EVALUATION OF STRENGTH AND POWER CAPABILITIES IN TUNISIAN KARATEKAS

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Introduction

Kumite karate, that may be considered as an alternative type of sport activity, requires swift movements as well as fist and foot kicks that demand specific strength and speed qualities reflecting fighter's physical potential. Muscular properties, in particular those of the extensor muscles of karatekas' lower and upper limbs, have been the topic of only few researches (Zehr et al., 1997). Specific training that aims at improving the fighters' physical qualities, particularly during competition periods, has rarely been studied (Ravier et al., 2004; Voigt et al., 1990). Therefore, the aim of the present study is to analyse the modifications in strength capabilities and in muscular power among elite karatekas, during a pre-competition period of 10 weeks.

Method

14 senior elite karatekas belonging to the Tunisian national team have been selected for our study. Their anthropometric characteristics are shown in table 1.

Table 1: Anthropometric characteristics of the subjects

	Age (years)	Height (cm)	Weight (Kg)	Fat mass (%)
Average	21,5	176,3	72,02	12,09
Standard deviation	1,5	4,7	9,86	3,2

All subjects followed the same type of training and benefited from a medical and a scientific (biomechanical and physiological) follow-up, which was individualized and regular. Their weekly training consisted in nine sessions, including 7 technical and tactical training sessions, and 2 specific training sessions focusing on muscular strengthening.

The measurements of strength and power capabilities have been conducted under the same conditions, at the beginning and at the end of the 10 weeks pre-competitive preparation preceding the Arab Championships in April 2006.

The tests consisted in measuring the strength and power qualities of the upper and lower limbs with an isokinetic-type ergometric device (ARIEL ACE 2000). The evaluations took place on the same morning for all subjects; the training session of the previous day has been consequently lightened, in order to allow for a prompt recovery.

After a general warm-up, every subject has achieved a series of 8 bench-press, measuring the physical capabilities of the upper limbs extensor muscles. Each action has been achieved at a constant speed determined in advance, ranging from the fastest to the slowest (200, 150, 100, 75, 50, 32, 16 and 8 cm/s).

After a 20min. recovery, a series of 8 half-squats has then been carried out by the same subjects and at the same pre-determined speeds for the measurement of the muscular qualities of lower limbs extensors.

Moreover, a power and strength index for each series has been calculated, dividing the maximum obtained value by each individual's body mass.

The statistical treatment has been done with the non parametric Wilcoxon test.

Results

No significant modification has been observed between the first measurement series and those conducted ten weeks later. There was no significant change in strength capabilities and power in either the upper or lower limbs among all the 14 elite sportsmen under study (Table 2).

Table 2: Mean values (standard deviation) strength capabilities and power of the upper and lower limbs

Exercise	Parameters	Pre- test	Post-Test	Wilcoxon Test (sig.)
Bench-press	F max (kg)	81,83 ± 12,97	80,24 ± 7,70	0,89
	P max (watts)	547,79 ± 126,9	569,5 ± 73,0	0,33
	Index F max	1,13 ± 0,13	1,11 ± 0,14	0,83
	Index P max	0,77 ± 0,11	0,79 ± 0,07	0,31
Half-Squat	F max (kg)	171,62 ± 3,3	160,34 ± 32,63	0,89
	P max (watts)	1692,3 ± 724,72	1569,53 ± 281,05	0,89
	Index F max	2,37 ± 0,37	2,19 ± 0,39	0,67
	Index P max	2,35 ± 0,77	2,18 ± 0,27	0,80

F max = Maximum strength *P max = Maximum power*

Discussion

At the end of this 10-week training program, it appears that the combination of 7 technical and tactical sessions and 2 muscles strengthening sessions does not show an improvement in strength capabilities and power of the upper and lower limbs among elite karatekas.

The same conclusions have been reached by Voigt and Klausen (1990) who do not notice any muscular strength despite 3 different training programmes. The same conclusions have also been obtained in the study of Ravier and al. (2003) who demonstrated that there is no significant input by the theoretical maximum strength in the strength/velocity equation among karatekas. It would therefore seem that the performance of karatekas is not particularly based on the maximum strength, but rather on strength/velocity (Ravier et al., 2003). Furthermore, the speed of execution of the movement is not correlated to the variations of the maximum strength as demonstrated by the studies of Voigt et Klausen K. (1990).

The pre-competitive period studied (10 weeks), does not lead to any significant variations in strength capabilities and power among elite karatekas.

References

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Paru dans : *4th international sport sciences days : 2006 conference proceedings / entretiens de l'INSEP, November 28-November 30 . - Paris : INSEP, 2006. pp. 81-82*