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Short Report

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Effect of Different Warm-up Methods on Anaerobic Power in Young Women

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ABSTRACT

Improving anaerobic performance and anaerobic power is the critical aspect on successfully in competitions for many athletes. The purpose of current research was to investigating the effect of various pre-competitions warm-up on anaerobic performance. It has been shown that, differences pre-competitions activity may effect on anaerobic and explosive performance. Effect of general warm-up, without warm-up and warm-up with specific static stretch training were examined on anaerobic power. Twenty four young women were recruited in this research. Subjects (20 +/- 2.4 years; 164.91+- 7.54 cm; 62.04+- 12.34 kg) were performed three pre-test workouts and in the next step, the Wingate test (30 Second) was used to determination of anaerobic power and fatigue index. Familiar session was performed 48 hours before first test. Data management and analysis was performed by one-way ANOVA repeated measure, using SPSS 20.0. The Result of this study indicated that, there is not significant different on fatigue index and maximum anaerobic power in three conditions (P>0.05). It is interesting to note that 30 seconds anaerobic performance was not affected by pre-competitions activities in three stage of this study.

KEY WORDS: ***Anaerobic Power, Fatigue Index, Creatine Phosphate, Explosive Energy System.***

INTRODUCTION

The anaerobic power and anaerobic capacity are the essential factors in success in sport performance (1). Anaerobic performance closely related to the body's ability in using creatine phosphate during explosives activities. The alactic energy system is using CrP to provide energy and resynthesize of adenosine three phosphate in high intensity exercise in short duration(2). Researchers in recent decade have been investigated effect of pre-competitions exercise on the sport performances (3). There are several factors that may effect on anaerobic performance (4, 5). Type of diet, fuel's storage, supplements, fatigue and pre-performance workouts are interposition variables in anaerobic performance. Power and explosive performance are resulted by force which produced by muscle fibers and speed of contraction. Type of muscle type as well as fast and slow twitch or FOG (fast oxidative glycolytic) and other biochemical property are essential at the anaerobic performance. From a different angle, Length of muscle fibers may effect on contraction force. Speed of contraction is also other important factor in power production. Power in physics is equal to work (force × Distance) dived to time (That is related to speed of contraction) (6). In human analysis, researchers suppose that the D (distance) is fixed factors which may not influenced by external variables. By the way the

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other variables such as speed or time and force my change by manipulation of several external or internal factors. According to these findings, increasing force or decreasing time (increasing speed of movement) will provide more power and explosive energy in human subjects.

One of the most important variable is length of muscle fibers, which can increase or reduce force production by the muscles (7). There are several investigations in animals and human subjects that are discussed regarding to this issue. It has been shown that, muscle fibers, produced more explosive force by 3.3% to 12% of resting length. This may be varied in type of joints and movements. Also it has been shown that any increasing of length more than usual or reducing, shorter than the resting length, will give us negative result by decreasing on force and power (8).

Until recent, there has been no reliable evidence to indicate pre-workout exercise for improving anaerobic and explosive performance. Here is gap for some researchers and coaches. In some professional competitions, coaches skipped the warm-up for two reason; they believed that warm up may reduce energy source storage in muscle for explosive performance. They also believed that any warm-up include the static stretching may increasing length of muscle fibers more than usual, so at result, has been shown reducing power performance in sprinting, jumping of explosives competitions (9, 10). Researcher believed that pre-competitions warm up will decrease risk of injuries and improve human abilities in aerobic performance. Increasing metabolic interaction by increasing enzymes activities, increasing blood pumping and body capacity to carrying oxygen to the cells are the main reasons to engaging pre-competition warm up and activities. Nevertheless benefits of these type of warm up for improving records on anaerobic competition need more investigations (11).

Researcher in this study was investigated effect of differences warm-up protocols before Wingate anaerobic test to determining of anaerobic performance. Scrutiny of these per-workout activity in women subjects, help us to find appropriated manner (using warm-ups with or without stretching exercise) before explosives and anaerobic activities.

MATERIALS AND METHODS

Participants. This study was approved by Ethical committee of Sport Science Faculty, in Shomal University. Twenty four young girls, healthy subject with 3 session recreational physical activity in per week, volunteered to participate in this study (20 +/- 2.4 years; 164.91+- 7.54 Cm; 62.04+- 12.34 kg). Subject were signed consent form include procedure of study, benefits and risk situations, test and exercise protocols that was approved by ethical committee. Subjects were participated in familiar session 48 hours before start the tests. Participants in this study were performing Wingate anaerobic performance test three time with 48 hours rest between. Medical conditions, diet and physical activities were controlled by researcher during this investigation. Static stretching (SS), general warm up (GW), and without warming (WW) protocols were performed as pre-competition workout conditions in this study.

