IN TURKISH NATIONAL TEAM SKIERS AND JUDO ATHLETE'S PERFORMANCE

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ABSTRACT

The purpose of this study was examined variations in skiers and judo athlete's performance, and to the variation in different aerobic and anaerobic variables. Fifty Turkish skiers and judo athletes were used, competing at the national and international levels. Independent simple-t tests were done statistical analysis. Age and Body weight was higher in judo athletes than skiers. Skiers were aerobic power 47.81 ml/kg/min, anaerobic power 97.72 kg-m/sec, Body fat % 10.73, Number Sit up 27.99 repetition. 50 m sprint time 7.70 sec, Shuttle Run 20.51 sec, and Sit and Reach Flexibility test 21.37 cm. Judo athletes were aerobic power 52.21 ml/kg/min, anaerobic power 132.27 kg-m/sec, Body fat % 9.06, number of Sit up 32.0 repetition, 50 m sprint time 7.25 sec, Shuttle Run 19.52 sec, and Sit and Reach Flexibility test 25.34 cm. There was significant difference in Body fat %, Aerobic power and anaerobic power, Sit up, 50 m sprint time, Shuttle Run, and Sit and Reach Flexibility of the judo and skier groups ($p<0,05$ and $p<0,001$). Judo athletes have better values than skiers. For high performance in male Turkish national ski and judo athletes are aerobic and anaerobic power, durability and speed capacities low. Coaches must use training programs to optimize physiological adaptations and increase performance in ski and judo.

Keywords: *Ski, Judo, Aerobic and Anaerobic Power, Body Fat*

INTRODUCTION

During the pre-season, athletes' training emphasizes aim to improve physical and physiological qualities (Yarim et al., 2016). One of the main prerequisites for the effective sports training management is the establishment of leading factors (Gibadullin, 2009). Physiological profiles of elite skiers reveal the importance of muscular strength, anaerobic power, anaerobic endurance, aerobic endurance, coordination, agility, balance, and flexibility. Physical characteristics of elite skiers reveal an average height and body mass. Today, successful skiers are taller and heavier than their predecessors. Slalom skiers tend to be leaner than skiers in other events while the downhill racers are the heaviest (Anderson and Montgomery, 1988). However, the new appraisal of the performance factor in modern cross-country skiing is the shorter sprint. The current results show that

world-class skiers have superior aerobic capacity, efficiency, and high-speed capacity and it is suggested that these variables determine sprint skiing performance (Sandbakk et al., 2011). Cross-country skiing performance should have anaerobic capacity as well as aerobic capacity. Thus, cross-country ski has aerobic and anaerobic capacities of incorporating the sport (Patricia et al., 1989).

Being aware of the anthropometric and physiological characteristics of an elite athlete will pave the way for his success (Singh et al., 2011). As judo is a weight-classified sport, high level judo players should have low body fat. It has been suggested that percentage of body fat may be a discriminator for success (Ali et al., 2010). Judo is the sport in which movements are powerful, delivered in a short period of time, usually against the force of the opponent. It is a sport of changeable intensity of effort. During contest, the non-stop periods of maximum or sub maximum intensity are separated by longer or shorter breaks (Drapsin et al., 2009).

Measurement of maximal oxygen consumption (VO2 max) has long been accepted as the "gold standard" in the assessment of cardio-respiratory fitness (Craig et al., 1993; Hopkins and McKenzie, 1994). A test variable that indicates performance in many endurance sports is the maximal oxygen uptake (O_2max). Hence, to make an appropriate evaluation of an elite skier's performance capability, it is important to use the O_2max-to-mass ratio that optimally indicates the performance. VO_2max is a good indicator of aerobic capacity also indicating integration of physiological, pulmonary, cardiovascular and neuromuscular functions. Anaerobic threshold and VO_2max values are important in evaluating person's aerobic condition as well as for organizing training programs and writing clinical exercise prescriptions for athletes. Anaerobic capacity is a measure of the capacity of muscles to adapt work in short duration, to maximal and supra maximal physical activities. Anaerobic power is the value of anaerobic capacity per unit time (Yildiz, 2012). Cross country skiing is a whole body exercise that uses a high amount of muscle mass, and thus uses a high amount of oxygen (Sandbakk et Al., 2014). In addition, a significant O_2 deficit has been observed during the uphill, indicating a high anaerobic-energy contribution. In sprint skiing, skiers perform 2- to 4-minute races at maximal effort. In other endurance sports such as running and cycling, both aerobic power and anaerobic characteristics are clearly different between athletes competing in different events such as time trials or specialists such as climbers and sprinters. However, in sprint skiing, due to the ~20% higher speed, anaerobic capacity contributes significantly (Losnegard and Hallén, 2014).

