

Maximal Oxygen Levels as an Incremental Exercise to Optimise Individual Training Prescription with the Aim of Rectifying Weaknesses of Elite Algerian Soccer

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Abstract Purpose: This study aims to provide the Algerian soccer trainers with a systematic method to control and interpret the Algerian soccer's progress. Recommend by soccer studies based on new high-tech to monitor intensity aimed at a competitive superiority of soccer players. Performed based on direct relationship VO_{2max} , intensity and distance covered in elites match. **Methods:** to esteem the weaknesses of elite Algerian soccer. This controlled study focused on a yo-yo (IR1) test as a reliable, valid predictor of high-intensity aerobic capacity and VO_{2max} athletes levels, which is able to discriminate the differences between player's post-games and player's ability levels. Investigated in this study as a protocol to classify 59 male soccer players under 18 years, labelled on their VO_{2max} levels and their relationships with body fat index studies. **Results:** All statistical procedure results advance the players with high VO_{2max} levels up than 59 ml/kg/min, allows this category of players to record a difference of 8.98% VO_{2max} levels, 1160.86 m of distance covered, -1,27% of BFP and -4,55 ml/ kg/min of BMI higher compared to the other fewer categories records. **Conclusions:** Our results approve the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) test as a valid and reliable test to monitor improvements or decrements of soccer physiological and anthropometrical training concept game demands. It can be concluded in this study as simple and valid data to predict the excess of body fat index on the request aerobic fitness claims for demanding soccer top player profile.

Keywords Athletic Body, Intermittent Tests, Training Load, Aerobic Fitness

1. Introduction

Nowadays, soccer coaches need all the information and guidance for the success of their teams in training sessions or competitions. Support within the formative feedback able to provide valuable data collection and analysis to interpret the samples physiological profiles [3]. Suggested by the soccer studies through the use of appropriate data tracking tools, such as power output measuring devices, internal load unit measures, and the perception of effort, heart rate, blood lactate, training impulses, and time-motion analysis [31]. Investigated in this study using the Yo-Yo Intermittent Recovery Test (IR1) to estimate the ability of players to perform intense intermittent exercise with a high rate of aerobic and anaerobic energy turnover [17]. Extensively utilised in the literature to monitor the sport-specific intermittent endurance capacity level and training adaptations in soccer players [5]. Despite the fact that the aerobic energy system is highly taxed, with mean and peak heart rates of around 85 and 98% of maximal values, requiring from top-class players a significant energy intake during a week [1,33]. This study focused on a yo-yo (IR1) test as a reliable, valid predictor of high-intensity aerobic capacity and VO_{2max} athletes' levels [37]. Checked in this study, based on the aerobic exercise intensity as a significant physiological athletic performance body adaptation to raise aerobic improvement [11,14,28,35,30]. Report by preventive body goals studies in the improvements of high-intensity physical training [15] that is more helpful than the moderate-intensity to reduce the effects of body composition [19]. Targeted in this study based on Yo-yo test VO_{2max} data levels as a powerful strategy to inspect the adequate fitness concomitant with ideal body composition among our sample [36]. Admitted in this study, as a valid tool for predicting the excess of body weight on the request aerobic fitness profile through soccer players [14,18,20,25,27,32].

2. Material and Methods

2.1. Approximation Method

The present study compared the improvements of soccer players under 18 years from Algerian elite S-League players using the yo-yo intermittent test. Allowed by Yo-Yo IR level 1 (Yo-Yo IR1) as a simple and valid way to obtain important information of an individual's capacity to perform repeated intense exercise and to examine changes in performance [36] associated with body composition (BMI & BFP), weight loss goals [4,10] and athletes' aerobic fitness programs [20,28,29,31,37].

