Optimal Ranges of Training Load and Recovery Status Prior to the Game to Maximize Game-day Performance in Soccer

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ABSTRACT

Identifying ideal ranges of training load (TL) and recovery status before soccer games is essential to maximize game-day performance. **PURPOSE**: To determine how accumulative TL and subjective fatigue affect performance during the game. **METHODS**: Twenty-one male semi-professional soccer players (mean ± standard deviation; age: 22 ± 2 years; mass: 77.3 ± 6.9 kg) wore a player tracking device to monitor TL during each practice and game. A 7-day accumulation of high speed running and sprinting (HSR+Sprint, $\geq$12.30 mph), total distance (TD), low acceleration (Low_{ACC}: 0.50-1.99 $m \cdot s^{-2}$), and high acceleration ($High_{ACC}$: 2.00-50.00 $m \cdot s^{-2}$) was calculated. Also, 7-day average fatigue and pre-game fatigue was monitored using a 0 to 10 Likert scale. Game-day performance was defined as the percent changes in average HR and velocity between 1st and 2nd halves. Standard least square regression analysis was performed to determine if TL metrics and fatigue predicted game-day performance. Then, a predictive modeling decision tree was used to establish optimal ranges for each variable and corresponding probability of positive game-day performance. **RESULTS**: TD, Low_{ACC}, $High_{ACC}$, HSR+Sprint, and game-day fatigue predicted game-day performance in HR ($p<0.05$). Players covering a TD between 10.3 $\leq$ 17.4 miles within 7 days prior to the game had an 83% probability of maintaining HR in the 2nd half compared to 1st half. Similarly, achieving Low_{ACC} between 0.8 $\leq$ 1.6 miles and $High_{ACC}$ between 0.1 $\leq$ 0.2 miles had a 74% and 82% probability maintaining performance in the 2nd half. Additionally, HSR+Sprint between 0.1 $\leq$ 0.9 miles in practice had a 77% probability and game-day fatigue within 2-4 (small-somewhat fatigued) had an 80% probability. For velocity, TD, Low_{ACC}, $High_{ACC}$, and 7-day average fatigue predicted game-day performance ($p<0.05$). Players that covered TD < 10.6 miles had a 78% probability of maintaining velocity in the 2nd half. **CONCLUSION**: In order to achieve better game-day performance, players need to follow the designated ranges of TL, specifically for TD, Low_{ACC}, $High_{ACC}$, and HSR+Sprint. Also, maintaining low levels of fatigue can lead to better game-day performance. Based on these findings, coaches can create individualized training and recovery plans for their players during practice to optimize performance in the game.