Cross Sectional Study

Y Balance Normative Data of Dynamic Balance for Collegiate Soccer Players

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Abstract

Background: Balance is a vital component of physical fitness wherein athletes have to stay in control of their body's position. Poor balance has often been associated with the risk of sustaining injuries among participants of competitive sports. Y balance test (YBT) has been found to be a reliable and valid tool to assess balance. Establishing a normative data for different sports based on their level of competition could be beneficial for screening, ruling out balance deficits. It could as well help coaches or trainers make decisions about athlete's fitness level, risk of injuries and return to sports after any injury.

Objectives: To find out the normative data of lower extremity using Y Balance test among collegiate soccer players and to compare the Y balance scores between the legs.

Study Design: A cross sectional study.

Methods: Thirty three soccer players aged between 17-26 were selected from Yenepoya (Deemed to be University) soccer team. A standardized protocol was followed to record Y balance test scores. Reach distances of each participant was then normalized with limb length of respective side. Mean and standard deviation was used to find the normative distribution of Y balance reach score in all the three directions and paired t-test was used to compare the reach scores between the legs.

Result: Normative values of anterior reach distance right and left were 70.93 and 70.79 respectively, posterolateral right and left were 107.95 and 107.74 respectively, posteromedial right and left were 105.52 and 106.26 respectively and composite scores of right and left were 94.82 and 94.86 respectively. There were no statistically significant difference between the legs in anterior, posterolateral, posteromedial and composite scores.

Conclusion: Normative data of dynamic balance of lower extremity among collegiate soccer players have been established using Y balance test kit.

Key Words: *Normative data, Balance, Soccer players, Y balance test*

Introduction

Balance plays an important role in all kinds of sports, whereby the player has to maintain their balance to move the required body parts in different directions in order to complete a task. Balance can be categorized into static balance and dynamic balance. The ability to maintain the body segments within the available base of support with minimal movement is termed as static balance and the ability to perform a task while maintaining the stable position is termed as dynamic balance.[1] Balance of an individual is maintained by inputs from vestibular, somato-sensory and visual systems and motor responses that affect coordination, joint range of motion, strength and other factors such as age, height, neuromuscular diseases, drugs, etc.

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Dynamic balance has been found to have an influence over a player's skill and performance and a poor balance has often been associated with injuries among players.[2] Dynamic balance of the soccer players differ according to their level of competition, i.e., balance scores differed for high school, college and professional soccer players.[3] A research done on the epidemiology of collegiate injuries participating in 15 sports activities have revealed that the incidences of injuries both during practice and competitions while playing soccer were on the higher side.[4] The injuries sustained may include contact injuries occurring as a result of contact between the players, or non-contact injuries, which are often linked to certain factors such as neuromuscular disorders, faulty training, faulty footwear, training overload, etc. Factors such as poor balance, altered motor control, or lack of neuromuscular control have all been listed as predictors of injury risk in athletes and researchers have supported the fact that balance assessments prior to games or practice sessions could help to prevent some injuries.[3] Inefficient neuromuscular stabilization leads to compensations and substituted movement patterns that may result in excessive mechanical loading thereby increasing the risk of injuries.[5] Gonel AC had performed a study in among 74 soccer players and had established that there was a relationship between YBT scores and the incidences of injury sustained. The author had noted that among the players who demonstrated a test score difference of 4 cm or more in the posteromedial direction of the YBT between their their left and right limbs were more prone to sustain injury.[6] These results were suggestive of the fact that coaches and health care professionals could team up and and plan an appropriate training programmes so as to help to improve the efficiency of their team players. Several studies have been performed in populations like professional, high school level soccer players, cricketers, baseball players and have suggested that normative values of dynamic balance for each competition level and age group could help in predicting injuries, as well as in evaluating the pre-competition conditioning, fitness level and recovery from injury.[3, 7, 8] The purpose of this study was to establish normative data of dynamic balance of lower extremity using YBT in soccer players.

Materials and Methods

This cross-sectional study included 33 university soccer players between the age group of 17 to 26 who represented the Yenepoya (Deemed to be University) soccer team. The players were excluded from the study if they had musculoskeletal system pain, deformities in lower limb, neurological deficits, history of any surgery to the lower limb within 6 months, history of any mental or psychological illness, history of alcohol abuse or any history of usage of drugs. The ethical approval for the study was obtained from Yenepoya University ethical committee. Participants were explained about the purpose of the study and an informed consent was taken from all the participants who were included in the study.

The Y Balance Test scores were taken by using the Y Balance Test Kit™ (FMS). Once the general details of the participants were collected, a demonstration of the YBT was given for all participants in the study and a video of the testing procedure was shown for a better understanding. The test was initiated among the participants only after they were comfortable in performing the test. Initially lower limb length of each of the players was recorded by using inch tape and was measured in centimeter (cm). Dynamic balance of the lower extremity was assessed using YBT. Standardized Y Balance Testing procedure was used. The maximum reach distance a player could achieve in three different directions anterior, posterolateral and posteromedial were recorded. Relative reach distance and composite scores were calculated for each side of every player.

Findings

Statistical analysis was done using SPSS version 22. Paired t-test was used to compare the mean scores of YBT between the legs to find the significant differences. The level of significance was set at < 0.05. A total of 33 soccer players from Yenepoya (Deemed to be University) were enrolled for the study. Majority of the players were playing in position of forward (34%) and midfield (30%).

