

PRE-SEASONAL AEROBIC FITNESS IN SEMI-PROFESSIONAL ITALIAN FOOTBALL PLAYERS: PRELIMINARY RESULTS

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Abstract

Aerobic fitness assumed as anaerobic threshold may discriminate between players of different competitive level and consequently parallel success considered as participation in higher national professional leagues. This way, maximal oxygen uptake (VO_{2max}) has been found to be an important determinant of physical fitness in football players. In addition, a strong correlation was observed between VO_{2max} and body size expressed as body mass index (BMI). 23 male semi-professional Italian football players participated in this study within the context of regular pre-season summer camp. Many of the devices that exist for monitoring training and individual status are relatively expensive and might be not available to the majority of football teams. We reproduce a reliable and simple field test to assess VO_{2max} at two different stages of pre-season. The aim of this pilot study was to compare physical fitness at two different stage of pre-season period. Our null hypothesis was no significant differences occurred in both variables between the two stages. VO_{2max} significantly increased throughout pre-season period whereas no significant differences were observed in BMI. However, this pilot study provides the basis to characterise physical fitness of semi-professional football players.

Key words: football, aerobic fitness, anaerobic threshold.

Introduction

Football has been defined as a sport which a high physical and physiological capacity is required to withstand the fatigue induced between matches and training sessions (Drust, Atkinson, & Reilly, 2007; Reilly, Drust, & Clarke, 2008; Stølen, Chamari, Castagna, & Wisløff, 2005). This way, VO_{2max} has been found to be an important determinant of physical fitness in football players (Drust, Reilly, & Cable, 2000; Rebelo, Brito, Seabra, Oliveira, & Krstrup, 2014).

During the last decade, semi-professional football seems to have been receiving scarce attention rather than elite amateur and youth football in terms of physiological variables. In order to sustain the physical and physiological effort due to regular football practice at any competitive level, a physical and physiological evaluation is of crucial importance.

Furthermore, semi-professional football should receive more attention since may be a transition stage for many young footballers to step from amateur to professional leagues. Aerobic fitness assumed as anaerobic threshold may discriminate between players of different competitive level and consequently parallel success considered as participation in higher national professional leagues (Castagna, Impellizzeri, Chaouachi, Bordon, & Manzi, 2011; Stølen et al., 2005). Aerobic fitness resulted to positively affect match physical and technical performance in football players of different competitive levels (Helgerud, Rodas, Kemi, & Hoff, 2011; Impellizzeri et al., 2006). For these reason, training programs should include

aerobic training at any competitive level (Castagna et al., 2011; Impellizzeri, Rampinini, & Marcora, 2005). Many of the devices that exist for monitoring training and individual status are relatively expensive and might be not available to the majority of football teams. Amateur and semi-professional teams do not provide sophisticate tools for the purpose and they must arrange on their limited resources. Thus, subjective assessment based on questionnaires or simples filed test have been used to evaluate perceived exertion during training sessions and physiological variables.

As instance, rating of perceived exertion, well-known as *RPE-method* proposed by Borg, Hassmen, and Langerstrom (1987) seems to be the most commonly method used for quantifying internal load in team sport settings, or simple field test used to calculate VO_{2max} throughout their formula.

According to our "limited" availability in terms of instruments, we performed Gacon incremental test since it represent an useful, reliable and cheap field test to assess VO_{2max} in football players (Assadi & Lepers, 2012). Furthermore, VO_{2max} has been associated to body size in youth football players (Valente-Dos-Santos et al., 2015), whereas both variables resulted as successful indicators in football (Nevill, Holder, & Watts, 2009).

The aim of this pilot study was to compare VO_{2max} and BMI at two different stage of pre-season period. Our null hypothesis was no significant differences occurred in both variables between the two stages.

Materials and methods

Participants

23 male semi-professional Italian football players (21.5 ± 5.8 years old; 180.5 ± 6.1 cm; 72.7 ± 7.4) received an informed consent and participated voluntarily to the experiments in the context of the regular data gathering aid to characterize the physiological status of the players during the pre-season summer camp. Players were part of a semi-professional Italian team involved in *Serie D* league. Inclusion criteria were: (i) at least four years as federated player; (ii) no previous joint injuries within the last two years. Goalkeepers and players that arrived later than first evaluation were excluded from analysis. All the participants were familiar to strength and conditioning training.

Measurements

The present study had a cross-sectional design and was carried out during pre-season in the month of August 2015. Pre-season summer camp took place in the rural area of Salerno, region of Campania, Italy and had 1 month duration. The present study consisted in a crossover design. Each participant performed two $VO_{2\max}$ assessment as well as BMI at the first and last stage of the pre-season (30 days far). Each micro-cycle consisted in seven training sessions *per* week (evening or morning-evening) distributed within five days and a friendly match. Tactical/technical collective exercises (TT) were also included, each micro-cycle was designed as follows: preventives/eccentric exercises (Monday morning); strength-TT (Tuesday); endurance-TT (Wednesday) various format of small-sided games (Thursday evening); Small sided games and TT (Friday morning); Friendly match (Saturday evening); Rest (Sunday).

