

DOES WARMING UP WITH A WEIGHTED BAT HELP OR HURT BAT SPEED IN BASEBALL?

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INTRODUCTION

Although baseball players may believe that by warming up with a heavy bat they will increase their swing speed, past research indicates that following warm-up with heavy bats, swing patterns are significantly altered resulting in lower velocities than warm-ups with a standard bat [1]. Further, it was demonstrated that prior to impact with a ball on the first swing following a weighted warm-up there is a 3.3% reduction in linear bat velocity at the trial right after weighted bat swing [2]. The purpose of the current study was to identify if warm-ups with different weighted bats prior to bat swing alter the bat speed and determine whether bat speed agrees with kinesthetic feeling from subjects.

METHODS

Thirteen subjects ranged from 22 to 28 years (eight males and five females) participated in this study. They came in three different days for three different bat warm-ups. Three different weighted bats, such as a lighter bat (wiffle bat, 113g), a standard bat (909g), and a heavier bat (standard bat + 568g donut weight), were used for each warm-up condition. Subjects were asked to perform total 15 trials of swing as fast as they could per day. The first five trials were PRE-warm-up swings with a standard bat. Following two minutes break, the next five trials were warm-up swings with a randomly selected bat. The last five trials following two minutes break were POST-warm-up swings with a standard bat again. Subjects were asked to rate the kinesthetic feeling of each swing on a scale from -5 (very slow) to +5 (very fast) after each trial during POST-warm-up swings.

A seven-camera VICON system (sampling rate: 120 Hz) was used to collect kinematic data of the bat. Seven reflective markers on a bat and upper arms were attached to measure the trajectories and to determine pattern changes. Peak tangential velocity and time-to-peak velocity at each landmark were dependent measures for the analysis.

RESULTS AND DISCUSSION

Repeated measures ANOVA on bat speed indicated that there were significant differences between PRE-warm-up and warm-up conditions and between warm-up and POST-warm-up ones, while there was no significant difference between PRE- and POST-warm-up conditions. Bat speed of the lighter bat at warm-up (22.0 m/s) was significantly faster than the heavier bat (14.4 m/s) and the standard bat (16.0 m/s) (see Figure 1). One-way ANOVA on kinesthetic feeling at POST-warm-up swing indicated significant main effect of different weighted bat warm-up (see Figure 2). Subjects felt significantly faster bat speed following a heavier bat warm-up (2.55 ± 1.29) than any other bat warm-ups ($-.38 \pm 1.75$ and $.35 \pm .82$) regardless of non-difference on bat speed. No pattern change was found following warm-ups. However, there were changes of the differences on time-to-peak

velocities between bat and wrists and between wrists and elbows in leading and trailing arm, respectively.

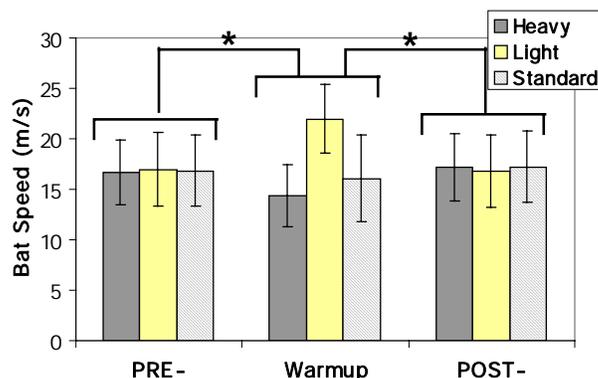


Figure 1: Changes in bat speed among PRE-Warm-up, Warm-up, and POST-Warm-up with different weighted bats. Significant differences are shown with an asterisk.

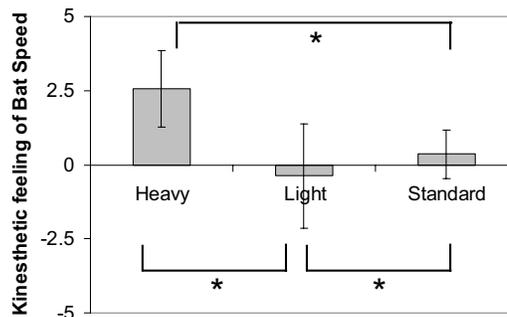


Figure 2: Kinesthetic feeling of bat speed at POST-Warm-up swings following different weighted bat warm-ups. Scale ranged from -5 (very slow) to +5 (very fast) with indication of 0 (no difference). Significant differences are shown at each different POST-Warm-up swing.

CONCLUSIONS

Warm-up with different weighted bats provides no significant differences on bat speed following warm-ups, while it provides significant different kinesthetic feelings of bat speed. The kinesthetic feeling during POST-warm-up swing may result from the shortened differences on time-to-peak velocity between wrists and elbows. Finally, there is no benefit on bat speed with a heavier bat warm-up.

REFERENCES

1. Southard, D & Groomer, L *Research Quarterly for Exercise and Sport*, **74**, 270-276, 2003.
2. Otsuji, T. *et al.*, *Perceptual and Motor Skills*, **94**, 119-26, 2002.