Original scientific paper

The Effects of 8-Week Speed Training Program on the Acceleration Ability and Maximum Speed Running at 11 Years Athletes

Cecilia Gevat[1], Halil Taskin[2], Fatma Arslan[3], Alin Larion[1] and George Stanculescu[1]

[1] Ovidius University of Constanta, Faculty of Physical Education and Sport, Constanta, Romania

[2] Selcuk University, Discipline Sciences of Movement and Training, School of Physical Education and Sport, Department of Trainer Education, Konya, Turkey

[3] Aksaray University, School of Physical Education and Sport, Department of Trainer Education, Aksaray, Turkey

A B S T R A C T

The aim of this study was to examine the effects of an 8-week speed training program on the acceleration ability and maximum speed at 11 years athletes. A total of 30 healthy female athletes volunteered to participate in this study. They were divided randomly into 1 of 2 groups: Experimental group (EG; N=15) and control group (CG; N=15). The mean (SD) age was 11.20±0.32 years, height was 1.44±0.08 m, and weight was 35.20±2.02 kg for the experimental group; the mean (SD) age was 11.40±0.39 years, height was 1.45±0.05 m, and weight was 36.06±1.15 kg for the control group. A speed training program was applied to the subjects 3 days a week for 8 weeks. Testing was conducted before and after 8 weeks of training. Acceleration and maximum speed was evaluated for 15-m and 30-m, respectively, involving sprinting 15 m and 30 m as fast as possible from a stationary start position that was ascertained during a 50-m. Electronic timekeeping was conducted by the facility – Brower Timing System – made in Utah, USA., consisting of 4 components. Paired t-tests detected significant differences in pre- and posttests for clearance time of 5 m during 50 m in the experimental and control groups (p<0.05). Therefore, acceleration phase was significantly reduce at 15 m distance interval for the experimental group and control groups posttraining than pretraining (0–15 m, p<0.05). Acceleration improvement was 12.6% for the experimental group posttraining, on the other hand, acceleration improvement was 5% for the control groups posttraining. we did not find significant difference between pretest and posttest in 10–15 m, 15–20 m, and 20–25 m for the experimental group (p>0.05). On the other hand, we did find significant difference between pretest and posttest values of other clearance times of consecutively each 5m during 50 m for the experimental and control groups (p<0.05). Also, this study observed that athletes reached maximum speed in 30 m. In conclusion, in speed training, it is important to improve as many fast motor units as possible, which are more suitable for fast movements. The gains in sprint performance occurred in the initial acceleration and speed-maintenance phases. The ability to accelerate quickly from a stationary position will provide a competitive advantage for athletes.

***Key words**: acceleration, velocity, athletes, speed training*

Introduction

In general, sport performance can be classified as muscle strength, instantaneous force, muscle endurance, physical endurance, and coordination ability which is agility, balance, flexibility, quicness, acceleration and accuracy[1]. Also, Development of the nervous system is thought to be deeply related to the development of sport performance components. Therefore, determinant of physical activity among children and adolescents may be the level of mastery of the movement skills that are a foundation for the skills used in common forms of adult physical activity[2,3]. Movement proficiency track at low--to-moderate levels during childhood, so greater motor skill in youth may be guess of later physical activity. Besides, Research has shown significant positive relative among motor skills[2].

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Running has become the preferred mode for exercise and millions of recreational runners are taking part in such activities[4]. Speed is the rapidity of movement. Speed may be defined as displacement in *per* unit of time and usually is measured covering a fixed distance as time. To develop speed, one must increase stride frequency, stride length and arm-hand action[5]. Therefore, to increase one or both factors may cause faster running. Stride length is associated with height, leg length and flexibility. This makes difficult the development of maximum speed. Stride frequency is credited to be more trainable due to speed enhance, impulse production becomes gradually connected with the ability to form force rapidly. Thus, the higher the maximal speed obtained the faster the stride is[6]. Achieving maximum speed earlier or possessing greater acceleration has obvious advantages in many sports[7]. Many researches mentioned that acceleration and maximum running speed are fundamental ingredients in many different field sports including games such as rugby union, rugby league, soccer, Australian Rules football, and field hockey)[8–10].

