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Core strength training based research on agility and upper limb strength of fencing players

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Abstract

The purpose of this investigation was to study the effects of Core Strength Training on Agility and Upper Limb Strength of Fencing Players. Twenty, University level male Fencers of Guru Nanak Dev University, Amritsar between the age group of 18-28 years (Mean \pm SD: age 20.7 ± 2.536 yrs, body height 166.795 ± 3.639 cm, body mass 65.23 ± 3.963 kg) volunteered to participate in the study. 7-5-7 Agility Test was used to measure the Agility and 1 Minute Push up Test was used to measure the Upper Limb Strength. Statistical analyses were performed using the Statistical Package for the Social Sciences for Windows version 16.0 software (SPSS Inc., Chicago, IL). Data is expressed as the mean \pm SD. Paired sample t-test was utilized to compare the means of the Pre-Test and the Post-Test. The level of significance was set at 0.05. Significant differences were found in Agility in the experimental group subjected to 6-week training. However, no significant changes over that 6-week period were noted in the control group. Furthermore, significant differences were found in Upper Limb Strength in the experimental group subjected to 6-week training. However, no significant changes over that 6-week period were noted in the control group.

Keywords: Core strength training, agility, upper limb strength, fencing

Introduction

Agility is difficult to define, but is often described as a quality possessing the ability to change direction and start and stop quickly^[1, 2, 3, 4]. Therefore, it has been recognized that a component of agility performance is the response to a stimulus^[5]. In 1969, a study was conducted^[6] that compared the effects of speed and agility training on various fitness parameters. Speed and agility in team sports represent complex psychomotor skills^[7].

They involve moving the body as rapidly as possible, but agility has the added dimension of changing direction. Speed is classically defined as the shortest time required for an object to move along a fixed distance, which is the same as velocity, but without specifying the direction^[8]. Fencing has been conceived of and practised as an art form^[9, 10]. And has also been presented as a science formally since 1604^[11].

Material and Methods

Subjects

Twenty, University level male Fencers of Guru Nanak Dev University, Amritsar between the age group of 18-28 years (Mean \pm SD: age 20.7 ± 2.536 yrs, body height 166.795 ± 3.639 cm, body mass 65.23 ± 3.963 kg) volunteered to participate in the study. The subjects were purposively divided into three groups:

- Group-I: Control ($N_1=10$)
- Group-II: Experimental ($N_2=10$)

Distribution and demographics of subjects are brought forth in Table-1.

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Table 1: Distribution and Demographics of Subjects (N=20) (i.e., Control Group (N₁=10) and Experimental Group (N₂=10)).

Variable(s)	Sample Size		
	Total (N=20)	Control Group (N ₁ =10)	Experimental Group (N ₂ =10)
Age (yrs)	20.7±2.536	21.2±3.084	20.2±1.873
Height (cm)	166.795± 3.639	166.4±3.913	167.19±3.508
Body Weight (kgs)	65.23±3.963	64.84±4.068	65.62±4.032

*N; sample size, yrs; years, cm; centimeters, kg; kilograms.

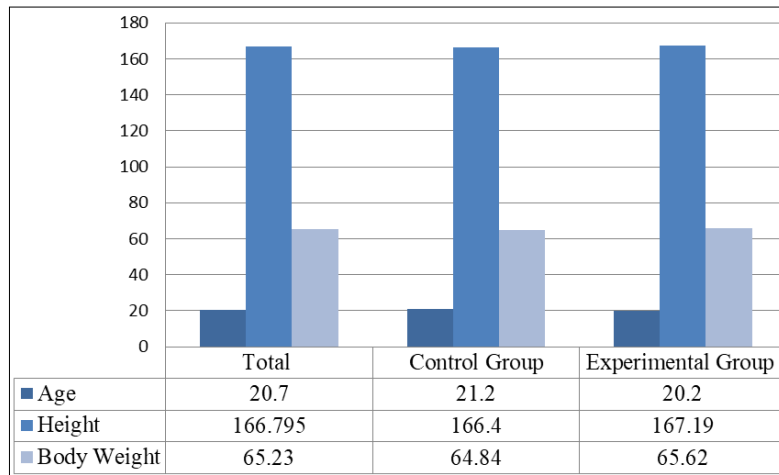


Fig 1: Distribution and Demographics of Subjects (N=20) (i.e., Control Group (N₁=10) and Experimental Group (N₂=10)).

Variable Agility

- 7-5-7 Agility Test was used to measure the Agility.