2.2. Participants

A total of 59 male elite players, aged around 17.65 (years) \pm 0.39 took part in the present study, season 2016 to 2017, from division one league Oran. Examined in the parameters (anthropometric and physiological), during the transition phase of the Algerian Championship. Listed in Table 1, according to their VO₂max levels derived from Yo-yo test norms, as scientists approached helpful soccer and active people gain the desired body-weight goals or body composition, required for athletic success performance, appearance and health [23].

Table 1. Present the evaluated VO₂max levels of samples classified by the yo-yo intermittent test data norms

		N	Mean	SD	Levine Statistic	P \leq 0.05	Anova	P \leq 0.05
BFP (%)	VO ₂ max <50 ml/kg/min	10	12.23	1.12	0.841	0.477	6,409	0.00
	VO ₂ max> 53 ml/kg/min	20	12.11	3.37				
	VO ₂ max > 56 ml/kg/min	18	10,96	1,05				
	VO ₂ max > 59 ml/kg/min	11	8,85	0,92				
	Total	59	11.17	2.43				
BMI (kg/m ²)	VO ₂ max < 50 ml/kg/min	10	24,01	1,09	1 395	0,254	18 436	0,00
	VO ₂ max > 53 ml/kg/min	20	22,36	1,71				
	VO ₂ max > 56 ml/kg/min	18	21,36	1,47				
	VO ₂ max > 59 ml/kg/min	11	19,45	1,22				
	Total	59	21.79	2.02				
VO ₂ MAX (ml/kg/min)	VO ₂ max < 50 ml/kg/min	10	51,32	1,63	1 688	0,180	75 029	0,00
	VO ₂ max > 53 ml/kg/min	20	54,64	1,64				
	VO ₂ max > 56 ml/kg/min	18	56,77	1,17				
	VO ₂ max > 59 ml/kg/min	11	60,30	1,23				
	Total	59	55.78	3.16				
Distance (m)	VO ₂ max < 50 ml/kg/min	10	1773,33	176,24	2 512	0,458	52 301	0,00
	VO ₂ max > 53 ml/kg/min	20	2174,57	199,89				
	VO ₂ max > 56 ml/kg/min	18	2429,62	142,49				
	VO ₂ max > 59 ml/kg/min	11	2934,19	366,27				
	Total	59	2326.00	425.49				
Height (cm)	VO ₂ max < 50 ml/kg/min	10	172,00	4,71	0,715	0,547	1 781	0,16
	VO ₂ max> 53 ml/kg/min	20	174.60	4.66				
	VO ₂ max> 56 ml/kg/min	18	176.6111	4.23				
	VO ₂ max> 59 ml/kg/min	11	174.6364	7.13				
	Total	59	174.7797	5.19				
Weight (kg)	VO ₂ max < 50 ml/kg/min	10	67,170 0	8,22	0,140	0,936	1 650	0,19
	VO ₂ max> 53 ml/kg/min	20	63.2050	7.43				
	VO ₂ max> 56 ml/kg/min	18	63.0111	7.88				
	VO ₂ max> 59 ml/kg/min	11	59.6091	7.84				
	Total	59	63.1475	7.91				

2.3. Tests and Protocol

As the objective of this controlled study is aimed to provide the Algerian soccer trainers with a valuable method to control and interpret the Algerian soccer's progress, in the lack of modern soccer coaching tools. We centred on Yo-Yo intermittent endurance test level 1, in addition to the formula of body index fat or fatness. Reported in several studies as a practical measure that does not require any skilful involvement of sophisticated equipment [7].

2.3.1. Yo-yo Intermittent Test

The Yo-yo intermittent recovery test (level 1 test): developed to measure the player's ability to repeat high-intensity aerobic work. Admitted in soccer studies as a more reliable, valid indicator of the individual's status aerobic capacity, directly correlated to the physical demands and physiological cardiovascular function. The Yo-yo IR1 incorporates 2×20 m shuttles interspersed with 10 s of active recovery with speed increases regulated by audio signals from a CD player. Participants continue until they can no longer maintain the speed imposed by audio signals, and the distance covered at that moment is the test result [24]. The equations for calculating VO_{2max} (YYIR1 test: VO_{2max} (mL * kg⁻¹ * min⁻¹) = IR1 distance (m) \times 0.0084 + 36.4).

