TRAINING LOAD IN ACTUAL HIGH PERFORMANCE TRIATHLON

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Introduction

Performance in actual triathlon is more spectacular each Olympic cycle. In recent decades, athletes, coaches, and sport scientists have been keen to find creative new methods to improve the training quality and quantity for athletes (Kellmann, 2010). In this way, Millet et al. (2002) found cross transfer training effects between cycling training and running performance in elite triathletes too, but a similar cross-training effect does not seem to happen in swimming performance. In addition, training loads completed in running were shown to have a greater effect on performance in triathlon competition (Millet et al., 2002). Palazzetti and Margaritis (2003) did not found dependence relationship between overtraining in triathletes and training load volume as it has been proposed for endurance running (Lehmann M., et al. 1992). Thereby, Coutts et al., (2007) proposed tools to prevent overtraining and to detect neuromuscular fatigue in athletes. In reference to taper, Mujika (2011) shows that performance improvement during the taper was highly sensitive to the reduction in training volume. The present study tries to collect information about actual elite triathletes training load and study the training load evolution in season.

Methods

A total of 83 triathletes (44 men, 39 women), participants in world cup events or world championship series, were involved in this study. 25 elite coaches from 20 different countries (five continents) filled a questionnaire about training load in each triathlon leg during each phase of season.

Table 1. Age and experience

	Men *N=44*	Women *N=39*
Age (years)	24.8 ± 3.0	26.0 ± 4.0
Experience (years)	7.8 ± 3.4	7.0 ± 2.6

Means and Standard Deviations were calculated. Pearson correlation coefficients were used. Different between season phases were compared by an analysis of variance (ANOVA) for repeated measures. Changes at a value of $P<0.05$ were considered to be significant.

Results

There were no differences between men and women nor on the average nor on the maximum volume per week, as well as neither in the average and maximum sessions number per week in swimming, cycling and running. In addition, we found a positive and significant relationship in maximum training volume between swim, bike and run training ($r > 0.700$; $p < 0.001$).

Comparing usual to maximal triathlon training volume, this is increased by 71% in swimming, 53.2% in cycling and 35.9% in running in men, and by 66.5%, 58.2% and 31.6% in swimming, cycling and running respectively in women (*fig. 1, 2 and 3)*.

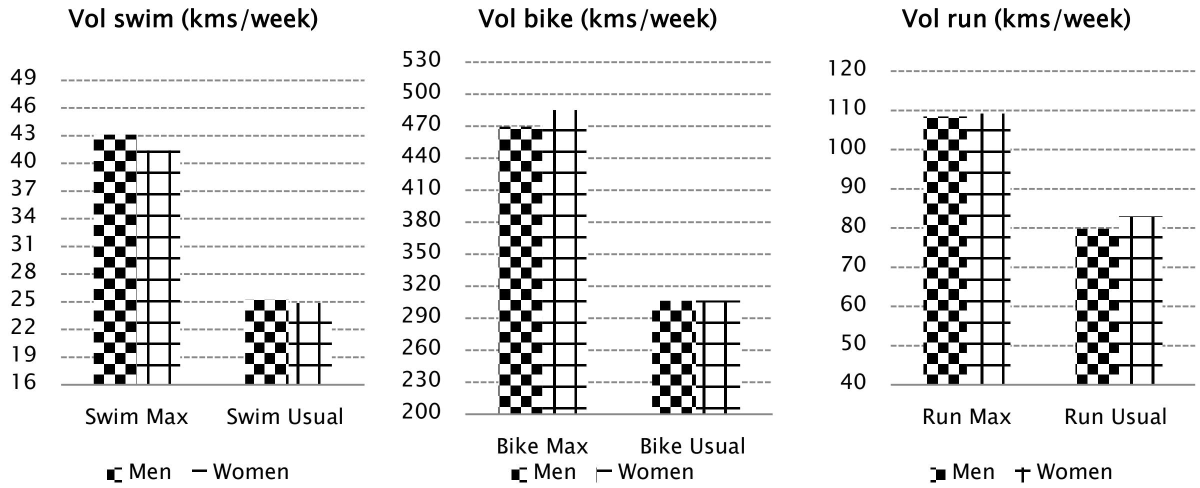

Fig. 1, 2 and 3. Maximal and usual swim, bike and run triathlon training volume per week.

