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ORIGINAL RESEARCH

RELATIONSHIP BETWEEN THE Y BALANCE TEST SCORES AND SOFT TISSUE INJURY INCIDENCE IN A SOCCER TEAM

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ABSTRACT

Background: Although the dynamic balance has been proposed as a risk factor for sports-related injuries, few researchers have used the Y balance test to examine this relationship. The purpose of this study was to determine if the Y Balance Test (YBT) is a valid test for determining subjects susceptible to soft tissue injury among soccer players on a professional team.

Study Design: Prospective cohort

Methods and Measures: Prior to the 2011 football (soccer) season, the anterior, posteromedial and posterolateral YBT reach distances and limb lengths of 74 soccer players were measured. Athletes' physiotherapists documented how many days the players were unable to play due to the injuries. After normalizing for lower limb length, each of the reach distances, right/left reach distance difference and composite reach distance were examined using odds ratios and logistic regression analysis.

Results: Logistic regression models indicated that players with a difference of equal or greater than 4cm between lower limbs in posteromedial direction were 3.86 more likely to sustain a lower extremity injury ($p = 0.001$). Results indicate that players who had lower scores than the mean in each reach direction, independently, were almost two times more likely to sustain an injury.

Conclusions: The results suggest that YBT can be incorporated into physical examinations to identify soccer players who are susceptible to risk of injury.

Key Words: Balance/postural stability, injury prevention, lower extremity

Level of evidence: 2b

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INTRODUCTION

Typically, sports and exercise are considered to have a long-term health benefits. However, there are certain health risks, such as injury, that should be taken into consideration.[1,2] Injury prevention in sports is very important, and a lot of investigative time and effort is spent in this realm. Prevention is important given the fact that athletes do not wish to miss competitions or training for their sports.

A number of different tools have been created that are designed to pinpoint the athlete's predisposition to or risk for injuries. In addition, health professionals and coaches should work with athletes to attempt to reduce the number of injuries as much as possible. The objective of the prevention process is not to completely eliminate injuries, but rather to reduce them and keep them at an acceptable level.

The risk of injury is a combined measurement of incident probability and the consequences of an adverse effect. The risk factor is a situation that offers a predisposition to an adverse event. The estimation and evaluation of the risk level is called "risk assessment". If the activity risk level combined with the individual risk level is considered too high, preventive measures must be applied in order to decrease the risk.[3]

Risk factors can be divided into two groups: intrinsic and extrinsic. Intrinsic factors include medical history, age, physical conditioning, and performance measures such as balance and functional movements. Extrinsic factors include the weather, temperature, and altitude. Both types of factors should be considered when examining risk.

Injuries can be divided in two types, contact injuries, caused by contact with a fellow athlete or an object while participating in competition or training, and non-contact injuries which are often caused by intrinsic factors such as neuromuscular disorders, being unfit, training overload, etc. Non-contact injuries are often the focus of prevention initiatives, and managing identified risk factors plays an important part.

Well-designed prevention programs with neuromuscular and proprioceptive training components have been suggested to reduce injury risks.[4] There is evidence regarding the efficiency of training prevention programs for the reduction of some injuries in adults and teenagers in sports which involve pivoting.[5] Many authors have shown that interventions that include balance exercises[6,7,8] are very efficient in injury risk reduction as well as performance improvement after an injury.[9] Changes in proprioception and neuromuscular control are considered to be responsible for these effects.[10]

Poor balance, altered motor control, or lack of neuromuscular control have all been described as predictors of injury risk in the lower limbs of athletes.[11] Poor dynamic balance is considered an intrinsic risk factor. The implementation of an injury prevention program that includes balance and neuromuscular control in soccer athletes has been shown to reduce both injury incidence and health care costs.[12] However, in order to implement an injury prevention program athletes at risk must be identified. Several methods or measures have been proposed to asses injury predisposition, including injury history, body mass index, hop testing, and isokinetic testing. One of the most promising is the evaluation of the dynamic balance using the Y Balance Test (YBT).

