THE EFFECT OF A COMPETITIVE SEASON ON JUMP PERFORMANCE MEASURES IN STARTER V. NON-STARTERS IN FEMALE DIVISION 1 VOLLEYBALL ATHLETES

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Purpose

The purpose of the study was to examine the influence of fatigue in starters vs. non-starters over the course of a volleyball season on modified-reactive strength index, Jump height, Relative peak power, and Vertical velocity at takeoff.

Methods

Participants: Fourteen NCAA Division 1 volleyball athletes (Starters: n= 7 vs Non-Starters: n = 7) completed volunteered to complete 14 testing sessions over the course of the season (4 months).

Study Design: The athletes completed 3 maximal countermovement jumps (CMJ) on a set of bilateral force plates within 2-3 days post-completion of the weekend series (3 games over 2 days). All jumps occurred at approximately (± 1 hr) the same time of day before the strength and conditioning sessions. Athletes were instructed to jump as high as possible and get off the ground as quickly as possible while using their arms. Athletes were given 10 seconds of rest between jumps. The average of the three maximal CMJs were collected.

Jumping Variables:

- Jump height (JH; in) - The athlete's JH was calculated using flight time and converted to inches.
- Relative peak power (rPP; W) - The rPP was calculated as the power the athlete produced during the jump normalized to the athlete's body weight (kgs).
- Vertical velocity at takeoff (m·s) - VVT was calculated as the highest velocity achieved once the athlete's feet left the force plate.
- Modified-reactive strength index (m-RSI) - The m-RSI was determined as the ratio between jump height (cm) and time to takeoff (s).

Statistical Analysis: Bayesian generalized linear models with Markov Chain Monte Carlo (MCMC) estimation were used for data analysis using the *MCMCglmm* package in R version 4.2.2. Reported parameter estimates include the posterior mean and the 95% credible intervals (CI). Parameter estimates were interpreted as statistically significant if the 95% credible intervals did not include zero and pMCMC values calculated in *MCMCglmm* were less than 0.05. Percent decline was evaluated from pre-post testing for each variable.

Results

There were no significant interactions or main effects for m-RSI or vertical velocity at takeoff ($p > 0.05$). For JH and rPP, no significant interaction effects were observed when looking at starting status across sessions (Figure 2 and 3). However, a main effect for session in JH (Pre-season: 13.27 ± 4.04 in vs. Post-season: 9.60 ± 1.97 in, % decline = 28%, b = -0.23 [95% CI: -0.31, -0.16], $p \leq 0.001$) and rPP (Pre-season: 52.89 ± 8.38 W vs. Post-season: 38.24 ± 15.09 W, % decline = 28%, b = -0.74 [95% CI: -1.27, -0.23], $p = 0.004$).

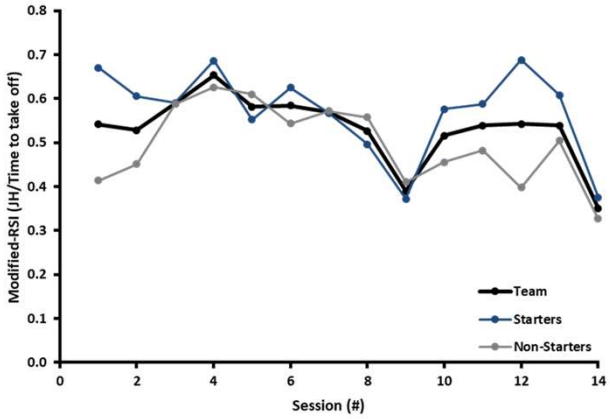

Figure 1. Average modified-reactive strength index (m-RSI) differences in non-starters (gray) and starters (blue) over the course of 14 training sessions. Average team (**black**) differences display the average m-RSI of combined starter and non-starters.

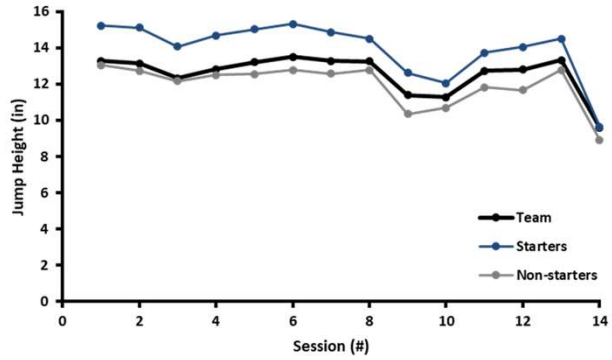

Figure 2. Average jump heigh (JH) differences of three countermovement jumps in non-starters (gray) and starters (blue) over the course of 14 training sessions. Average team (**black**) differences display the average jump height of combined starters and non-starters.

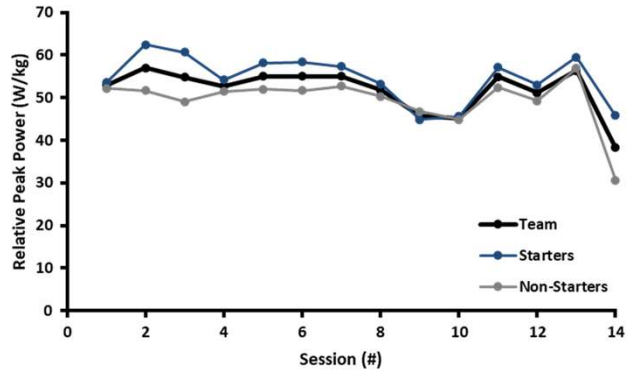

Figure 3. Average relative peak power (rPP) differences in non-starters (gray) and starters (blue) over the course of 14 training sessions. Average team (**black**) differences display the average rPP of combined starters and non-starters.

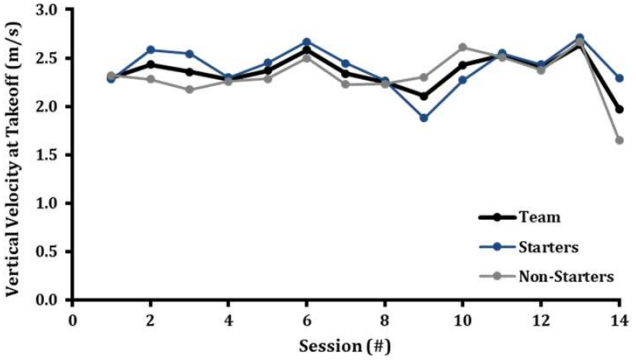

Figure 4. Average vertical velocity at takeoff (VVT) differences in non-starters (gray) and starters (blue) over the course of 14 training sessions. Average team (**black**) differences display the average VVT of combined starters and nonstarters.

Conclusions

The main effects for testing session suggests a small decline in jump height and relative peak power over the course of the season. These data suggest that playing status did not influence fatigue over the course of the season. Jump volume throughout the season may play an important role in performance.

Practical Applications

Practitioners and strength and conditioning professionals can use these data to optimize resistance exercise or practice intensity to maintain performance across a competitive volleyball season.