ANTHROPOMETRY, PHYSIOLOGICAL MARKERS AND PHYSICAL PERFORMANCE UNDER CONTROL DURING AN AMATEUR FEMALE SOCCER PLAYERS´ PRESEASON

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INTRODUCTION

According to the periodization theory, preseason is the 1st phase on the training process. Preseason training lasts only 6-8 weeks in professional soccer teams, but it is a crucial period because players often return in a significant detrained state as a result of summer intermission period (Brito de Souza et al., 2017).

Adaptations to preseason training stimuli may not occur uniformly in all players. Individual features such as physical fitness, external load, age or body composition may determine the physiological stress athletes can withstand. That is why it is recommended to assess body composition, physical performance factors and several biological, hormonal and psychological markers to periodically monitor both daily training load and fatigue levels (Halson, 2014).

In spite of their practical importance, there is a lack of evidence about preseason changes in physical fitness and physiological markers of amateur female soccer players.

PURPOSE

To investigate the magnitude of changes in anthropometry, sprint ability and jump capacity, and physiological stress biomarkers among amateur female soccer players during the preseason.

METHODOLOGY

Sample

22 amateur female soccer players (23.68 ± 3.69 years) belonging to the same team participated voluntarily in this study

Variables

- Body mass (BM); body mass index (BMI); body fat percentage (BF%)
- Heart rate variability: logarithm of the root mean square of successive heartbeats interval differences (lnRMSSD), SD of all normal heartbeats intervals (SDNN), high and low frequency ratio (LF/HF)
- Salivary cortisol (C) and testosterone (T) concentrations
- 20 and 40-meter sprint and countermovement jump (CMJ)

Procedure

5 weeks. 3 training sessions (120' warm-up, physical fitness preparation, and technical and tactical practice) + 1 friendly match per week.

Microcycles are arranged for transition from high-volume and low-intensity workloads to high-intensity and low-volume workloads (Matveev, 1965).

Figure 1 shows the experimental design.

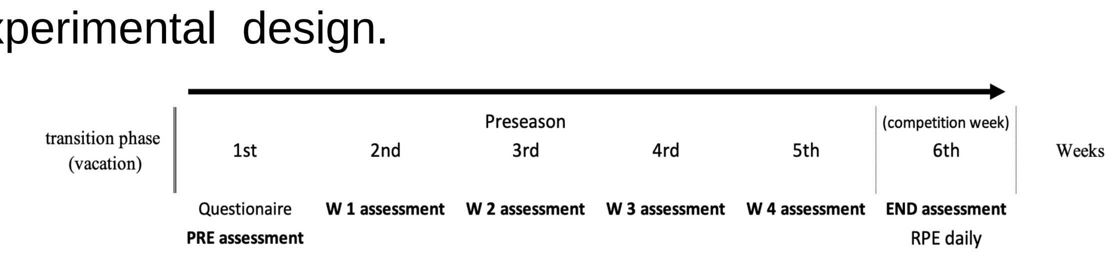

Figure 1. Experimental design. W, week; PRE, first assessment; END, final assessment; RPE, rate of perceived exertion.

Statistical Analyses

Effects related to the week load were assessed using one-way ANOVA (time) with repeated measures. When Wilks' Lambda indicated a significant F-value, Scheffe's post-hoc procedures were performed to determine pairwise differences. Partial eta squared (η^2_p) was computed. Statistical significance was set at $p < 0.05$.

RESULTS

In table 1:

- ✓ Wilks' Lambda indicated a significant F-value in all variables (except LF/HF)
- ✓ Scheffe's post-hoc procedures identified differences between PRE and all measurements in anthropometry variables, and between PRE and END in all variables (except LF/LH).
- ✓ We mainly found differences in the tendency to improve fitness level after the 5-week preseason training.

