peak Power (W)	723.3 \pm 125.8
Mean Power (W)	442 \pm 82.6
Peak Power per kg of weight (W/kg)	11.67 \pm 1.56
Mean Power per kg of weight (W/kg)	7.1 \pm 0.9
Rate to Fatigue (sec)	15.48 \pm 3.28
Time to Peak (sec)	1.82 \pm 1.16

Conclusions

When analyzing the results it can be concluded that these young women are strong and healthy individuals. They are not as strong as the men who play in the NHL (who have a peak power per kg of 15.6 W/kg), nor the women who tryout for the Olympic team (who are much heavier than these subjects, but also much leaner: BF% of 15.8%). Nevertheless it implies that one who has a peak power output of 723.3 \pm 125.8W can be interpreted as an athlete who carries a strong potential to succeed in the sport of Ice Hockey. It can also be concluded that to be successful in the sport it not only takes the sport specific skills (e.g. skating and stick-handling), but the ability to produce a great amount of power. Further studies should include entire teams, and also look at the aerobic ability of the athletes.