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Locomotor demands of 30-15 Intermittent Fitness Test, Yo-Yo Intermittent Recovery Test, and VAMEVAL test and comparisons with regular locomotor demands in training sessions and matches: a study conducted in youth male soccer players

original paper
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ABSTRACT

Purpose. The study aim was 2-fold: (i) characterize and compare the locomotor demands of 30-15 Intermittent Fitness Test (30-15IFT), Yo-Yo Intermittent Recovery Test level 1 (YYIRT), and VAMEVAL test; (ii) compare the locomotor demands of these progressive multistage tests with those of training sessions and matches in youth soccer players.

Methods. A descriptive case study lasting 3 weeks was performed to implement the tests once and to monitor the locomotor demands in training sessions and matches. Overall, 12 soccer players (age: 18.21 ± 0.34 years) from the same team participated after consideration of inclusion criteria. A Global Positioning System unit was used for each player over the training sessions, matches, and multistage tests to monitor locomotor demands. The following outcomes were extracted: total distance; peak speed; distances covered at 3.00–6.99 km/h (Z1), 7.00–10.99 km/h (Z2), 11.00–14.99 km/h (Z3), 15.00–18.99 km/h (Z4), and ≥ 19.00 km/h (Z5); accelerations at 0.50 to 0.99 m/s^2 and 1.00 to 1.99 m/s^2; and decelerations at –0.99 to –0.50 m/s^2 and –1.99 to –1.00 m/s^2.

Results. Significant differences between progressive multistage tests were found in total distance (p = 0.028); distances covered at Z1 (p < 0.001), Z2 (p < 0.001), Z3 (p < 0.001), Z4 (p = 0.009), and Z5 (p = 0.044); accelerations at 0.50 to 0.99 m/s^2 (p < 0.001) and 1.00 to 1.99 m/s^2 (p < 0.001); and decelerations at –0.99 to –0.50 m/s^2 (p < 0.001) and –1.99 to –1.00 m/s^2 (p < 0.001). The total distance of the 3 progressive multistage tests may vary between 39% and 49% of a middle training session (match-day 3). However, as for intense locomotor demands at distance covered at Z4, 2 of the field-based tests exceeded a typical match-day 3 between 308 m (+83%) in 30-15IFT and 112 m (+30%) in YYIRT.

Conclusions. The results suggests that 30-15IFT is more demanding considering high-intensity locomotor activities, while YYIRT and VAMEVAL are more demanding considering moderate locomotor demands. Moreover, specific adjustments in training sessions must be conducted, especially when introducing 30-15IFT and YYIRT since they may exceed the typical doses of distances covered at 11.00–14.99 km/h and 15.00–18.99 km/h.

Key words: football, exercise test, athletic performance, cardiorespiratory fitness

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Introduction

Conducting periodical aerobic fitness assessment is important to provide information about the status of players and their capacity to sustain high-intensity efforts and match demands [1, 2] and, eventually, adjust the training process with the level of the player. However, there is some debate about which aerobic fitness assessment test should be used. One of the issues is the specificity of the test and ecological validity. Although laboratory tests ensure greater accuracy and reliability (since they are gold-standard and allow the use of such instruments as gas analysers) [3], field-based tests are closer to the ecological validity and specificity of soccer. Another question is the type of field-based test to use. Among the progressive field-based tests, some are continuous, and others are intermittent. The intermittent ones claim greater specificity regarding the intermittence of soccer running demands.

Among the progressive aerobic fitness tests, the VAMEVAL (an adaptation of the University of Montreal Track Test) [4] is one of the most reported tests in soccer. It consists of running at an athletic track and progressively increasing the speed by 0.5 km/h per each minute. The test starts at 8.5 km/h and the players must accomplish the beeps and the expected position at each stage. One of the strengths of this test is the ability to reliably estimate the maximal oxygen uptake of athletes [5]. Some limitations of the VAMEVAL are associated with the fact that an athletic track is required and with its low-to-moderate sensitivity to detect meaningful improvements [5].

