CAN AGILITY TRAINING AFFECT ATHLETIC POWER PERFORMANCE?

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Abstarct

Propose of this study was to determine effects of agility training on athletic power performance. Eighty healthy college-age men (age 19 ± 1.1 years; body mass 77.2 ± 7.1 kg; height 180.1 ± 7.1 cm; body fat percentage 10.8 6 1.6) participated in this study. Subjects were assigned randomly to 2 experimental groups (EG) and 1 control group (CG). The EG groups were required to perform 3 sessions per week on alternate days (i.e., on Monday, Wednesday, and Friday) for 10 weeks. There were no statistical significant differences between CG and EG in initial measurement, also there were no differences found between CG in initial and final measurement. The main result of this study is associated with the aglity training–induced changes in athletic power performance.

Keywords: agility, training effects, power performance

Introduction

For high level competition efficiency it is necessary to have adequate motor and functional abilities. Importance of all abilities vary from sport to sport, in fact abilities need to be in correspondence to demands of given sport. As any training regime, physical conditioning has its own way to transform an athlete from initial state to another desirable final state (Gambetta, 2000). Majority of sports have in their structure different changes of direction. The ability that is used in such movement patterns is called agility. When it comes to conditioning agility is defined as an ability of quick and efficient body transfer through space in terms of quick stops and changing direction of movement (Harman et al., 1990; Hess et al., 2001). Same authors represent agility as ability which makes it possible for an athlete to change directions, quick stops and perform fast, smooth, efficient and repetitive movements (Miller et al., 2006). When we look at the same problem in wider context agility can be called speed coordination. In terms of specific situational conditioning some sports use term specific agility, because it has specific movement patterns. Basic methodology of agility training makes learning of basic walking technique, running technique, change of direction, jumps and landings (Wroble and Moxley, 2001). These are basic movement structures which are of vital importance for successful dealing in any sport. If movement technique is better athlete is more effective in competition and effects of training. Knowing the complexity of agility training the Propose of this study was to determine effects of agility training on athletic power performance.

Methods

Subjects

Eighty healthy college-age men (age 19 ± 1.1 years; body mass 77.2 ± 7.1 kg; height 180.1 ± 7.1 cm; body fat percentage 10.8 6 1.6) participated in this study. The study was carried out at the beginning of the 2003/04 during summer semester. It was a two-week testing period in both phases and it was done by experienced professionals, members of the Sport Diagnostic Centre at the Faculty of Kinesiology. The study was a randomized controlled trial. Subjects were assigned randomly to 2 experimental groups (EG) and 1 control group (CG).

Table 1. Plan of experiment and testing

Initial testing 2 wk	5 week of training / 3 times a week for 60 min	Control testing 1 week	5 week of training / 3 times a week for 60 min	Final testing 2 wk

Training procedure

The EG groups were required to perform 3 sessions per week on alternate days (i.e., on Monday, Wednesday, and Friday) for 10 weeks. The program entailed 30 training workouts for each subject in both experimental groups. One unloading week was introduced between the two 5-week cycles (see also Table 1). Training sessions in both experimental groups lasted 60 minutes and began with a standard 15-minute warm-up: 5 minutes of jogging, calisthenic exercises, and stretching. All agility training were performed on an indoor athletic running track. The training program employed by each experimental group is outlined in Table 2.

Table 2. Agility training program for the experimental group

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Duration of training	Inic	Inic	60	60	60	60	60	60	60	60	60	60	Fin.	Fin.
Learning movement technique of direction changing task			+	+	+	+								
Frontal agility			+	+	+	+	+	+	+	+	+	+		
Lateral agility			+	+	+	+	+	+	+	+	+	+		
Agility with changing direction of movement up to 90^0					+		+		+		+			
Agility with changing direction of movement up to 90^0 and more						+		+		+		+		
Horizontal and vertical agility						+	+	+	+	+	+	+		
Agility in random reaction tasks							+	+	+	+	+	+		

Statistical analyses

Measures of centrality and spread are shown as mean _ *SD*. Effects of training within each group were assessed using Dunn's multiple comparison procedure incorporating the Bonferroni correction to maintain the family-wise type I error rate at 0.05. By using the Bonferroni correction, the 0.05 significance level was divided by 3 (3 *t*-tests), yielding a type I error rate of 0.0167 for each *t*-test. The within-group ES is defined as the difference between posttest mean and pretest mean divided by pretest *SD* (Thomas et al., 1997). The between-group ES is defined as the difference between experimental group posttest mean and control group posttest mean divided by control group pretest *SD*.

