

## **Relationships Between Body Size, Strength, and Power with Throwing Velocity Following a Strength Training Block in High School Water Polo Players**

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### **ABSTRACT**

A high school strength and conditioning program should ideally improve fitness and develop motor skills in athletes. This could be a targeted goal if research details relationships between sport-specific motor skills and measures of fitness in high school athletes. **PURPOSE:** To investigate the correlations and predictive relationships (controlling for age) between height, body mass, strength, and power on throwing velocity in male high school water polo athletes after a 4-week strength training block. **METHODS:** Eighteen water polo athletes (age:  $15.50 \pm 0.20$  years; height:  $177.05 \pm 1.60$  cm; body mass:  $74.28 \pm 3.70$  kg) from one high school program were recruited. Testing occurred in one day; age, height and body mass were recorded first. Strength was measured using combined grip strength (right and left hands) and isometric lower-body strength via a leg/back dynamometer. Power was measured by a vertical jump and 2-kg seated medicine ball throw (MBT). Athletes also threw a water polo ball with maximum effort to measure throwing velocity. Partial correlations and stepwise regression controlling for sex were used to calculate relationships between throwing velocity with body size, strength, and power ( $p < 0.05$ ). **RESULTS:** Combined grip strength ( $r = 0.712$ ), leg/back strength ( $r = 0.656$ ), and MBT ( $r = 0.684$ ) all showed significant positive relationships with throwing velocity. Age and combined grip strength predicted throwing velocity with 61.3% explained variance ( $R^2 = 0.658$ , adjusted  $R^2 = 0.613$ ,  $p < 0.001$ ). **CONCLUSION:** Strength and conditioning programs targeting upper- and lower-body strength and upper-body power could improve motor skills such as throwing in water polo high school athletes irrespective of age, which provided an indirect metric for maturation. The 4-week training block included exercises targeting these qualities (e.g., squats, presses, pull-ups, hang cleans), and this likely impacted the relationships between strength, power, and throwing velocity seen in this study. Strength and conditioning coaches working with overhead throwing sports at the high school level could incorporate upper- and lower-body strength and power exercises, including exercises that target grip strength, into to their training blocks to enhance their athletes' throwing velocity.