Among the intermittent progressive multistage fitness tests, 2 are well-researched [6–9] and implemented in practical soccer scenarios: (i) the Yo-Yo Intermittent Recovery Test (YYIRT) and (ii) the 30-15 Intermittent Fitness Test (30-15IFT). YYIRT has 2 levels (1 and 2); level 1 is dedicated to youth players and/or amateurs and/or adult females, while level 2 is adjusted to male professionals. Level 1 focuses on aerobic capacity, with a greater aerobic contribution during the test, while level 2 has a greater anaerobic participation [10]. YYIRT level 1 (which is most used, since it covers a greater population) consists of performing 2 × 20 m, followed by a 10-second active recovery. The test starts at 10 km/h and the speed increases by 0.5 km/h after performing 4 bouts 2 × 20 m at 10–13 km/h, 7 bouts at 13.5–14 km/h, and 8 bouts for the remaining speeds until exhaustion [11]. Thus, it is a long test that may last 25 minutes, and the player may cover 3640 m. The great advantage of YYIRT is the good sensitivity and the ability to determine the aerobic capacity of players and to distinguish competitive levels and playing positions, although there is a disadvantage of a low transfer for the training process (e.g., adjustment to high-intensity interval training) [5].

30-15IFT was specifically designed for adjusting the main outcome (final velocity at 30-15IFT) to the implementation of high-intensity interval training [12]. The test consists of performing running bouts of 30 seconds interspaced by a 15-second recovery. The test starts at 8 km/h and at each stage, the imposed pace increases by 0.5 km/h. The total distance covered in the test can be 204.17 m. The great advantage of the test is the good sensitivity [13] and the good direct transfer for training, although there is a low criterion-related validity for estimating maximal oxygen uptake [5].

Besides the challenge of selecting the most appropriate test, another important factor is how to implement the test and at which moment. In fact, coaches often report the lack of time to introduce aerobic fitness tests. Thus, a specific characterization of the demands of each test can be important to fit those demands in the typical training context. One of the few examples that compared the physiological and locomotor demands of a test was presented in the form of a short report and practical case of using 30-15IFT in a professional scenario [14]. In this study, it was observed that 30-15IFT represented 30–50% of typical locomotor demands of a regular training session, and even less if one considers high-intensity locomotor demands [14].

The challenge of introducing aerobic fitness tests is to fit the demands of the test with the remaining session, using the test as a moment for providing a given training stimulus. To do that, is important to characterize the locomotor demands of the test and compare them with the demands of typical training scenarios [15–17]. This characterization may help coaches to more regularly introduce aerobic fitness tests in the training process, without compromising the demands expected to impose in the training. With this idea in mind, the current research had 2 main objectives: (i) to characterize and compare the locomotor demands of 30-15IFT, YYIRT level 1, and the VAMEVAL test; and (ii) compare the locomotor demands of these progressive multistage tests with those of training sessions and matches in youth soccer players.

Material and methods

Study design

We followed a descriptive case study design.

Setting

A 3-week observational period was employed (from November 21, 2021 to December 11, 2021). The period of observation corresponds to the middle part of the in-season (about 16 weeks after starting the training sessions). In the first week, the VAMEVAL test was applied, while in the second and third weeks, 30-15IFT and YYIRT were implemented, respectively. The tests were performed 4 days after the last match (and 24 hours of rest preceding the test). They were conducted in the afternoon (6 p.m.), and as part of the first task of the training session, immediately after a standardized warm-up protocol (FIFA 11+) [18], consisting in 8 minutes of self-paced low-intensity running, followed by 10 minutes of strength, plyometrics, and balance (level 2) and 2 minutes of running exercises. The tests were performed outside on synthetic turf, with an average temperature of 22°C and relative humidity of 54%. Aside from the tests, the players were monitored for their locomotor demands in field-based tests, training sessions (regular sessions without field-based tests), and matches during the 3-week period. A Global Positioning System (GPS) unit was used individually to monitor the players' locomotor demands. During the period of observation, training sessions were classified on the basis of the proximity to the next match. Thus, training sessions occurring 3, 2, and 1 days before the match-day (MD) were classified as MD-3, MD-2, and MD-1. In the case of MD, with the consideration of the contextual competition interruption, non-official matches were performed and tracked.

