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## ORIGINAL ARTICLE

### COMPARATIVE EFFECT OF SINGLE LEG BRIDGING EXERCISE IN SWISS BALL OVER FORWARD JUMP EXERCISE ON PATIENT WITH FUNCTIONAL ANKLE INSTABILITY

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#### ABSTRACT

**Aim and objective of the study:** The main objective of the study is to find the comparative effect of single leg bridging in Swiss ball over forward jump exercise on patients with functional ankle instability. Secondary objectives of the study are to find the individual effect of single leg bridging in Swiss ball and forward jump exercise on patients with functional ankle instability. **Methodology:** This is a comparative pre and post type study. 30 subjects with age of 20-30 years of both male and female subjects were included in this study; they were divided into 15 subjects in two groups. This study conducted at Department of Physiotherapy of ACS Medical college and Hospital, Chennai, for 3 session in a week for 4 weeks. Group A were given receive single leg bridging exercise in Swiss ball and Group B were given forward jump exercise. Both group trained for 10 repetitions of exercise in each session. Pain and functional disability was measured before and after the intervention session using the measurement tools VAS and CAIT. The special test done for confirming functional ankle instability by Talar Tilt Test. **Result:** Comparative study between Group A and Group B showed significant difference in effectiveness of pain and improve Ankle instability with P value >0.0001, among patients with functional ankle instability. **Conclusion:** This study is concluded that single leg bridging exercise found more effective on reduction of pain and improve ankle stability among patients with functional ankle instability.

**Keywords:** Swiss ball, Single leg bridging, forward jump exercise; Ankle instability; Visual analog scale (VAS); Cumberland ankle Instability Tool (CAIT)

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## INTRODUCTION

Practical flimsiness of the lower leg joint has been characterized by Freeman as "a propensity for the foot to give way later a lower leg sprain." Three variables thought to cause useful shakiness of the lower leg joint are anatomic or mechanical unsteadiness, muscle shortcoming, and deficiencies in joint proprioception. Cornwall showed that people with a background marked by reversal lower leg hyper-extends exhibit less dependability when playing out a solitary leg position than do no impaired subjects<sup>1-3</sup>.

Up to 70% of individuals have persevering manifestations of pain and precariousness later a straightforward lower leg sprain. Persistent lower leg precariousness, among the most well-known manifestations, is crippling and can prompt a wide range of disability. Chronic lower leg insecurity can incorporate repetitive injury, mechanical shakiness in which an essential mechanical restriction is lost, and utilitarian lower leg instability<sup>4-7</sup>.

As per this hypothesis, dynamic soundness of the lower leg joint relies upon the capacity of the evertors (Peronei) to respond rapidly to abrupt reversal annoyances, to develop sufficient pressure to forestall harmful scopes of lower leg movement, and accordingly to forestall injuries of the horizontal tendon complex of the lower leg. This hypothesis recommends that people with FI could have postponed and decreased reflex reactions in the evertor muscles of their impacted lower legs in response to an inversion stress in light of modified capsular and ligamentous afferent information<sup>8-10</sup>.

In any case, more current proof recommends that the dynamic control of lower leg

dependability relies upon feed-forward engine control of the focal sensory system. It has been recommended that unseemly situating of the lower leg joint before ground contact during strolling may have significant ramifications for lower leg joint stability<sup>11-15</sup>.

## METHODOLOGY

The study design is an experimental study. The study type is pre-post comparative study. Population: Only sports persons are included in the study. The study setting is conducted in Faculty of Physiotherapy, ACS Medical College campus, Velappanchavadi, Chennai. The sample size is 30 subjects. Study Sampling Method: Simple random sampling by lottery method used to divide the samples equally 15 subjects in each group. The study was conducted for duration of 4 weeks.

### Selection Criteria

**Inclusion Criteria:** Age group 20-30 years, Both Male and Female subjects were included in this study.

**Exclusion Criteria:** Ankle pain above grade 2, Lower limb fracture, Dislocations of lower limbs, obese persons, cardiovascular patients

Measurement Tool of the study was Pain measured by VAS and Ankle instability by CAIT.

