The Influence of Jaw Clenching with a Self-Adapted Performance Mouthpiece on Bat Swing Velocity in Division II Baseball and Softball Athletes

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Introduction

Bat swing velocity (BSV) is an important component of successful hitting in baseball and softball. Implementing strategies to improve BSV may positively influence hitting performance. Maximal jaw clenching has been demonstrated as an effective ergogenic strategy to enhance muscular force production characteristics. Commercially available performance mouthpieces (MP) claim to enhance athletic performance. However, due to the assortment of MP products available, those claims remain unsubstantiated. Additionally, the combined effect of maximal jaw clenching while wearing a MP is also unknown.

Purpose

The purpose of this study was to examine the effects of jaw clenching in combination with a performance MP on BSV in collegiate baseball and softball athletes.

Methods

Eight softball (age 19.88 ± 0.78 years; height 165.0 ± 5.61 cm; mass 65. 54 ± 12.52 kg) and six baseball (age 19.33 ± 0.75 years; height 179.83 ± 1.67 cm; mass 85.08 ± 7.29 kg) athletes volunteered as participants in this research. First, participants were fitted with the AIRWAAV™ performance MP according to manufacturer specifications. A one-week MP familiarization period in which athletes wore the MP for all sport and conditioning activities preceded data collection. Prior to data collection, participants completed their normal in-game at-bat warm-up routine. Following the warmup, participants executed five maximal effort swings targeting a ball on a tee for each of four experimental conditions: MP + Clench, MP Only, Clench Only, and Control (jaw relaxed and no MP). Experimental conditions were counterbalanced between participants to account for possible order effects. A 30-second rest period separated each swing attempt, and a 2-minute rest period separated each experimental condition. BSV was recorded using an inertial measurement unit (Zepp Sensor, Zepp Labs, Inc.), which was recalibrated between each experimental condition and between athletes (see Figure 1 for example sensor output).

Methods Continued

All recorded trials for each condition were averaged for analysis. With an a priori alpha level of $p \leq 0.05$, a 2x2 (MP x clench) repeated measures ANOVA was used to determine differences between BSV for each experimental condition. Significant main effects were analyzed through pairwise comparisons with Bonferroni correction.

Bat Swing Velocity (mph)

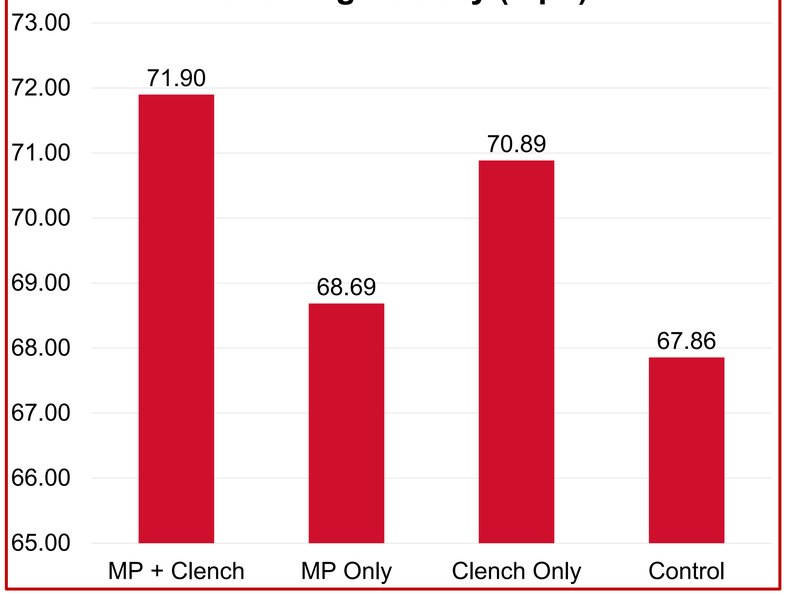

Table 1: Mean BSV across experimental conditions.

Results

Average BSV across the four experimental conditions are presented in Table 1. There was a statistically significant main effect for jaw clenching which led to increased BSV ($p < 0.001$). There was no significant effect for the MP condition and no MP x clench interaction. Average BSV during jaw-clenched conditions was 71.39mph compared to an average of 68.27mph during jaw-relaxed conditions. Jaw clenching, either alone or with the MP, led to increased BSV in 13 of 14 participants. Jaw clenching in combination with the MP led to greater BSV (71.9mph) compared to clenching alone (70.89mph) but this difference was not statistically significant.

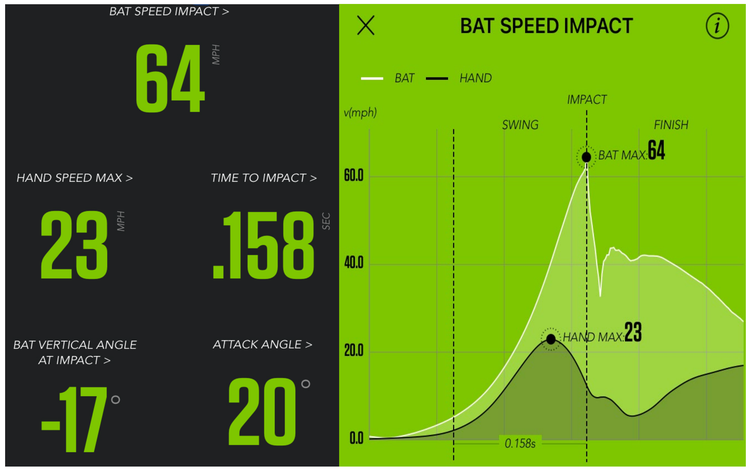

Figure 1: Sample inertial measurement unit data visuals.

Conclusions

Maximal jaw clenching provides an effective ergogenic strategy to improve BSV in NCAA Division II baseball and softball athletes. Using a MP to facilitate jaw clenching could possibly provide additional ergogenic effects.

Practical Application

Baseball and softball athletes desiring to enhance hitting performance outcomes should maximally clench their jaw during the swing. To account for potential individual variability athletes should assess performance with and without a MP to determine which strategy is appropriate for them.

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