The YBT has been shown to be able predict lower extremity injury in university basketball players,[13] and to identify those with chronic ankle instabilities.[13]

In addition, the YBT improves with training sessions[14] and is a good test to evaluate whether or not the athlete can return to practicing sports. Hertel et al and Plisky et al [13,15] reduced the number of reach directions to three from the original eight proposed by the createors of the Star Excursion Balance Test, anterior, posteromedial, and posterolateral.

The YBT is a functional test that requires strength, flexibility, neuromuscular control, stability, range of movement, balance, and proprioception. This test is a good solution for functional testing because of its speed, efficiency, portability, consistency, and objectivity. It can be performed on multiple surfaces. In less than three minutes/subject one can perform a standard protocol with high inter and intra-evaluator reliability (95% CI: 0.88 –0.99 $p < .01$).[15,17] This fact makes it possible to test many athletes during the pre-season. When the results of the YBT are asymmetrical or fail to meet expected norms (for gender, sport, experience level) a neuromuscular system disorder may be present. However, it is important to remember that the YBT is only a test, and is not an assessment of the cause of the disorder.

According to Plisky et al[13] a greater than four centimeter difference in the anterior reach direction between the legs suggests that an athlete has 2.5 times greater risk of injury. The YBT could be useful to identify athletes that are vulnerable to injuries. Side to side differences in performance of the YBT is considered an intrinsic risk factor for injury. The YBT has been shown to have significant differences in performance between genders, types of sports, and competition levels. In a study of 598 athletes, high school basketball player's scores were much worse than those found in the university players.[16]

For these reasons, it is of interest to test players at the beginning of the preseason and study the number of injuries that subsequently occur throughout the season in order to determine injury risk. Considering the fact that all the studies to date have been carried out in the United States, it is important that similar same studies be conducted worldwide. Therefore, the purpose of this study was to determine whether the preseason YBT scores were able to predict injury in Spanish professional soccer players.

METHODS

Subjects and Setting:

Athletes from a professional soccer club that has six teams, two professional and four amateur were followed during the 2011-2012 season. All the subjects were males and of the 101 players who were a part of the six teams, 74 participated in the study. Thirteen players left the club before the study was completed. Fourteen players were excluded due to human errors in recording injury dates by the responsible physiotherapists' who served as data collectors. The Institutional Board of Jaume I University, approved the study. Written consent was obtained from players, parents or guardians prior to participation in the study. The rights of the subjects were protected throughout the study.

Questionnaire:

During the 2011-2012 season, each teams physiotherapist collected players' baseline and injury data: name and age, date of any sustained injury, days not played due to injury, games missed, injured body part(s), type of injury, medical diagnosis, date of relapse, and whether it was a contact or non-contact injury.

YBT-LQ Protocol

The YBT is a functional test that requires strength, flexibility, neuromuscular control, balance, stability, and range of motion (ROM). The lower quarter version of the YBT (YBT-LQ) was performed barefoot. A YBT Kit (Perform Better, West Warwick, Rhode Island) was used, which consists of three connected cylindrical tubular plastic bars marked in half centimeter increments. Each bar has a moveable indicator plate, which the subject moves by pushing with their foot/toes without bearing weight on the indicator.

Prior to the test, players performed a warm-up on an exercise bicycle for three minutes. The players were then allowed to have six practice trials on each leg in each of the three reach directions prior to formal testing. The player was instructed to stand on the leg (which was being evaluated) in the center of the platform with the most distal end of the longest toe just behind the red line. While maintaining single-leg stance, the player was instructed to reach with the free limb in the anterior direction for three trials (Figure 1), followed by three trials in posteromedial direction (Figure 2) and then three trials in posterolateral direction (Figure 3), all named in relation to the stance foot, per YBT-LQ protocol.