Acceleration is physically described as the rate of change in speed. Besides, in a practical content, especially among coaches and practical sport scientists, acceleration ability is frequently mentioned as sprint performance over smaller distances such as 5 m or 10 m and speed or using sprint time are evaluated[11]. In most types of sport the human body must be accelerated from a stationary position to maximal speed. Some studies have looked for changes in sprint kinematics produced by sled towing devices during the acceleration phase of sprinting[12–14]. Although the acceleration phase is mostly relevant to field sports which involve short explodes of speed, acceleration performance and maximum sprint velocity are separate and specific qualities[15]. Improved acceleration and speed are achieved by increasing the physical, metabolic, and neurological components associated with sprinting[16]. Overall sprinting technique can be broken-down into several phases: the starting block phase, acceleration phase, and constant speed phase[6].

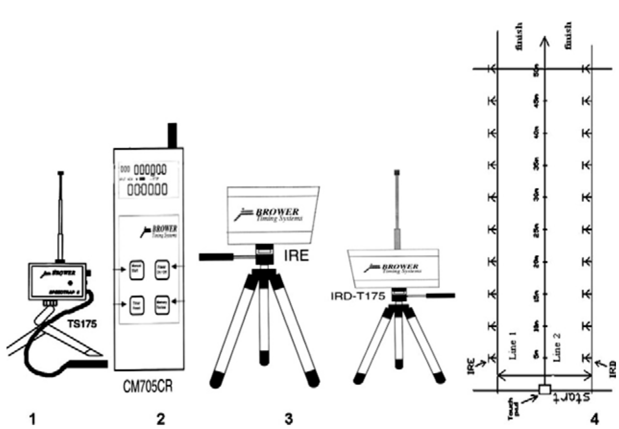


Fig. 1. An electronic start command SPEEDTRAP modes llS 175, operated by a pedal start (touch pad) connected to the monitor. A number of 10 photo-electronic cell IRD-T 175, and a number of light sources 10 IRE).

During the acceleration phase, an athlete increases stride length and stride frequency. When an athlete reaches the maximum constant speed phase, running velocity is increased through an increase in stride length and more importantly through stride frequency[17]. There are studies that analyze the speed of 5m intervals in a sprint of 10 m, 20 m 30 m or 40 m[18]. Speed and acceleration are important at senior players because they need to achieve high velocity when chasing a lob[19]. Also, speed and acceleration is perfect for seniors because it will condition fitness aspects that are generally lost with age-speed[20]. The athletics brings in time conceptual clarification regarding the human capacity to overcome.

Therefore, the aim of this study is to examine the effects of an 8-week speed training program on the acceleration ability and maximum speed at 11 years athletes.

Material and Methods

Experimental approach to the problem

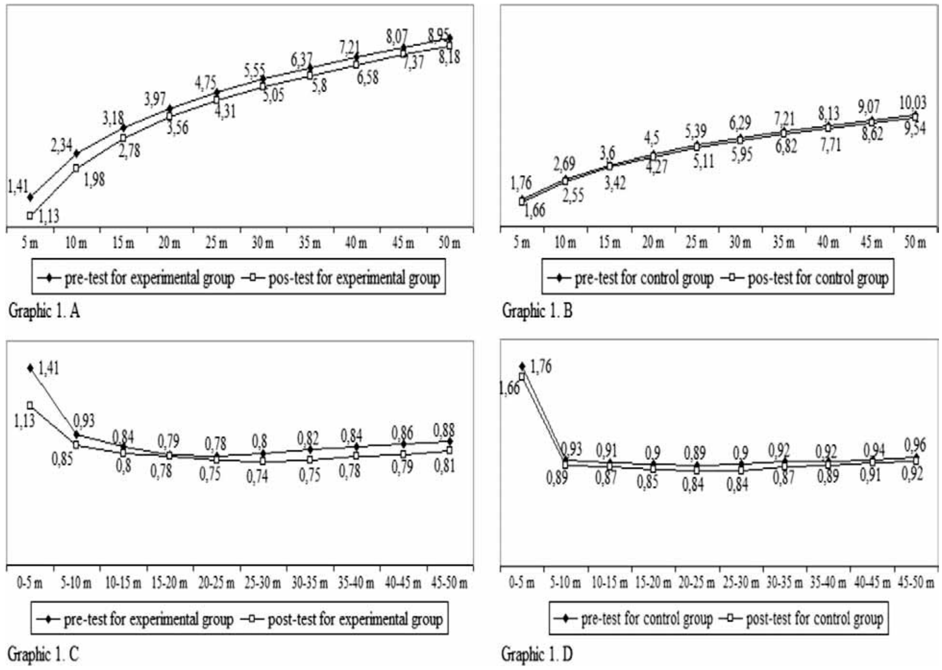
This investigation involved to implementation of special programs for children may lead to improved ability to maintain acceleration and maximum speed developed during acceleration. A total of 30 healthy female athletes volunteered to participate in this study. The electronic timekeeping, which was designed by the facility – Brower Timing System–made in Utah, USA, was used for subjects.

