

Anthropometric Factors in Softball Hitting Performance

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Baseball is considered one of America's pastimes, and as such, is one of the most popular sports today in America among youth. Despite the popularity of the sport, there are limited data available when examining hitting mechanics, especially in conjunction with anthropometric measurements of the hitters. Hitting is a major component to team success in baseball; therefore, research dedicated to understanding performance parameters that improve hitting performance is valuable to the development of the sport. Research has found arm length is an important anthropometric factor in elite players of other sports, particularly those that require extensive use of the upper extremity.¹⁻⁵ Given that the upper extremity is an important link within the kinetic chain in hitting, the objective of this study was to find the effect of arm length and other physical traits on baseball hitting performance.

Nine youth baseball players (11.2 ± 1.3 years, 149.8 ± 9.6 cm, 51.1 ± 14.1 kg) volunteered to participate in the study. The Institutional Review Board of Auburn University approved all testing protocols and informed written consent was obtained from each participant prior to participation. Each participant was then measured for bilateral hip and shoulder isometric strength and range of motion using a dynamometer and inclinometer, respectively. Hip measurements were conducted with the participants sitting on an athletic training table, with their hips and knees both flexed to 90 degrees. Shoulder measurements were completed with the participants lying supine on the table, with their shoulder abducted 90 degrees and their elbow flexed 90 degrees. Participants were then hooked up to an electromagnetic motion capture system synced with motion analysis software, which was used to record weight, height and arm length for all participants. Yakkertek, a ball-tracking device, was used to measure batted ball distance, launch angle and exit speed for all trials (Figure 1). Each participant warmed up for as long as needed, then completed ten swings from a front tossed pitch. Of the ten swings, the four trials with the closest launch angle to the average launch angle for the ten trials were used for data analysis.



Figure 1. Yakkertek device used to measure batted ball characteristics.

Pearson's correlations ($p < 0.05$) revealed a significant relationship between player mass and batted ball distance (Figure 2), as well as player height and exit speed (Figure 3). Therefore, these findings would suggest overall height and mass have a greater impact on hitting performance than arm length, strength and range of motion measures.

These results suggest that neither arm length nor isometric strength has a significant effect on batted ball performance in youth. These findings could indicate the overall importance of total body kinetic chain sequencing versus absolute brute strength in hitting performance. However, it should be noted that these findings may also be due to the inconsistency of isometric strength and lean muscle mass in youth athletes. Future research should be conducted to examine the relationship between anthropometric factors and hitting performance among a larger age

range of athletes accounting for those with bigger body characteristics and more hitting expertise.

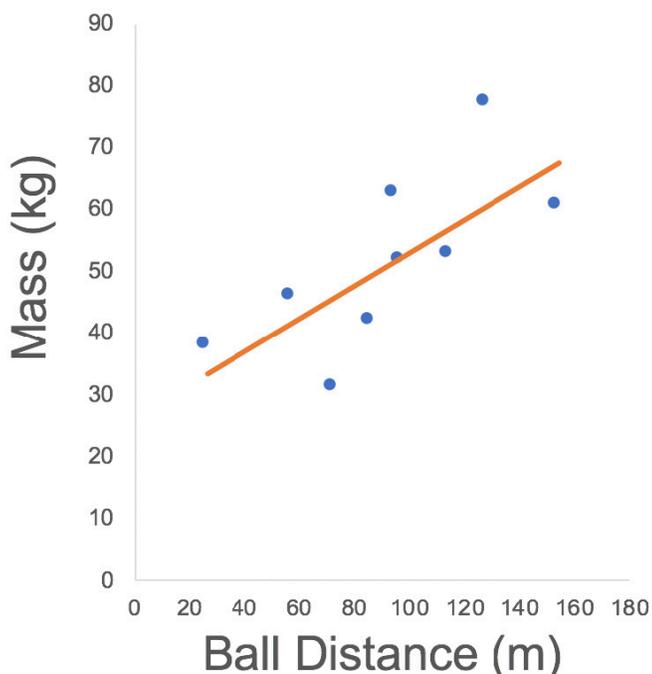


Figure 2. Relationship between mass and ball distance.

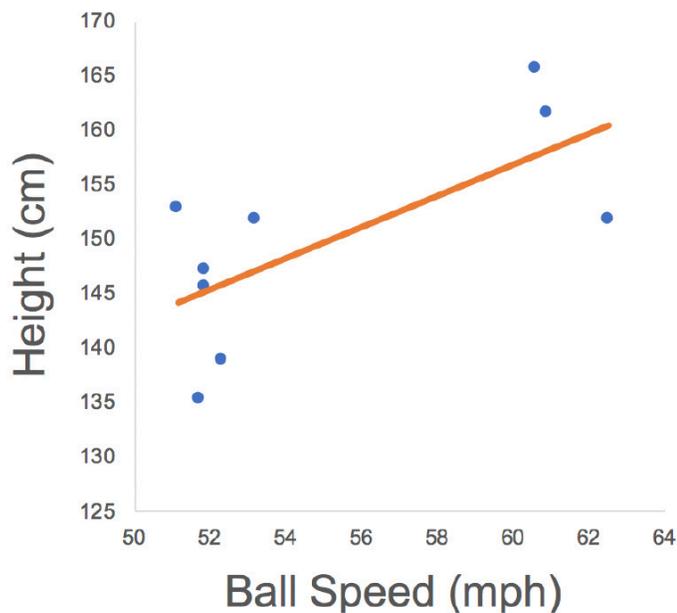


Figure 3. Relationship between height and exit speed.

Statement of Research Advisor

Johann’s research has established normative data on a small subset of athletes that will allow for more in-depth exploration into total body mechanics and anthropometrics in hitting athletes of different skill levels.

– Gretchen Oliver, Kinesiology

References

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