**Procedure:** This is a comparative study with pre and post intervention. 30 subjects with ankle instability are selected based on the inclusion criteria.

Group A (15 subjects) received single leg bridging in Swiss ball for period of 15 seconds holding of 3 repetitions and they were asked to do this for 4 weeks in alternative day.



**Fig 1.** Group A Single Leg Bridging Exercise In Swiss Ball

Group B (15 Subjects) received forward jump exercise for period 3 sets of 10 repetition for 4 weeks in alternative day. Pain and functional disability was assisted before and after the intervention session using the measurement tool. The special test done for confirming functional ankle instability was Talar Tilt Test. Pre and Post data was collected before and after the training program.



**Fig 2 .**Group B Forward Jump Exercise

**Talar Tilt Test:** The talar slant test or reversal move is performed with the patient prostrate

or on their side, with foot loose. The gastrocnemius should likewise be loose by flexion of the knee. The bone is then shifted from one side to another into adduction and kidnapping. The discoveries ought to be contrasted and the contralateral side. Steal and rearrange the heel. On the off chance that a firm endpoint can't be felt when contrasted and the contrary lower leg, suspect harm to the CFL. Note that the level of slant goes from 0-23 degree. Much of the time, this test is troublesome, if certainly feasible, to perform auxiliary to patient torment and expanding.. This test is done to the subject for confirming functional ankle instability. The examination is demonstrated in the image below.



**Fig 3.** Talar Tilt Test

### Data Analysis

#### Group A- Single Leg Bridging in Swiss Ball Exercise

The below table 1 shows significant difference in VASon patients with functional ankle instability with P value >0.0001

VAS	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig.Diff. (P < 0.05)
Pre Test	1.533	15	1.133	0.192	14	5.906	<0.0001	****
Post Test	0.400			0.743				

**Table 1:** Paired t test on VAS within the Group A on the effectiveness of Single Leg Bridging in Swiss Ball Exercise among patients with functional ankle instability.

The above table 1 shows significant difference in VAS on effectiveness of Single Leg Bridging in Swiss Ball Exercise among patients with functional ankle instability with P value >0.0001

VAS	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig.Diff. (P < 0.05)
Pre Test	1.600	15	0.800	0.7746	14	4.00	>0.0013	**
Post Test	0.8000			0.200				

**Table 2:** Paired t test on VAS within the Group B on the effectiveness of Single Leg Bridging in Swiss Ball Exercise among patients with functional ankle instability

The above table 2 shows significant difference in VAS on effectiveness of Single Leg Bridging in Swiss Ball Exercise among patients with functional ankle instability with P value >0.0013

#### Group B -Forward Jump Exercise

CAIT	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig.Diff. (P < 0.05)
Pre Test	7.467	15	11.67	3.478	14	12.99	>0.0001	****
Post Test	19.13			0.898				

**Table 3:** Paired t test on CAIT within the Group B on the effectiveness of Forward Jump Exercise among patients with functional ankle instability.

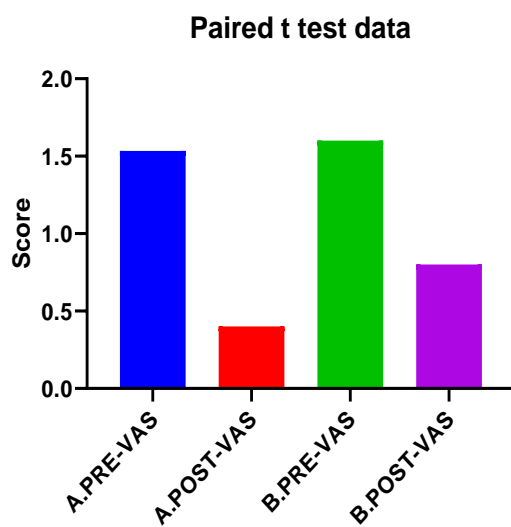
The above table 3 shows significant difference in CAIT within the Group B on the effectiveness of Forward Jump Exercise among patients with

functional ankle instability with P value >0.0001.

