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## Balance in fencing: Its Association to and effects on sport performance

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### Abstract

The endeavor of this study was to investigate the effects on Balance of Fencing Players. 24 University level male Fencers of Guru Nanak Dev University, Amritsar between the age group of 18-28 years (Mean  $\pm$  SD: age 20.791 $\pm$ 2.873 yrs, body height 168.25 $\pm$ 2.608 cm, body mass 67.183 $\pm$ 3.125 kg) volunteered to participate in the study. Modified Star Excursion Balance Test was used to measure the Balance. 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 Balance-Right 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 Balance-Left 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:** Balance, fencing, sport performance

### Introduction

Balance is the key to all functional movement. This is an integral component of almost every activity of daily living. From standing on toes to reach something on the top shelf, walking up and down the stairs or walking on an irregular surface, running, swimming, bike riding and in many other daily activities balance is essential. Any impairment in balance will lead to decrease in performance and increases the risk of injury and fractures as a result of which daily activities may be impaired. Thus balance is of key clinical relevance to any rehabilitation/prophylactic physiotherapy program<sup>[1, 2]</sup>.

There are many outcome measures to assess the balance but number of tests for evaluating the dynamic balance is very less. The standardized test that are present for examining balance clinically, mostly put emphasis on the static balance, whereas many activity of daily living required dynamic balance<sup>[2]</sup>. The majority of dynamic balance assessment tools e.g. functional reach tests and the berg balance scale were developed specifically for paediatrics<sup>[3]</sup>, geriatrics<sup>[4]</sup> and neurological patients<sup>[5]</sup>.

The Star Excursion Balance Test (SEBT) is a simple, reliable and cost effective test which is quick to administer and typically accessible in clinical and field settings to assess dynamic balance of lower limb<sup>[1, 6]</sup> monitor rehabilitation progress, assess deficits following injury and identify athletes at high risk for lower extremity injury. SEBT requires neuromuscular characteristics such as lower extremity coordination, balance, flexibility and strength<sup>[7]</sup>.

### Material and Methods

#### Selection of Subjects

24 University level male Fencers of Guru Nanak Dev University, Amritsar between the age group of 18-28 years (Mean  $\pm$  SD: age 20.791 $\pm$ 2.873 yrs, body height 168.25 $\pm$ 2.608 cm, body mass 67.183 $\pm$ 3.125 kg) volunteered to participate in the study. The subjects were purposively divided into three groups:

- Group-I: Control (N<sub>1</sub>=12)
- Group-II: Experimental (N<sub>2</sub>=12)

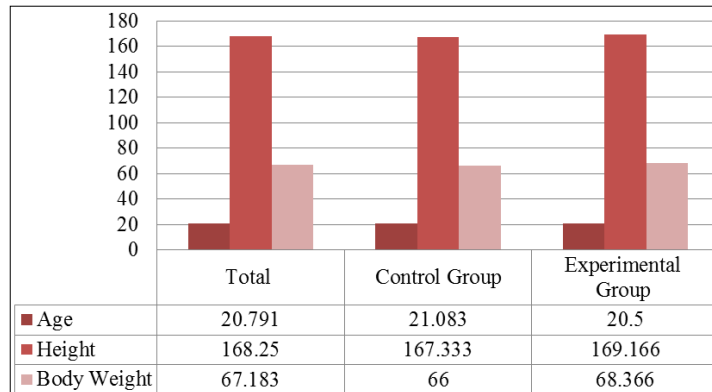
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Distribution and demographics of subjects are brought forth in Table-1.

**Table 1:** Distribution and Demographics of Subjects (N=24) (i.e., Control Group (N<sub>1</sub>=12) and Experimental Group (N<sub>2</sub>=12)).

Variable(s)	Sample Size		
	Total (N=24)	Control Group (N <sub>1</sub> =12)	Experimental Group (N <sub>2</sub> =12)
Age (yrs)	20.791±2.873	21.083±3.528	20.5±2.153
Height (cm)	168.25±2.608	167.333±2.498	169.166±2.480
Body Weight (kgs)	67.183±3.125	66±3.249	68.366±2.609

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



**Fig 1:** Distribution and Demographics of Subjects (N=24) (i.e., Control Group (N<sub>1</sub>=12) and Experimental Group (N<sub>2</sub>=12)).

**Selection of Variable**

**Balance**

Modified Star Excursion Balance Test was used to measure the Balance.

**Training Protocol**

Week's	Training	
Week-1	1. Transversus abdominis (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 ▪ Bracing with quadruped position	
	Week-2	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.
		2. Central plank (8 repetitions with 30 seconds hold).
		3. Abdominal bridging (10 repetitions with 15 seconds hold).
		Week-3
	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.	
	3. Trunk Curl (2 sets, 30 repetitions).	
	4. Abdominal bridging with leg raise (10 repetitions with 15 seconds hold).	
Week-4	1. Central planks with variations(6 repetitions with 30 seconds hold)	
	2. Sit-ups (2 sets of 30 repetitions).	
	3. Cross crunches (2 sets of 30 repetitions).	
	4. Leg raises (2 sets of 15 repetitions by descending the legs slowly).	
Week-5	1. Central planks with variations (8 repetitions with 30 seconds hold).	
	2. Scissors (2 sets of 30 repetitions).	
	3. Cycling crunches (2 sets of 30 repetitions).	
	4. Flutter kicks (2 sets of 30 repetitions).	
Week-6	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=24) (i.e., Control Group (N<sub>1</sub>=12) and Experimental Group (N<sub>2</sub>=12) for Balance.

Modified Star Excursion Balance Test-Right					
Group	Number	Mean	Standard Deviation	Variance	t-value
Experimental (Pre-Test)	12	48.666	54.75	54.75	5.727
Experimental (Post-Test)	12	54.75	9.611	54.75	
Control (Pre-Test)	12	51.583	8.207	67.356	2.092
Control (Post-Test)	12	57	8.984	80.727	
Modified Star Excursion Balance Test-Left					
Experimental (Pre-Test)	12	54.75	9.611	92.386	6.201
Experimental (Post-Test)	12	58	9.361	87.636	
Control (Pre-Test)	12	52.583	8.680	75.356	0.304
Control (Post-Test)	12	52.75	7.933	62.931	

### Balance

#### Modified Star Excursion Balance Test-Right

##### Experimental Group

- The means of Group 1 and Group 2 are significantly different at  $p < 0.05$ .
- The absolute value of the calculated t exceeds the critical value ( $5.727 > 2.201$ ), 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 ( $2.092 < 2.201$ ), so the means are not significantly different.

#### Modified Star Excursion Balance Test-Left

##### Experimental Group

- The means of Group 1 and Group 2 are significantly different at  $p < 0.05$ .
- The calculated t exceeds the critical value ( $6.201 > 2.201$ ), 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 ( $0.304 < 2.201$ ), so the means are not significantly different.

### Conclusion

Significant differences were found in Balance (Right) 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 Balance (Left) 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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