

# Comparison of Star Excursion Balance Test Performance in Football Players with and Without Chronic Ankle Instability

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**Abstract**—Chronic ankle instability (CAI) is a common consequence of recurrent ankle sprains in football players and may be associated with impairments in dynamic postural control. The Star Excursion Balance Test (SEBT) is a reliable and clinically feasible assessment tool for evaluating dynamic balance. The purpose of this study was to compare SEBT performance in football players with and without chronic ankle instability and to identify the reach directions most affected in players with ankle instability. A comparative cross-sectional study was conducted among 30 male football players aged 15–25 years. Participants were divided into a chronic ankle instability group (n=15) and a control group without ankle instability (n=15). Dynamic balance was assessed using the SEBT in eight reach directions for both limbs. Reach distances were measured in centimeters. Descriptive statistics were expressed as mean  $\pm$  standard deviation, and independent t-tests were used to compare groups. The source study reports direction-specific differences, with medial and anteromedial reach directions identified as particularly affected. The source data also report an overall p value of 0.21116, which was not statistically significant. Because the available source document contains inconsistencies between some tabulated values and the written interpretation, the present manuscript reports the available findings without reconstructing missing statistical values. The SEBT may be a useful clinical tool for assessing dynamic postural control in football players with chronic ankle instability.

**Index Terms**—ankle instability, balance, chronic ankle instability, dynamic postural control, football players, Star Excursion Balance Test.

## I. INTRODUCTION

Ankle sprain is one of the most common musculoskeletal injuries encountered in sports, particularly in football. Recurrent lateral ankle sprains may result in chronic ankle instability (CAI), which is characterized by repeated episodes of the ankle giving way, persistent symptoms, and functional limitations. Although structural recovery may occur following an ankle injury, many athletes continue to demonstrate functional instability, suggesting the contribution of neuromuscular and sensorimotor impairments.

Chronic ankle instability is associated with impairments in proprioception, neuromuscular control, and postural stability. These impairments may affect an athlete's ability to respond effectively to dynamic and unpredictable sporting demands such as cutting, jumping, landing, and rapid changes in direction. Football players are particularly exposed to these demands and may therefore be at increased risk of recurrent ankle injury when dynamic postural control is impaired.

Assessment of dynamic postural control is important for identifying functional deficits associated with chronic ankle instability. The Star Excursion Balance Test (SEBT) is a low-cost and clinically feasible functional test that challenges an individual to maintain single-leg stance while reaching with the contralateral limb in multiple directions. The SEBT has demonstrated reliability and validity for assessing dynamic balance and has been used to identify balance deficits in individuals with lower-extremity injuries. Previous research has reported reduced reach distances in individuals with chronic ankle instability

compared with healthy individuals, particularly in specific reach directions. Direction-specific assessment may therefore provide clinically relevant information regarding functional limitations associated with ankle instability.

Football involves repeated high-velocity movements, cutting maneuvers, jumping, landing, and external perturbations. Identification of direction-specific balance deficits in football players may assist physiotherapists and sports rehabilitation professionals in developing targeted rehabilitation and injury-prevention programs.

Therefore, the purpose of the present study was to compare Star Excursion Balance Test performance in football players with and without chronic ankle instability and to determine which reach directions were most affected in players with ankle instability.

## II. MATERIALS AND METHODS

### A. Study Design

This study was designed as a comparative cross-sectional study to evaluate dynamic postural control in football players with and without chronic ankle instability.

### B. Participants

A total of 30 male football players aged between 15 and 25 years participated in the study. Participants were recruited from a local sports club and divided into two groups: a chronic ankle instability group (n=15) and a control group without ankle instability (n=15).

### C. Inclusion Criteria

- History of at least one significant ankle sprain on the involved side within the previous 12 months.
- Three or more reported episodes of ankle “giving way”.
- No acute lower-extremity injury within six weeks before data collection.
- Control participants had no history of ankle sprain, fracture, or surgery involving either lower limb.

### D. Exclusion Criteria

- Vestibular disorders.
- Recent upper respiratory or ear infections.
- Neurological conditions that could influence balance.

- History of concussion that could affect balance performance.

### E. Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of Padmashree Dr. D. Y. Patil University, Navi Mumbai. Participants were informed about the purpose and procedures of the study, and written informed consent was obtained before participation.

### F. Outcome Measure

Dynamic balance was assessed using the Star Excursion Balance Test (SEBT). The SEBT requires the participant to maintain a single-leg stance while reaching as far as possible with the contralateral limb in different directions. Reach distance is used as an indicator of dynamic postural control.

### G. Testing Procedure

The SEBT was performed barefoot with the participant standing at the center of a grid consisting of eight lines extending from a central point at 45° intervals. The eight reach directions were anterior, anteromedial, medial, posteromedial, posterior, posterolateral, lateral, and anterolateral.

Participants were instructed to maintain balance on the stance limb while reaching as far as possible along the designated line with the contralateral limb. The participant lightly touched the line with the most distal part of the foot before returning to the starting position. The stance foot was required to remain in contact with the center of the grid throughout the trial. A trial was repeated if balance was lost or the stance foot moved. Each participant performed six practice trials in each direction for familiarization, followed by a five-minute rest period. Three test trials were subsequently performed in each reach direction on both limbs, with a 10-second rest interval between trials. Reach distance was measured in centimeters from the center of the grid to the point of maximal reach using a measuring tape. The mean of the three trials for each direction was used for analysis.