Subjects

A total of 30 healthy female athletes (mean ± SD; age: 11.30±0.35 years; weight: 35.63±1.58 kg; body height: 1.44±0.06 m) volunteered to participate in this study after having all risks explained to them before the investigation. They were divided randomly into 1 of 2 groups: Experimental group (EG; N=15) and control group (CG; N=15). The mean (SD) age was 11.20±0.32 years, height was 1.44±0.08 m, and weight was 35.20±2.02 kg for the experimental group; the mean (SD) age was 11.40±0.39 years, height was 1.45±0.05 m, and weight was 36.06±1.15 kg for the control group.

All the athletes included the study had the same physical fitness because they had at least 1 year of experience in athletics training. The subjects in the control group did not participate in the training program and participated only in the pre- and posttest measurements. Besides, the subjects in the control group continued normally the training program.

Prior to data collection, all participants signed a university-approved consent form. After receiving a detailed explanation of the study's benefits and risks, all subject signed an informed consent document that was approved by the local ethics committee. None of the subjects reported any medical or orthopedic problems that would compromise his participation and performance in the study. This study was conducted in the city of Constanta, in the years 2007–2008.



Graph. 1. A) Mean of pretest and posttest data of clearance times of 5 m during 50 m for the experimental group. B) Mean of pretest and posttest data of clearance times of 5 m during 50 m for the control group. C) Mean of pretest and posttest data of clearance times of consecutively each 5m during 50 m for the experimental group. D) Mean of pretest and posttest data of clearance times of consecutively each 5 m during 50 m for the control group.

Procedures

To evaluate the ability to maintain acceleration and maximum speed developed during acceleration. Subjects' height is measured with an instrument sensitive to 1 mm. Their body weight is measured with a weigh-bridge sensitive up to 20 g while they are dressed in only shorts (and no shoes). Height variable is in terms of meters, and body weight variable is in terms of kilograms. Each subject was familiarized with the testing procedures prior to data collection. Testing was conducted before and after 8 weeks of training. Subjects abstained from physical activity not related to the study during the testing period. Furthermore, during the testing periods and throughout the 8 weeks of training subjects were instructed to maintain normal dietary habits.

A speed training program was applied to the subjects 3 days a week (Monday, Wednesday, and Friday) for 8 weeks. The subjects did not add weight. The tests and all training sessions were started with a standard (20-minute) warm-up session (Table 1). While the tests were conducted, the same weather conditions were taken into consideration. A rest was given between repetitions 1–2 min and between exercises 5–7 min. The training program was labeled with tables.

Testing

Acceleration and maximum speed was evaluated for 15-m and 30-m, respectively, involving sprinting 15 m and 30 m as fast as possible from a stationary start position that was ascertained during a 50-m.

The acceleration was evaluated using a 10-m test, as previously used by Wilson et al.[21]. Little and Williams[22] examined the acceleration, maximum speed, and agility. In the study, acceleration was evaluated using a 10-m test. Maximum speed was assessed using a flying 20-m test. The current study was to investigate the acceleration phase of sprint running in trained football players; therefore, the training consisted of a series of maximum sprint efforts over typical acceleration distances of 5, 10, 15, and 20 m[23].

Description of the electronic timekeeping

Electronic timekeeping was conducted by the facility – Brower Timing System–made in Utah, USA., consisting of 4 components: an electronic clock-monitor CM705 CR (drawing 3.) connected to a battery, which recorded and displayed on the screen sequences for each time interval, the cumulative time intervals and the total time 50m. Investigator time record in a table, the data is then placed in the program MATHCAD computer for processing (Figure 1).

