WORKLOAD, SALIVARY IGA AND UPPER RESPIRATORY TRACT INFECTIONS DURING TWO SUCCESSIVE WEEKS OF DIFFERENT TRAINING DYNAMIC IN PORTUGUESE ELITE SWIMMERS.

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Abstract

The repercussion of training workloads on the immunity system has been the subject of some research with a large number of papers monitoring the immunity status on cycles of accumulated training load. The suppression of immunity associated with low levels of salivary IgA (sIgA) seems to be related with intense training. On the other hand moderate exercise seems to induce higher values of sIgA. A relationship between Upper Respiratory Track of Infections (URTI) and low sIgA levels has also been reported. The aim of this study was to control the sIgA values of a group of elite Portuguese swimmers during two weeks of different training dynamic. The first week was an intensive microcycle with high workload while the second one was of relative recovery. This is a case study due to the small sample number (4 elite swimmers and 5 control coaches). For sIgA levels determination, saliva samples were taken daily before and after scheduled practices. Both the training load and the URTI episodes were recorded daily in a logbook. The overall sIgA values showed an inverse behaviour to that of the training load volume and intensity. It was observed that not all the swimmers obey to same pattern for daily sIgA levels. Two of them showed low levels before the training sessions and the other two exhibited low levels after. At the end of the recovery week all swimmers showed an increment on sIgA levels. The athlete with the lowest level of sIgA in the beginning on the first day of this study had the higher number of URTI episodes during the four weeks that were monitored while the swimmer with the higher level of sIgA had the lowest number of URTI episodes. In conclusion, sIgA levels seem to be influenced by training load. In all the cases studied a relationship between low sIgA levels and the predisposition to URTI episodes seems to occur. The daily levels of sIgA reveal an individual response that is probably based on the individual capacity of adaptation to training.

Introduction

The influence of training load on the immunity status has been the subject of some research in different environments of sporting participation (Gleeson et al 2000, MacKinnon 1997, 2000, Neiman 2000, Pyne et al 2000, 2001). The immunity parameter most commonly used in these studies was the salivary IgA (sIgA) level. In swimming immune suppression with low values of salivary IgA associated with intense training has been reported (3,7,8) contrasting with an increment of IgA levels associated with moderate exercise (Gleeson et al 2000, MacKinnon 1997, 2000, Pyne et al 2001). Some research related to susceptibility to URTI episodes and IgA levels assume that high numbers of URTI episodes seem to be associated with low levels of salivary IgA. The aim of our study was to follow the daily variation of salivary IgA levels, before and after the training sessions, and to monitor the occurrence of URTI episodes during two weeks of different training dynamics within a group of Portuguese elite swimmers.

Methods

Since the experimental group was relatively small, it is assumed that this project is a case study. Four elite Portuguese male swimmers were studied during two weeks of different training dynamics. During the first week the athletes were subjected to intense training with a morning and afternoon session. The second week was a recovery week with lower intensity training and only one session a day. The training load was assessed by the total volume and the meters swam in each intensity zone (Mujika and al 1995 Chatard and Mujika, 1999) who result on arbitrary unities of load [a.u.l. = *å (partial volume x stress index) / total volume)*.To ensure the same exposure to environmental conditions and pathogens a control group of five swimming coaches was also studied. In order to assess the immunity status, saliva samples were collected daily, before any food intake and 15 min after training sessions by scheweing a polyester swab for 1 min (Salivette, Sarstedt, Portugal). Salivary IgA concentrations were determined by nephelometry (BN2 Analyser, Dade Behring, USA). Total saliva protein was determined by UV spetrofomometry (6105 UV/Vis Spectrophotometer, Jenway, UK) Symptoms characteristics of upper respiratory infections like sore throat, runny nose and cough not related to allergies, were controlled daily during this period and in the following two weeks of the study.

Results

As shown in table1, the volume and intensity of the training load of the first (intensive) week were higher than those of the second (recovery) week.

Table1 – Workload volume (km) and intensity (a.u,l) on two microcycles of the four subjects (A to D)

Subjects	Vol mc1 (Km)	Int mc1 (a.u.l.)	Vol mc2 (Km)	Int mc2 (a.u.l.)
A	37.9	20.53	29.85	12.94
B	47.85	22.25	30.4	13.17
C	46.85	20.25	24.7	10.98
D	44.35	18.2	33.25	15.34

The overall sIgA values assume an inverse behaviour than that of the training load – sIgA levels decrease as volume and intensity increase (Fig.1). On the second day the athletes were subjected to a very intense training session (aerobic threshold), with subjects A and C lowering their sIgA values after the training session. In subject B although his sIgA levels increase after training they are lower than the ones from the previous day. On the 3rd day a very high anaerobic load was applied (near lactic tolerance). This maintains a suppressor effect on the sIgA but the post training values are still higher than the morning ones. During the 4th day another important intense aerobic training load was applied (aerobic threshold) which maintains the sIgA values low and decreases the post training ones. The high values of sIgA from day 6 were obtained after the week end during which no training sessions were performed. On the intensive week all swimmers show a wider range of sIgA levels then during the recovery week.