Participants

The study was conducted in a single team; thus, the players were selected with convenience sampling. From the initial number of 19 players, 12 were included in the data treatment after considering the eligibility criteria. The 12 participants had the following characteristics: (i) age: 18.21 ± 0.34 years; (ii) height: 1.78 ± 5.6 m; (iii) body mass: 72.6 ± 3.5 kg; (iv) performance at the VAMEVAL: 14.6 ± 0.8 km/h; (v) performance at 30-15IFT: 16.8 ± 1.9 km/h; and (vi) performance at YYIRT: 17.4 ± 0.9 km/h. The eligibility criteria were as follows: (i) participation in the 3 tests conducted over the period (VAMEVAL, 30-15IFT, and YYIRT); (ii) participation in at least 1 match played during the period of observation (1 in 3 maximum); and (iii) participation in each of the training sessions regarding MD-3, MD-2, and MD-1 that occurred over the period. From the initial 19 players, 7 were excluded because of the fact of not participating in all the 3 tests. The participants were informed about the study design and protocol, risks, and benefits.

The VAMEVAL test

The VAMEVAL test [19] consists in running at a 400-m athletic track with cones placed at each 20-m distance; the progressive increases of the pace were indicated with an audio beep. The test starts at a pace of 8.5 km/h, which increased by 0.5 km/h at each minute. Although the test is progressive, no recovery period occurs between the stages (i.e., the test is continuous). The test stops for the player who is unable to sustain the pace or to reach the supposed mark associated with the beep for 3 consecutive times. The final velocity completed by the player is considered as the main outcome extracted from the test.

The 30-15 Intermittent Fitness Test

The original 30-15IFT was employed [12]. The test consists of performing 30-second shuttle runs interspaced by a 15-second walking recovery period. The test is conducted in a field of 40 m, organized in 3-line zones (A, B, and C). The middle zone (B) is in the middle of the field (i.e., 20 m). The test starts at 8 km/h and the pace increases at each stage (30-second) by 0.5 km/h. Audio beeps govern the pace of players. The test ended if the player could not sustain the pace of the test or failed to reach the expected line zone before the beep for 3 consecutive times. The final velocity at 30-15IFT was considered as that obtained at the last correctly completed the stage.

The Yo-Yo Intermittent Recovery Test level 1

The original YYIRT level 1 protocol was employed [11]. The test consists of performing 2 consecutive runs of 20 m interspaced by a 10-second period of recovery after completing the 40-m distance. The full tests comprise a total of 91 shuttles. The test starts with 4 bouts of 10–13 km/h, and another 7 runs at 13.5–14 km/h [11], whereafter it continues with stepwise 0.5-km/h speed increments after every 8 running bouts [11] until exhaustion. An audio beep governed the pace of players. The players stopped their participation every time they failed to sustain the intensity and/or made 2 consecutive fails in reaching the line in synchronization with the audio beep. The total distance covered during the test was registered for each player, as well as the final velocity attained.

Monitoring the locomotor demands

The locomotor demands were collected in the progressive multistage tests, training sessions, and matches. Each player used the same GPS unit (Polar Team Pro GPS, Polar Electro, Kempele, Finland). This GPS acquires data with 10-Hz sampling. The device was previously confirmed for the accuracy and reliability of data regarding main outcomes of total distance, distances covered at different speed thresholds, and peak speed [20]. The following outcomes were extracted for each test, for the training sessions, and for the matches: (i) total distance (overall distance covered in meters); (ii) peak speed registered; (iii) distance covered at zone 1 (Z1; 3.00–6.99 km/h); (iv) distance covered at zone 2 (Z2; 7.00–10.99 km/h); (v) distance covered at zone 3 (Z3; 11.00–14.99 km/h); (vi) distance covered at zone 4 (Z4; 15.00–18.99 km/h); and (vii) distance covered at zone 5 (Z5; ≥ 19.00 km/h). The monitoring process of the training sessions considered the entire session. However, only sessions performed without the progressive multistage tests were monitored. Moreover, locomotor demands were also recorded. It is important to highlight that the matches were non-official, thus more replacements than normally allowed in official matches were observed.