The player was instructed to push the distance indicator as far as possible towards the direction that was being evaluated. The player was monitored by the researcher during testing, and was not allowed to move the indicator by kicking it or accelerating the indicator at the end of the push. The maximal reach distance was recorded at the most distal point reached by the foot in the proximal edge of the indicator and was measured to the half centimeter. The trial was discarded and repeated if the player (1) Lost his balance during the exercise (reaching the maximal point and coming back at the initial position), (2) Lifted the heel of the foot that was on the platform. The entire surface of the foot must have remained remain in contact with the platform throughout the entire duration of the movement**,** (3) The foot did

Figure 1. *Y-Balance test anterior reach.*

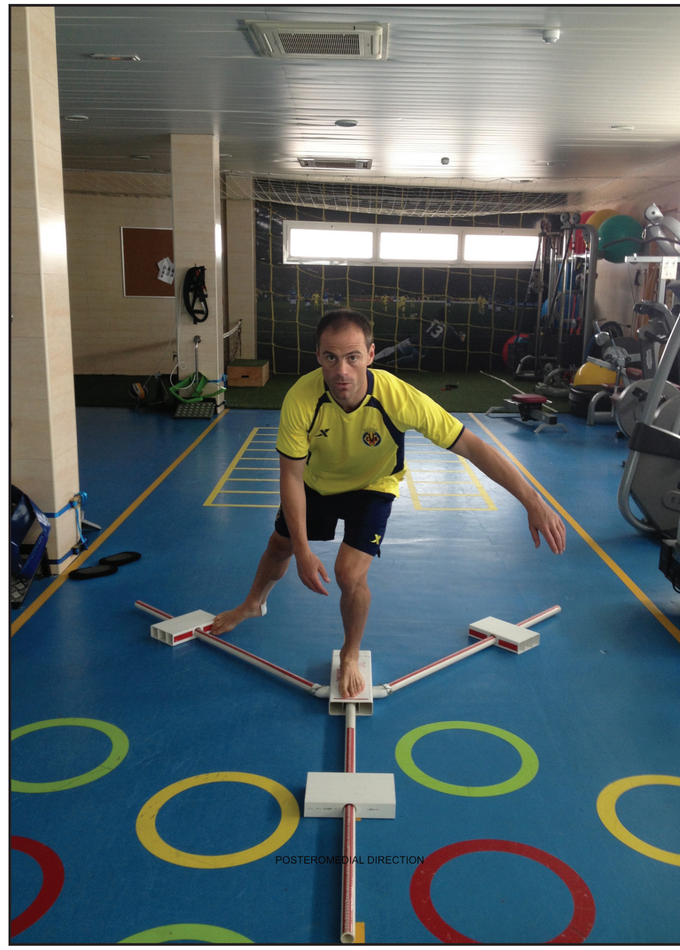

Figure 2. *Y-Balance test posterior medial reach*

not maintain contact with the distance indicator while the indicator was in motion (e.g. the indicator was kicked), (4) The distance indicator was used to maintain posture (e.g. the athlete supported their weight on the movement indicator), or (5) a loss of balance occurred during the return to the starting position once the distance had been marked. The greatest of the three trials for each reach direction was used for analysis. Also, the greatest reach distances for each of the directions were summed to yield a composite reach distance, which was normalized to limb length for analysis of the overall performance on the test.

Subjects limb length was measured before doing the test. They were placed in supine on a table with their hips and knees flexed. Subjects then lifted the pelvis and returned it passively to the table. The examiner then stretched the lower limbs passively into extension, in order to balance the pelvis. The subject's right leg was measured in centimeters, with a tape measure, from the bottom edge of the anterior superior iliac spine to the distal edge of the medial malleolus. One researcher measured the subjects´ limb length and explained the test procedures, and the other researcher collected data during the test and made sure that all test movements were performed correctly.

Injury Surveillance Protocol

All injury data were recorded on a table by the physiotherapist responsible for the injured player. Several details were recorded including: name, injury date, the date of recovery, and the body side and area. The number of missed days and matches were also recorded. A medical assessment was carried out, determining the type of injury (contact or non-contact) and whether it was sustained during a match

Figure 3. *Y-Balance test posterior lateral reach*

or a training session, and both of these details were recorded. Lastly, it was determined whether there was a violation of soccer rules that had occurred when the injury was sustained.