2.3.2. Anthropometrics' Measurement

Body height (BH) and body weight (BW): Standing height (m) was measured without shoes to the nearest 0.1 cm using a portable stadiometer (seca 213), and weight (kg) was measured to the nearest 0.1 kg by a digital scale (Tanita model number TBF 410). BMI was calculated by weight in kg divided by the square of height in meters (m²).

2.3.3. Body Fat Percentage (BFP)

In the current study, BFP was assessed by BIA methods using Biodynamics-310. Support by Lin Wang and Stanley Sai-chuen Hui (2015) as a valid tool to estimate BFP [10]. Reported by its significant positive correlation with DXA Measurement.

2.4. Statistical Analysis

Data analysis was performed using SPSS 22.0 for Windows (32-bit) (IBM, Armonk, NY, USA). Descriptive statistics were adopted to describe the anthropometric parameters and for performance presentation of the entire sample. Data collected studies show the homogeneity of the sample by the power of the Levine test. ANOVA was directed to identify the significant effect of VO_{2max} categories on performance relative to the optional athletics body composition. LSD post hoc tests were accompanied to show the mean difference between the groups via variables chosen to study. The relationship between the variables was checked using Pearson correlations (r). All statistical significance fixes at p 0.05.

3. Results

Based on the study design, tests, protocol and statistics applied. Our results in **Table 1** and **figure 1** show the homogeneity of the collected sample in all variables entered. Certified by the significance of Levine's statistic. The opposite of ANOVA one-way that is significant in the distance covered, BMI and BFP, the contrary of weight and height. Enabling users, the calculation of the LSD to classify the difference between groups listed in **Table 3**. Recorded in favour of the players with high VO_{2max} levels and low body fat or composition, competent to achieve a more significant distance covered in this intermittent test. Interpret by users through the effect of the body fat, not body weight as the principal factor, influencing aerobic players' performance [9]. Upkeep in this study by the validity of Yo-Yo IR level 1 (Yo-Yo IR1) as a simple and valid way to obtain important information of an individual's capacity to perform repeated intense exercise and to examine changes in performance [17]. Detailed in the present via **Tables 2 and 3**. Records for the advantage of players with VO_{2max} up to 59 ml/kg/min, permitting this player to top score a difference of 8.98% (VO_{2max}), 1160.86 m of distance covered (-1.27%) of BFP and (-4.55 ml/kg/min) of BMI, superior to other VO_{2max} categories. Shown in a recent study as an advantage of 11% VO_{2max} increases, enabling players to growth their intensity match by 5% and the distance covered by 1800 m [11].

