Jeel Jeevrajani
PG Student, SBB College of
Physiotherapy, Gujarat, India

Shrinath Vyas
Sports Physiotherapist, Sport
Authority of Gujarat (SAG),
Gujarat, India

Association between ankle function and balance in Gujarat state football players

Jeel Jeevrajani and Shrinath Vyas

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Abstract
The ankle joint plays a crucial role in providing stability during movements in sports such as football. Ankle injuries are common in football and can have significant physical and psychological consequences for players and teams. Understanding the relationship between ankle function and balance can aid in developing effective preventive measures. A total of 53 football players (mean age: 19.17±3.71years) were recruited for the study. Balance was assessed using the Stork Balance Test (SBST), and function was evaluated using the Foot and Ankle Disability Index (FADI). The results indicated a strong positive correlation between fadi right and Stork right (r=0.764, $p<0.001$) and a weak positive correlation between fadi left and Stork left (r=0.163, $p=0.243$), suggesting the influence of limb dominance. In conclusion, this study demonstrates that there is an association between ankle function and balance in football players.

Keywords: Ankle function, balance, football players

1. Introduction
The ankle is a simple hinge joint made up of the talus, medial malleolus, tibial plafond, and lateral malleolus. It is extremely stable, owing primarily to bony congruence and ligamentous support. The two malleolus and tibial plafond form a "mortise" joint with the talus dome [1].
Football is a fast-paced sport that requires both skill and speed. The ability to complete a movement in a short period is referred to as speed. Football being the most competitive sport, a physically fit player not only enjoys the game more, but he is also capable of using all of the skills he has acquired and mastered throughout the game, from start to finish. A player's ability and physical fitness are inextricably linked, and without either, he will be unable to achieve much, particularly to play any ball game competently. Identifying and selecting future elite football players during childhood or adolescence has become essential [2]. To perform skills in each sport, different levels of sensorimotor processing are required. Football players require a great deal of strength and range of motion. Depending on the environmental context and demands, it poses different challenges to the sensorimotor systems. Balance is dependent on the body's ability to integrate visual, vestibular, and somatosensory systems in both static and dynamic situations [3]. Maintaining equilibrium while moving or re-establishing equilibrium by rapidly and successively shifting positions is referred to as dynamic balance. Soccer requires good balance to perform technical motions like dribbling, shooting, and passing. Players must learn required motor skills and monitor their posture throughout the game while using visual cues about opposing team members [4].
Traumatic ankle injuries are common in professional football (soccer). Ankle injuries account for 17% of all injuries. Many ankle injuries are classified as "severe," defined as requiring a player to miss more than 28 days of team training. Football injuries can have both physical and psychological consequences for players. When a team's player match availability decreases due to injury, so does the number of points per match. When a team's time lost due to injury increases, so does its final league ranking. Ankle injuries in football have serious consequences for both the player and the team. As a result, injury prevention strategies for the first time are prudent [5]. Football players are prone to ankle sprains, which usually involve the lateral ligament. Their frequent occurrence and recurrence suggest that preventive strategies such as functional profiles (including normative and preinjury ankle stability measures),

Corresponding Author:
Jeel Jeevrajani
PG Student, SBB College of
Physiotherapy, Gujarat, India

effective rehabilitation, preseason ankle conditioning, and education of coaches and players are critical [6].

Thus it is important to find out the association between ankle function and balance in football players to design targeted interventions to enhance ankle stability and reduce injury risk in football players, emphasizing the importance of considering ankle function and balance in injury prevention and rehabilitation programs.

2. Materials and methods
2.1 Materials
1. Stopwatch
2. Pen
3. Paper

2.2 Method
53 football players were recruited for the study from 18-25 years. A purposive sampling technique was utilized to achieve the ideal sample size. Balance was measured using the Stork Balance Test [7]. The Foot and Ankle Disability Index was assessed to determine the functional limitations with interclass coefficient = 0.89 and intraclass coefficient = 0.84 [8].

In the stork balance stand test (SBST), the subject, initially in a standing position with upper limbs abducted, was invited to slowly lift a leg and place the toes of the raised foot on the knee of the other leg, by lifting the heel. At this point, the timing was stopped when the raised foot touched the ground. (Figure 1).

The Foot and Ankle Disability Index is a 34-item questionnaire divided into two subscales: the Foot and Ankle Disability Index and the Foot and Ankle Disability Index Sport. The fadi has 26 items, and the fadi Sport has 8. The fadi contains 4 pain-related items and 22 activity-related items. The fadi Sport contains 8 activity-related items. It assesses more difficult tasks that are essential to sport. The fadi Sport is unique in that it is a population-specific subscale designed for athletes. It is designed to address this need by detecting deficits in higher-functioning subjects.