Table 1. Descriptive data for the variables in all measurements

Variables	PRE (Mean±SD)	Week 1 (Mean±SD)	Week 2 (Mean±SD)	Week 3 (Mean±SD)	Week 4 (Mean±SD)	END (Mean±SD)	Time F (η^2_p)
RPE (a.u.)	n/a	6.27 ± 0.76	7.54 ± 0.51	8.13 ± 0.56	8.00 ± 0.68	8.18 ± 0.50	1545.842* (0.989)
Anthropometry							
BM (kg)	67.18 ± 7.12	66.93 ± 7.09[a]	66.76 ± 6.97[b]	66.39 ± 6.85[c]	66.22 ± 6.70[d]	66.19 ± 6.56[e]	28.491* (0.576)
BMI (kg/m^2)	24.47 ± 1.86	24.38 ± 1.85[a]	24.32 ± 1.80[b]	24.19 ± 1.77[c]	24.13 ± 1.73[d]	24.12 ± 1.70[e]	32.092* (0.604)
BF (%)	26.80 ± 2.68	26.60 ± 2.60[a]	26.36 ± 2.55[b]	26.11 ± 2.63[c]	25.79 ± 2.51[d]	25.17 ± 2.40[e]	189.796* (0.918)
Heart Rate Variability							
lnRMSSD (ms)	4.59 ± 0.45	4.58 ± 0.42	4.52 ± 0.39	4.51 ± 0.39	4.42 ± 0.52	4.33 ± 0.42[e]	55.624* (0.766)
SDNN (ms)	83.55 ± 10.43	79.91 ± 8.20	76.12 ± 7.91[b]	75.21 ± 7.84[c]	72.08 ± 6.80[d]	68.66 ± 7.00[e]	58,220* (0.774)
LF/HF	0.86 ± 0.20	0.90 ± 0.21	0.91 ± 0.21	0.89 ± 0.20	0.87 ± 0.20	0.88 ± 0.21	0.762 (0.043)
Biomarkers							
C (nmol·L^{-1})	6.90 ± 1.40	6.99 ± 1.53	7.19 ± 1.57	8.15 ± 1.75[c]	9.68 ± 1.76[d]	10.29 ± 1.72[e]	344.406* (0.953)
T (nmol·L^{-1})	406.67 ± 48.20	451.24 ± 56.52[a]	491.18 ± 57.84[b]	540.31 ± 66.99[c]	630.26 ± 64.0[d]	651.85 ± 89.78[e]	1040.677* (0.984)
T/C (nmol)	18.03 ± 1.74	17.92 ± 1.53	17.71 ± 1.75	17.57 ± 1.70	17.10 ± 1.69[d]	16.74 ± 1.72[e]	15.287* (0.504)
Physical Capacities							
20-m (s)	3.47 ± 0.26	3.43 ± 0.25	3.44 ± 0.25	3.42 ± 0.26	3.38 ± 0.25[d]	3.32 ± 0.24[e]	30.642* (0.643)
40-m (s)	6.58 ± 0.51	6.50 ± 0.49[a]	6.48 ± 0.49	6.46 ± 0.57	6.39 ± 0.48[d]	6.31 ± 0.46[e]	30.540* (0.642)
CMJ (cm)	25.97 ± 1.92	26.20 ± 2.02[a]	26.42 ± 1.95[b]	26.67 ± 2.00[c]	27.78 ± 2.04[d]	28.28 ± 2.0[e]	444.950* (0.963)

* $p < 0.05$; PRE, first assessment; END, final assessment; RPE, rate of perceived exertion; a.u., arbitrary unit; n/a, not applicable; lnRMSSD, logarithm of the root mean square of successive heartbeats interval differences; SDNN, SD of all normal heartbeats intervals; LF/HF, high and low frequency ratio; BM, body mass; BMI, body mass index; BF, body fat; C, cortisol; T, testosterone; T/C, testosterone/cortisol ratio; 20-m, 20 m sprint; 40-m, 40 m sprint; CMJ, countermovement jump; Scheffe's post-hoc pairwise differences: [a]Week 1&PRE, [b]Week 2&PRE, [c]Week 3&PRE, [d]Week 4&PRE, [e]END&PRE.

CONCLUSIONS AND PRACTICAL APPLICATION

- ◉ A 5-week preseason training program in amateur female soccer players significantly decrease the anthropometric values (BM, BMI and BF) through all of the preseason's measurements.
- ◉ Heart rate variability variables (lnRMSSD and SDNN) demonstrated small decreases, with significant relationships between PRE and END assessments.
- ◉ The participants also experimented a significant increase in salivary cortisol and testosterone concentrations, and improved the sprint performance and jump capacity.

These findings may help coaches and athletes to better understand preseason physiological stress and plan appropriate training strategies to improve athletic performance without risk of injury or overtraining.

REFERENCES

1. Brito de Souza, D., González-García, J., Campo, L. D., Resta, R., Martínez Buldú, J., Wilk, M. & Del Coso, J. (2021). Players' physical performance in LaLiga across the season: insights for competition continuation after COVID-19. *Biol Sport*, 38(1), 3-7. DOI: 10.5114/biolsport.2020.96856
2. Halson, S. L. (2014). Monitoring training load to understand fatigue in athletes. *Sports Med*, 44(2), 139-147. DOI: 10.1007/s40279-014-0253-z
3. Matveev, L. P. (1965). *Periodization of Athletic Training*. Moscow: Fizkultura I Sport.