Statistical procedures

Descriptive statistics were presented in the form of mean, standard deviation, and percentage of difference. The percentage of difference was calculated with the following formula:

$$(\text{outcome } 2 - \text{outcome } 1)/\text{outcome } 1 \times 100$$

Comparisons of locomotor demands between the 3 progressive multistage tests were performed by using the Friedman test owing to the small sample sizes. Pairwise comparisons were executed with the Wilcoxon signed-rank test, which is indicated for being more conservative and exhibiting lower power [21]. The statistical analysis was conducted with the SPSS software (version 28.0.0.0., IBM, USA), with statistical significance assumed at the value of $p < 0.05$.

Ethical approval

The research related to human use has complied with all the relevant national regulations and institutional policies, has followed the tenets of the Declaration of Helsinki, and has been approved by the Afyon Kocatepe University ethics committee (approval No.: 2022/4).

Informed consent

Informed consent has been obtained from all individuals included in this study.

Results

The descriptive statistics of locomotor demands imposed by 30-15IFT, YYIRT, and the VAMEVAL test can be found in Table 1. The players covered significantly greater total distances in VAMEVAL than in 30-15IFT (+589.8 m; $p = 0.015$). The VAMEVAL test presented significantly smaller distances covered at Z1 than 30-15IFT (–303.8 m; $p = 0.002$) and YYIRT (–410.2 m; $p = 0.002$), while YYIRT exposed significantly greater distances covered at Z1 than 30-15IFT

Table 1. Locomotor demands of 30-15IFT, YYIRT, and VAMEVAL ($n = 12$)

Outcome	30-15IFT (mean ± *SD*)	YYIRT (mean ± *SD*)	VAMEVAL (mean ± *SD*)	Friedman test
Total distance (m)	2210.9 ± 548.8^{c}	2539.8 ± 563.5	2800.7 ± 372.6^{a}	0.028
Peak speed (km/h)	21.3 ± 2.0	20.1 ± 1.6	20.5 ± 2.5	0.338
Distance covered at Z1 (m)	317.9 ± 65.0^{b,c}	424.3 ± 110.7^{a,c}	14.1 ± 7.7^{a,b}	< 0.001
Distance covered at Z2 (m)	312.0 ± 44.4^{b,c}	487.1 ± 90.2^{a,c}	650.7 ± 152.5^{a,b}	< 0.001
Distance covered at Z3 (m)	808.3 ± 115.8^{b,c}	981.0 ± 207.9^{a,c}	1784.8 ± 322.3^{a,b}	< 0.001
Distance covered at Z4 (m)	635.8 ± 211.7^{c}	446.3 ± 218.7	309.8 ± 184.0^{a}	0.009
Distance covered at Z5 (m)	83.8 ± 83.6^{b}	14.8 ± 15.6^{a}	35.7 ± 49.2	0.044
Accelerations at 0.50 to 0.99 m/s^2 (*n*)	65.3 ± 15.5^{c}	79.2 ± 18.6^{c}	38.5 ± 20.5^{a,b}	< 0.001
Accelerations at 1.00 to 1.99 m/s^2 (*n*)	54.7 ± 12.3^{c}	52.1 ± 14.4^{c}	14.9 ± 7.3^{a,b}	< 0.001
Decelerations at –0.99 to –0.50 m/s^2 (*n*)	72.8 ± 14.8^{b,c}	103.3 ± 23.8^{a,c}	42.4 ± 20.7^{a,b}	< 0.001
Decelerations at –1.99 to –1.00 m/s^2 (*n*)	59.9 ± 19.3^{c}	64.3 ± 20.9^{c}	15.0 ± 7.4^{a,b}	< 0.001

