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Assessment of YBT Performance in Athletes that Participate in Asymmetrical Sports

Melissa Ferlo
ferlom@mail.sacredheart.edu

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Melissa Ferlo *[Mentor: Eric Scibek]*

College of Health Professions

Department of Physical Therapy and Human Movement Science

EXERCISE SCIENCE

Sacred Heart University

ABSTRACT

The lower quarter y-balance test (YBT) is a pre-participation functional movement assessment used to assess dynamic balance. The YBT has been evaluated in a number of studies to identify asymmetry in movement and individuals at risk of musculoskeletal injury. Asymmetries have been associated with a higher risk of lower extremity injury in athletes. It is not known how YBT performance differs between athletes that participate in asymmetrical sports compared to sports with symmetrical movement patterns. The purpose of this study was to assess differences in YBT performance between dominant (D) and non-dominant (ND) limbs in athletes participating in sports with asymmetrical movement patterns, as compared to athletes that participate in sports with symmetrical movement patterns. Healthy athletes that participate in sports with either symmetrical or asymmetrical movement patterns participated in this study. The YBT kit (Move2Perform) has a stance platform and 3 wooden dowels that reach out in the anterior (A), posteromedial (PM), and posterolateral (PL) directions. Participants stood with one leg on the stance platform and extended the other out in each of the reach directions for 3 recorded trials. Six practice trials were given in each direction. Reach direction and the starting stance leg were randomized. Reach distances were normalized by leg length. No significant difference was found in athletes who participate in asymmetrical versus symmetrical sports in any of the reach directions. Though differences can be seen in the reach differences between these two groups, the evidence is not clinically or statistically significant. Based on this data, asymmetrical sport athletes are not at a greater risk for injury.

What is the Y-Balance Test (YBT)?

The lower quarter Y-balance test (YBT) is a pre-participation screen that is used clinically to assess dynamic balance and postural control.[1] The YBT was developed from the Star Excursion Balance test (SEBT). The YBT features less reach directions which makes it faster and easier to use.[2] The three reach directions in the YBT are the anterior, posteromedial and posterolateral. The test consists of a participant standing on the stance platform and reaching out in each of the three reach directions. Scores are typically normalized by leg length. Results of the YBT are looked at in terms of dominant and non-dominant limb asymmetry and also sometimes a composite score is calculated.

What does asymmetrical performance mean?

Many studies interpret the results of the YBT in the context of injury prediction. Through various research, it is generally understood that a difference of >4 cm in particularly the anterior reach direction has been associated with a greater risk of lower extremity musculoskeletal injury.[3] This is important for clinicians when assessing various return to sport criteria or pre-participation screens to identify athletes that may have an increased risk of injury. For the purpose of this study it is important to see if natural asymmetrical movement patterns in sport will cause greater asymmetry on the test and therefore a potentially increased risk of injury.

PARTICIPANTS

In this study 12 college aged athletes (male n=9, female n=3) were tested using the Y-Balance test kit (Move2Perform). The participants that were classified as asymmetrical sport performance athletes were baseball players. The participants that were in the symmetrical sport performance athletes were all distance runners. The participants' mean age was 21 ±1.54, mean weight was 76.8 ± 19.5 kg, and mean height was 175.5 ± 7.2 cm.

Figure 1 – *The 3 YBT reach directions; Anterior, posteromedial and posterolateral (Left to right).*

METHODS

Before the test, subjects gave informed consent and filled out a medical history form. Participants with an existing injury who were not cleared for sport were excluded. The leg lengths were recorded by measuring from the anterior superior iliac spine to the apex of the medial malleolus. Subjects were given 6 practice trials in each of the reach directions and then 3 consecutive trials were recorded. The reach direction and the starting stance leg were randomized. Subjects were instructed to keep the heel of the stance foot on the platform with their hands on their hips and reach out while maintaining their balance.

RESULTS

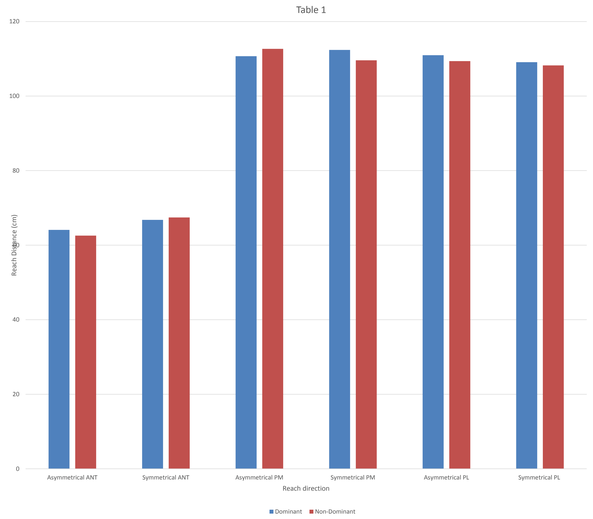

Table 1 – Differences in Peak YBT Reach Differences between Dominant and Non-Dominant Limbs

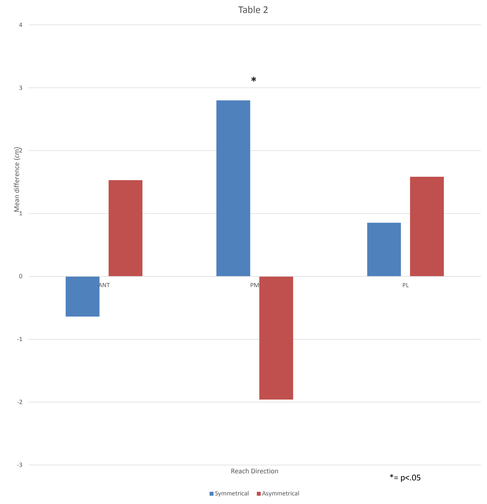

Table 2 – *Mean Difference Changes in YBT Reach Directions for Symmetrical and Asymmetrical Groups*

DISCUSSION

The data was analyzed using simple t-tests and the results were graphed. Table 1 shows the differences between the symmetrical and asymmetrical groups in each of the reach differences and compares the normalized reach differences on their dominant and non-dominant limbs. There was no significant statistical or clinical difference in symmetry between the dominant or non-dominant limbs for any of the reach directions. Table 2 shows the results of another t-test done that compares the mean difference in each of the reach directions between the two groups. The only statistically significant data was in the posteromedial reach direction ($p<.05$). After further analysis, though the data is statistically significant there seems to be no clinical significance in this figure. This could be because there was no significance between dominant and non-dominant limbs for both of the groups, this may have come out to be a significant value because the reach differences trend in opposite directions. After analyzing these results, it is evident that though there are differences in asymmetrical and symmetrical athlete performance on the YBT, these differences are not significant. Further research could be done with a larger sample size which may uncover further differences.

TAKE HOME MESSAGES

- There is no statistical or clinical significance between athletes who participate in asymmetrical sports versus symmetrical sports on the YBT in any of the reach directions.
- Asymmetrical performance in the YBT is what is predictive of lower extremity musculoskeletal injury. Due to the fact that this study did not show any significant asymmetries in performance, athletes who participate in sports with asymmetrical movement patterns are not at a higher risk of injury based on the data collected in this study.

REFERENCES

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