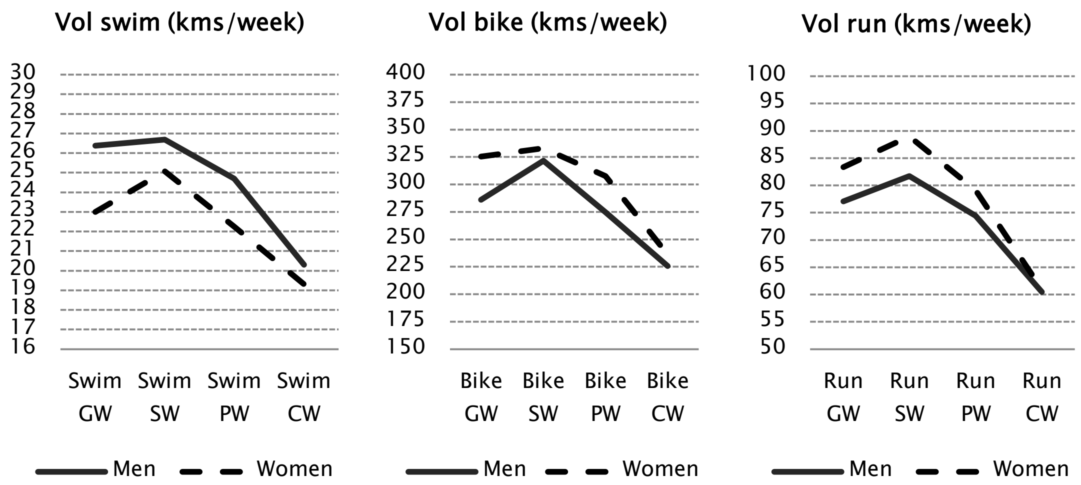

Fig. 4, 5 and 6. Average swim, bike and run triathlon training volume per week in each phase of season (GW: general week; SW: specific week; PW: precompetitive week; CW: competition week)

Elite men and women triathletes changes swimming, cycling and running training volume and sessions at each stage of the season or macrocycle ($p<0.05$), being lower in PW and CW and higher in SW. It's been observed a volume increase trend in cycling and running SW phase, near to significant difference with a GW in men, not in women. Comparing SW to CW, the volume is reduced by 23.9% in swimming, 29.8% cycling and 26% running in men and by 23%, 29.1% and 31.5% in swimming, cycling and running respectively in women (*fig. 4, 5 and 6)*.

The number of cycling sessions were significantly lower at the early season (GW) than in SW and PW phases in men ($p<0.05$) and women ($p<0.01$), but not than in CW phase. Besides, the number of run sessions per week was significantly lower too in GW than SW ($p<0.05$) in men *(fig. 6)*.

The number of power work sessions was significantly different between the season phases. This differences were between the GW and SW training phases with PW and CW phases in men ($p<0.05$); and between GW and SW phases in women, developing more power sessions in SW ($p<0.01$) (*fig. 7)*.

