Effectiveness of sleep-enhancing strategies during taper: Impact on performance in elite swimmers with acute and high fatigue levels

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Résumé

Introduction

In swimming, tapering is implemented before major competitions to enhance performance. However, its effectiveness varies depending on the athlete's pre-taper fatigue level. While tapering increases performance in swimmers with acute fatigue (+1.8 ± 1.4%), it is less effective or ineffective for those with high accumulated fatigue (-0.5 ± 1.6%, $p < 0.05$ vs acute fatigue; Bretonneau et al., 2024). Given the critical role of sleep in recovery, we aimed to evaluate the combined effects of tapering and sleep-enhancing strategies on performance in elite swimmers with acute and high fatigue levels.

Materials and method

Physiological, psychological, and biomechanical profiles were assessed in 27 elite swimmers at T0 and T1, scheduled respectively 10 and 3 weeks before their major competition. Sleep profile was evaluated at T0, T1, and throughout the subsequent two taper weeks. External training load was monitored daily. Race times were officially recorded at T1 and during the major competition. Between T0 and T1, athletes participated in a sleep education program (Pasquier et al., 2023). During tapering, they slept on a high-thermal-conductivity mattress topper and underwent daily cryostimulation (3 min) or contrast baths (28 min) during the first week.

Results

Based on changes in physiological, psychological, and biomechanical profiles from T0 to T1, 13 swimmers (17±2 years old; best performance: 88±3% of the world record) exhibited acute fatigue (AF), and 14 swimmers (17±2 years old; best performance: 89±3% of the world record) demonstrated functional overreaching (F-OR). External training load did not differ between groups. Taper-induced changes in performance were +1.2 ± 1.6% in the AF group and +0.4 ± 2.3% in the F-OR group ($p > 0.05$). Notably, 82% of athletes in the AF group and 67% in the F-OR group showed a performance improvement exceeding 0.5% ($p > 0.05$). These changes in performance were positively correlated with changes in total sleep time

*Intervenant

from T0 to T1 and, specifically in the F-OR group, with the average sleep duration during tapering.

Discussion

In overreached swimmers, the combination of tapering and sleep-enhancing strategies resulted in a 0.4% performance improvement, whereas tapering alone was associated with a 0.5% decline (Bretonneau et al., 2024), thereby mitigating the previously observed disparity in tapering benefits between AF and F-OR swimmers. Furthermore, in the current study, 67% of F-OR swimmers achieved a performance gain exceeding 0.5% (the smallest meaningful enhancement impacting final rankings), compared to 50% with tapering alone (Bretonneau et al., 2024). Finally, taper-induced changes in performance observed in this study were linked to changes in sleep duration before tapering. Interestingly, it was also linked to average sleep duration during tapering in F-OR swimmers. These findings highlight the importance of assessing and optimizing sleep before and during tapering, especially in overreached swimmers, to achieve peak performance.

References

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