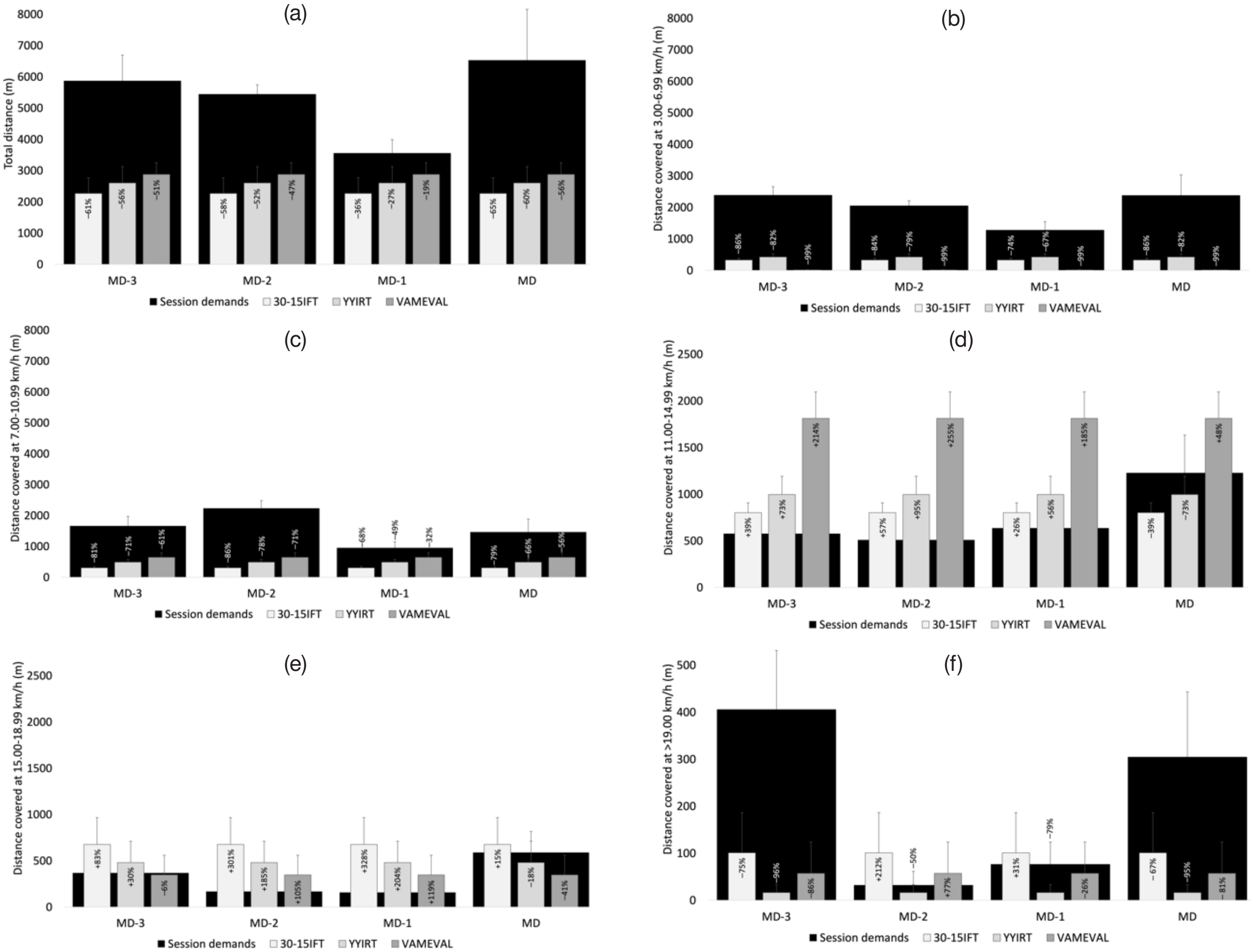
30-15IFT – 30-15 Intermittent Fitness Test, YYIRT – Yo-Yo Intermittent Recovery Test level 1, Z1 – zone of 3.00–6.99 km/h, Z2 – zone of 7.00–10.99 km/h, Z3 – zone of 11.00–14.99 km/h, Z4 – zone of 15.00–18.99 km/h, Z5 – zone of ≥ 19.00 km/h

