

Comparing Biomechanical and Metabolic Demands of Manipulating a Foam Cube and Soccer Ball Using Soccer-Style Movements

Researchers:

- Michael Coles, Ph.D., Professor
Department of Kinesiology, Fresno State
- Brian Zwaschka, Head Soccer Coach, Fresno State

Introduction: This is a preliminary investigation that aims to compare the oxygen cost and/or biomechanical similarities of manipulating a foam cube and a soccer ball during common, low-intensity, soccer-style movements in experienced soccer players.

Background: The SAID principle of training suggests that the body will make Specific Adaptations to the Imposed Demands placed on it during training. For this reason alone, it makes sense for soccer players and coaches to use traditional soccer balls as the primary training tool during training sessions. There are, however, a variety of circumstances in which an athlete or coach may need to use an alternative training modality such as a foam cube. These circumstances include: 1) The need to have a training device that can be used to develop coordinated patterns of soccer ball manipulation when the NCAA limits the amount of time an athlete can actually use a soccer ball during off-season training.; 2) The need for athletes recovering from injuries to train using a tool that limits and controls soccer-style movement patterns to a greater degree than a rolling soccer ball, but that still provides the same coordinated movement patterns used in soccer ball manipulation; 3) The need to have an additional warm-up modality to use when an athlete is preparing to enter the field of play during a live match when established rules prohibit the use of a soccer ball on the sidelines during the athlete's warm-up routine.

Methods: Experienced soccer players manipulated both a foam cube and soccer ball through four movement patterns in a randomized, crossover experimental design. Each movement pattern lasted one minute and participants recovered between patterns. The movement patterns included: a lateral roll, a forward/backward roll, a forward toe tap, and a side-to-side toe tap.

The foam cubes measured 12 inches across and were approximately the same height as a traditional size 5 (official sized) soccer ball. All movement patterns were analyzed and compared for oxygen cost (VO_2), heart rate (HR), and biomechanical (BioMech) characteristics using a ParvoMedic True One 2400 metabolic measurement system and a PEAK Motus Motion Measurement System.

Results: This is a preliminary investigation, so additional work needs to be completed before definitive results can be interpreted, but initial analysis of VO_2 , HR, and BioMech suggest there is

no difference between the use of the cube and traditional soccer ball. This begins to support the idea that a foam cube may be a good equivalent training modality to a traditional soccer ball.