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Research article

Evidence of a Non-Linear Dose-Response Relationship between Training Load and Stress Markers in Elite Female Futsal Players

Vinicius F. Milanez[1], Solange P. Ramos[1], Nilo M. Okuno[2], Daniel A. Boullosa[3], Fabio Y. Nakamura[1],

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ABSTRACT

The aim of this study was: to describe typical training load (TL) carried out by a professional female futsal team for a period of 5 weeks; and to verify the relationship between TL, stress symptoms, salivary secretory immunoglobulin A (SIgA) levels, and symptoms of upper respiratory infections (URI). Over 45 sessions, the TL of the athletes was monitored daily by means of session-RPE method during the in-season period prior to the main national competition. Stress symptoms were measured weekly by means of the "Daily Analysis of Life Demands in Athletes Questionnaire" (DALDA), SIgA levels, and by symptoms of URI by the "Wisconsin Upper Respiratory Symptom Survey-21" (WURSS). There was a significant increase in TL, monotony, and training strain in week 3, with a concomitant and significant reduction in percentage variation (Δ%) of SIgA concentration and secretion rate ($p < 0.05$). Additionally, a second order regression model showed a high goodness of fit (R^2 = 0.64 - 0.89) between TL and strain with SIgA concentration, secretion rate, and "worse than normal" responses of stress symptoms from the questionnaire. In conclusion, a link between TL and SIgA levels, and stress symptoms in female futsal players was evident in a non linear fashion. There appears to be an optimal range of values of daily TL between ~343 and ~419 AU and strain between ~2639 and 3060 AU, because at levels below and above these values there was an increase in stress symptoms and above ~435 and ~3160 AU to TL and strain there

were a decrease in SIgA levels. In contrast, symptoms of URI failed to demonstrate relationship with the variables studied.

Key words: Team sports, mucosal immunity, psychometric measures, overtraining

Key Points

- There is a dose-response relationship between SIgA levels and stress symptoms with TL.
- For the athletes of the present study, values of ~436 AU and ~3161 AU to TL and strain training would be desirable because higher values would decrease responses of SIgA levels.
- An optimal range of values of TL between ~336 and ~412 AU to TL and ~2610 and ~3016 AU to strain training would be suggested for this group of athletes, since below and above these values increased responses of stress symptoms were observed.