RELATIONSHIPS BETWEEN COUNTERMOVEMENT JUMP FORCE-TIME CHARACTERISTICS AND STRIKEOUTS IN DIVISION III BASEBALL PLAYERS

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Introduction

Assessing countermovement jump (CMJ) performance is common within athlete monitoring programs. CMJ testing can provide strength and conditioning practitioners and sport scientists with a wealth of information related to an athlete's ability to produce force. Specifically, researchers have explored the propulsion phase characteristics of jump performance and how it changes after different training programs (4). Additional variables such as modified reactive strength index (RSImod) may also provide insight into an athlete's lower body explosive strength characteristics (2).

Baseball players require explosive strength characteristics to benefit their performance. Researchers displayed significant relationship between lower body strength and bat swing speed (3). Additional findings have shown positive relationships between rate of force development and the home runs hit by NCAA Division I athletes over three seasons (1). Although the research on hitting performance is valuable, less information exists on the relationships between an athlete's force production characteristics and pitching performance. Therefore, the purpose of this study was to examine the relationships between CMJ force-time characteristics and the number of strikeouts pitchers had at the National Collegiate Athletic Association (NCAA) Division III level. It was hypothesized that moderate relationships would exist between rapid force production characteristics and the strikeouts achieved.

Methods

•Fifteen male (20.9 ± 0.9 years, 91.2 ± 11.7 kg, 183.0 ± 5.8 cm) NCAA Division III baseball pitchers participated in this study as part of a long-term athlete monitoring program.

•During preseason testing, each pitcher completed two maximal effort CMJ trials on force plates.

•The force-time data were used to calculate jump height and time to takeoff as well as propulsion mean force (PMF), propulsion duration (PDur), and peak power.

•Modified reactive strength index (RSImod) was calculated as the ratio of jump height and time to takeoff.

•At the conclusion of the competitive season, strikeout totals were determined for each subject who had pitched 10 or more innings during the season.

•Pearson correlation coefficients (r) and coefficients of determination (R^2) were used to determine the relationships between CMJ variables and strikeouts.

Results

Table 1. Relationships between peak power, propulsion mean force, propulsion duration, reactive strength index modified (RSImod), and strikeouts.

	Propulsion Mean Force (N/kg)	Propulsion Duration (s)	Peak Power (W/kg)	RSImod	Strikeouts
Mean	19.1	0.29	57.3	0.47	20.8
SD	1.5	0.03	6.9	0.10	18.8
r	0.091	0.093	0.415	0.282	
R^2	0.0083	0.0086	0.1722	0.0795	

Note: r = Pearson correlation coefficient; R^2 = coefficient of determination

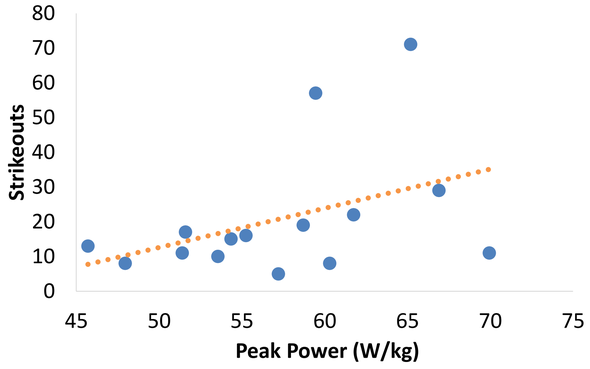

Figure 1. Relationship between peak power and strikeouts.

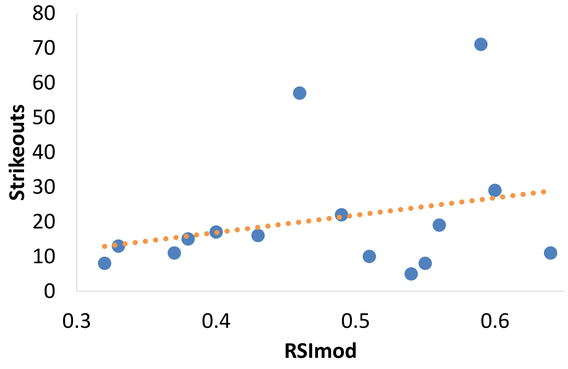

Figure 2. Relationship between RSImod and strikeouts.

Conclusions

•Moderate and small relationships were found between CMJ peak power and RSImod with strikeouts, respectively.
•Only small portions of strikeout variance were explained by peak power and RSImod
•CMJ PMF and PDur displayed trivial relationships with baseball strikeouts.

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Practical Applications

•Strength and conditioning coaches may consider using the CMJ to monitor how an athlete is progressing throughout the course of a season or off-season.
•Increased power output may lead to an increase in strikeouts; however, it should be noted that pitching requires a given amount of skill and may not be predictable based on athlete testing and monitoring.

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