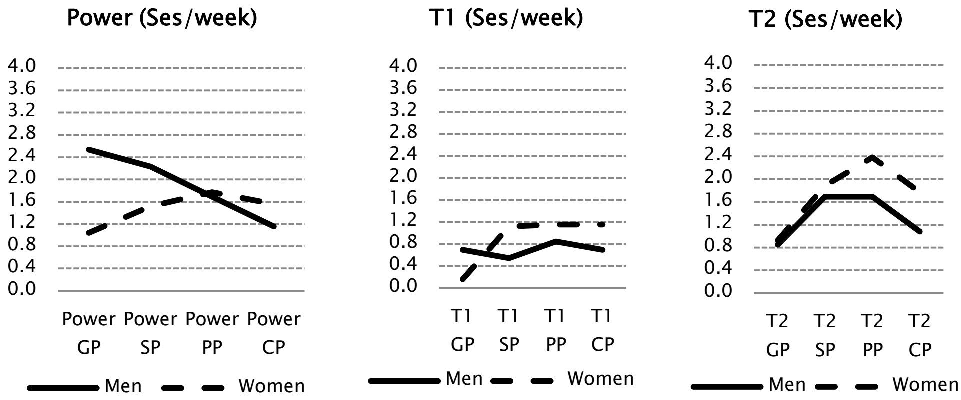

Fig. 7, 8 and 9. Power, T1 and T2 triathlon training sessions per week in each phase of season (GW, SW, PW and CW)

No significant differences were found between Transition 1 (T1) training sessions in the different phases of season in men triathletes. However, we found significant differences in women between GW and other training phases (SW, PW, CW), being lower or almost not existent the number of T1 sessions at the start of the macrocycle ($p<0.001$). Nevertheless, the number of sessions of Transition 2 (T2) training was significantly different in men and women elite triathletes when we compared CW or GW to SW and PW, being higher in SW and PW in men ($p < 0.05$) and in PW in women ($p<0.001$) *(fig. 8 and 9).*

Discussion/conclusion

Most triathletes begin the season with low volumes and number of cycling and running sessions. The increase in the work volume goes from the initial phase to the specific preparation phase. This increase in volume is achieved by increasing the number of sessions too. At the pre-competitive phase triathletes reduces training volume but not the number of sessions. Run foot is the leg with highest number of sessions during this phase, according to Millet et al. (2002) and the running performance importance in triathlon competition.

Regarding transitions training in actual triathlon, there is no consensus yet in T1 develop in men and women, caused by the high coefficient of variation obtained in the number of sessions with this goal in each season phase. However, the time in the season to develop more T2 sessions begins to be more defined, carried on in specific and pre-competitive phases, both men and women. Besides, men and women perform T2 sessions already at the early season.

Acknowledgements

To the International Triathlon Union (ITU) who send the questionnaire to National Triathlon Federations and another special acknowledgement to all technical, coaches and triathletes participants in this study.

References

1. Coutts A.J., Slattery K.M., Wallace L.K. (2007). Practical tests for monitoring performance, fatigue and recovery in triathletes. *Journal of Science and Medicine in Sport*. Volume 10, Issue 6, December 2007, Pages 372-381.
2. Kellmann, M. (2010). Preventing overtraining in athletes in high-intensity sports and stress/recovery monitoring. *Scand J Med Sci Sports*: 20 (Suppl. 2): 95–102.
3. Lehmann, M., Baumgartl, P., Wiesenack, C., Seidel, A., Baumann, H., Fischer, S., Spori, U., Gendrisch, G., Kaminski, R., Keul, J. (2002). Training-overtraining: influence of a defined increase in training volume vs training intensity on performance, catecholamines and some metabolic parameters in experienced middle- and long-distance runners. *Eur.J.Appl.Physiol*: 64:169-177.
4. Margaritis I, Palazzetti S, Rousseau AS, Richard MJ, Favier A. (2003). Antioxidant supplementation and tapering exercise improve exercise-induced antioxidant response. *Journal of the American College of Nutrition*, Vol. 22, No. 2, 147–156.
5. Millet, G. P., Candau, R.B., Barbier, B., Busso, T., Rouillon, J.D., Chatard J.C. (2002). Modelling the transfers of training effects on performance in elite triathletes. *Int J Sports Med*; 23: 55–63.
6. Mujika, I. (2011). Tapering for triathlon competition. *Journal of Human Sport and Exercise*. Vol. 6, No. 2; pp. 264-270
7. Palazzetti, S., Margaritis, I. (2003). Does overtraining occur in triathletes?. *Biology of Sport*. Vol. 20 (2):139-146.