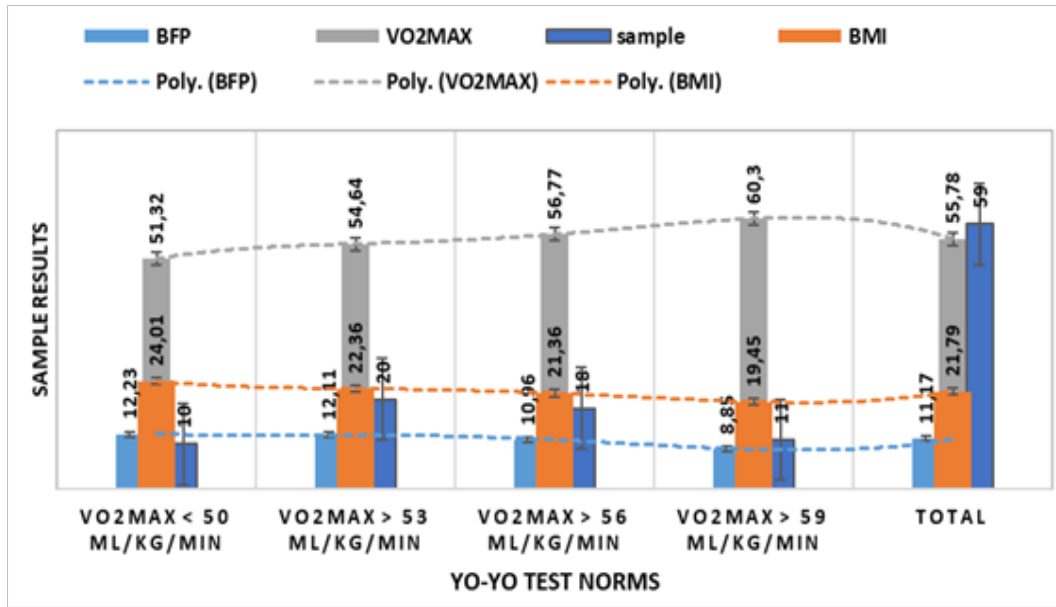


Figure 1. Present the characteristics of the sample based on VO₂max levels as data analysis derive from Yo-yo test norms

Table 2. Present the Pearson correlation VO₂max levels and distance covered versus body fat index applied in this study

Pearson Correlation	BFP	BMI	VO ₂ MAX	Distance
VO ₂ MAX	-0.78**	-0.76**	1	0.95**
Distance	-0.72**	-0.70**	0.95**	1
N=59	P<0.05**. Correlation is significant at the 0.01 level (2-tailed)			

Table 3. Show the Multiple Comparisons between VO₂max levels under the variables studies

Dependent Variable	(I) VO ₂ MAX Levels	(J) VO ₂ MAX Levels	Mean Difference (I-J)	Std. Error	P<0.05
BFP%	VO ₂ max <50 ml/kg/min	VO ₂ max > 53 ml/kg/min	0.13	0.83	0.87
		VO ₂ max > 56 ml/kg/min	1.27	0.84	0.14
		VO ₂ max > 59 ml/kg/min	3,38*	0,93	0,00
	VO ₂ max > 53 ml/kg/min	VO ₂ max <50 ml/kg/min	-0.12	0.83	0.87
		VO ₂ max > 56 ml/kg/min	1.14	0.69	0.11
		VO ₂ max > 59 ml/kg/min	3.25*	0.81	0.00
	VO ₂ max > 56 ml/kg/min	VO ₂ max <50 ml/kg/min	-1.27	0.85	0.13
		VO ₂ max > 53 ml/kg/min	-1.14	0.69	0.11
		VO ₂ max > 59 ml/kg/min	2.12*	0.82	0.01
	VO ₂ max > 59 ml/kg/min	VO ₂ max <50 ml/kg/min	-3,38*	0,93	0,00
		VO ₂ max > 53 ml/kg/min	-3,25*	0,81	0,00
		VO ₂ max > 56 ml/kg/min	-2,12*	0,82	0,01
BMI (kg/m ²)	VO ₂ max <50 ml/kg/min	VO ₂ max > 53 ml/kg/min	1,64*	0,56	0,00
		VO ₂ max > 56 ml/kg/min	2,64*	0,57	0,00
		VO ₂ max > 59 ml/kg/min	4,55*	0,64	0,00
	VO ₂ max > 53 ml/kg/min	VO ₂ max <50 ml/kg/min	-1,64*	0,56	0,05
		VO ₂ max > 56 ml/kg/min	1,02*	0,47	0,04
		VO ₂ max > 59 ml/kg/min	2,91*	0,55	0,00
	VO ₂ max > 56 ml/kg/min	VO ₂ max <50 ml/kg/min	-2,64*	0,57	0,00
		VO ₂ max > 53 ml/kg/min	-1,02*	0,47	0,04
		VO ₂ max > 59 ml/kg/min	1,91*	0,56	0,00

