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## COMPARISON OF THE EFFECT OF PROPHYLACTIC KNEE BRACE ON STATIC BALANCE AMONG COLLEGIATE FOOTBALL PLAYERS USING DOMINANT AND NON DOMINANT LEG

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### ABSTRACT

**Objective:** To find out and compare the effect of prophylactic knee brace on static balance among collegiate football player in dominant and non dominant leg. **Design:** Experimental study. **Setting:** Jamia Hamdard University, **Participants:** 60 male healthy collegiate football players.

**Main Outcome Measure:** Static balance. **Results:** It was seen that the two groups i.e. dominant leg and non dominant leg has yielded no significant improvement in static balance within group and between groups. There was no significance difference data in static balance in dominant leg without brace and with brace ( $p=0.983$ ) & non dominant leg without brace and with brace ( $p=0.53$ ). Between groups analysis there was also no significant differences in static balance ( $p=0.993$ ). **Conclusion:** The finding suggests that there was no improvement in static balance in dominant and non dominant leg without brace and with brace in healthy collegiate football player.

**Keywords:** Prophylactic Knee Brace, Static Stability, dominant and non dominant leg

### INTRODUCTION

A brace can be defined as a device that claps objects together to resist deforming forces & to support weakened structure<sup>1</sup>. External bracing is used for prevention of knee injuries, enhancement of performance & prevention of giving way in an injured knee.

Knee injuries account up to 60% of all sport injuries, with the ACL accounting for almost half the knee injuries. The medial collateral ligament is one of the most commonly injured ligaments of the knee in football players. Most injuries result from a valgus force on the knee<sup>8</sup>. Knee injuries continue to plague the athletic population especially in the sports of football. Advances in the treatment and rehabilitation of

sports related knee injuries and have hastened recovery time and subsequent return to sport.

However, prevention of knee injuries remains elusive despite attempts to limit the frequency and severity of knee injuries & is used primarily in football. Prophylactic knee braces are designed to reduce the likelihood or severity of knee ligament injuries in a relatively normal knee

There are two basic design of prophylactic knee braces<sup>4</sup>. Lateral bar with various hinge designs strapped to soft tissue, Medial & lateral bars with plastic cuffs or straps as well as various as well as various hinges. Knee braces grip bone indirectly through soft tissue. Pressure applied to skin is transmitted to the underlying fat, muscle,

blood vessel & nerve. This external compression from the brace increase intramuscular pressure<sup>6</sup>. Researchers have conducted many epidemiological studies on the effectiveness of prophylactic knee braces on knee injury prevention, some reported reduction of knee injuries and other reported an increase in knee injuries<sup>3</sup> and some reported no effect<sup>4</sup>. Psychological support may be the greatest benefit in footballer when using prophylactic knee brace.

Balance can be defined as the ability to maintain or make adjustment in order to keep the body's centre of gravity over the base of support (Irrangle et al 1994, Nashner 1993). Somatosensory information from the feet in contact with the support surface is the preferred sensory input for the control of balance in healthy athlete<sup>9</sup>. Centre of balance data can be considered a proprioceptive measurement as assessed in the closed kinematic chain. Normal centre of balance can be defined as point between the feet where the ball and heel of each foot has 25% of body weight<sup>10</sup>.

The balance developed however, is static in nature and thus it improves balance in which you must hold the body in one position. There is no transfer to active sports in which there is dynamic movements. To improve balance, especially dynamic balance is needed in sports. You must do active movements and at the same time, keep your body in balance<sup>5</sup>.

Stability of knee joint is maintained by the shape of the condyles and menisci in combination with passive supporting structure. These are the 4 major ligaments, anterior cruciate ligament, Posterior Cruciate Ligament, Medial Cruciate Ligament and Lateral Cruciate Ligament. Significant contributions are also made by the postero-medial & postero-lateral capsular components and the ilio-tibial tract. The muscle acting over the joint provide secondary dynamic stability<sup>7</sup>

## MATERIALS AND METHODS

A sample, consisting total of 60 healthy male football players, between 18 to 26 yrs participated in the study. All the subjects were informed about the nature, purpose, and possible risk involved in the study and an informed written consent was taken from them prior to participation. Subjects were randomly assigned into two groups. Group A- Dominant leg, Group B- Non dominant leg. Static stability was checked on dominant leg and non dominant leg without brace and with brace both the sides.

### Procedure:

Prior to testing subjects were given a trail of 2 minutes with and without prophylactic brace. Then subjects were asked to stand with one limb with other limb raise so that raised foot is near but not touching the ankle of their stance limb. Each subject were asked to focus on a spot on the wall at eye level in front of him for duration of eye open test, prior to raising the limb the subject were instructed to cross his arms over his chest. The investigator used stop watch to measure amount of time the subject is able to stand on one limb.

Time commenced when the subjects raised the foot off the floor, time ended when the subject either

1. Used his arms (uncrossed arm)
2. Used the raised foot (move it toward or away from the standing limb or touched the floor)
3. Moved the weight bearing foot to maintain his balance (i.e. rotate foot on the ground)
4. A maximum of 45 seconds had elapsed

The procedure is repeated 3 times and each time is recorded on data collection sheet. The best of the average of 3 is recorded. At least 3 minutes of rest were allowed between 3 trail tests to avoid fatigue.

## RESULTS

Within group analysis:-

The comparison for within group differences was using Paired Sample T-Test which was conducted to see differences between dominant and non dominant leg without brace and with brace.