Wingate Protocol. Wingate Anaerobic Test (WANT), developed at the Wingate Institute during the 1970s, is the most popular assessment tools to measure **peak anaerobic power, anaerobic fatigue and total anaerobic capacity**. The Wingate test is most often carried out on a mechanically braked cycle ergometer or arm crank ergometer, for 30 seconds, at an "all out" pace. A counter is used to record revolutions of the flywheel for every 5-second intervals. Although the actual Wingate test is performed in a 30-second time. The individual was advised to complete a warm-up (3-5 minutes), followed by a recovery, cool down (1-2 minutes). Resistance of the 0.075 of body weight was added automatically to the flywheel after reaching to the speed of 90rpm. The Monark Cycle device was calibrated prior the test. The Monark Anaerobic software was reported the variables at the end of test. To increase validity of data, researcher has been used relative data in anaerobic power (power divided to weight of subjects)

Exercise Protocol. There were three pre-test conditions in this study. At the first step (WW), participants performed the test without general or specific warm-up before Wingate test. Anaerobic power and fatigue indexed were determined by Monark anaerobic software. The second stage (SS), subjects were performed general warm-up routine include static stretching on major muscle in lower body (Quadriceps, Hamstring, Gluteal,

Soleus and Gastrocnemius muscle) by 15 second, and 30 second rest between, in two set. In the final step (GW), subjects were performed movement in joints without static stretching (general warm-up). Major parts such as, hip, knee, ankle joint in lower body were involved in this type of warm-up. Rotation, flexion, Extension in selected joints was performed to warming-up subject's body. For all three conditions, researcher demonstrated corrected warm-up protocols on the cycle to ensure that the activities performed probably. Fatigue index in this study was calculated by the standard formula, (Maximum power-Minimum power) / Time. Total time in this study was 30 seconds and released load in Monark cycle was 0.075 percent of subject's total body weight.

Statistical Analysis. Kolmogorov-Smirnov was performed at initially to determination of normality within data. One-way repeated-measures ANOVA was performed by using SPPS 20, to compare data between three steps.

RESULTS

Kolmogorov-Smirnov was performed at initially to determination of normality within data. All the data presented in this research were with normal distribution. The mean maximum anaerobic power on the one-way repeated-measures ANOVA was 6.54 watt/kg on the first test; 6.75 watt/kg on the second test; and 6.73 watt/kg on the third at the final step (Table 1).

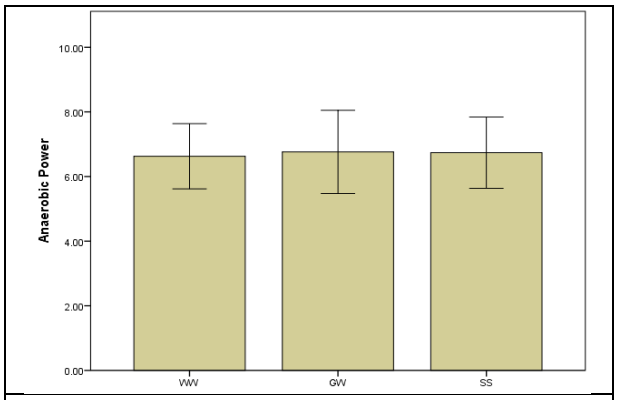
Table 1. Mean and Standard Error on three condition (Anaerobic power)

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
WW	6.549	.200	6.135	6.963
GW	6.750	.274	6.181	7.319
SS	6.739	.230	6.261	7.216

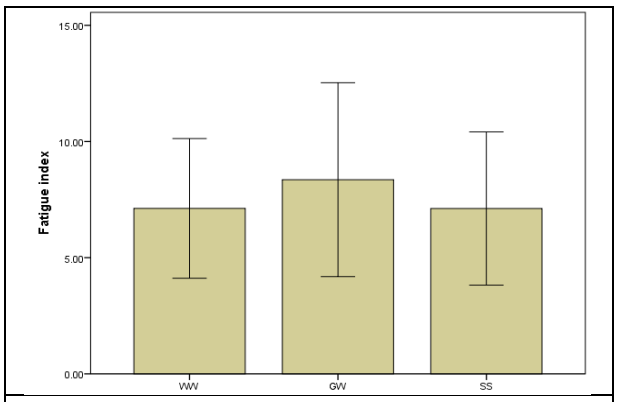
The result of ANOVA shows that anaerobic powers is no significantly different between steps, $F_{(2, 44)} = 1.051$, $p>0.05$ (Graph 1). Repeated-measures one way ANOVA also showed that fatigue index in three test are not significantly different, $F_{(2, 44)} = 1.587$, $p>0.05$ (Graph 2).

DISCUSSION

The aim of current study was to examine effect of differences pre-competitions workout on anaerobic performance. For anaerobic power, result of statistical analysis has been shown no significant differences between groups (Graph 1). The result of this study has been shown; there are not significant differences in fatigue index between three conditions (Graph 2). Results of this study highlighted are usefulness for coaches and athletes. According to previous studies warm-up at the first, decreased risk of injuries (12, 13). For this reason, the current research suggested athletes and coach to spend time for warm-up because of injuries prevention.



Graph 1. Anaerobic Power in three conditions



Graph 2. Fatigue index in three conditions

This study produced results which corroborate the findings of a great deal of the previous work in this field(14). Several studies have been shown no change on anaerobic performance or explosive activities resulting by differences pre-workout exercise or warm-ups protocols (15). The findings of the current study are consistent with those of AE Lee (2014) who found no effect on anaerobic performance by differences warm-ups protocol(16).

However, the findings of the current study do not support the previous research (17). Some investigations have contradicted results in pre workout activities in performance. Anaerobic performance is containing difference nature of activities such as high explosives activities in few second, jumping, weight lifting or longer time duration as well as dash sprinting. Clarifying all aspects of an aerobics activity my help us to implement best methods for conditioning programs and preparing for competitions.

APPLICABLE REMARKS

- The results of current study indicated that with regular warm up exercise prior performing anaerobic activity, athletes will maintain their ability into anaerobic performance and additionally they never put itself to dangerous situation.

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