Turkish skiers were far behind in world rankings as performance. Judo athletes have a better ranking in the world rankings than skiers. In Turkey, judo athletes train all year round and Skiers perform seasonal training. Judo and ski athletes are thought to have significant differences in their performance parameters. The purpose of this study was examined variations in skiers and judo athlete's performance, and to the variation in different aerobic and anaerobic variables.

METHODOLOGY

Fifty Turkish skiers and judo athletes, competing at the national and international levels, volunteered to participate in the study. The descriptive statistics were calculated for measured each observed variables.

Height and Weight Measurements

Heights were measured with athletes in upright position, with bare feet and soles touching with an accuracy of 0.1cm, while the weights were measured with 0.01 kg accurate Seca body mass and height meter again with bare feet and a short and t-shirt on.

Testing Procedures

Vertical jump and 50 m sprint tests were done to assess the explosive power and speed performances.

50-meter sprint: The start and finish points of the test were set on the athleticism track (50 meters). Two "Prosport tmr esc 2100 sb electronic chronograph" make photocell –one to the starting point and the other to the finishing point. These were pc-compatible with a feature of transferring wireless data and placed with an accuracy of 1/ 1000. Photocells had three ports each with two laser reflexive eyes. After two repetitive sprints with a recovery, the best value was recorded in seconds. Starts were done when the athletes felt ready and in high start position.

One Minute Sit Up: The purpose of this test is to measure abdominal muscular endurance. The test does as many sit-ups as they can in one minute.

Shuttle Run: The test consisted of continuous running back and forth between two lines 10 meters apart from each other within a given time.

Vertical Jump: Before the Vertical Jump Test, all the participants were made to perform a warming up program which contained very immediate and very short sprints. Each subject performed at least two maximum vertical jumps starting from a standing position, with one minute of recovery time.

Anaerobic power (Levis nomogram) kg-m/sec = $\sqrt{}$ **4.9 x body mass (kg) x$\sqrt{}$ jump-height (m).** Peak anaerobic power was measured by vertical jump test and aerobic capacity was measured by 12 minute run test. According to the 12-minute running test formula: Rel. VO_2max (ml/kg/min) = 33.3 + (X-150) x 0.178 ml/kg/min.

Skin-fold calipers: Seven sites (Abdomen, biceps, triceps, chest, subscapular, medial calf and proximal thigh) were identified on the right side of the body was calculated.

Body fat percentage (Body fat %) was estimated by Imamoglu et al (1999) Formula:

Fat %= (0.152 x Abdomen) +(0.129 x Biceps) +(0.156 x Chest) +(0.133 x Subscapular) +0.127 x Triceps) + (0.145 x Thigh) + (0.118 x Calf) + 0.8078

Statistical Analyzes

Analyses of collected data were used by SPSS for Windows (Ver. 22.0) and alpha level was set as 0.05 for statistical significance. All measurement results were presented as mean ± SD. Independent simple-t tests were done statistical analysis.

RESULTS

Table 1. *Characteristics of Skier and judo athletes*

Variables	Group	N	Mean	Std. Deviation	t-tests
Age (year)	Skier	25	17.72	1.02	-5.97**
	judoka	25	20.76	2.33	
Body Height (cm)	Skier	25	169.44	2.59	-1.42
	judoka	25	170.76	3.85	
Body Weight (kg)	Skier	25	64.76	3.87	-4.76**
	judoka	25	76.34	11.52	

***p<0.001*

Skier was age 17.72 years, Body height 169.44 cm, body weight 64.76 kg and judo athletes was age: 20.76 years, body Height 170.76 cm; body weight 76.34 kg. Table 1 shows physical characteristics of skier and judo athletes. Age and Body weight was higher in judo athletes than skiers (P < 0.001). Body Height is similar in skiers and judo athletes (p>0.05).