^{a} significantly different from 30-15IFT, ^{b} significantly different from YYIRT, ^{c} significantly different from VAMEVAL, at $p < 0.05$

(+106.4 m; p = 0.015). The players covered significantly greater distances at Z2 in the VAMEVAL test than in 30-15IFT (+338.7 m; p = 0.002) and YYIRT (+175.1 m; p = 0.005), while YYIRT imposed significantly greater distances at Z2 than 30-15IFT (+175.1 m; p = 0.004). Similarly, VAMEVAL presented significantly greater distances covered at Z3 than 30-15IFT (+976.5 m; p = 0.002) and YYIRT (+803.8 m; p = 0.002), while the distance covered at Z3 was significantly greater in YYIRT than in 30-15IFT (+172.7 m; p = 0.034). 30-15IFT exhibited significantly greater distances covered at Z4 compared with VAMEVAL (+326.0 m; p = 0.006). The distance covered at Z5 was significantly greater in 30-15IFT than in YYIRT (+69 m; p = 0.014).

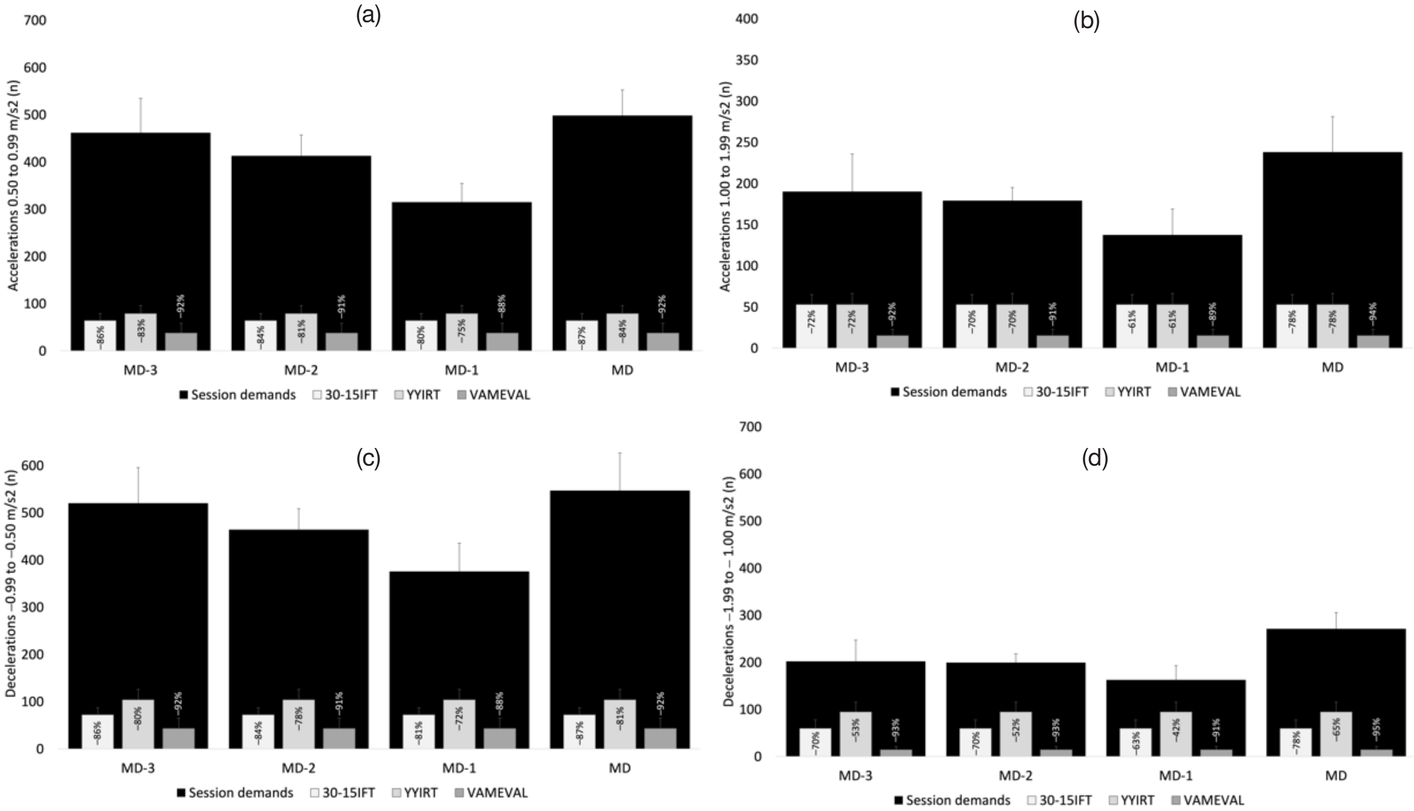
Accelerations at 0.50 to 0.99 m/s^2 were significantly smaller in VAMEVAL than in 30-15IFT (–26.8 n; p = 0.002) and YYIRT (–40.7 n; p = 0.003). Accelerations performed at 1.00 to 1.99 m/s^2 were also significantly smaller in VAMEVAL than in 30-15IFT (–39.8 n; p = 0.002) and YYIRT (–37.2 n; p = 0.002). Decelerations at –0.99 to –0.50 m/s^2 were significantly greater in YYIRT than in 30-15IFT (+30.5 n; p = 0.010) and VAMEVAL (+60.9 n; p = 0.002), while a significantly greater number of such accelerations were found in 30-15IFT in comparison with VAMEVAL (+30.4 n; p = 0.004). Decelerations at –1.99 to –1.00 m/s^2 were significantly smaller in VAMEVAL than in 30-15IFT (–44.9 n; p = 0.002) and YYIRT (–49.3 n; p = 0.003).

