THE RELATIONSHIP BETWEEN ROTARY POWER AND THROWING VELOCITY OF HIGH SCHOOL BASEBALL PLAYERS

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Abstract

PURPOSE: The purpose of this study was to investigate the relationship between rotary power and throwing velocity of high school baseball players. **METHODS**: The subjects were 93 male athletes (age = 16.75 ± 0.82 years) who participated in a summer baseball showcase conducted by an NCAA Division I baseball program. Trained test administrators used the Baseball/Softball Athletic Testing System (BATS) to collect data for rotary power and throwing velocity. Rotary power (28.03 ± 3.12 mph) was measured with the rotary power test using a 1kg medicine ball and radar gun. Throwing velocity (72.33 ± 4.98 mph) was measured on flat ground from the traditional pitcher's stretch position. Additional data that was collected includes height, weight, percent body fat, lean body mass, grip strength, leg power, agility, speed, and batted-ball velocity. A standard stadiometer and scale were used to measure height (69.12 ± 2.36 in) and weight (170.85 ± 25.30 lb). Biolelectrical impedance analysis was used to determine percent body fat (16.32 ± 5.98 %) and lean body mass (140.27 ± 19.24 lb). A hand dynamometer was used to assess grip strength (48.09 ± 7.15 kg) while the standing long jump was used to assess leg power (87.31 ± 8.10 in). Agility (8.94 ± .46 s) was measured with the 10-yard shuttle run while running speed (7.59 ± .23 s) was determined by the 60-yard dash. Batted-ball velocity (79.87 ± 5.50 mph) was assessed by a radar gun from five swings on a batting tee. **RESULTS**: Pearson's r was utilized to calculate a correlation coefficient for rotary power and throwing velocity. A significant positive relationship (p<0.01) was determined for rotary power and throwing velocity, r (93) = 0.355, p < 0.01. **CONCLUSION:** The results of this study indicate statistically significant relationship between rotary power and throwing velocity. **PRACTICAL APPLICATION**: While correlation does not imply causation, the results of this study suggest that coaches and players wishing to increase throwing velocity may consider strength and conditioning training to improve rotary power.

Introduction

- Baseball involves skills like striking or throwing a baseball both rotational motions requiring an explosive movement across the transverse plane [1,2].
- Batting and throwing sport skills require connecting the upper and lower bodies for energy transfer. Kinetic energy transfers from ground push off, to pelvic and trunk rotation, through the shoulder and elbow resulting in energy transferred to a ball or bat [1,2].
- Rotational power is associated with ball striking variables like bat swing speed and batted-ball velocity [3,4].

PURPOSE

The purpose of this study was to investigate the relationship between rotary power and throwing velocity of high school baseball players.

Methods

Summer Baseball Showcase
conducted by NCAA Division I baseball program

93 teenage male athletes
age = 16.75 ± 0.82 years

Baseball/Softball Athletic Testing System (BATS)

- **Height**
- **Weight**
- **% Body Fat**
- **Lean Body Mass**
- **Grip Strength**
- **Standing Long Jump**
- **10-yd Shuttle Run**
- **60-yd Dash**
- **Rotary Power Test** — See Figures 1-4
- **Throwing Velocity** — Measured on flat ground from the traditional pitcher's stretch
- **Batted-Ball Velocity** — Measured with a radar gun from five swings on a batting tee

Figure 1. The Rotary Power Test (RPT) uses a 1kg medicine ball and radar gun.

Figure 2. RPT starting position. Subjects stand in an athletic stance holding the ball waist height.

Figure 3. RPT loading phase. Subjects rotate torso away from projected path shifting weight to the back leg.

Figure 4. RPT release phase. Subjects are cued to throw the ball parallel to the ground as hard as they can.

References

Results

Pearson's r correlation found a significant positive relationship between rotary power and throwing velocity, r (93) = 0.355, p < 0.01).

Table 1. Means and standard deviations of teenage athletes (n=93) performance during the Baseball/softball Athletic Testing System (M ± SD).

BATS Test	Performance
Height (in)	69.12 ± 2.36
Weight (lb)	170.85 ± 25.30
% Body Fat (%)	16.32 ± 5.98
Lean Body Mass (lb)	140.27 ± 19.24
Grip Strength (kg)	48.09 ± 7.15
Standing Long Jump (in)	87.31 ± 8.10
10-yd Shuttle Run (s)	8.94 ± .46
60-yd Dash (s)	7.59 ± .23
Rotary Power Test (mph)	28.03 ± 3.12
Batted-Ball Velocity (mph)	79.87 ± 5.50
Throwing Velocity (mph)	72.33 ± 4.98

Conclusions

The results of this study indicate a statistically significant relationship between rotary power and throwing velocity.

Practical Applications

The results of this study suggest coaches and players wishing to increase throwing velocity may consider strength and conditioning training to improve rotary power.