### H. Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean  $\pm$  standard deviation. Independent

t-tests were used to compare SEBT reach distances between football players with chronic ankle instability and controls. Statistical significance was set at  $p < 0.05$ .

### III. RESULTS

#### A. Participant Characteristics

A total of 30 male football players participated in the study, with 15 participants in the chronic ankle instability group and 15 participants in the control group. Participants were aged between 15 and 25 years. All participants completed the testing procedure without reported adverse events.

#### B. SEBT Performance

The study assessed SEBT reach distances in eight directions for both limbs. The available source data indicate direction-specific differences between football players with and without chronic ankle instability.

Table I. SEBT reach distances for left-limb stance

| SEBT direction | CAI (cm) | Without CAI (cm) |
|----------------|----------|------------------|
| Anterior       | 78.15    | 76.50            |
| Anteromedial   | 80.92    | 70.27            |
| Medial         | 70.60    | 58.82            |
| Posteromedial  | 77.58    | 68.77            |
| Posterior      | 78.96    | 74.94            |
| Posterolateral | 84.50    | 76.13            |
| Lateral        | 53.92    | 74.45            |
| Anterolateral  | 72.34    | 73.27            |

The source document reports the above mean reach distances for the left stance limb. These values are reproduced without modification.

Table II. SEBT reach distances for right-limb stance

| SEBT direction | Without CAI (cm) | CAI (cm) |
|----------------|------------------|----------|
| Anterior       | 76.45            | 78.05    |
| Anteromedial   | 66.00            | 72.46    |
| Medial         | 58.22            | 51.92    |
| Posteromedial  | 81.00            | 74.11    |
| Posterior      | 77.27            | 74.42    |
| Posterolateral | 78.68            | 79.03    |
| Lateral        | 76.50            | 103.71   |
| Anterolateral  | 76.22            | 88.12    |

The source document reports the above mean reach distances for the right stance limb. These values are reproduced without modification.

#### C. Overall Descriptive Statistics

| Group   | Mean     | Standard deviation | Standard error |
|---------|----------|--------------------|----------------|
| Group 1 | 73.06182 | 5.76003            | 1.82148        |
| Group 2 | 76.25165 | 12.86133           | 3.43733        |

The source document reports an overall p value of 0.21116, indicating that the observed overall difference between the two groups was not statistically significant.

#### D. Direction-Specific Findings

The source manuscript identifies the medial and anteromedial directions as demonstrating the greatest differences in football players with chronic ankle instability and reports statistically significant differences for these directions ( $p < 0.05$ ). The exact direction-specific p values are not available in the supplied document and have therefore not been reconstructed.

### IV. DISCUSSION

The present study investigated dynamic postural control in football players with and without chronic ankle instability using the Star Excursion Balance Test. The study focused on differences in reach performance across eight directions.

According to the reported findings in the source document, the medial and anteromedial directions demonstrated the greatest differences between football players with chronic ankle instability and controls. These findings suggest that direction-specific assessment of dynamic balance may provide clinically useful information regarding functional deficits associated with ankle instability.

Chronic ankle instability may be associated with altered sensorimotor function, including impairments in proprioception and neuromuscular control. Recurrent ankle sprains may affect sensory feedback mechanisms involved in maintaining postural stability. In football players, these impairments may become particularly important because of the frequent demands of rapid directional changes, cutting, jumping, landing, and single-leg loading.

The SEBT provides a functional assessment of dynamic balance because it requires the participant to maintain single-leg stance while controlling movement of the opposite limb. Assessment across multiple reach directions allows clinicians to identify

specific movement directions in which postural control may be compromised.

The reported medial and anteromedial findings may have implications for physiotherapy assessment and rehabilitation. Identification of direction-specific impairments may assist clinicians in selecting appropriate interventions involving proprioceptive training, neuromuscular control, single-leg balance, perturbation training, and sport-specific movement strategies.

The overall analysis reported in the source document yielded  $p=0.21116$  and therefore did not demonstrate a statistically significant overall difference between the groups. This result should be considered when interpreting the direction-specific findings.

## V. LIMITATIONS

- The sample size was relatively small and included only male football players, which may limit generalizability to female athletes and other sporting populations.
- Reach distances were not normalized to limb length according to the source study, which may have influenced comparisons between participants.
- The supplied document does not contain the original SPSS output or complete direction-specific  $p$  values.
- Some tabulated values and the written interpretation in the supplied source are not fully concordant; therefore, the reported numerical results should be interpreted as the available study record rather than reconstructed statistical output.

## VI. CONCLUSION

Football players with chronic ankle instability demonstrated direction-specific alterations in dynamic postural control when assessed using the Star Excursion Balance Test. The medial and anteromedial directions were identified in the source study as particularly affected. The SEBT may therefore serve as a practical clinical tool for assessing dynamic balance and identifying functional deficits associated with chronic ankle instability in football players. The findings may assist physiotherapists in developing targeted rehabilitation and injury-prevention strategies.

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