Upper Limb Strength

- 1 Minute Push up Test was used to measure the Upper Limb Strength.

Training Protocol

Week's	Training
Week-1	1. Traansversusabdominus (10 repetitions with 15 seconds hold).
	▪ Abdominal bracing.
	▪ Bracing with heel slides
	▪ Bracing with leg lifts
	▪ Bracing with bridging
	▪ Bracing in standing row
	▪ Bracing with walking
Week-2	▪ Bracing with quadruped position
	1. Parspinals/ multifidi (10 repetitions with 15 seconds hold).
	▪ Quadruped arm lifts with bracing.
	▪ Quadruped leg lifts with bracing.
	▪ Quadruped alternate arms and leg lifts with bracing.
Week-3	2. Central plank (8 repetitions with 30 seconds hold).
	3. Abdominal bridging (10 repetitions with 15 seconds hold).
	1. Quadratuslumborum and obliques (6 repetitions with 30 seconds hold).
	▪ Side plank with knees flexed.
	▪ Side plank with knees extended.
	2. Planks with variation of arm and leg(6 repetitions, 3-3 on each side with 30 seconds hold)
	▪ Plank with 1 arm raise.
▪ Plank with 1 leg raise.	
Week-4	3. Trunk Curl (2 sets, 30 repetitions).
	4. Abdominal bridging with leg raise (10 repetitions with 15 seconds hold).
	1. Central planks with variations (6 repetitions with 30 seconds hold)
	2. Sit-ups (2 sets of 30 repetitions).
Week-5	3. Cross crunches (2 sets of 30 repetitions).
	4. Leg raises (2 sets of 15 repetitions by descending the legs slowly).
	1. Central planks with variations (8 repetitions with 30 seconds hold).
	2. Scissors (2 sets of 30 repetitions).
Week-6	3. Cycling crunches (2 sets of 30 repetitions).
	4. Flutter kicks (2 sets of 30 repetitions).
	1. Leg circles (30 repetitions).
	2. Reverse crunches (2 sets of 30 repetitions).
	3. Sitting twist (2 sets of 30 repetitions).
	4. V-sit (10 repetitions with 10 seconds hold) (Akuthota, V., et a., 2008)

Statistical Technique

Statistical analyses were performed using the Statistical Package for the Social Sciences for Windows version 16.0 software (SPSS Inc., Chicago, IL). Data is expressed as the mean \pm SD. Paired sample t-test was utilized to compare the

means of the Pre-Test and the Post-Test. The level of significance was set at 0.05.

Results

Table 2: Descriptive statistics (Mean & Standard Deviation) and paired sample t-test of Subjects (N=20) (i.e., Control Group (N₁=10) and Experimental Group (N₂=10) for Core Strength and Stability.

Agility					
Group	Number	Mean	Standard Deviation	Variance	t-value
Experimental (Pre-Test)	10	81.8	29.645	878.844	8.041
Experimental (Post-Test)	10	113.2	32.054	1027.511	
Control (Pre-Test)	10	80.9	18.087	327.157	1.211
Control (Post-Test)	10	82.05	17.519	306.913	
Upper Limb Strength					
Experimental (Pre-Test)	10	9.534	1.109	1.231	4.451
Experimental (Post-Test)	10	8.919	0.870	0.757	
Control (Pre-Test)	10	10.55	1.217	1.483	0.476
Control (Post-Test)	10	10.6	1.062	1.128	

Agility

Experimental Group

- The means of Group 1 and Group 2 are significantly different at $p < 0.05$.
- The calculated t exceeds the critical value ($8.041 > 2.262$), so the means are significantly different.

Control Group

- The means of Group 1 and Group 2 are not significantly different at $p < 0.05$.
- The absolute value of the calculated t is smaller than critical value ($1.211 < 2.262$), so the means are not significantly different.

Upper Limb Strength

Experimental Group

- The means of Group 1 and Group 2 are significantly different at $p < 0.05$.
- The calculated t exceeds the critical value ($4.451 > 2.262$), so the means are significantly different.

Control Group

- The means of Group 1 and Group 2 are not significantly different at $p < 0.05$.
- The absolute value of the calculated t is smaller than critical value ($0.476 < 2.262$), so the means are not significantly different.

Conclusion

Significant differences were found in Agility in the experimental group subjected to 6-week training. However, no significant changes over that 6-week period were noted in the control group.

Furthermore, significant differences were found in Upper Limb Strength in the experimental group subjected to 6-week training. However, no significant changes over that 6-week period were noted in the control group.

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