CAIT	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig.Diff. (P < 0.05)
Pre Test	7.267	15	2.267	0.961	14	9.134	>0.0001	****
Post Test	9.533			0.248				

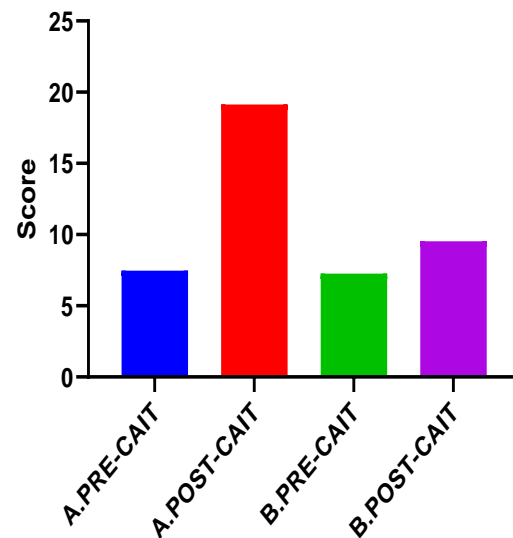
**Table 4:** Paired t test on CAIT within the Group B on effectiveness of Forward Jump Exercise among patients with functional ankle instability.

The above table 4 shows significant difference in CAIT within the Group B on effectiveness of Forward Jump Exercise among patients with functional ankle instability with P value >0.0001.



**Graph 1:** Presentation of VAS within the Group A and B on the effectiveness of Jump Exercise among patients with functional ankle instability

**Paired t test data**



**Graph 2:** Presentation of CAIT within the Group A and B on the effectiveness of Jump Exercise among patients with functional ankle instability.

The below table 5 shows significant difference on VAS between Group A and B among patients with functional ankle instability with P value <0.0001.

Out come Measures	Exercise Group A and B	Test	Mean	Mean Diff.	R Square	F	P value	Sig. diff. (P < 0.05)
VAS	Single Leg Bridging in Swiss Ball Exercise	Pre test	1.533	1.133	0.4986	18.57	<0.0001	****
		Post Test	0.400					
	Forward Jump Exercise	Pre test	1.600	0.800				
		Post Test	0.8000					

**Table 5:** ANOVA to compare VAS between Group A and B among patients with functional ankle instability

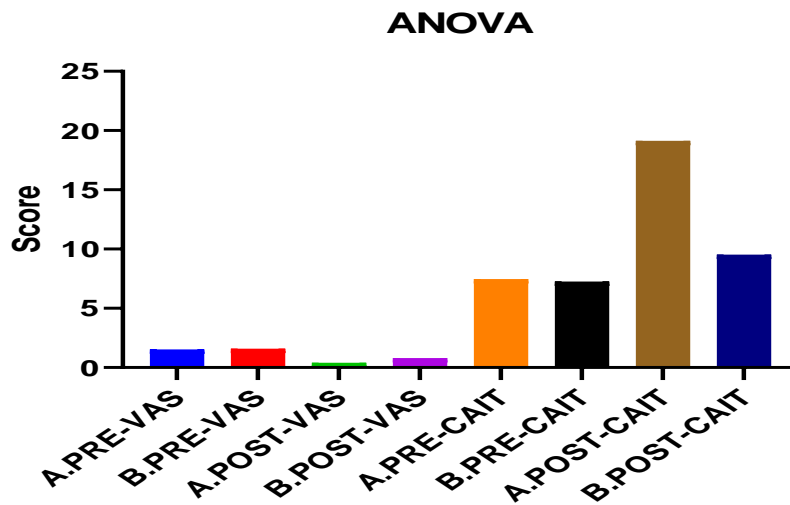
The above table 5 shows significant difference on VAS between Group A and B among patients with functional ankle instability with P value <0.0001.

Out come Measures	Exercise Group A and B	Test	Mean	Mean Diff.	R Square	F	P value	Sig. diff. (P < 0.05)
CAIT	Single Leg Bridging in Swiss Ball Exercise	Pre test	7.467	11.67	0.7994	74.40	<0.0001	****
		Post Test	19.13					
	Forward Jump Exercise	Pre test	7.267	2.267				
		Post Test	9.533					

**Table 6:** ANOVA to compare CAIT between Group A and B among patients with functional ankle instability

The above table 6 shows significant difference on CAIT between Group A and B among patients with functional ankle instability with P value <0.0001.





