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FITNESS CHARACTERISTICS OF A GREEK NATIONAL ALPINE SKIING TEAM: CORRELATION WITH RACING PERFORMANCE*

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Abstract

The aims of this study were to describe the physical and physiological factors of elite Greek alpine ski athletes and to examine the correlations of aerobic capacity, anaerobic power and strength of the lower limbs with their racing performance in slalom and giant slalom. Eleven members of the national Greek alpine men's ski team participated in this study. Body mass, height, body mass index, percent body fat, aerobic capacity, anaerobic power and strength of the lower limbs were measured. The athletes aerobic capacity (VO_{2max}) was assessed by maximal incremental treadmill exercise and the anaerobic capacity was assessed by the 30s Wingate test. The athletes' strength of the lower limbs was evaluated by vertical jumps tests and isokinetic (knee extension-flexion) and isometric (leg press) testing. The results showed that racing performance of Greek alpine ski was significantly correlated with anaerobic capacity and the strength of lower limbs ($p < 0.05$). In contrast, aerobic capacity was not correlated with racing performance ($p > 0.05$). Greek athletes had lower strength and anaerobic power compared to those previously reported in elite international athletes. This fact may be a disadvantage for the Greek alpine skiing team performance since alpine skiing is considered mainly an anaerobic sport.

Key Words: alpine ski, slalom, giant slalom, isokinetic strength, isometric strength, aerobic power, anaerobic power, jumping ability.

*An extended Summary Plus English version is freely available at www.hellenicjsport.com

Introduction

Alpine ski performance depends on several physiological, biomechanical, and psychological parameters. Alpine skiing demands aerobic capacity, anaerobic power, and strength. The aims of this study were to describe the physical and physiological factors such as anthropometrical characteristics, aerobic capacity, anaerobic power and strength of elite Greek alpine ski athletes and to examine the correlations of aerobic capacity, anaerobic power and strength of the lower limbs with their racing performance in slalom and giant slalom. Furthermore we compared the fitness parameters of the members of the Greek national team with those previously reported for elite international athletes.

Method

Eleven members of the national Greek alpine men's ski team volunteered to participate in the study. Body mass, height, body mass index, percent body fat, aerobic capacity, anaerobic power and strength of the lower limbs were measured. The athletes aerobic capacity ($VO_2\max$) was assessed by maximal incremental treadmill exercise and the anaerobic capacity was assessed by the 30s Wingate test. The athletes' strength of the lower limbs was evaluated by vertical jumps tests (Squat Jump, Countermovement Jump) and by tests on isokinetic (knee extension-flexion) and isometric (leg press) testing. All data were analyzed using descriptive statistics and Pearson correlation coefficient was used to correlate the racing performance (FIS points) of Greek athletes with aerobic capacity, anaerobic power and strength of the lower limbs.

Results

Results of physical and physiological parameters of Greek alpine skiing athletes are shown at table 1 and correlations of physical performance parameters with their performance are shown at table 2.

Table 1. Physical and physiological parameters of a national Greek alpine skiing team (means \pm SD).

Variables	Means	SD
Body mass (Kg)	73.4	6.6
Height (cm)	174.9	7.2
Percent Body Fat	11.1	1.8
$VO_2\max$ (ml/Kg/min)	56.5	5.3
Peak Power (W/Kg)	10.4	0.7
Mean Power (W/Kg)	8.1	0.5
Fatigue index	41.7	6
Peak Torque		
Extensors 60°/s (Nm)	241.2	31.5
Flexors 60°/s (Nm)	162.9	22.7
Maximal Isometric Strength (N)	5057.5	644.4
Squat Jump (cm)	42.8	3
Countermovement Jump Arms Swing (cm)	51.7	4.3

Table 2. Correlation of FIS points (SL, GS) of Greek alpine skiing team with aerobic capacity, anaerobic power and strength of the lower limbs

Variables	Slalom	Giant Slalom
Peak Power (W)	r = -0.62*	r = -0.74**
Mean Power (W)	r = -0.60*	r = -0.72*
Isokinetic Strength (Nm)	r = -0.65*	r = -0.78**
Maximal Isometric Strength (N)	r = -0.62*	r = -0.66*
CMJA (cm)	r = -0.62*	r = -0.60
VO ₂ max	r = 0.38	r = 0.38

* p < 0.05; ** p < 0.01; CMJA = countermovement jump with arms swing; FIS = Federation International of Ski, SL = Slalom; GS = Giant Slalom.

Discussion

In conclusion, the racing performance of Greek alpine ski was significantly correlated with anaerobic capacity and the strength of lower limbs. In contrast, aerobic capacity was not correlated with racing performance. Greek athletes had lower strength and anaerobic power compared to those previously reported in elite international athletes. This fact may be a disadvantage for the Greek alpine skiing team performance since alpine skiing is considered mainly an anaerobic sport. The aerobic capacity of elite Greek alpine ski athletes was relatively similar compared to that of elite international athletes.

Key Words: alpine ski, slalom, giant slalom, isokinetic strength, isometric strength, aerobic power, anaerobic power, jumping ability

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