For the purposes of this study, an injury was defined as an event that caused at least one training day to be missed. A missed day was defined as the day following the moment the injury was sustained. Missed days ended when the subject was discharged from medical services (that day exclusive) and was able to return to training with the team. According to Ekstrand[18] and Fuller,[19] injuries can be divided into minimal (1-3 missed days), mild (4-7 missed days), moderate (8-28 missed days) or severe (more than 28 missed days).

Statistical Methods

Means and standard deviations were calculated for the baseline characteristics, YBT reach distance, and limb length. As reach distance is associated with limb length, reach distance was normalized to limb length in order to allow for comparison between players. To express reach distance as a percentage of limb length, the normalized value is calculated by using the formula: reach distance divided by limb length, multiplied by 100. Composite reach distance is calculated using the formula: the sum of the three reach directions divided by three times the limb length, multiplied by 100. For right/left reach distance difference, a cutoff point of 4.0 cm in each direction was selected a priori and used to classify a player at increased risk for injury based on the results of Olmstead et al.[20]

Crude odds ratios and 95% confidence intervals were calculated for total lower limb injuries, and those that were contact and non-contact. This was accomplished by comparing the proportion of individuals at risk of injury (reach distance difference between right and left leg in the same direction ≥ 4cm) without risk of injury (reach distance difference between right and left leg in the same direction < 4cm) and comparing the proportion of individuals at risk of injury (more days off during the season that the average of the sample) without risk of injury (less days off than the average of the sample). An alpha level of $p < .05$ was used to determine statistically significant differences. All data were analyzed using R for Windows, Version 2.14. [21]

RESULTS

Seventy-four subjects were included, who were on average 20.89 ± 5.31 years old. From September 1 to April 30, a total of 1874 training sessions were missed, with a mean of 25.32 (± 36.7) missed days per player. Of the total of subjects, 34 (45.95%) were from one of the two professional teams (age, 25.38 ± 4.76) and 40 (54.05%) were from amateur teams (age, 17.07 ± 1.07). Total missed training sessions were 880 in professionals and 994 in non-professional subjects. All participants were from the same organization. Baseline characteristics including age, number of missed days and mean of missed days per players are shown in Table 1.

The results for YBT test performance at the beginning of the season are displayed in Table 2. These are actual distances reached by the subjects, without normalization. In anterior direction, the mean reach

Table 1. *Baseline characteristics of soccer players during 2011-12.*

Players	Total	Professional	Amateur	p-value
	n=74	n=34	N=40	
	100%	45.95%	54.05%	
Mean Age (years)	20.89	25.38	17.07	.0001
Mean Height (cm)	182.67	184.22	179.86	.0001
Weight (kg)	78.45	81.32	75.77	.0001
Numbers of missed days	1874	880	994	.0001
Number of missed days/players (average +/- SD)	25.32±36.70	25.88±35.16	24.85±38.40	

Table 2. *Mean of reach distances of players during 2011-2012 season. Values reported in centimeters*

	Total	Professional	Amateur
Direct reach distance			
Anterior direction	55.74 ± 5.56	57.20 ± 6.02	54.50 ± 4.87
Posteromedial direction	107.38 ± 7.37	106.91 ± 8.46	107.77 ± 6.39
Posterolateral direction	104.70 ± 8.50	104.32 ± 8.69	105.01 ± 8.42
Composite reach distance	267.82 ± 18.52	268.44 ± 20.62	267.28 ± 16.78
Normalized reach distance			
Anterior direction	62.71 ± 5.14	61.53 ± 5.59	63.71 ± 4.57
Posteromedial direction	119.85 ± 8.79	116.03 ± 8.04	123.10 ± 8.14
Posterolateral direction	117.17 ± 9.72	113.29 ± 8.00	120.46 ± 9.94
Global result	99.91 ± 6.87	96.95 ± 6.09	102.42 ± 6.54