	VO ₂ max > 59 ml/kg/min	VO ₂ max < 50 ml/kg/min	-4.55*	0.64	0.00
		VO ₂ max > 53 ml/kg/min	-2.91*	0.55	,000
		VO ₂ max > 56 ml/kg/min	-1.91*	0.56	0.00
VO ₂ MAX (ml/kg/min)	VO ₂ max < 50 ml/kg/min	VO ₂ max > 53 ml/kg/min	-3.32*	0.56	0.00
		VO ₂ max > 56 ml/kg/min	-5.45*	0.57	0.00
		VO ₂ max > 59 ml/kg/min	-8.98*	0.63	0.00
	VO ₂ max > 53 ml/kg/min	VO ₂ max < 50 ml/kg/min	3.32*	0.56	0.00
		VO ₂ max > 56 ml/kg/min	-2.13*	0.47	0.00
		VO ₂ max > 59 ml/kg/min	-5.66*	0.54	0.00
	VO ₂ max > 56 ml/kg/min	VO ₂ max < 50 ml/kg/min	5.45*	0.57	0.00
		VO ₂ max > 53 ml/kg/min	2.13*	0.47	0.00
		VO ₂ max > 59 ml/kg/min	-3.53*	0.55	0.00
	VO ₂ max > 59 ml/kg/min	VO ₂ max < 50 ml/kg/min	8.98*	0.63	0.00
		VO ₂ max > 53 ml/kg/min	5.66*	0.54	0.00
		VO ₂ max > 56 ml/kg/min	3.53*	0.55	0.00
Distance (m)	VO ₂ max < 50 ml/kg/min	VO ₂ max > 53 ml/kg/min	-401.24*	86,22	0,00
		VO ₂ max > 56 ml/kg/min	-656.29*	87,79	0,00
		VO ₂ max > 59 ml/kg/min	-1160.86*	97,26	0,00
	VO ₂ max > 53 ml/kg/min	VO ₂ max < 50 ml/kg/min	401.24*	86.22	0.00
		VO ₂ max > 56 ml/kg/min	-255.06*	72.32	0.00
		VO ₂ max > 59 ml/kg/min	-759.63*	83.56	,000
	VO ₂ max > 56 ml/kg/min	VO ₂ max < 50 ml/kg/min	656.29*	87.79	0.00
		VO ₂ max > 53 ml/kg/min	255.06*	72.32	0.00
		VO ₂ max > 59 ml/kg/min	-504.57*	85.19	0.00
	VO ₂ max > 59 ml/kg/min	VO ₂ max < 50 ml/kg/min	1160.86*	97.26	0.00
		VO ₂ max > 53 ml/kg/min	759.63*	83.56	0.00
		VO ₂ max > 56 ml/kg/min	504.57*	85.19	0.00

*. The mean difference is significant at the 0.05 level.

Established in this study by Yo-Yo IR level 1 (Yo-Yo IR1) test VO₂max levels and players' distance covered and their strong negative inverse correlations with fat index calculated. Set in this study as a complicated body's function to sustainance the high-intensity work [18] for long periods [13]. Demanding from Algerian players to increase both energy systems to maximise fat oxidation rates and total metabolic demand [34].

Informed by this trial study, as a simple process to select demand exercise intensity able to enhance fat oxidation [30] and promote weight loss [5]. Highlighted in this study based on the significant correlations recorded between the player's fat index and the total work time associated with the distance covered in the yo-yo test [3]. Advanced by Asok Kumar Ghosh as the best measure of endurance performance to determine the well-trained player [12].

