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Effect of the pre-taper level of fatigue on the taper-induced change in performance in elite swimmers

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INTRODUCTION:

In swimming, a taper period is usually planned before major competitions to reach a peak performance. The pre-taper level of fatigue is a key factor to consider in the individualization of taper strategy. If parameters that condition the pre-taper level of fatigue are little known, sleep appears to play a key role due to the recovery processes activated during this phase. Thus, the aims of this study were 1) to assess the effect of taper on performance according to the pre-taper level of fatigue in elite swimmers and 2) to evaluate the role of sleep on the pre-taper level of fatigue.

METHODS:

Physiological, psychological, biomechanical and sleep profiles were evaluated in 26 elite swimmers on 2 occasions: T0 and T1, scheduled respectively 10 and 3 weeks before their major competition. External training load was assessed on a daily basis. Race time was assessed during three official competitions (at T0 and T1 during intermediate competitions, and at the end of the protocol during the major competition).

RESULTS:

Considering changes in physiological, psychological and biomechanical profiles between T0 and T1, 14 swimmers ($17\pm 2y$; $1.8\pm 0.1m$; $63\pm 11kg$; best performance in % world record: $88\pm 3\%$) were allocated to acute fatigue group (AF) and 12 swimmers ($18\pm 2y$; $1.7\pm 0.1m$; $67\pm 10kg$; best performance: $89.5\pm 2.6\%$) to functional overreaching group (F-OR). External training load before and during the taper was not different between groups, as well as the change in race time from T0 to T1. In contrast, the race time was lower in competition than at T1 in AF ($-1.80\pm 1.36\%$), while it was higher in F-OR ($+0.49\pm 1.58\%$, $p<0.05$ vs AF). Before taper, total sleep time was lower in F-OR, as compared to AF. Conversely, the fragmentation index was higher in F-OR ($p=.06$). From wakefulness to sleep, the internal temperature decreased in AF but not in F-OR. The minimum temperature during sleep was significantly lower in AF than in F-OR.

CONCLUSION:

As compared to swimmers with acute fatigue, pre-taper sleep was poorer in overreached swimmers, which could contribute to their different response to the same training load. This poorer sleep could be linked to a lower regulation of the internal temperature before and during sleep. Moreover, the decrease in training load during the taper was not high enough to observe a gain in performance in overreached swimmers, probably due to excessive cumulated fatigue.

Thus, it could be interesting to evaluate and improve, if necessary, the sleep of swimmers before the overload period, in order to prevent overreaching. In this way, techniques that aim to improve sleep by acting on body temperature, such as cryostimulation, cold water immersion or specific mattresses, could be relevant. Also, it could be interesting for overreached swimmers to extend the use of these techniques during the taper period to further reduce their level of fatigue and, a fortiori, to observe a gain in performance during the competition.

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