- Composite reach distance: Sum of three directions.
- Normalized reach distance: (Direct reach distance/ low limb length) x 100
- Global result: (Composite reach distance/3 times low limb length) x 100

for all subjects was 55.74 ± 5.56 cm. Professionals reached 57.20 ± 6.02 cm and amateurs 54.5 ± 4.87 cm. In PM direction, mean reach for all subjects was 107.38 ± 7.37 cm, and professionals reached 106.91 ± 8.46 cm while amateurs reached 107.77 ± 6.39 cm. In the PL direction mean reach scores were 104.70 ± 8.50 cm, professionals reached 104.32 ± 8.69 cm while amateurs reached 105.01 ± 8.42 cm. The composite reach distance was 267 ± 18.52 cm for all the subjects; 268.44 ± 20.62 cm in professionals and 267.28 ± 16.78 cm in amateurs.

Normalized reach distances (direct reach distance divided by limb length and multiplied by 100) results are displayed in Table 2. The anterior direction mean for all subjects was 62.71 ± 5.14%. Professionals reached 61.53 ± 5.59% and amateurs reached 63.71 ± 4.57%. In PM direction, the sample mean was 119.85 ± 8.79%, professionals reaching 116.03 ± 8.04%, and amateurs, 123.10 ± 8.14%. In PL direction, the normalized reach for all subjects was 117.17 ± 9.72%, 113.29 ± 8.00% for professionals, and 120.46 ± 9.94% for the amateurs. With regard to composite normalized reach results, the sample mean was 99.91 ± 6.87%. In professionals the mean composite, normalized reach distance result was 96.95 ± 6.09% while in amateurs it was 102.42 ± 6.54%.

Injury risk according to the difference between absolute reach distances is shown in Tables 3, 4, 5, and 6

Table 3. *Risk as related to anterior direction reach difference between limbs*

Anterior direction difference[+]	n at risk	Total (n=77) % injured	OR	(95% CI)
Total injuries				
<4cm	53	38.00	1	
≥4cm	21	55.00	0.50	(0.2, 1.4)
Non-contact injuries				
<4cm	53	50.00	1	
≥4cm	21	33.00	0.48	(0.2, 1.4)
Contact injuries				
<4cm	53	31.00	1	
≥4cm	21	48.00	2.10	(0.74,6.0)

Abbreviations: OR=odds ratio
[+] Between right and left reach distances.

Table 4. *Risk as related to posteromedial direction difference between limbs*

Posteromedial direction difference[+]	n at risk	Total (n=77) % injured	OR	(95% CI)
Total injuries				
<4cm	47	47.00	1	
≥4cm	27	57.00	1.42	(0.50, 3.73)
Non-contact injuries				
<4cm	47	34.00	1	
≥4cm	27	67.00	3.86**	(1.46, 10.95)
Contact injuries				
<4cm	47	38.00	1	
≥4cm	27	29.00	0.168	(0.24,1.84)

Abbreviations: OR= odds ratio.
[+] Between right and left reach distances.
**p=0.001

and according to normalized reached distance compared with the total average is presented in Tables 7, 8, 9 and 10. Regarding the injury risk, results in Tables 3, 4, 5 and 6 dichotomize differences between limbs as equal, lesser than, or greater than 4cm different in each direction and the number of injury risk subjects (high injury risk as previously defined as having more missed days than the average). The only significant odds ratio (OR) was between PM direction and non-contact injuries, with an OR of 3.86 (95% CI: 1.46 – 10.95). (Table 4) Although not statistically significant, the OR of 2.10 (95% CI: 0.74 – 6.0) was found in the difference between limbs in anterior reach distances and injury risk in contact injuries. With regard to total injuries, the OR was 0.50 (CI 95% CI: 0.2 – 1.4), and in non-contact injuries the OR of 0.48 (95% CI: 0.2 – 1.4).