Statistical analysis

The SPSS statistical program (version 16.0) was used for data analysis. Standard statistical methods were used for the calculation of means and SD. The Kolmogorov--Smirnov test was used to determine if dependent variables were normally distributed. The Levene test was used to determine if there was homogeneity of variance. Analyses of covariance (ANCOVAs) was run on each of

TABLE 1
SPEED TRAINING PROGRAM FOR 8 WEEKS

Weeks	Monday	Wednesday	Friday
First Week	6 × 30 m 80% Distance for sense of acceleration	6 × 30 m 90% Distance for sense of acceleration	6 × 40 m 80% Distance for sense of acceleration 6 × five steps standing 4 × five steps standing
Second Week	6 × 40 m 80% Distance for sense of acceleration	6 × 40 m 90% Distance for sense of acceleration 2×40 m 80% Distance for capacity to accelerate 6 × triple jump standing 4 × five steps standing	4 × 50 m 80% Distance for sense of acceleration 4 × 40 m 100% Distance for capacity to accelerate 6 × triple jump standing 4 × five steps standing
Third Week	4 × 50 m 80% Distance for sense of acceleration 4 × 35 m 100% Distance for capacity to accelerate 6 × five steps standing 4 × five steps standing	4 × 50 m 90% Distance for sense of acceleration 4 × 35 m 100% Distance for capacity to accelerate 6 × five steps standing 4 × five steps standing	6 × 30 m 100% Distance for capacity to accelerate 6 × five steps standing 4 × five steps standing
Fourth Week	4 × 50 m 80% Distance for sense of acceleration 4 × 30 m 100% Distance for capacity to accelerate 6 × five steps standing 4 × five steps standing	4 × 50 m 90% Distance for sense of acceleration 4 × 25 m 100% Distance for capacity to accelerate 6 × five steps standing 4 × five steps standing	4 × 25 m 100% Distance for capacity to accelerate 6 × five steps standing 4 × five steps standing
Fifth Week	4 × 60 m 80% Distance for sense of acceleration 4 × 20 m +10 m Distance for maximum speed 6 × five steps standing 4 × five steps standing	3 × 60 m 80% Distance for sense of acceleration 3 × 20 m 100% Distance for capacity to accelerate 3 × 20 m +10 m Distance for maximum speed 6 × five steps standing 4 × five steps standing	4 × 20 m 100% Distance for capacity to accelerate 4 × 20 m +10 m Distance for maximum speed 6 × five steps standing 4 × five steps standing
Sixth Week	4 × 60 m 90% Distance for sense of acceleration 4 × 20 m +15 m Distance for maximum speed	4 × 15 m 100% Distance for capacity to accelerate 4 × 20 m +15 m Distance for maximum speed	4 × 15 m 100% Distance for capacity to accelerate 4 × 20 m +15 m Distance for maximum speed
Seventh Week	4 × 60 m 90% Distance for sense of acceleration 4 × 30 m +20 m Distance for maximum speed	4 × 10 m 100% Distance for capacity to accelerate 4 × 30 m +20 m Distance for maximum speed 6 × five steps standing 4 × five steps standing	4 × 10 m 100% Distance for capacity to accelerate 4 × 30 m +20 m Distance for maximum speed
Eighth Week	4 × 60 m 90% Distance for sense of acceleration 4 × 30 m +20 m Distance for maximum speed	4 × 10 m 100% Distance for capacity to accelerate 4 × 30 m +20 m Distance for maximum speed 6 × five steps standing 4 × five steps standing	4 × 120 m 100% Distance for capacity to accelerate 4 × 30 m +20 m Distance for maximum speed

the dependent variables**.** Microsoft office excel 2003 were used for the show of pretest and posttest means for clearance times of 5 m during 50 m and clearance times of consecutively each 5 m during. For all analyses, the criterion for significance was set at an alpha level of $p<0.05$.

