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For The Long Run®

RESEARCH

Improving Running Speed with Resisted Treadmill Sprinting

Purpose
- Does training with resistance improve sprinting performance?
- Will resistance from an adjustable self-propelled treadmill elicit speed gains?

Subjects
- Youth Athletes
- High School Football
- N = 18
- Means:
  - Age 16.7 ± 1.04 yrs
  - Height 176.1 ± 6.88 cm
  - Weight 86.4 ± 20.07 kg

Measures
- Vertical jump
- 9.1m (10yd) sprint
- 36.6m (40yd) sprint
- 91.4m (100yd) sprint
- Pro Agility test

Design
- Pre-Post Testing
- Technique instruction to both groups
- Control Group
- Resisted (RES) subjects participated in sprint training 2x per week
- Drills with load
  - Build Ups
  - In-Outs
  - Sprints

Results
- Significant changes;
  - RES group: **YES**
  - CNT group: NO
- Significant Difference between RES and CNT groups
- Improvements;
  - 10, 40 & 100 yd Sprints
  - Vertical
  - Pro Agility

Overview

Sprinting speed is an important component of performance in many sports including football, soccer, baseball, and basketball (1,5,6,12). Resistance during sprinting has been proposed to increase force output in the lower extremity, increase stride length, and increase explosiveness during initial strides (2,3,6,7). Another possible benefit of sprinting under resistance is increased kinesthetic feedback, allowing the athlete to better improve technique (7). Resisted sprinting is a common method with the resistance added through parachutes, towed sleds, elastic tubing, and partner resistance (1,2,6,7,8).

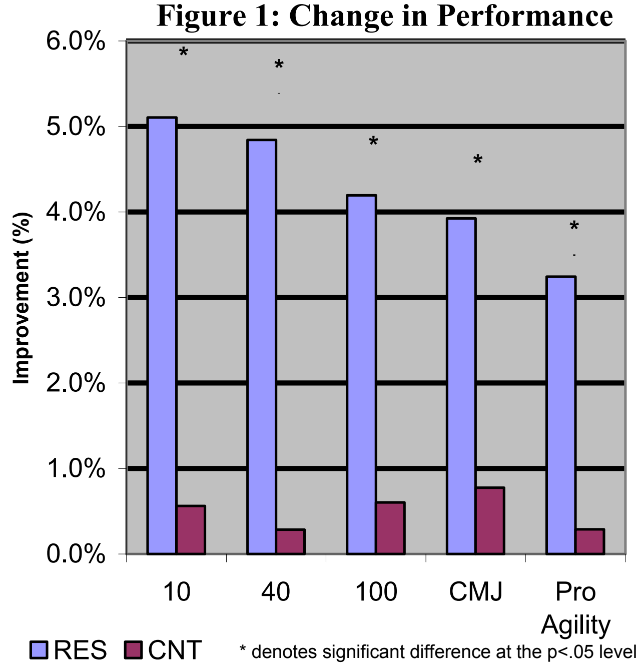
It has been documented that full speed in sprinting is not obtained until acceleration has taken place for 30-60m (7,8,11). Since the majority of sprints in these sports last for less than this distance acceleration may be considered the more important factor. A new commercially available sprint ergometer (**FORCE** from Woodway, USA) allows for resisted sprint training in an indoor setting. It also allows training variables such as time, distance, speed, load, and power output to be monitored.

Methods

Pilot work found that subjects using the resisted sprint ergometer required basic sprint technique instruction. To control variables, all athletes were given basic technique instruction. This included basic instructions and demonstrations on arm action, posture, and leg drive.

Eighteen high school males (means ± SD age=16.7 ± 1.04 years, height =176.1 ± 6.88 cm, weight = 86.4 ± 20.07 kg.) participated in the study. A battery of standard field tests was chosen to measure performance changes. These included in order of performance; Vertical jump, 9.1m (10yd), 36.6m (40yd), 91.4m (100yd) sprints, and Pro Agility (5-10-5 shuttle) agility test. Pre and post testing were performed on the same days for both groups in a team setting. All subjects participated in the same warm-up lasting approximately 20 minutes. The warm-up included a general dynamic warm-up followed by specific warm-up of progressive sprints and jumps.

Figure 1: Change in Performance



* denotes significant difference at the p<.05 level
** denotes significant difference at the p<.001 level

Experimental Design

Subjects in the experimental group participated in resisted sprint training 2 times per week for 4 weeks. Training was performed on a FORCE treadmill (Woodway USA, Waukesha, WI). This is a non-motorized treadmill on which the athlete propels the belt while tethered from behind. A constant resistive force from 1 – 150 lbs in 1 lb increments can be applied through a braking mechanism. Each training session lasted approximately 35 minutes consisting of a standard dynamic warm-up, build-up sprints, in-outs, resisted acceleration sprints, and a stretching cool-down (Table 1).

Results

The experimental group demonstrated a statistically significant improvement in all performance tests during a 4-week treatment period and only 8 training sessions. The control group showed no significant improvements (Table 2). There was a significant difference in the changes in performance between the groups (Figure 1). There was a greater improvement in the shorter sprint distances (Table 3). The shorter training history and level of performance among these high school athletes may have made such improvements in a short time possible.

Table 1: Pre, Post Test Results

		PRE					POST				
		10	40	100	CMJ	Pro Agility	10	40	100	CMJ	Pro Agility
RES	Mean	1.98	5.48	15.53	48.11	5.58	1.88**	5.22**	14.87*	50.00*	5.40**
	SD	*0.26*	*0.53*	*2.44*	*7.44*	*0.47*	*0.23*	*0.41*	*2.10*	*7.55*	*0.49*
CNT	Mean	1.88	5.25	15.00	51.79	5.52	1.86	5.24	14.92	52.14	5.50
	SD	*0.31*	*0.90*	*2.59*	*8.21*	*0.87*	*0.33*	*0.90*	*2.49*	*7.77*	*0.87*

* sig., p. < .01 ** sig., p. <.001

Practical Applications

The idea of resisted sprinting is not new. Since acceleration is an important aspect of many team sports and occurs many times during competition, any effective and efficient method of improving acceleration is valuable for coaches and athletes. This resisted sprint ergometer can be used in a small space indoors and can measure important training variables. Precise measurement of resistive loads and feedback on performance through times, distances and power output may enhance its effectiveness. Being indoors and stationary can allow a coach to view sprinting technique at a perpendicular angle and give technique cues constantly.

Table 2: Resisted Sprint Training Protocol

	Exercise	Repetitions	Resistance
Week 1	60 yard build ups	3	
	60 yard build ups	4	2.5%
	In-Outs	4	2.5%
	40 yard Sprints	6	5.0%
Week 2	60 yard build ups	3	
	60 yard build ups	4	5.0%
	In-Outs	4	5.0%
	40 yard Sprints	6	5.0%
Week 3	100 yard build ups	3	
	100 yard build ups	4	5.0%
	In-Outs	4	5.0%
	60 yard Sprints	6	7.5%
Week 4	100 yard build ups	3	
	100 yard build ups	4	5.0%
	In-Outs	6	5.0%
	60 yard Sprints	6	7.5%

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