Injury risk according to the normalized reach distances, are presented in Tables 7, 8, 9 and 10. There were no significant OR's although there were scores where some type of relation may have existed. When anterior direction scores were examined with injury risk in contact injuries in table 7, the OR was 1.89 (95% CI: 0.72 – 5.13). In Table 8, PM direction was examined with injury risk in non-contact injuries,

Table 5. *Risk as related to posterolateral direction difference between limbs*

Characteristic. Posterolateral direction difference+	n at risk	Total (n=77) % injured	OR	(95% CI)
Total injuries				
<4cm	46	48.00	1	
≥4cm	28	57.00	1.59	(0.62, 4.16)
Non-contact injuries				
<4cm	46	44.00	1	
≥4cm	28	50.00	1.30	(0.50, 3.36)
Contact injuries				
<4cm	46	35.00	1	
≥4cm	28	36.00	1.04	(0.38,2.77)

Abbreviations: OR=odds ratio.
+ Between right and left reach distances.

Table 6. *Risk as related to composite reach difference between limbs*

Composite Result difference+	n at risk	Total (n=77) % injured	OR	(95% CI)
Total injuries				
<12cm	55	53.00	1	
≥12cm	19	43.00	0.65	(0.22, 1.86)
Non-contact injuries				
<12cm	55	42.00	1	
≥12cm	19	57.00	1.92	(0.67, 5.67)
Contact injuries				
<12cm	55	40.00	1	
≥12cm	19	20.00	0.40	(0.10,1.27)

Abbreviations: OR= odds ratio.
+ Sum of all three reach distances

and the OR was 2.14 (95% CI: 0.85 – 5.33). In contrast, in Table 9, PL direction with total injury risk provided an OR of 2.41 (95% CI: 0.96 – 6.26). When only with non-contact injuries were considered, the OR was 2.18 (95% CI: 0.87 – 5.67). When the composite results are normalized, and related to an injury risk in total injuries Table 10 shows the OR of 1.93 (95% CI: 0.77 – 4.96), while when joined with injury risk in non-contact injuries only, the OR was 2.24 (95% CI: 0.89 – 5.86).

DISCUSSION

The aim of this study was to determinate if YBT could be used as a predictor of lower extremity injury in soccer players. The results show that athletes with a side-to-side difference equal to or greater than 4cm in PM direction have a 3.86 greater probability of suffering a non-contact injury than those who did not. Plisky et al[13] showed that high school basketball players with decreased normalized reach distance in PM direction were significantly associated with lower extremity injury ($p < .05$). In addition, although there were no significant differences, there were indications that players who have low scores in anterior direction have nearly two times the possibility of a contact injury (OR 1.89) similar to the findings of Plisky et al[13].

The results of the current research did not agree with the findings of Plisky et al who suggested that

Table 7. *Risk injury using normalized anterior reach distance average for total sample*

Normalized anterior direction[+]	n at risk	Total % injured	OR	(95% CI)
Total injuries				
>62.71	36	0.44	1	
≤62.71	38	0.55	1.54	(0.62,3.91)
Non-contact injuries				
>62.71	36	0.44	1	
≤62.71	38	0.47	1.13	(0.45,2.83)
Contact injuries				
>62.71	36	0.28	1	
≤62.71	38	0.42	1.89**	(0.72,5.13)

Abbreviations: OR= odds ratio

**P=0.001

Note: 62.71=normalized anterior direction average for the entire sample

[+] Normalized reach distance is reach distance divided by limb length multiplied by 100

Table 8. *Risk injury using normalized posteriomedial reach distance average for total sample*

Normalized posteromedial direction[+]	n at risk	Total % injured	OR	(95% CI)
. Total injuries				
>119.85	38	0.45	1	
≤119.85	36	0.56	1.54	(0.62,3.91)
Non-contact injuries				
>119.85	38	0.37	1	
≤119.85	36	0.56	2.14**	(0.85,5.33)
Contact injuries				
>119.85	38	0.42	1	
≤ 119.85	36	0.27	0.53	(0.20,1.38)

Abbreviations: OR= odds ratio

**P=0.001

Note: 119.85=normalized posteromedial direction average for the entire sample.

[+] Normalized reach distance is reach distance divided by limb length multiplied by 100

a difference of greater than 4 cm in ANT direction between limbs implied having 2.5 greater possibility of injury. When comparing results between this study and the Plisky et al study, the athletes sport of preference differed; and although basketball can be compared to football (soccer) in some aspects, there are several performance based differences which may account for the differences in study outcomes. Gender, competitive level, and type of sport are purported to affect YBT performance.