Results

As shown in Table 2, the mean (SD) age is 11.2±0.32 (years), body height is 1.44±0.08 (m), weight is 35.2±2.02 (kg) for the experimental group, the mean (SD) age is 11.4±0.39 (years), body height is 1.45±0.05 (m), weight is 36.06±1.15 (kg) for the control group. As shown in Table 3, it indicates descriptive statistics of posttest values according to experimental and control groups. As shown in Table 4, covariance analyses detected significant differences in effect of speed training for clearance time of 5m during 50 m in the experimental and control groups ($p<0.05$). Therefore, it was shown that effect of speed training method on the acceleration ability and maximum speed running ($p<0.05$). Also, acceleration phase was significantly reduce at 15 m distance interval for the experimental group and control groups post training than pre training (0–15 m, $p<0.05$). In the Table 5, it indicates descriptive statistics of posttest values according to clearance time of consecutively each 5m during 50 m for experimental and control groups. As shown in Table 6, covariance analyses detected significant differences in effect of speed training for clearance time of consecutively each 5 m during 50 m in the experimental and control groups ($p<0.05$). Therefore, it was shown that effect of speed training method on the acceleration ability and maximum speed running ($p<0.05$). Also, this study observed that athletes reached maximum speed in 30 m.

TABLE 2
PHYSICAL CHARACTERISTICS DATA FOR THE EXPERIMENTAL GROUP AND CONTROL GROUP

Variables	Experimental group (N=15) $\bar{X}$±SD	Control group (N=15) $\bar{X}$±SD
Age (year)	11.2±0.32	11.4±0.39
Body height (m)	1.44±0.08	1.45±0.05
Weight (kg)	35.2±2.02	36.06±1.15

TABLE 3
MEAN VALUES OF CLEARANCE TIME OF 5 m DURING 50 m IN THE EXPERIMENTAL AND CONTROL GROUPS

Variables	Clearance times of 5 m during 50 m	$\bar{X}$±SD (s)	Estimate Marginal Means (s)
Experimental Group	5 m	1.13±0.071	1.28
	10 m	1.98±0.090	2.09
	15 m	2.78±0.104	2.92
	20 m	3.56±0.128	3.70
	25 m	4.31±0.156	4.45
	30 m	5.05±0.179	5.20
	35 m	5.80±0.202	5.96
	40 m	6.58±0.223	6.74
	45 m	7.37±0.244	7.55
	50 m	8.18±0.266	8.37
Control Group	5 m	1.66±0.149	1.51
	10 m	2.55±0.167	2.44
	15 m	3.42±0.193	3.28
	20 m	4.27±0.227	4.13
	25 m	5.11±0.264	4.96
	30 m	5.95±0.307	5.80
	35 m	6.82±0.346	6.66
	40 m	7.71±0.380	7.55
	45 m	8.62±0.419	8.44
	50 m	9.54±0.458	9.36

Discussion

Longitudinal experiment at this age showed that in a sprint distance of 50 m at athletes of 11 years old with 1 year in athletic training can develop a progressive speed after 8 weeks of training, maximum acceleration is achieved in 20 m distance and following distance independent variables application acceleration to increase from 20 to 25 m, while also improving each interval is 5 m in 50 m sprint speed, running at maximum speed with the standing start. As shown in Table 4, covariance analyses detected significant differences in effect of speed training for clearance time of 5m during 50 m in the experimental and control groups ($p<0.05$). Therefore, it was shown that effect of speed training method on the acceleration ability and maximum speed running ($p<0.05$). Also, as shown in Table 6, this study observed that athletes reached maximum speed in 30 m. Acceleration was improvement 12.6% for the experimental group post training, on the other hand, acceleration was improvement 5% for the control groups post training.

Little and Williams[22] examined the acceleration, maximum speed, and agility. In the study, acceleration was evaluated using a 10-m test. Maximum speed was assessed using a flying 20-m test. The performances on the 10-m test for acceleration, the flying 20-m test for maximum speed, and the zigzag test for agility were all correlated at high levels of statistical significance ($p<0.0005$). Spinks et al.[23] have reported that an 8-week resistance sprint training program significantly improved acceleration. For the total acceleration distance (15 m), the experimental groups improved by 6–8%, which equated to 0.41 ms^{-1} and 0.32 ms^{-1} improvement for the resisted sprint and nonresisted sprint groups, respectively. The greatest improvement in 0–15 m acceleration performance was in the 0–5 m interval, in which approximately 50% of the overall velocity increase was achieved by both training groups.