Statistical Analysis
Analyses were performed using the IBM SPSS Statistics 20 and data is shown as Mean±SD. The Kolmogorov-Smirnov test was conducted to verify if all data met the normality test assumption. (Table 1) The data was not normally distributed, so nonparametric tests were used. Since the data was not normally distributed Spearman's correlation was computed to find association between parameters.

3. Results and Discussion
3.1 Results
The mean age of participants was (19.17±3.71years).

Table 2 shows the mean and SD for fadi right and left and Stork right and left. For fadi Right the mean and SD are 129.58±10.63; Stork right 43.28±11.62; fadi Left 13521±2.49 and STORK Left 43.92±10.95.

There is a strong positive correlation between fadi right and stork right (r=0.764, *p*<0.001). There is a weak positive correlation between fadi left and Stork Left (r=0.163, p=0.243). (Graphs 1 and 2)

4. Discussion
The present study was designed to find the association between ankle function and balance in Gujarat state football players. The results of the present study show a positive correlation between right-sided ankle function and balance whereas a weak positive correlation is seen between left-sided ankle function and balance.

The previous study done by Brown and Mynark showed similar results in which they found that the dynamic balance was affected in individuals with Chronic Ankle Instability (CAI). In that study, 20 recreational athletes with CAI and 20 recreational athletes with stable ankles were included and balance deficits were assessed for each subject during static and dynamic trials. The dynamic balance was affected in subjects with chronic ankle instability which is consistent with the present study as a stronger association is observed between reduced ankle function and reduced balance [9].

A study by Ogwumike and Tijani on 115 professional footballers using the stork balance stand test also showed a similar result that poor balance performance was observed in the injured limb compared to the uninjured limb in an injured group but they were not specific about ankle instability but there was a positive association between balance performance and lower limb musculoskeletal injury which is consistent with our present study [10].

Ganeswara Rao Melam *et al*. conducted a study to compare static and dynamic balance in ankle instability among college football and basketball players. It included 24 collegiate-level players (12 each) with chronic ankle instability who had been out of sports for more than 3 months and had a Foot and Ankle Ability Measure Sports score of 85% or less. The stork standing test was used to assess static balance, and the Star Excursion Balance Test was used to assess dynamic balance. Both the football and basketball groups showed significant differences in static and dynamic balance between injured and noninjured limbs (*p*<0.05) [11].
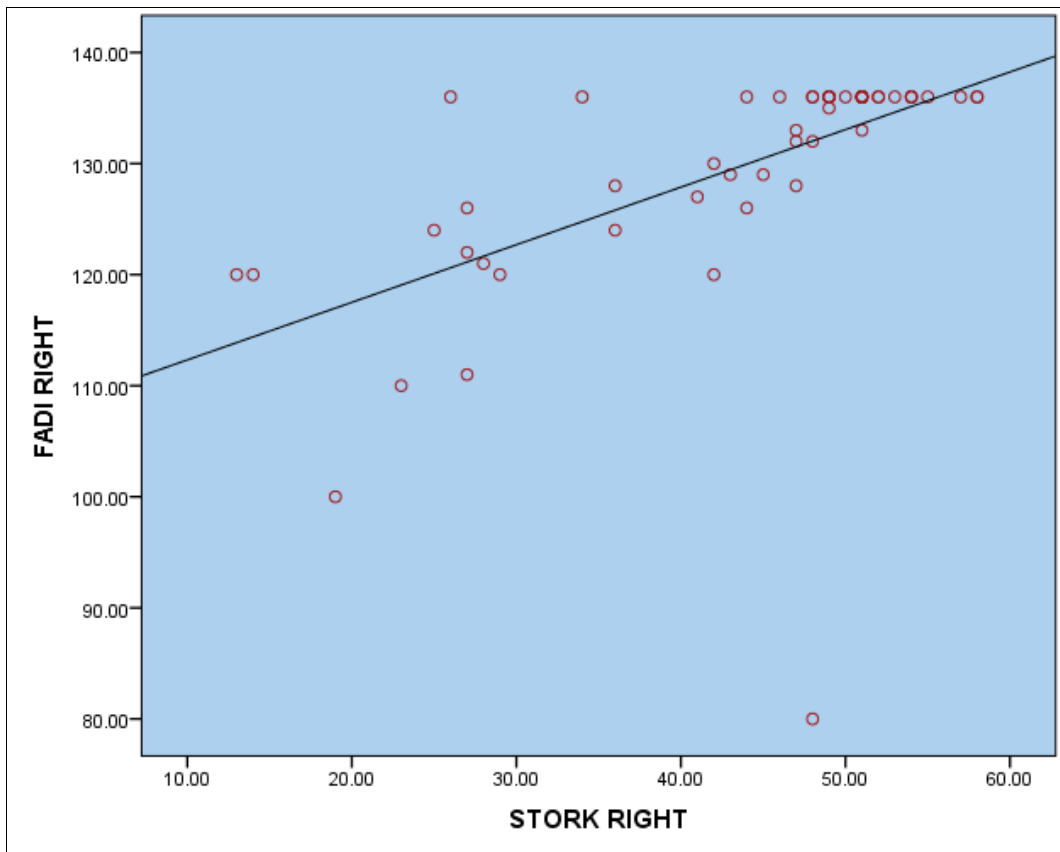
4.1 Tables and Figures

