The Effect of a Standardized Dynamic Warm-up on YBT Scores

Sophia Smith, Danielle Norton, Abby Atchley, & Kristen Flateau
Exercise Science
Gardner-Webb University

This project does not attempt to produce generalizable knowledge. It is dedicated to the practice of developing skills and demonstrating understanding of the research process.

Introduction

According to Greenberg et al. (2019), the Y Balance Test (YBT) is a clinical measurement of dynamic balance that mimics sports movements requiring unilateral balance. In this lab specifically six NCAA Division 1 athletes were chosen to complete a "cold" YBT with no warm-up prior to the test and a YBT test with a standardized dynamic warm-up protocol before the test. According to Daneshjoo et al. (2012), a dynamic warmup protocol will increase dynamic and static balance and proprioception of the athletes. The six athletes that were chosen contained three male and three female athletes from various sports including track and field, soccer, baseball, swimming, and lacrosse. All the athletes had been cleared for play in their sport and were free from injury or surgery within the past six months. The purpose of this lab was to test the hypothesis that a dynamic warmup prior to a YBT will have higher scores compared to a cold YBT.

Methods

Participants

- 3 male, 3 female (n=6)
- Division I collegiate athletes
- No injury or surgery <6 months
- Ages 18-22

Day 1 Protocol

- Height, weight, and right LE limb length recorded
- Right LE then left LE tested in anterior, posteromedial, and posterolateral directions
- 6 practice and 3 trials per leg per direction
- Record results (dependent variable)

Day 2 Protocol

- Height, weight, and right LE limb length recorded
- Dynamic warm-up completed with 10 seconds rest between exercises (independent variable)
- Right LE then left LE tested in anterior, posteromedial, and posterolateral directions
- 6 practice and 3 trials per leg per direction
- Record results (dependent variable)

Demonstration of YBT in anterior, posteromedial, and posterolateral directions (Functional Movement, n.d.)

Results

During the YBT balance lab, subjects participated in the YBT balance test over a two-day testing period. Results were gathered from an initial YBT test with no warm-up and a YBT test after a dynamic stretch warm-up. Measurements collected during this lab include right LE limb length (Distal ASIS to Distal Medial Malleolus), greatest right pre-test (GR pre), greatest left pre-test (GL pre), greatest right post-test (GR post), greatest left post-test (GL post). In addition, the following data were collected: range, standard deviation, and mean. Correlation compared to pre and post limb length and pre and post composite reach distance was positive. Although limb length per individual stayed the same, overall composite reach distance improved for both males and females post dynamic warm-up stretch.

Table 1. Assessment of Pre and Post Results

	Mean	Stand. Dev.	Range
GR pre	98.3	21.4	73.0
GR post	103.0	23.2	107.0
GL pre	103.7	27.4	83.0
GL post	103.9	22.8	81.0

Note. Greatest Right (GR), Greatest Left (GL)

Table 2. Assessment of Male and Female Data

	Male	Female
GR pre	101.1	95.4
GR post	107.9	98.1
GL pre	109.9	101.3
GL post	107.0	100.9

Note. Greatest Right (GR), Greatest Left (GL)

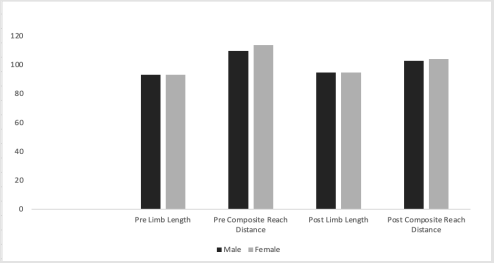

Figure 1. Assessment of Pre and Post Reach Distance Compared to Limb Length

Exercise	Repetition
Knee to Chest Walks with Calf Raise and Balance Reach	10x each leg alternating
Standing Quad Stretch with Balance Reach	10x each leg alternating
Lateral Lunges	10x each side alternating
World's Greatest Lunge with Reach	5x each leg alternating
Leg Swing with Balance Reach	10x each leg alternating
Open the Gate with Shuffle	10x each leg alternating
Close the Gate with Shuffle	10x each leg alternating
Walking Hamstring Sweeps	10x each leg alternating
Skater Lunge	10x each leg alternating

