



Effects of Warm-Up on Anaerobic Performance

Author: Andrea Prempeh

Faculty Sponsor: J.R. Wilson, Ph.D., M. Ricard, Ph.D., A. Yilla, Ph.D., B. Heddins, M.S. Neuromuscular Research Laboratory and Biomechanics Laboratory, The University of Texas at Arlington, Arlington, TX



Abstract

INTRODUCTION: Warm-up is a common practice among athletes and those who partake in physical activity. According to McMillian et al. (2006) warm-up increases muscle and tendon elasticity, stimulates blood flow to the periphery, increases body temperature, and enhances coordinated body movement.

PURPOSE: The purpose of this study was to compare the effects of static stretching, dynamic stretching, and controlled pedaling on a bike at low resistance before performing anaerobic exercises.

METHODS: Ten students from the University of Texas at Arlington volunteered to participate in this study. Each subject participated in a total of three different types of warm-up—static stretching, dynamic stretching, and a controlled 5 minute warm-up on a stationary bike on low resistance and performed two anaerobic tests—a Vertical jump test and Wingate Anaerobic Test (WAnT).

RESULTS: The mean age of the subjects was 23.5 ± 2.46 years, mean weight was 73.89 ± 10.18 kg, and mean height was 172.5 ± 8.15 cm. A single repeated measures ANOVA with one within-subjects factors time (warm-up 1, 2, and 3) was used to determine the effects of different warm ups. Follow-up tests of significant ANOVA effects were compared using the Sidak post hoc test. Of the variables measured, mean power, peak power, fatigue index, peak power by weight, and mean power by weight, there were no significant differences ($p > 0.05$).

CONCLUSION: These results indicate that there was no significant effect of any type of warm-up on anaerobic performance.

Purpose

The purpose of this study was to compare the effects of static stretching, dynamic stretching, and controlled pedaling on a stationary bike at low resistance before performing anaerobic exercises.

Methods

Participants

- Ten students from the University of Texas at Arlington volunteered to participate in this study.
- 5 males and 5 females

Instrumentation

- AMTI Force Plates
- Lode Excalibur Sport Cycle Ergometer

Methods (cont'd)



Procedures

- Upon arrival, subjects signed an informed consent document and filled out a warm-up questionnaire
- Subjects reported to the Maverick Activities Center on 3 separate days to participate in the study
- Each subject participated in a total of three different types of warm-up—static stretching, which consisted of 2 repetitions of 30 seconds of static stretching of quadriceps, hamstrings, gluteal muscles, calf muscles, and hip flexor muscles of each leg.; dynamic stretching, which consisted of 2 sets of 10 forward and backward leg swings, walking knee pull-ups, walking lunges of each leg, and a controlled 5 minute warm-up on a stationary bike on low resistance.
- Two anaerobic tests were performed after warm-up. The vertical jump test requires subjects to put their hands on the hips and jump as high as possible on a force plate. The WAnT requires pedaling for 30 seconds at maximal speed against a constant force or resistance and to induce a noticeable development of fatigue within the first few seconds.

Results

Table 1. Demographics

Variable	Mean	±SD
Age (years)	23.5	2.46
Height (cm)	172.5	8.15
Weight (kg)	73.89	10.18

Results (cont'd)

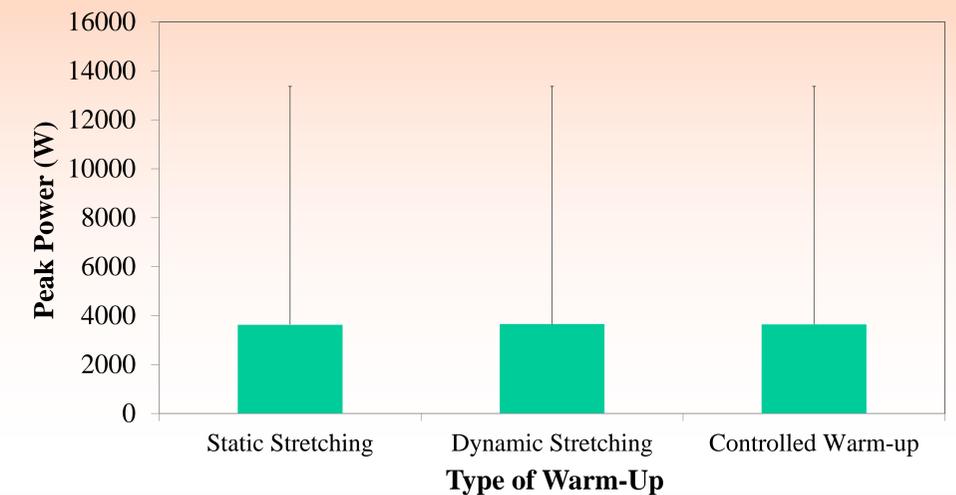


Figure 1.2: The Comparison Between 3 Warm-Ups on Peak Power for Vertical Jump Test

- Data were analyzed using SPSS version 19.0 for Windows. A single repeated measures ANOVA with one within-subjects factors time (warm-up 1,2,and 3) was used to determine the effects of different warm ups. Follow-up tests of significant ANOVA effects were compared using the Sidak post hoc test. Of the variables measured, mean power, peak power, fatigue index, peak power by weight, and mean power by weight, there were no significant differences $p > 0.05$

Conclusions

- Previous studies have shown that dynamic warm-up can decrease lactate concentrations, raise blood pH to enhance thermoregulation, and improve performance in bicycle sprints and vertical jumps.
- The results in this study indicate that there were no significant effects of any type of warm-up on anaerobic performance prior to performing the vertical jump test and Wingate Anaerobic Test (WAnT).