Procedures

Height and weight were measured without shoes and with light clothing. Height was measured using a metric type stuck to a wooden wall. Weight was assessed using a simple balance. Once height and weight were noted, BMI was calculated using a standard formula (weight [kg]/height [m²]). Each participant was measured twice, and the mean value was used. $VO_{2\max}$ was estimated using a field intermittent test (FIT) proposed by *Georges Gacon* (French National Team Manager of middle-distance race runners from 1984 to 1994) in 1994 consisting of 45-second runs alternated with 15-second rests (45-15FIT). This test has been recently validated by Assadi and Lepers (2012). *Gacon* assumed that the velocity reached at the end of the 45-15FIT was well adapted for a 30-s/30-s intermittent training session, which may elicit a high percentage of $VO_{2\max}$ during the exercise.

Statistics

Data were analysed utilizing SPSS version 21.0 © SPSS, Inc. (Chicago, Illinois, USA) statistical software. Descriptive statistics (mean \pm SD) for the different variables were reported. Normality of distribution was assessed through *Shapiro-Wilks* test.

Subsequently, a paired sample *t* test was performed to compare $VO_{2\max}$ and BMI between the two stages. Magnitude of differences was interpreted by *d* values according to Cohen (1988) setting 0.2 (small), 0.5 (moderate), 0.8 (large) and considering only $\eta^2 > 0.14$ sufficiently large to be of any consequence. Statistical significance was set on $p \leq 0.05$.

Results

Moderate increases ($p < 0.05$; $d = 0.54$) in $VO_{2\max}$ were observed between the two stages whereas no differences were observed in BMI (table 1)

Table 1. Changes between 1st and 2nd stage. Data are presented as Mean \pm SD

	1 st stage	2 nd stage	<i>P</i>	<i>d</i>	Descriptor
$VO_{2\max}$ (ml·kg ⁻¹ ·min ⁻¹)	47.88 \pm 2.5	51.61 \pm 3.13	0.000	0.54	Moderate
BMI (kg m ⁻²)	22.22 \pm 1.22	22.12 \pm 1.09	0.386	0.04	Trivial

$VO_{2\max}$: Maximal oxygen uptake; BMI: Body mass index

Discussion

All players were received a devolution during the whole pre-season. Despite *circa* half of the team, especially older players were committed on an own job, independently to the team filiation, due to the limited resources that clubs provide to athletes at non-elite level. In our opinion, semi-professional football should receive more attention since may be a transition stage for many young footballers to step from amateur to professional leagues.

Values of $VO_{2\max}$, higher in 2nd stage corresponded to an efficient conditioning training carried out throughout one-month pre-season. Our results are in accordance with other studies that investigate the efficiency of aerobic training on anaerobic threshold in football players (Castagna et al., 2011; Impellizzeri et al., 2006). However, further research should investigate semi-professional football regarding ratings of players upgrading toward elite football or downgrading toward amateur football.

This way, we defined semi-professional football as a transition phase where young athletes should be provided to much advantages as possible to prove their skills, increasing the possibility to upgrade toward elite football.

Conclusions

As expected, aerobic fitness improved alongside pre-season. On the other hand, no significant changes were observed in anthropometric measurements. Our preliminary results provide the basis to characterise physical fitness of semi-professional football players. The second step is to enlarge the sample and to compare data to model the design.

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PRED-SEZONSKI AEROBNI FITNES U POLU-PROFESIONALNIM TALIJANSKIM NOGOMETAŠIMA: PRELIMINARNI REZULTATI

Sažetak

Aerobna kondicija koja se pretpostavlja kao anaerobni prag može diskriminirati između igrača različitih razina konkurentnosti i time paralelni uspjeh koji se smatra sudjelovanjem u višim nacionalnim profesionalnim ligama. Na taj način, utvrđeno je da je maksimalni unos kisika (VO₂max) važna odrednica fizičke kondicije u nogometaša. Osim toga, uočena je jaka korelacija između VO₂max i veličine tijela izražene kao indeks tjelesne mase (BMI). U ovom je istraživanju sudjelovalo 23 poluprofesionalnih talijanskih nogometaša u kontekstu redovnog ljetnog kampa prije sezone. Mnogi uređaji koji postoje za praćenje treninga i individualnog statusa relativno su skupe i možda nisu dostupni većini nogometnih timova. Mi reproduciramo pouzdano i jednostavno terensko ispitivanje kako bismo procijenili VO₂max u dva različita stadija pred sezonu. Cilj ove pilot studije bio je usporediti fizičku sposobnost u dva različita stadija razdoblja prije sezone. Za našu hipotezu nije bilo značajnih razlika u obje varijable između dviju faza. VO₂max se znatno povećao tijekom razdoblja prije sezone, dok u BMI nije zabilježena značajna razlika. Međutim, ovo istraživanje pruža osnovu za obilježavanje fizičke sposobnosti poluprofesionalnih nogometaša.

Ključne riječi: nogomet, aerobna kondicija, anaerobni prag.

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