Table 1: Normative values of Y balance reach distance

Reach Directions	Mean	Standard Deviation	Minimum score	Maximum Score
Anterior right	70.93	5.32	62.40	81.60
Anterior left	70.79	5.14	63.40	79.60
Posterolateral right	107.95	5.19	93.90	115.80
Posterolateral left	107.74	7.12	93.20	120.40
Posteromedial right	105.52	6.00	94.00	115.70
Posteromedial left	106.26	7.39	93.90	120.60
Composite right	94.82	4.65	85.20	102.50
Composite left	94.86	5.88	85.40	103.60

Table 1 shows the mean, standard deviation, minimum and maximum reach distance scores of Y balance test in different directions. Mean values of anterior reach distance right and left are 70.93 and 70.79 respectively, posterolateral right and left are 107.95 and 107.74 respectively, posteromedial right and left are 105.52 and 106.26 respectively and composite scores of right and left are 94.82 and 94.86 respectively.

Table 2: Comparison of the YBT scores of right and left leg

Reach Direction	Extremity	N	Mean	Standard Deviation	Paired Differences		t value	df	P value
					Mean Difference	Std. Deviation			
Anterior	Right	33	70.93	5.32	0.136	4.043	0.194	32	0.85
	Left	33	70.79	5.14					
Postero-lateral	Right	33	107.95	5.19	0.209	4.919	0.244	32	0.81
	Left	33	107.74	7.11					
Postero-medial	Right	33	105.51	6.00	-0.742	4.698	-0.91	32	0.37
	Left	33	106.26	7.38					
Composite Score	Right	33	94.82	4.65	-0.036	2.991	-0.07	32	0.94
	Left	33	94.85	5.87					

Table 2 shows the comparison of reach scores in all three directions and composite scores between right and left leg by using paired t- test. On comparison of the mean values of anterior right and anterior left the mean values of anterior right is higher with a difference of 0.1363636 which is statistically not significant (p value = 0.848). On comparison of the mean values of posterolateral right and posterolateral left the mean values of posterolateral right is higher with a difference of 0.2091 which is statistically not significant (p value = 0.809). On comparison of the mean values of posteromedial right and posteromedial left the mean values of posteromedial left is higher with a difference of 0.7424 which is statistically not significant (p value = 0.371). On comparison of the mean values of Composite Score Right and Composite Score Left the mean values of Composite score left which is higher with a difference of 0.0364 is statistically not significant (p value = 0.945).

Discussion

YBT is a portable, reliable and valid device which may be used to assess dynamic balance. YBT is relatively easy to administer and does not require any additional training. A brief video demonstration of the test procedure was sufficient to make the participants comfortable in performing the tests. In the present study, the dynamic balance of 33 soccer players was measured and the normative data for each reach distance was arrived at. The reach distances included- anterior reach distance right and left were 70.93 and 70.79 respectively, posterolateral right and left were 107.95 and 107.74 respectively, posteromedial right and left were 105.52 and 106.26 respectively and composite scores of right and left were 94.82 and 94.86 respectively.

Over the years several researchers have studied the influence of balance and performance of athletes. Researchers also explored the effect of the level of competitions and the on field poisitions among sportsmen on the balance abilities. Buttler R J in his study among baseball players had found that the level of competition had an effect on the balance performance.[8] Similarly, Buttler R J and colleagues, in their study among soccer players had reported that balance performance differed according to the level of competition among soccer players and the authors had also suggested that it could be beneficial to establish a normative data of balance taking into consideration various sports and for different levels competition as well.[3] There were also studies that had tried to compare the balance scores of individuals involved with different sports and the results were suggestive of the fact that soccer players often displayed a superior balance compared to other sports.[1] Buttler R J, Queen RM and colleagues in their study to compare the dynamic balance scores of soccer players from Rwanda and United states had concluded that players from Rwanda were having greater scores than United states players and they suggested that athletes from different countries of origins may have different reach scores which should be considered during the assessment of normative data of Y balance test.[2] Similar to their results Rwandan players were having greater reach scores than the current scores of university soccer players.[2]

Normative values of all three reach directions and composite scores of both lower extremities could be helpful for the coaches and trainers during their training sessions, screening and selection of players before the season begins and could thereby reduce the risk of injuries. The pre-season evaluation could also help to predict the sport related performance of the individual player which could help to pick on players who could deliver superior performances. Studies have also proven that an earlier evaluation of the players could help to identify those at risk of injuries which could moreover help to reduce the expense related to this injuries.[9, 10] The normative data for collegiate level soccer players could be established in this study. Similar studies could be planned for athletes and players involved in other sports activities which could be helpful in arriving at a normative data for the specific sports activities.

Conclusion

The reference value of dynamic balance of lower extremity using Y balance test is established in a sample of university soccer players. The results also demonstrated that there was no significant reach asymmetry between right and left lower extremity. These values may be useful for coaches and trainers for selection of players by screening their injury risk, fitness level and also during return to sports after any injury before the match begins.Moreover the YBT kit is portable and can be easily administered, it could be carried and on field assessments could be performed.

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Ethical Clearance: The ethical clearance for the study was obtained from the Yenepoya University Ethical Committee (YEC) and the procedures followed were in accordance with the ethical standards of the committee.

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