Nevertheless, the current results demonstrated that those in the current study who had differences of greater than 4 cm in the PM direction had almost a four fold greater possibility of suffering a non-contact injury in a lower limb. These results demonstrate

Table 9. *Risk injury using normalized posterolateral reach distance average for the total sample*

		Total		
Normalized posterolateral direction[+]	n at risk	% injured	OR	(95% CI)
Total injuries				
R>117.17	36	0.40	1	
R≤117.17	38	0.61	2.41**	(0.96,6.26)
Non-contact injuries				
R >117.17	36	0.36	1	
R≤117.17	38	0.55	2.18**	(0.87,5.67)
Contact injuries				
R >117.17	36	0.33	1	
R≤ 117.17	38	0.37	1.17	(0.45,3.07)

Abbreviations: OR= odds ratio

**P=0.001

Note: 117.17=normalized posterolateral direction average

[+] Normalized reach distance is reach distance divided by limb length multiplied by 100

Table 10. *Risk injury using normalized composite reach distance average for the total sample*

		Total		
Composite Result	n at risk	% injured	OR	(95% CI)
. **Total injuries**				
>99.91	34	0.41	1	
≤99.91	39	0.58	1.93**	(0.7,4.96)
Non-contact injuries				
>99.91	34	0.35	1	
≤99.91	39	0.55	2.24**	(0.89,5.86)
Contact injuries				
R >99.91	34	0.35	1	
R≤ 99.91	39	0.35	0.98	(0.38,2.60)

Abbreviations: OR= odds ratio

**P=0.001

Note: 99.91=composite result average

[+] Normalized reach distance is sum of the three reach distances, divided by 3x limb length, multiplied by 100

that there is a relationship between non-contact injuries and the reaching difference in the PM direction between lower limbs, which may indicate that body balance is essential for performance stability, and is important with regard to non-contact injury but does not directly relate to contact injury.

In reference to the composite result of normalized directions in Table 10, when related to total injuries, the OR was 1.93 (95% CI: 0.77 – 4.96) while when the composite result was related to injury risk in non-contact injuries only, the OR was 2.24 (95% CI: 0.89 – 5.86), and both were statistically significant. The injury risk in those with a composite reach distance less than the average of the sample were approximately two times more likely to sustain an injury. If composite scores lower than the average can be considered as having poorer balance, these results affirm the findings of McGuine et al[11] who showed that poor balance had a relationship with high lower limb injury risk. Regarding the differences in the results compared with other studies, it is important to note that only the results of the YBT were examined as a predictor of injury, and there are many other variables such as previous injury, biomechanics, coordination or strength which have a considerable amount of influence and may serve to raise the risk of injury.

There are several limitations to the current study. First of all, an injury was defined if it incapacitated a player, rendering them unable to practice sport. There is an intrinsic factor that was not measured, the tolerance to pain by the player in minor injuries, which may have impacted their ability to practice. The second limitation is that several members of the staff registered injuries and there is a possibility that minor injuries went unnoticed. An additional limitation was that the side of the injury and dominant leg were not taken into account. An injury was only registered as an injury without attempting to relate to a specific reach score for a limb, instead only relating injury to difference in LE scores on the YBT. Plisky et al[14] used the same methods for recording and examination of injury in their previous research.

CONCLUSION

The results of the current study indicate that subjects with inequalities between right and left lower limbs equal to or greater than 4 cm have an almost four-time greater likelihood of missed days in a season due to a non-contact injury. Moreover, athletes with lower composite scores than the sample average have greater possibility of having more missed days. As a result, the YBT should be considered a useful tool in detecting injury susceptible subjects. The YBT could therefore be useful during pre-season testing and when attempting to determine when the player is able to return to sport after an injury. Future research should be conducted in order to expand the YBT database for additional sports by gender and competitive level. More research is needed with the aim of determining whether the YBT is an efficient test for injury prediction or can be used as a test that provides information regarding return to sport decisions.

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