Dominant side:

There was no significance difference data in static balance in dominant side without brace and with brace ( $p=0.983$ ) (refer Table 1)

Non dominant leg:

There was no significance difference data in static balance in non dominant side without brace and with brace ( $p=0.053$ ) (refer Table 2)(refer graph 1)

Between group analysis:

Between group analysis using Independent Samples Test showed no significance difference in dominant and non dominant leg without brace and with brace ( $p=0.993$ ) (refer Table 3) (refer graph 2)

## DISCUSSION

The purpose of this study was to determine whether wearing a prophylactic knee brace design improves static balance to the dominant and non dominant leg. A total of 60 healthy subjects were participated in the study. In group-A, 60 subjects with dominant side without brace and with brace evaluated. In other group -B 60 subjects non dominant side, without brace and with brace evaluated. Static balance was the outcome measure of the study. The static balance was measured by unipedal stance test (UPST). All the variables were measured before and after applying the brace.

Results showed both the groups, dominant leg and non dominant leg don't have significant differences in the static balance. However, no improvements in static balance in healthy collegiate football players within the group and between the groups using prophylactic knee brace.

Barrett et al <sup>11</sup> suggested that wearing a knee brace improves joint position sense in knees in which proprioception is impaired. Our subjects did not have a history of such joint position deficits and used healthy subjects with no history of knee problems.

Hansen <sup>12</sup> showed no deficits in isokinetic muscle performance while wearing prophylactic knee braces. Several studies using the Acro Brace (the precursor to the McDavid Knee Guard) indicated that this prophylactic knee brace had no effect on running, speed and agility (A Johnson, unpublished data, 1969 & TL May, unpublished data, 1981) <sup>13</sup> A similar study by Clover (unpublished data, 1983) showed no decline in running speed while wearing the Anderson Knee Stable. Down et al (unpublished data, 1990) reports that wearing of a prophylactic knee brace on each knee did not change the overall timing of the gait cycle or range of motion at the knee, hip and ankle joint. Regalbuto et al <sup>14</sup> showed that brace placed incorrectly or positioned improperly caused changes in the forces generated at the knee joint. Retrospectively, researchers began conducting longitudinal studies comparing injury rates before and after the prophylactic knee brace was being used. Subsequently, the results of these long-term epidemiological studies suggest that prophylactic knee bracing does not reduce the incidence and/or severity of injuries to the knee joint of college football players. Hansen <sup>88</sup> and Clover (unpublished research, Riverside, Calif, 1984) suggesting that prophylactic knee brace's have no effect on isokinetic muscular function.

Knee bracing improved centre of balance under one dynamic condition during the double leg stance. There was no difference in centre of balance between the braced and un braced groups during the single leg stance while on a stable or dynamic condition.

Currently footballers are using different type of braces like McDavid Knee Guard and Acro

Brace etc. the type of brace we used in the study was Tynor Knee Brace. So before reaching a final conclusion prophylactic knee braces have no significant effect on static balance. The effect of other braces on balance also has to be checked.

Healthy collegiate football player used to undergo lots of different type of training session which improves the balance. This may be another reason which does not give any significant improvement in static balance after applying of knee braces. The finding of the present study failed to show any significant improvement in static balance of collegiate football players after the application of prophylactic knee brace.

### CONCLUSION

The finding of the study suggests that there was no improvement in static balance in dominant and non dominant leg without brace and with brace in healthy collegiate football player.

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**Table 1: Within group comparison of dominant side**

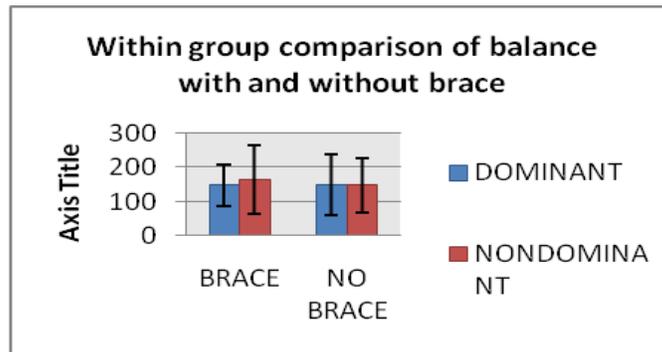
		Mean	Std. deviation	t- value	p-value
Pair 1	NOBRACE-BRACE	-.2605	93.9855	-.021	.983

**Table 2: Within group comparison of non dominant side**

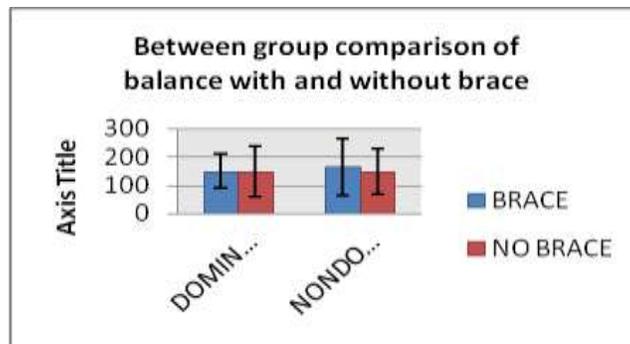
		Mean	Std. deviation	t- value	p-value
Pair 1	NOBRACE-BRACE	16.4927	64.7227	-1.974	.053

**Table 3: Between group comparison of dominant and non dominant leg**

	Mean Differences	Std. Error Differences	f-value	p-value
NO BRACE	0.1430	15.3930	0.082	0.993
BRACE	-16.0892	15.2790	4.284	0.294



**Graph 1: Within group comparison of balance with and without brace**



**Graph 2: Between group comparison of balance with and without brace**