**Graph 3:** Presentation of VAS and CAIT between Group A and B among patients with functional ankle instability.

## RESULT

Total 15 participants of patients with functional ankle instability were included in the study base on specific selection criteria.

In study pain has reduced with mean difference of 1.133, by Single Leg Bridging in Swiss Ball Exercise with P value  $>0.0001$ , among patients with functional ankle instability.

In study pain has reduced with mean difference of 0.80, by Single Leg Bridging Exercise with P value  $>0.0001$ , among patients with functional ankle instability.

Shoulder function has improved with mean difference of 11.67, by Forward Jump Exercise with P value  $>0.0001$ , among patients with functional ankle instability.

Shoulder function has improved with mean difference of, by 2.267, Forward Jump Exercise with P value  $>0.0001$ , among patients with functional ankle instability.

Comparative study between Group A and Group B showed significant difference in

effectiveness of pain and improve Ankle instability with P value  $>0.0001$  respectively among patients with functional ankle instability.

Single Leg Bridging Exercise found more effective on reduction of pain and improve Ankle instability among patients with functional ankle instability with mean difference of 1.133 and 11.67 respectively, while compare the mean difference on effect of Forward Jump Exercise with 0.80 and 2.267 respectively.

## DISCUSSION

The capacity to recognize movement in the foot and make postural changes because of the identified movements is significant in the anticipation of lower leg injury. Essentially, the capacity of a person to detect the place of the foot preceding impact point strike is absolutely critical. Studies have shown that useful lower leg precariousness brings about a diminished capacity to keep up with balance and abatement in joint position sense. Constant lower leg shakiness is a typical issue in sports and among dynamic individual<sup>16, 17</sup>.

The present study investigated that to compare the effect of single leg bridging in Swiss ball over forward jump exercise on patients with functional ankle instability. After the rehabilitation the ankle instability is measured by using CAIT (Cumberland Ankle Instability Tool)<sup>18</sup>.

This review has recommended that lower leg injury might cause interruption of joint afferents situated in the supporting tendons and case, prompting an impedance of the postural control framework. Utilizing an altered Rom-berg's test, they tracked down a reduction in the capacity to keep up with static equilibrium on the harmed appendage when contrasted with the unharmed appendage of patients with one-sided lower leg injury. From their finding of diminished postural control, they proposed a halfway separation of joint mechano-receptors in the practically unsound lower leg, which added to indications of useful unsteadiness. Various mechanoreceptors are available in joint container, tendon, muscle, and skin. Mechanoreceptors are delicate to joint strain and pressure brought about by both powerful development and static position<sup>19</sup>.

This review has detailed a diminishing in manifestations of practical flimsiness and rehashed scene of injury following a preparation routine of equilibrium type works out. Peters et al, detailed after a parallel lower leg sprain, 10% to 30% of people report tenacious indications or reinjury<sup>20</sup>.

This study has suggested that the postural control and functional limitations exist in individuals with CAI. In addition, rehabilitation appears to improve these functional limitations. The result of the present study reported that the single leg bridging exercise

shows significant improvement in patient with ankle instability<sup>21</sup>.

**Ethical clearance:** There was no risk of conducting this study. Ethical clearance was obtained from the ethical Institutional Review Board of Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai with reference No. E17/PHYSIO/IRB/2019-2020 approval letter dated 07/01/2020.

**Conflicts of Interest:** There is no conflict of interest to conduct this study.

**Fund for the study:** This is self-funded study.

## CONCLUSION

This study is concluded that the single leg bridging exercise found more effective on reduction of pain and improve ankle stability among patients with functional ankle instability.

There was a significant reduction of pain and improvement of functional ankle instability in both groups. Comparatively there was more reduction of pain and improvement of functional ankle instability in subjects who received single leg bridging exercise in Swiss ball.

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