4. Discussion

Support low levels of VO₂max have been established as an independent risk factor for the overweight. Required

from our coaches to develop an intervention that targets weight management. As a negative process, Algerian coaches' selection practises [35]. Aimed by Algerian scientists via the application of multidisciplinary scientific and highly expert approach with available scientific findings and inferences, skilful knowledge, intuition and experience to decide the player selection and training proceed and progress [36]. The case of this study claim by Yo-Yo IR level 1 (Yo-Yo IR1) test as a simple and valid method to obtain important information of an individual's capacity to perform repeated intense exercise and to examine changes in performance [30-32-37]. Confirmed in this study as a valid sensitive measure not only to examine maximal activation of the aerobic system but also its associations with fat index and their relations with changes in performance. Suggesting Yo-yo IR level 1 (Yo-Yo IR1) to be the best measure of endurance performance during a soccer game and training. Its data of VO₂max performance confirmed the necessity to be trained above ~60% of VO₂max, likely to improve both energy systems (aerobic and anaerobic) [2]. Admitted by soccer match analysis as a positive relationship between the Yo-Yo IR1 test result and

match performance of top-class soccer referees [15,20,27,33]. Where a 31% increase in Yo-Yo IR1 performance after a 12-week training period was associated with a 23% higher intensity workload during a match. The case of this study records in the profits of the group above +59% of VO₂max as effective physiological load responses ready to improve individuals' training state (body goals and performance) [33,38]. Backed by Małgorzata Fortuna et al., via energy expenditure directly associated with the total distance and player's work intensity [18]. Qualified by similar studies through the impacts of training loads and their relationship with the excess of body fat, and its consequences on physical performance correlated with anthropometric dimensions (shape or type) [8]. Upkeep by soccer literature via excess body fat that slows down the athlete's speed and affects endurance [21]. Admitted by present in the interest of players with high VO₂max levels up than 59 ml/kg/min, allows this category of players to record a difference of 8.98% VO₂max levels, 1160.86 m of distance covered, -1,27% of BFP and -4,55 ml/ kg/min of BMI higher than the other smaller amount categories. Shown in this study as benefit data analysis to design the proper individual's program, adjust based on the player physiological responses, which must attend high-intensity aerobic capacity and VO₂ max recruitment supervision as training concepts [4]. Reported by the validity of Yo-Yo IR tests shown in this study as a sensitive measure to inspect the changes in performance allied to ideal body weight fat index [7]. Established in this study by Yo-yo IR level 1 (Yo-Yo IR1) VO₂max data. To be maintained at up to 59% of VO₂max as advantageous fat max intensity-training competencies to perform the physical and physiological player status improvements. Asserted by J Hoff et al., as representatives load specific training to improve the various components of fitness in all its aspects and levels [16]. Appreciate by Hassane Zouhal et al., as a significant training body adaptation that increases aerobic and anaerobic fitness [15]. Due to the enhancement of skeletal muscle-fat oxidation and glucose tolerance concomitant with body composition management [26]. Suggested in this study as informative data analysis inspected to assess the complete picture of player abilities [19]. Built on Yo-yo VO₂max data levels as formative control tools of training progress [37]. Presenting by Yo-Yo IR level 1 (Yo-Yo IR1) test as a simple and valid way to obtain important information of an individual's capacity to perform repeated intense exercise and to examine changes in performance relative to change of players body fat index [13,22,23,34,35].

5. Conclusions

The present study confirms the Yo-Yo IR level 1 (Yo-Yo IR1) test as an incremental protocol of accurate information to assess the completed picture of players' aerobic abilities. Report as a valid alternative approach to

adjust physiological variables based on inter-individual body fat size difference. The case of this study support by the players' performance in Yo-Yo IR level 1 and their relationships with body fat index studies. Reported in this study in the interest of players with high VO₂max levels up than 59 ml/kg/min. Electives to cause significant differences about 8.98% VO₂max levels, 1160.86 m of distance achieved, -1, 27% of BFP and -4, 55 ml/kg/min of BMI higher than its reduced. Let researchers recommending Algerian coaches to take Yo-yo test VO₂max data norms. As a systematic approach to optimise individual training prescriptions with the aim of rectifying the weaknesses of their players.

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