

## EFFICACY OF SENSORIMOTOR TRAINING AND ECCENTRIC STRENGTHENING EXERCISE ON BALANCE AMONG ATHLETES WITH ACHILLES TENDINOPATHY

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### ABSTRACT

**Back Ground of the Study:** Achilles tendinopathy is the most common overuse injuries among competitive and recreational athletes. Achilles tendinopathy patients suffer with muscle imbalances, tendon tightness or ankle mal alignment, which affects muscle strength, ankle proprioception and balance. Sensorimotor training and eccentric strengthening exercises are widely used to treat achilles tendinopathy. This study was an attempt to compare the effects of sensorimotor training and eccentric strengthening exercise on balance among athletes with achilles tendinopathy.

**Methodology:** 30 athletes with achilles tendinopathy were selected based on the inclusion and exclusion criteria. They were randomly allocated into two groups (Group A and B) consists of 15 subjects each. Group A received sensorimotor training and group B received eccentric strengthening exercise. Intervention lasted for 6 weeks, five days in a week. Balance was measured by Balance Error Scoring System (BESS) before and after 6 weeks of intervention.

**Conclusion:** Both sensorimotor training and eccentric strengthening exercise were significantly improved balance. When comparing both sensorimotor training is more effective than eccentric strengthening exercise in improving balance among athletes with achilles tendinopathy.

**KEYWORDS :** Achilles tendinopathy, sensorimotor training, eccentric strengthening exercise, BESS.

### Introduction:

The overuse injury of the achilles tendon is known as achilles tendinopathy (1). It is common in the age group between 14 and 60 years. Achilles tendinopathy occurs due to overuse, degenerative changes and in some sports activity especially in athletes who participate in track field, soccer, volley ball, soft ball and tennis are more susceptible (2). The overall incidence of achilles tendinopathy is 2.35 per 1000(3).

The classical symptoms of achilles tendinopathy are pain, muscle imbalances, muscle weakness and tendon tightness or ankle mal alignment (4), which in turn leads to ankle proprioceptive loss and balance dysfunction(5,6). Stable balance is an important factor in athletes as it reduces the risk of fall, subsequent injuries and optimize the motor performance in a number of athletic disciplines (7). The purpose of the study is to find and compare the effects of 6 weeks sensorimotor training and eccentric strengthening exercise on balance among athletes with achilles tendinopathy.

### Methodology:

Review Board of Sri Venkateshwaraa College of Physiotherapy, Pondicherry has approved this two group pre and post-test experimental study and a written consent was obtained from the participants after giving clear instructions regarding the treatment procedure and its implications. The study was conducted in Sri Venkateswarraa college of Physiotherapy and Indira Gandhi stadium, Pondicherry, India.

Clinically diagnosed 30 achilles tendinopathy patients age between 18-25 were selected for this study and randomly assigned to any one of the two experimental groups. Group A, 15 subjects received sensorimotor training which includes short foot exercise, standing upright position, single leg stance with on firm then on foam surface, forward stepping lunge, toe skipping and heel skipping on firm then on foam surface and wobble board with eyes open and then closed. Group B 15, subjects received eccentric strengthening exercise which includes bicycle riding at a maximum heart rate of 40%. Exercises focusing on eccentric contraction of plantar flexors

like backward walking and down stairs backwards initially without resistance later with resistance. Balance was measured in all the subjects by balance error scoring system before and after 6 weeks of intervention.



**Figure: 1 Single leg stance on firm surface**



**Figure: 2 Single leg stance on foam surface**



**Figure: 3 Down stairs backwards without resistance**



**Figure: 4 Down stairs backwards with resistance**

**Data Analysis and Results:**

The study aims to find and compare the effects of sensorimotor training and eccentric strengthening exercise on balance among athletes with achilles tendinopathy.

**Table 1: Mean value, Mean Difference and Paired 't' value of balance among group A and B**

Group-A	Mean	Mean difference	SD	Paired 't' value
Pre test mean	49	6.47	2.203	48.5*
Post test mean	42.53		2.231	
Group-B	Mean	Mean difference	SD	Paired 't' value
Pre test mean	48.6	3.6	1.681	5.0*
Post test mean	45		1.558	

In group A and B for balance the calculated paired 't' values are 48.5 and 5 respectively and the 't' table value is 2.977 at 0.005 level. Since both the calculated 't' values are more than the 't' table value, there is significant difference between pre and post test scores of balance in both the groups. That is balance is improved following both sensorimotor training and eccentric strengthening exercise among athletes with achilles tendinopathy.

**Table 2: Mean value, Mean Difference and Un Paired 't' value of balance among group A and B.**

S. No	Groups	Improvement		Standard deviation	Unpaired 't' test
		Mean	Mean Difference		
1	Group-A	6.47	2.87	0.93	3.432*
2	Group-B	3.6			

In between group analysis the calculated unpaired 't' values for balance is 3.432 and the 't' table value is 2.763 at 0.005 level. Since all the calculated 't' values are more than the 't' table value there is significant difference between sensorimotor training and eccentric strengthening exercise in the management of balance among athletes with achilles tendinopathy. When comparing the mean values of both the groups, group A subjects showed more difference than group B subjects. That is sensorimotor training is more effective than eccentric strengthening exercise in improving balance among athletes with achilles tendinopathy.

**Discussion:**

In the present study both sensorimotor training and eccentric strengthening exercises are effective in improving balance among athletes with achilles tendinopathy. Sensorimotor training modulate the afferent input to influence neuromuscular regulation and improves balance[8]. Force fluctuations and alterations in tendon load occur during eccentric strengthening exercise which produce a motor pattern variation that influences tendon load and thereby improves balance [9].

**Conclusion:**

Sensorimotor training and eccentric strengthening exercises both significantly improve balance in achilles tendinopathy. When comparing both sensorimotor training is more effective than eccentric strengthening exercise in improving balance among athletes with achilles tendinopathy.

**REFERENCES:**

- Norkin, C.C. and Levangie, P.K (1983). Joint structure and function: a comprehensive analysis, Philadelphia, F.A. Davis.
- Jarvinen TA, Kannus P, Maffulli N, Khan KM (2005). Achilles tendon disorders: Etiology and Epidemiology. Foot and Ankle clinics; 10(2): 255-266.
- S. De jonge, C.Van Den Berg,R.J. De Vos (2011). Incidence of midportion Achilles tendinopathy in the general population, British journal of spors medicine, vol 45,no 13 pp. 1026-1028.
- Lake J, Ishikawa S (2009). Conservative treatment of achilles tendinopathy: emerging techniques, foot ankle clin; 14(4): 663-674.
- Maffulli N Khan KM, Puddu G.C (1992): Overuse tendon conditions: Time to change a confusing arthroscopy.
- Komi P V Fukashiro S, Jarvinen M (1992). biomechanical loading of Achilles during normal locomotion. Clin sports med.
- Alderton A-K, Moe-Nilssen R (2003). Force plate and accelerometer measures for evaluating the effect of muscle fatigue on postural control during one legged stance. Physiother Res Int; 8(4):187-199.
- Aagaard P (2003). Training-induced changes in neural function. Exerc Sport Sci Rev. 31(2):61-7.
- Rees JD, Wolman RL, Wilson A (2009). Eccentric exercises; why do they work, what are