Ropret et al.[24] showed that loading the arms caused no significant reduction in initial acceleration or maximum speed over 30 m. According to the relationship between first-step quickness (0–5 m), acceleration (0–10

TABLE 4
EFFECT OF SPEED TRAINING FOR CLEARANCE TIME OF 5 m DURING 50 m IN THE EXPERIMENTAL AND CONTROL GROUPS

Clearance times of 5 m during 50 m	Source of variance	Type III Sum of Squares	$\overline{X}$ Square	F	p
5 m	Covariate	0.263	0.263	60.565	0.000
	Effect of Experiment	0.126	0.126	28.858	0.000*
10 m	Covariate	0.195	0.195	17.206	0.000
	Effect of Experiment	0.322	0.322	28.372	0.000*
15 m	Covariate	0.350	0.350	29.305	0.000
	Effect of Experiment	0.367	0.367	30.724	0.000*
20 m	Covariate	0.370	0.370	17.180	0.000
	Effect of Experiment	0.546	0.546	25.347	0.000*
25 m	Covariate	0.406	0.406	12.069	0.002
	Effect of Experiment	0.786	0.786	23.334	0.000*
30 m	Covariate	0.454	0.454	9.341	0.005
	Effect of Experiment	1.121	1.121	23.070	0.000*
35 m	Covariate	0.486	0.486	7.457	0.011
	Effect of Experiment	1.473	1.473	22.619	0.000*
40 m	Covariate	0.568	0.568	7.108	0.013
	Effect of Experiment	2.045	2.045	25.583	0.000*
45 m	Covariate	0.671	0.671	6.933	0.014
	Effect of Experiment	2.571	2.571	26.563	0.000*
50 m	Covariate	0.761	0.761	6.499	0.017
	Effect of Experiment	3.173	3.173	27.084	0.000*

* $p<0.05$

TABLE 5
MEAN VALUES OF CLEARANCE TIME OF CONSECUTIVELY EACH 5 m DURING 50 m IN THE EXPERIMENTAL AND CONTROL GROUPS

Variables	Clearance time of consecutively each 5 m during 50 m	$\overline{X}$±SD (s)	Estimate Marginal Means (s)
Experimental Group	0–5 m	1.13±0.071	1.28
	5–10 m	0.85±0.026	0.85
	10–15 m	0.80±0.030	0.81
	15–20 m	0.78±0.038	0.79
	20–25 m	0.75±0.039	0.76
	25–30 m	0.74±0.032	0.75
	30–35 m	0.75±0.029	0.77
	35–40 m	0.78±0.026	0.79
	40–45 m	0.79±0.025	0.80
	45–50 m	0.81±0.026	0.82
Control Group	0–5 m	1.66±0.149	1.51
	5–10 m	0.89±0.051	0.89
	10–15 m	0.87±0.050	0.86
	15–20 m	0.85±0.052	0.84
	20–25 m	0.84±0.056	0.82
	25–30 m	0.84±0.054	0.83
	30–35 m	0.87±0.050	0.86
	35–40 m	0.89±0.044	0.88
	40–45 m	0.91±0.044	0.90
	45–50 m	0.92±0.052	0.91

m), and maximal speed (0–30 m), it is obvious from the result of Cronin and Hansen (2005) that the 2 measures of short-distance quickness (5 and 10 m) for the most part measure similar sprint qualities (84%)[7].

Kotzamanidis et al.[25] who found significant improvements in 30-m sprint performance in nonelite soccer players. He ordered to a progressive-load combined training program conducted over 13 weeks. Nonetheless, soccer players were not observed for lonely speed training effects. Additionally, study heavy-load strength training (i.e., from 8 to 3 repetition maximum loads) was performed 10 minutes before the sprint training session.

Mujika et al.[26] were applied in studies. They consisted of alternating heavy–light resistance (15–50% body mass) with soccer-specific drills (smallsided games or technical skills) as contrast protocol. Sprint training protocol used 30-m sprints line (2–4 sets of 4x30 m with 180 and 90 seconds of recovery, respectively). They found in Sprint-15m performance the contrast group showing significantly better scores than the sprint group.