Table 2. *Comparison of parameter in skiers and judo Athletes*

Variability	Group	Mean	Std. Deviation	t- tests
Body fat %	Skier	10.73	1.46	3.83**
	judoka	9.06	1.62	
Aerobic power (VO_2max) (ml/kg/min)	Skier	47.81	5.26	-2.80*
	judoka	52.21	5.78	
Anaerobic power (Kg-m/sec)	Skier	97.72	13.55	-10.15**
	judoka	132.27	10.28	
Sit up (1minute) (repetition)	Skier	27.99	4.73	-3.85**
	judoka	32.00	2.18	
Sprint (50 m) (sec)	Skier	7.70	0.87	2.10*
	judoka	7.25	0.63	
Shuttle Run (5x10m) (sec)	Skier	20.51	1.67	2.34*
	judoka	19.52	1.33	
Sit and Reach Flexibility Test (cm)	Skier	21.37	4.89	-2.40*
	judoka	25.34	6.67	

**p<0.05 and **p<0.001*

There was significant difference in Body fat %, Aerobic power and anaerobic power, Sit up, 50 m Sprint, Shuttle Run, and Sit and Reach Flexibility of the judo and skier groups (p<0,05 and p<0,001).

There is number of Sit up test for skier 27.99 repetition and judo athletes 32.0 repetition in one minute. The number on minute sit up of judo athletes was higher than skiers sit up. Skier's abdominal muscles must improve more than Judo athletes. Shuttle Run was for skiers 20.51sec and judo 19.52 sec. Skiers endurance must improve more than Judo athletes. In this study, there found 50 m sprint time for skier athletes 7.70 sec and for judo athletes 7.25 sec.

Sit and Reach Flexibility test was for skiers 21.37 cm and judo athletes 25.34 cm. Sit and Reach flexibility test was for skiers and for judoka. Skier's sprints, and flexibly must improve more than Judo athletes. The better aerobic power and the anaerobic power, sit up, shuttle run, Sit and Reach Flexibility is an important result for skiers and judo athletes. Judo athlete's body fat % was found less than skiers.

DISCUSSION

In This study, Skier was age 17.72 years, Body height 169.44 cm, body weight 64.76 kg and judo athletes was age: 20.76 years, body Height 170.76 cm; body weight 76.34 kg. Table-I shows physical characteristics of skier and judo athletes. Age and Body weight was higher in judo athletes than skiers ($P < 0.001$). Body Height is similar in skiers and judo athletes ($p>0.05$).

In this study, there was significant difference in Body fat %, Aerobic power and anaerobic power, Sit up, 50 m Sprint, Shuttle Run, and Sit and Reach Flexibility of the judo and skier groups ($p<0,05$ and $p<0,001$). Judo athletes have better values performance parameters than skiers. In the present study the value of judo group was better than skiers group with a statistically significant difference. Cause, It may also be just a reflection of physiological adaptations to long-term judo training (Callister et al., 1991; Drid et al., 2009). The new appraisal of the performance factor in modern skiing is the shorter sprint. The current studies show that world-class skiers have superior aerobic capacity, efficiency, and high-speed capacity and it is suggested that these variables determine sprint skiing performance (Sandbakk et al., 2001). There is very little information on seasonal variations in anaerobic capacity in skiers. Looking to other sports can help give insights into anaerobic variations in skiers. Imamoglu et al. (2001) found that the anaerobic power measured with Lewis Nomogram of the male judo athletes in Turkish National Team was 132.08 kgm/sec. In another research, Agaoglu et al. (2001) found that the anaerobic power 130,09 kg-m/sn of the male judo athletes in Turkish National Team. In this study found anaerobic power for skier 97.72 Kg-m/sec and for judo athletes 132.27 Kg-m/sec. Ainegren et al. (2013) conducted a study that compared the economy and efficiency of cross-country skiers of different ability levels. When looking at maximal aerobic power between the three groups (male recreational, male senior elite, and male junior elite) there was a significant difference in VO_2peak between the recreational group and both elite groups in both skate technique (Mrec = 50.8 ml/kg/min, Msen = 66.3 ml/kg/min, Mjun = 64.4 ml/kg/min, $p < 0.01$) and classic technique (Mrec = 53.3 ml/kg/min, Msen = 68.5 ml/kg/min, Mjun = 64.2 ml/kg/min, $p < 0.01$). Losnegard and Hallén (2014) found VO_2peak for Sprint skiers 76.4 ml/kg/min and for Distance skiers 83.0 ml/kg/min. Imamoglu et al. (2001) found that the aerobic power measured