Figure 1 presents the descriptive values of the total distance and the distances covered at different speed thresholds of the 3 progressive multistage tests and the locomotor demands typically observed in training sessions and non-official matches. The total distance



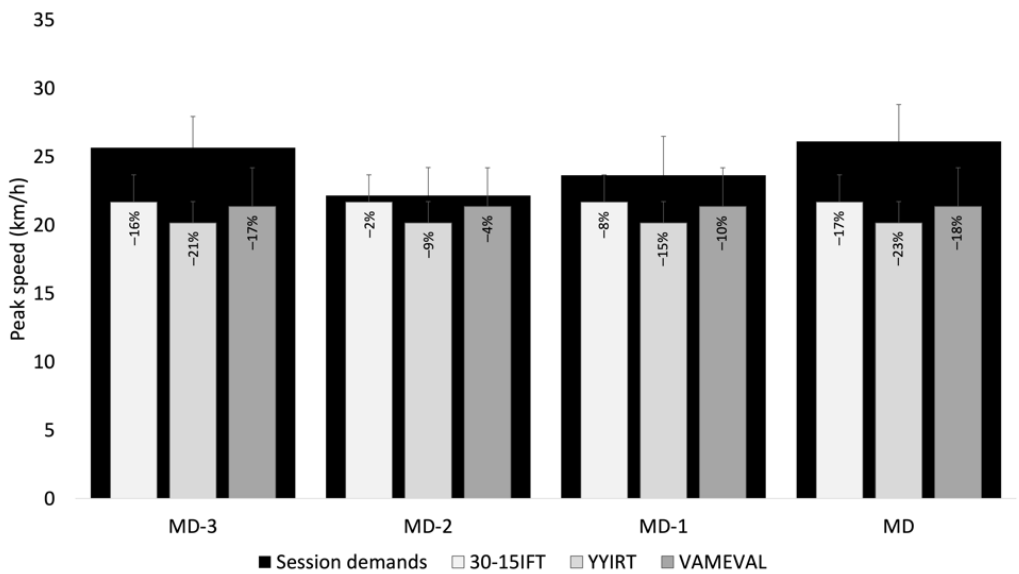
MD – match-day, 30-15IFT – 30-15 Intermittent Fitness Test, YYIRT – Yo-Yo Intermittent Recovery Test level 1