Edwin and Gordon[27] determine the effects of a sprint-specific plyometrics program on sprint performance; an 8-week training study consisting of 15 training sessions was conducted. Twenty-six male subjects completed the training. A plyometrics group (N=10) performed sprint-specific plyometric exercises, while a sprint group (N=7) performed sprints. A control group (N=9) was included. Subjects performed sprints over 10-and 40-m distances before (Pre) and after (Post) training. For the plyometrics group, significant decreases occurred in times and distances, but the improvements in the sprint group were

TABLE 6
EFFECT OF SPEED TRAINING FOR CLEARANCE TIME OF CONSECUTIVELY EACH 5 m DURING 50 m IN THE EXPERIMENTAL AND CONTROL GROUPS

Clearance time of consecutively each 5m during 50m	Source of variance	Type III Sum of Squares	$\overline{X}$ Square	F	p
0–5 m	Covariate	0.264	0.264	60.461	0.000
	Effect of Experiment	0.125	0.125	28.731	0.000*
5–10 m	Covariate	0.020	0.020	19.952	0.000
	Effect of Experiment	0.013	0.013	13.209	0.001*
10–15 m	Covariate	0.006	0.006	4.100	0.053
	Effect of Experiment	0.009	0.009	5.989	0.021*
15–20 m	Covariate	0.006	0.006	3.281	0.081
	Effect of Experiment	0.010	0.010	5.050	0.033*
20–25 m	Covariate	0.008	0.008	3.955	0.057
	Effect of Experiment	0.013	0.013	6.383	0.018*
25–30 m	Covariate	0.004	0.004	2.345	0.137
	Effect of Experiment	0.027	0.027	14.501	0.001*
30–35 m	Covariate	0.005	0.005	2.896	0.100
	Effect of Experiment	0.030	0.030	18.926	0.000*
35–40 m	Covariate	0.004	0.004	2.897	0.100
	Effect of Experiment	0.033	0.033	27.005	0.000*
40–45 m	Covariate	0.005	0.005	4.447	0.044
	Effect of Experiment	0.034	0.034	30.697	0.000*
45–50 m	Covariate	0.004	0.004	2.226	0.147
	Effect of Experiment	0.032	0.032	19.978	0.000*

* $p<0.05$

not significant in times or distance. The magnitude of the improvements in the plyometrics group was, however, not significantly different from the sprint group. The control group showed no changes in sprint times. There were no significant changes in stride length or frequency, but ground contact time decreased at 37 m by 4.4% in the plyometrics group only. As a result they have found a sprint-specific plyometrics program can improve 40-m sprint performance to the same extent as standard sprint training, possibly by shortening ground contact time.

In the study, researchers have investigated the effect of slow and explosive weight training on kayak sprint performance. Twenty-seven male and 11 female experienced sprint kayakers participated to slow weight training, explosive weight training, or control (usual training) groups in their research. To determine the effects of training on sprint acceleration and speed maintenance, the athletes performed 15-m kayaking sprints pre- and post training; an electronic timing system provided sprint times at 3.75-, 7.5-, and 15-m marks. They found slow weight training is likely to be more effective than explosive training for improving the acceleration phase of sprinting, when force is high throughout the length of the stroke. Explosive weight training may be more effective in speed maintenance, when forces are developed rapidly over a short period at the start of the stroke[28].

In a similar study, in the pretest, the mean (SD) 0–5m is 1.25±0.17 (second), 5–10 m is 0.81±0.06 (second), 10–15 m is 0.77±0.06 (second) and 0–15 m is 2.83±0.19 (second) for with speed, agility, and quickness equipment; in the posttest, the mean (SD) 0–5 m is 1.06±0.10 (second), 5–10 m is 0.80±0.06 (second), 10–15 m is 0.73±0.05 (second) and 0–15 m is 2.59±0.19 (second) for with speed, agility, and quickness equipment. In the pretest, the mean (SD) 0–5 m is 1.09±0.21 (second), 5–10 m is 0.83±0.06 (second), 10–15 m is 0.71±0.04 (second) and 0–15 m is 2.63±0.27 (second) for without speed, agility, and quickness equipment; in the posttest, the mean (SD) 0–5 m is 1.04±0.15 (second), 5–10 m is 0.79±0.04 (second), 10–15 m is 0.71±0.06 (second) and 0–15 m is 2.54±0.23 (second) for without speed, agility, and quickness equipment. Finally, the improvement seen in acceleration through 0–15 m is closely related to improvements over the first 5 m[29]. However, similar findings were obtained in a study of elite female footballers[30].