Results

There were no statistical significant differences between CG and EG in initial measurement, also there were no differences found between CG in initial and final measurement. Statistical significant differences were determined among EG in initial and final measurement (p > 0,001) and CG vs. EG in final measurement (p > 0,001). Changes in the 2 measures of athletic performance are depicted in Table 3. EG significantly (p > 0.001) improved in all sprint tests, SP5, SP10, and SP20, these improvements were significantly (p > 0.001) In all the countermovement tests (p > 0.001) and standing long jump tests (p > 0.001) significant improvement was detected in EG.

Table 3. Differences between experimental and control group in initial and final measurement

Variable	Initial measurement		Final measurement	
	CG	EG	CG	EG
SP5	1,12 ± ,13	1,09 ± ,12	1,11 ± ,11	1,06 ± ,03‡
SP10	1,87 ± ,14	1,86 ± ,13	1,87 ± ,23	1,77 ± ,09‡
SP20	3,14 ± ,16	3,15 ± ,17	3,09 ± ,19	3,02 ± ,09‡
CMJ	43,27 ± 5,30	43,17 ± 5,20	43,17 ± 5,22	43,01 ± 3,22‡
CMJ1L	29,76 ± 4,04	29,74 ± 4,00	29,66 ± 4,13	29,12 ± 3,00‡
CMJ1R	28,98 ± 3,83	28,96 ± 3,82	28,77 ± 3,67	28,11 ± 2,63‡
SLJ	187,28 ± 13,53	187,18 ± 13,43	187,16 ± 13,48	186,58 ± 9,22‡
SLJ1L	172,07 ± 14,33	172,12 ± 14,24	172,06 ± 14,14	171,37 ± 8,11‡
SLJ1R	167,69 ± 14,97	167,58 ± 13,88	167,66 ± 14,87	166,29 ± 9,34‡

*Values are expressed as mean ± SD
‡ Statistically significant at $p < 0.05$ for experimental (EG) and control group (CG) in final measurement

Discussion

This study evaluated the selective effects of 10-week agility training on athletic power performance in physically active men. The main result of this study is associated with the aglity training–induced changes in athletic power performance. In particular, we demonstrated that 10- week agility training significantly improved leg extensor strength (Table 3). Hence, our data represent a rather novel finding that could be of considerable importance for improving training methods aimed at enhancing athletic power performance. Information regarding the effects of agility training on muscle function and athletic performance is generally lacking. Few studies showed significant improvements in sprint performance as a result of short-term sprint training (Callister et al., 1988; Young et al., 2001; 2002; Markovic et al., 2007), supporting our findings and the well-known principle of training specificity (Sale, 1992). When it comes to training it would be best to implement agility training at beginning of training session or beginning of the main part of training because nervous system is ready stimulus of that type (Bompa, 1999). Volume of agility training depends on given sport and actual demands, training should be as intense as in competition (Brittenham, 1996). Therefore agility training directly effects on nervous and muscular system and needs certain time to regenerate (Buttifant et al., 1999;). This is one of the reasons why improvement in power performance of athlete was detected as positive effect of agility training (Table, 3). Because of that agility exercises are usually used at the start of main part of training session when body is at full work rate. Training should be formed out of short intervals of intense workload (3-10 sec) and appropriate intervals of rest. Intervals of rest provide good basis for quality of work. Agility training with specific task that combine reaction on a specific signal resulted with improvement in athletic power performance. In particular, it appears that the improvements in jumping (but also in sprint and agility) performance as a result of agility training could be partly the result of improved leg extensor strength and power. Therefore, it is possible that the agility training used in this study could have improved subjects' jumping performance primarily by improving muscle coordination. However, this is only an assumption, because the recorded parameters do not provide the bases for a more specific interpretation of the obtained results. Highest improvemet was detectied among EG on SP5, CMJ1L and SLJ1L. We can concude that aglity training has positive effect on movement technique (Sayers, 2000) and ability to produce force in leg muscle more efficiently (Rimmer and Sleivert, 2000). Single leg movement improve intra and inter muscle coordination which result with better athletic power performance in sprinting and jumping tasks (Adams, 1984; Paterno et al., 2004). This is one of the reasons why subjects in EG had better results in SP5, CMJ1L and SLJ1L tests.

To enhance explosive muscle power and dynamic athletic performance complex agility training can be used. The findings of this research indicate that agility training also can be used effectively as a training method for improving explosive leg power and dynamic athletic performance. Therefore, in addition to the well-known training methods such as resistance training and plyometric training, strength and conditioning professionals may well incorporate agility training into an overall conditioning program of athletes striving to achieve a high level of explosive leg power and dynamic athletic performance.

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