with 12 minute run of the male judo athletes in Turkish National Team was 50.29 ml/kg/min. In another research, Agaoglu et al. (2001) found that the aerobic power 51,28 ml/kg/min of the male judo athletes in Turkish National Team. Cross Skiing sport demands high aerobic capacity and according to some studies, the maximal oxygen uptake is more than 80 ml/kg/min (Rusko et al., 1978). Judo athletes of similar age when submitted to the same training type tend to show equal performance in the game and fitness levels after certain years of training (Katralli and Goudar, 2012). In this study found Aerobic power for skier 47.81 ml/kg/min and for judo athletes 52.21 ml/kg/min. These values are low to demonstrate high performance for skiers and judo athletes.

Imamoglu et al. (2001) found, of the male judo athletes in Turkish National Team was Body fat % 9.07. In another research, Agaoglu et al. (2001) found Body fat % 9.47 of the male judo athletes in Turkish National Team. Katralis and Goudar (2012) in study, found Body fat % 11.9 - 13.8 of Indian Judo Players. Hungarian team (8.9%), Canadian team (12.3%), Japanese (16.2%), Brazilian team (13.7%) and North American team (8.3%) (Franchini et al., 2007). Body fat % in this study was (10.73 % and 9.06%) for skiers and judo group respectively. Indicating that as the fat % increases the performance of the athlete comes down (Katralis and Goudar, 2012). In this study, there found Body fat % 10.73 for skiers and judo athletes 9.06%. There was results similar.

In this study, there is number of Sit up test for skier 27.99 repetition and judo athletes 32.0 repetition in one minute. The number on minute sit up of judo athletes was higher than skiers sit up. Skier's abdominal muscles must improve more than Judo athletes. In this study, Shuttle Run was for skiers 20.51sec and judo 19.52 sec. Skiers endurance must improve more than Judo athletes. In this study, there found 50 m sprint time for skier athletes 7.70 sec and for judo athletes 7.25 sec. Yuki et al. (2013) study, there test performances in young Japanese cross-country skiers; found 7.25 sec for Moderate trained group and 7.14 sec for Elite group. In this study, sprint time of 50 meters is similar to moderate trained group. Worse than the elite group. Sit and Reach Flexibility test was for skiers 21.37 cm and judo athletes 25.34 cm. Sit and Reach flexibility test was for skiers and for judoka. Skier's sprints, and flexibly must improve more than Judo athletes. The better aerobic power and the anaerobic power, sit up, shuttle run, Sit and Reach Flexibility is an important result for skiers and judo athletes. Judo athlete's body fat % was found less than skiers. In Turkey, judo athletes train all year round. In Turkey, Skaters perform seasonal training. Ski athletes should train all year round.

For high performance in male Turkish national ski and judo athletes are aerobic and anaerobic power, durability and speed capacities low. Physical components are discriminatory to the performance of Judo and skier athletes. Further studies with large sample size should be carried out and difference between branches in terms of anthropometry and performance should be focused. Physiological and biochemical features which might affect performance for skiers should be studied. Knowing how the major aerobic and anaerobic, sprint, flexibility, and endurance variables change during will allow better implementation of training programs (Bayansalduz et. al., 2016; Bingol and

Bayansalduz, 2016; Hazar et. al. 2016). Coaches must use training programs to optimize physiological adaptations and increase performance in ski and judo.

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