

Effect of 3-week progressive overloading and 1-week tapering on performance, internal training load, stress tolerance and heart rate variability in under-19 Brazilian badminton players

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Summary

Objective: This study aimed to determine the effect of 3-week progressive overloading and 1-week tapering during a pre-season on performance, internal training load, stress tolerance, and heart rate variability in under-19 Brazilian badminton players.

Material and method: Eight male under-19 badminton players (age 16.1 ± 0.6 years; height 1.68 ± 7.7 m; body mass 57.2 ± 5.8 kg; body mass index 20.3 ± 2.5 kg·m⁻²; body fat 8.0 ± 2.7 %), competing at the state level had physical and physiological monitored over four weeks during pre-season. Players underwent a badminton-specific movement agility test, 5-m multiple shuttle test, Yo-Yo Intermittent Recovery test level 1, and performed vertical jumps before and after the pre-season. During the training, the heart rate variability and internal training load were monitored daily, and weekly were stress tolerance was recorded by psychometric responses.

Results: The players showed significant improvements in all performance variables assessed after the training period. The internal training load during overloading was higher (1635 ± 109.9 ; 2490 ± 124 ; 2850 ± 210 AU) compared to tapering (1335 ± 100 AU). The stress tolerance decreased during overloading (4.0 ± 0.7 ; 8.2 ± 1.3 ; 10.1 ± 1.4) and increased during tapering (5.5 ± 1.5). In addition, higher internal training load during overloading resulted in a greater reduction in root-mean-square difference of successive R-R intervals (lnRMSSDmean) (4.2 ± 0.2 ; 4.1 ± 0.1 ; 4.0 ± 0.1 ms) and a smaller coefficient of variation (lnRMSSDcv) (4.5 ± 2.6 ; 2.1 ± 1.2 ; 1.4 ± 0.9 %), and the significant reduction in the internal training load during tapering led to a decrease in lnRMSSDmean (1.3 ± 0.5 ms).

Conclusions: Our results suggest that using badminton training programs during the pre-season, including intermittent high-intensity actions with progressive overloading followed by a tapering is sufficient to result in positive adaptations in performance and led to adaptative changes in internal training load, stress tolerance, and heart rate variability.

Key words:

Performance. Autonomic nervous system. Periodization. Monitoring.

Efecto de la sobrecarga progresiva de 3 semanas y la reducción gradual de 1 semana sobre el rendimiento, la carga de entrenamiento interno, la tolerancia al estrés y la variabilidad de la frecuencia cardíaca en jugadores brasileños de Bádminton menores de 19 años

Resumen

Objetivo: Este estudio tuvo como objetivo determinar el efecto de la sobrecarga progresiva de 3 semanas y la reducción gradual de 1 semana durante una pretemporada sobre el rendimiento, la carga de entrenamiento interno, la tolerancia al estrés y la variabilidad de la frecuencia cardíaca en jugadores de bádminton brasileños menores de 19 años.

Material y método: Ocho jugadores masculinos de bádminton sub-19 (edad $16,1 \pm 0,6$ años; altura $1,68 \pm 7,7$ m; masa corporal $57,2 \pm 5,8$ kg; índice de masa corporal $20,3 \pm 2,5$ kg·m⁻²; grasa corporal $8,0 \pm 2,7$ %), que competían a nivel estatal fueron monitoreados en sus aspectos físicos y fisiológicos durante cuatro semanas en la pretemporada. Los jugadores realizaron un test de agilidad específico de bádminton, el test 5-m multiple shuttle test, el test Yo-Yo y realizaron saltos verticales antes y después de la pretemporada. Durante el entrenamiento, se monitoreó diariamente la variabilidad de la frecuencia cardíaca y la carga interna de entrenamiento. Además, semanalmente se registró la tolerancia al estrés mediante respuestas psicométricas.

Resultados: Los jugadores mostraron mejoras significativas en todas las variables de rendimiento evaluadas después del período de entrenamiento. La carga de entrenamiento interna durante la sobrecarga fue más grande ($1.635 \pm 109,9$; 2.490

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