In the present study, when the players were divided into slowest and fastest sprinters (based on 5-m rankings), no significant between-group differences were found for any of the 3 distances. This indicates that those players who were fast over 5 m were also the fastest over 30 m, signifying the need for a good start and rapid acceleration for better sprint performance[7].

In conclusion, the study demonstrated that 8 weeks of speed training increased acceleration ability and maximum speed running of athletes. The gains in sprint performance occurred in the initial acceleration and speed-maintenance phases. The ability to accelerate quickly from a stationary position may be providing a competitive advantage for athletes. Therefore, it is suggested that speed training should be used as an effective strategy to promote improvements in the athletic performance.

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H. Taskin

Selcuk University, Discipline Sciences of Movement and Training, School of Physical Education and Sport, Department of Trainer Education, Alaaddin Keykubat Campus, 42079, Konya, Turkey
e-mail: htaskin@selcuk.edu.tr

UČINCI OSMOTJEDNOG PROGRAMA BRZINSKOG VJEŽBANJA NA SPOSOBNST POSTIZANJA UBRZANJA I MAKSIMALNE BRZINE TRČANJA KOD JEDANAESTOGODIŠNJIH SPORTAŠA

SAŽETAK

Cilj ove studije bio je ispitati učinke osmotjednog programa brzinskog vježbanja na ubrzanje sposobnosti i maksimalne brzine trčanja kod jedanaestogodišnjih sportaša. Sveukupno 30 zdravih sportašica volonterski je prisustvovalo istraživanju. Podijeljene su slučajnim odabirom u dvije grupe: eksperimentalna grupa (EG; N=15) i kontrolna grupa (CG; N=15). Aritmetička sredina godina bila je 11,20±0,32, visina 1,44±0,08 m, a težina 35,20±2,02 kg za eksperimentalnu grupu; aritmetička sredina godina za kontrolnu grupu bila je 11,40±0,39, za visinu 1,45±0,05 m, a za težinu 36,06±1,15 kg. Program ubrzanog vježbanja korišten je na ispitanicama tri dana u tjednu, osam tjedana. Testiranje bilo je provedeno prije i poslije osmotjednog vježbanja. Ubrzanje i maksimalna brzina ocijenjena je za trčanje na 15 metara i 30 metara, uključujući što brži mogući šprint na 15 i 30 metara od stajaće startne pozicije tijekom 50 min. Elektroničko mjerenje vremena složila je tvrtka Brower Timing System, Utah, SAD, a sastojalo se od četiri dijela. Upareni t-testovi otkrili su značajnu razliku u mjerenjima prije i poslije za trčanje u trajanju od 5 min tijekom 50 min testiranja u eksperimentalnoj i kontrolnoj grupi (p<0,05). Faza ubrzanja značajno se smanjuje na razdaljini od 15 m u eksperimentalnoj grupi i kontrolnoj grupi u testiranju prije i poslije (0–15 m, p<0,05). Poboljšanje ubrzanja bilo je 12,6% za eksperimentalnu grupu nakon vježbanja, ali s druge strane, poboljšanje ubrzanja za kontrolnu grupu bilo je 5% nakon vježbanja. Nismo pronašli značajnu razliku između testiranja prije i poslije na razdaljinama 10–15 m, 15–20 m i 20–25 m za eksperimentalnu grupu (p>0,05). Pokazala se značajna razlika između testiranja prije i poslije u vrijednostima trčanja svakih nadolazećih 5 min tijekom 50 min za eksperimentalnu i kontrolnu grupu (p<0,05). Također, primijećeno je da sportašice maksimalnu brzinu postižu za 30 min. Zaključno, u programu brzinskog vježbanja važno je poboljšati što više motornih sposobnosti koje prikladne za brze kretnje. Dobici u izvedbama šprinta pojavljuju se u inicijalnim fazama ubrzanja i održavanja brzine. Sposobnost brzog postizanja ubrzanja sa stajaće startne pozicije dat će sportašicama natjecateljsku prednost.