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BIOMECHANICAL PROFILE OF THE POSTURAL STABILITY IN HIGH PERFORMANCE SOCCER ATHLETES

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SUMMARY

Objective: This study aimed to identify the biomechanical profile of postural stability in high performance soccer athletes. **Methods**: We analyzed 19 soccer athletes within the 2013 preseason period. Level of postural stability was evaluated for each athlete using a unipodal protocol in the Biodex® Balance System, consisting of five different levels of platform stability for a total of 30 seconds. Indices analyzed were the overall stability index (OSI), the anterior-posterior stability index (APSI) and the medial-lateral stability index (MLSI). Data were analyzed with a *t*-Student test to determine the differences between the legs with a 5% level of significance. **Results**: Athletes presented a mean age of 25.74±4.55 years, Body Mass Index of 23.88±1.06 and 71.4% (n=15) of participants presented right-leg dominance. The APSI was the only index to have a significant difference between dominant and non-dominant limbs (p=0.01). **Conclusion**: This finding suggests that athletes have an asymmetric postural stability pattern.

INTRODUCTION

Postural balance is controlled by a complex process involving the integrity of proprioceptive receptors, vestibular system and visual input. The nervous system is responsible by processing of stimuli (input) and an appropriate motor response (output) [1].

Soccer is considered to be the most popular sport in the world; however, there has also been an increase in the number of injuries related to this sport among athletes. One possible hypothesis for this could be a change in the postural stability of the lower limbs [2]. Therefore, this study aimed to identify the biomechanical profile of postural stability in high performance soccer athletes.

METHODS

It was conducted a study in Movement Analysis Laboratory of Federal University of Ceara, Brazil. We analyzed nineteen soccer athletes within the 2013 preseason period. Players were subjected to an evaluation of their level of postural stability using the Biodex® Balance System. The dominant lower limb was defined by the athlete as the leg that was predominantly used for kicking.

The test protocol was unipodal, consisting of two periods of adaptation and three consecutive assessment trials in five different levels of platform stability for a total of 30 seconds: level 6 was the most stable and level 2 was the most unstable. The participants rested for 60 seconds between the tests. The testing order was randomized (dominant × non-dominant), and each athlete was positioned with his arms parallel to the longitudinal axis of the body throughout the entire duration of the tests.

Indices analyzed were the overall stability index (OSI), the anterior-posterior stability index (APSI) and the medial-lateral stability index (MLSI). This study was approved by the Ethical Committee at Federal University of Ceara and all participants provided written informed consent. We used a *t*-Student test to determine the differences between the legs with a 5% level of significance.

RESULTS AND DISCUSSION

Participants presented a mean age of 25.74±4.55 years, mean weight of 77.84±8.4 kg, mean height of 1.80±0.08 m, mean of Body Mass Index of 23.88±1.06, and 71.4% of athletes (n=15) presented right-leg dominance.

We only found a significant difference (p=0.01*) comparing the APSI between dominant and non-dominant limbs (Table 1). Average of percentage differences of the OSI, APSI and MLSI between the limbs were 22.52±22.96%, 31.68±24.87% and 28.55±30.43%, respectively (Figure 1).

The results suggest that athletes evaluated in this study have an asymmetric postural stability pattern, displaying a tendency to have more instability in the anterior/posterior axis. In a study that evaluated possible influences of limb dominance in postural stability in a group of 40 male and sedentary volunteers, authors concluded that lower-limb dominance had no influence on single-foot balance. Indices used for analysis were also OSI, APSI and MLSI, though with different stability levels (8 as the most stable level

instead of 6)[3]. These differences in results might be due to: 1) deficits in neuromuscular control and loss of proprioception due to any injuries [1] and 2) physical and physiological adaptations involved in conditioning in sports.

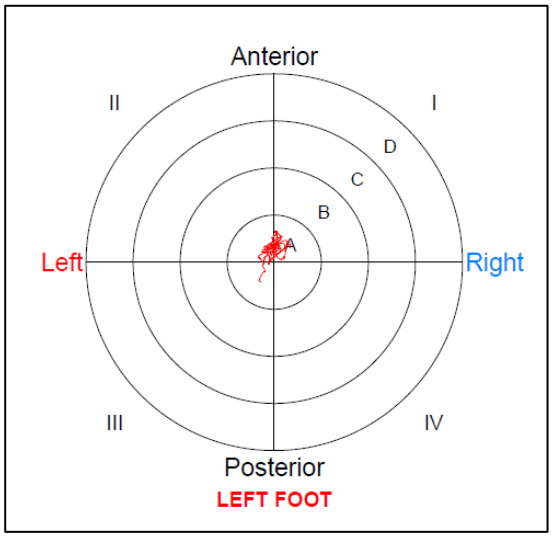

Figure 1. Estabilometric analysis.

CONCLUSIONS

Anterior/posterior percentage difference and stability index suggest that the athletes have an asymmetric postural stability pattern.

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Table 1. Mean and standard deviation of the postural stability.

	Dominant	Non-Dominant	Deficit	*P*
OSI (degrees)	4.36±2.12	5.57±3.6	-1.21±2.7	0.07
APSI (degrees)	2.39±1.10	3.77±2.55	-1.37±2.1	0.01*
MLSI (degrees)	3.31±1.95	3.57±2.67	-0.26±2.2	0.60

† OSI: Overall Stability Index; APSI: Anterior/Posterior Stability Index; MLSI: Medial/Lateral Stability Index.
* Significant difference between the limbs.