Discussion

According to Bishop (2013), a dynamic warmup in place of static stretching will increase athletic performance. The results of the effects of dynamic warm-up on the YBT in NCAA Division 1 athletes, showed that the subject's scores would increase after a standard dynamic warm-up. According to Smith (2016), male athletes will outperform their female counterparts even with normalization in reach distance. This made having both male and female athletes crucial to the integrity of the data collected. Following the dynamic warm up, the female greatest right (GR) improved from 95.4 to 98.1 and the male GR improved from 101.1 to 107.9 after the standard dynamic warm-up. This improvement would suggest that the dynamic warm-up increased the subject's range of motion in the lower extremities. According to Benis (2016), athletes were also recorded to have improved upon their postural control, lower limb stability, and YBT scores by body weight and neuromuscular training before the YBT being conducted. The calculations used for scoring the subjects were calculated by taking the sum of each 3 reach directions divided by the 3 times the limb length then multiplied by 100.

Conclusion

This lab was conducted to discover if a standard dynamic warmup protocol would increase a NCAA Division 1 athlete's Y-balance test score. The "cold" YBT was completed first and the scores were recorded. The athletes received a minimum of 24 hours rest before the dynamic warmup YBT were conducted. This testing protocol confirmed the hypothesis that a dynamic warmup does increase an athlete's YBT score compared to a cold YBT score. Errors in this lab could include the athlete's motivation to do their best on both tests.

References

Benis, R., Bonato, M., & Torre, A. L. (2016). Elite female basketball players' body-weight neuromuscular training and performance on the Y-balance test. *Journal of Athletic Training, 51*(9), 688–695. https://doi.org/10.4085/1062-6050-51.12.03
Bishop, D., & Middleton, G. (2013). Effects of static stretching following a dynamic warm-up on speed, agility and power. *Journal of Human Sport and Exercise, 8*(2), 391–400. https://doi.org/10.4100/jhse.2012.82.07
Daneshjoo, A., Mokhtar, A. H., Rahnama, N., & Yusof, A. (2012). The effects of comprehensive warm-up programs on proprioception, static and dynamic balance on male soccer players. *PLoS ONE, 7*(12), doi:10.1371/journal.pone.0051568
Greenberg, E. T., Barle, M., Glassmann, E., & Jung, M.-K. (2019). Interrater and test-retest reliability of the Y balance test in healthy, early adolescent female athletes. *International Journal of Sports Physical Therapy, 14*(2), 204–213. doi:10.26603/ijspt20190204
Smith, C. A., & Warren , M. (2016, June 8). *The Y balance test: Assessing the evidence: Lower Extremity Review Magazine*. Lower Extremity Review Magazine | Rehabilitation • Trauma • Diabetes • Biomechanics • Sports Medicine. Retrieved November 29, 2021, from https://lermagazine.com/article/the-y-balance-test-assessing-the-evidence.
Vitale, Jacopo A.1; La Torre, Antonio1,2; Banfi, Giuseppe3,4; Bonato, Matteo2 Effects of an 8-Week Body-Weight Neuromuscular Training on Dynamic Balance and Vertical Jump Performances in Elite Junior Skiing Athletes: A Randomized Controlled Trial. Journal of Strength and Conditioning Research: April 2018 - Volume 32 - Issue 4 - p 911-920 doi: 10.1519/JSC.0000000000002478
Y-Balance Test Kit. Y-Balance Test Kit | Functional Movement Systems. (n.d.). Retrieved November 29, 2021, from https://www.functionalmovement.com/store/23/y-balance_test_kit.