Fig 1: Stork balance stand test

Table 1: Tests of normality

	Kolmogorov-Smirnov		
	Statistic	**DF**	**Sig.**
Fadi right	.273	53	< 0.001
Stork right	.210	53	< 0.001
Fadi left	.530	53	< 0.001
Stork left	.236	53	< 0.001

Table 2: Mean scores of parameters

Variables	**Mean**
Fadi right	129.58±10.63
Stork right	43.28±11.62
Fadi left	135.21±2.49
Stork left	43.92±10.95

Graph 1: Correlation between Fadi Right and Stork Right
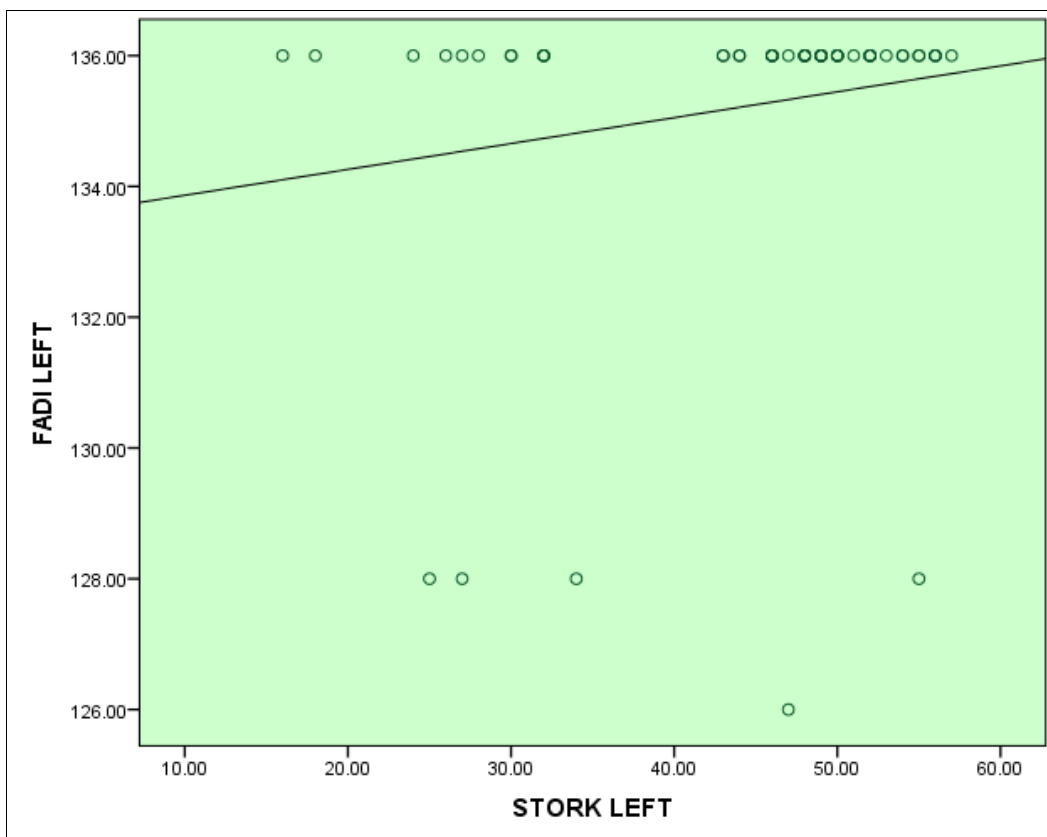
Graph 2: Correlation between Fadi Left and Stork Left

5. Conclusions

This study concludes that there is a positive correlation between ankle function and balance in Gujarat state football players. The results demonstrate a stronger association between right-sided ankle function and balance, while a weaker positive correlation is observed for the left-sided ankle function. These findings highlight the significance of assessing ankle function for optimizing balance performance in football players.

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