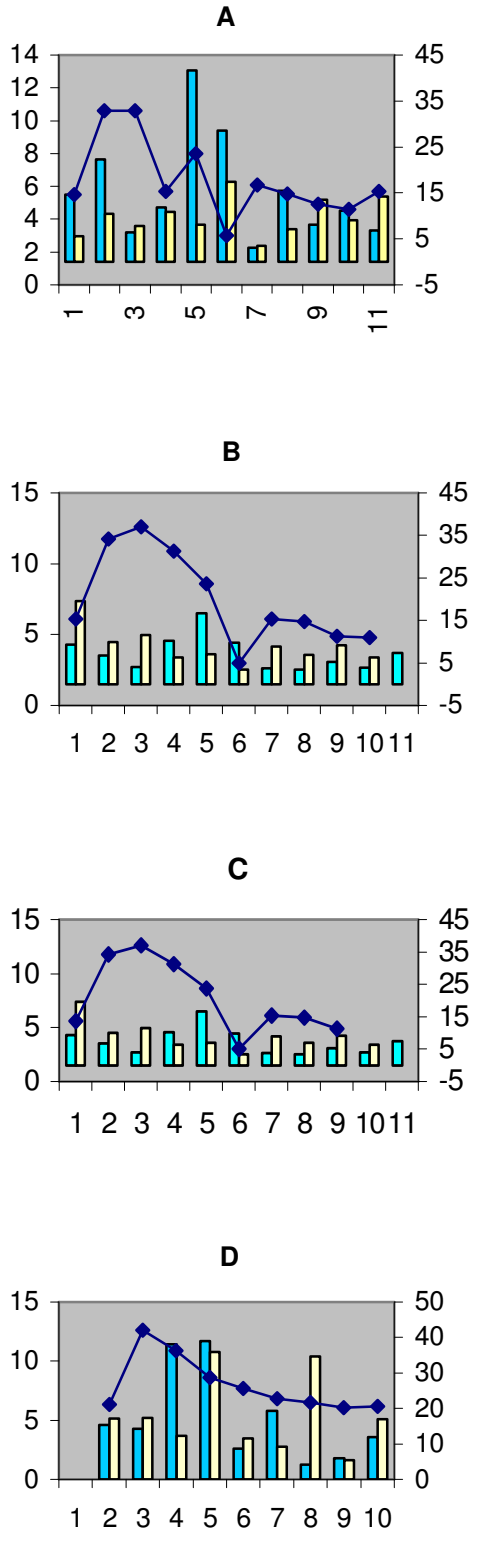

Fig.1- Volume workload (Km) and sIgA (mg.dl-1) before and after daily training sessions on the intense and recovery microcycles of the four subjects (A to D).

When we analyse the daily variation of sIgA values (Fig.1) we find two different behaviours: During most of the days, one of the swimmers (A) shows high morning values and the other three high levels after night training sessions. This tendency is confirmed by the median morning and after training sIgA and relative sIgA values.
At the end of the recovery week, all the swimmers show levels of sIgA similar to those of the beginning of the study reflecting the reduction of the training load (Table 2).
Initial sIgA and relative values for the control group were similar to the athlete's group (Table3). Slightly lower values were found for the intermediate and final periods.
There seems to exist a training load accumulation effect on the sIgA values decreasing them. This effect is observed after 2 or 3 high volume and intensity training sessions (Fig.1). However this effect is not reached at the same time by all the athletes what may indicate different adaptation capacity to the training load by each athlete.When looking at all the sIgA levels observed in this study, the swimmers show greater amplitude values when compared to the control group.
Regarding the URTI data, we found that the swimmer that exhibited the lower level of sIgA in the beginning of the study was the one that had the higher number of days with symptoms of URTI (Table 2). The control group didn't report any episodes or symptoms of URTI either during the study or in the following two weeks.

Discussion/Conclusion

Usually the swimmers showed little daily variation of sIgA levels when we compare the levels before and after training sessions specially during the week of intense training load. Susceptibility to URTI also seemed to be associated with low levels of sIgA, with the swimmers that presented higher levels in the beginning of the study being the least susceptible. sIgA levels appear to be related to the training status and capacity adaptation of the athletes and may be useful to assess the recovery level of swimmers with some athletes recovering faster than others.

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