Figure 1. Comparison of (a) total distance, (b) distance covered at Z1, (c) distance covered at Z2, (d) distance covered at Z3, (e) distance covered at Z4, and (f) distance covered at Z5 between training sessions, match demands, and field-based tests. Percentage of difference is between the field-based test and the session analysed



MD – match-day, 30-15IFT – 30-15 Intermittent Fitness Test, YYIRT – Yo-Yo Intermittent Recovery Rest level 1

Figure 2. Comparison of (a) accelerations at 0.50 to 0.99 m/s^2, (b) accelerations at 1.00 to 1.99 m/s^2, (c) decelerations at –0.99 to –0.50 m/s^2, and (d) decelerations at –1.99 to –1.00 m/s^2 between 3 training sessions, match demands, and field-based tests. Percentage of difference is between the field-based test and the session analysed



MD – match-day, 30-15IFT – 30-15 Intermittent Fitness Test, YYIRT – Yo-Yo Intermittent Recovery Test level 1

Figure 3. Comparison of peak speed between training sessions, match demands, and field-based tests. Percentage of difference is between the field-based test and the session analysed

of the 3 progressive multistage tests may represent 74–81% of the total distance covered in a single MD-1 session, while it may equal 39–49% of a middle training session and MD-3. However, if one considers intense locomotor demands at the distance covered between 15 and 18.99 km/h, 2 of the field-based tests exceeded a typical MD-3 between 308 m (+83%) in 30-15IFT and 112 m (+30%) in YYIRT. In the case of distances covered at 11–14.99 km/h, the VAMEVAL test exceeded a typical MD-3 session by about 1236 m (+214%), while 30-15IFT exceeded by about 225 m (+39%).

Figure 2 depicts the acceleration and deceleration demands of the 3 progressive multistage tests and the locomotor demands typically observed in training sessions and non-official matches. Accelerations and decelerations in low intensity (0.50 to 0.99 m/s^2 and –0.99 to –0.50 m/s^2) represent 8–14% of a typical MD-3 session, and 12–20% of a typical MD-1 session. However, in the intensities between 1.00 and 1.99 m/s^2 (accelerations) and between –1.99 and –1.00 m/s^2, the field-based tests resulted in about 8–30% of a typical MD-3 session and 9–39% of a typical MD-1 session.

Figure 3 presents the peak speed attained in the 3 progressive multistage tests in comparison with training and match demands. The difference between field-based tests and MD-3 is 4–6 km/h, while in the case of MD-2 it equals only 0–2 km/h.

Discussion

The current study is the first, as far we know, that has analysed the variations of the locomotor demands of 3 popular multistage aerobic fitness tests and compared them with typical locomotor demands in training and match scenarios. This innovative aspect may provide useful information about how to fit these tests in weekly training sessions while using them as a training stimulus in the context of locomotor demands. The findings of the study imply that VAMEVAL centres the main demands in moderate running, while 30-15IFT imposes a greater dose of stimulus in moderate- to high-intensity running. YYIRT is more demanding with regard to accelerations and decelerations than the remaining tests. No significant differences between the 3 tests were observed. The descriptive comparisons of the 3 tests with regular training sessions and matches revealed that at distances at 11–18.99 km/h, the tests imposed greater demands than a regular training session occurring at MD-3, MD-2, or MD-1. In comparison with the total distance covered, the tests represent 39–49% of an MD-3 session.

The current research revealed that VAMEVAL displayed more total distance and distance covered at Z2 and at Z3 than the remaining tests, while YYIRT showed higher values for distance covered at Z1, accelerations performed at 0.50 to 0.99 m/s^2, and both decelerations thresholds. 30-15IFT denoted higher values for distance covered at Z4 and at Z5 and accelerations performed at 1.00 to 1.99 m/s^2. These results can agree with the profiles of the tests. VAMEVAL is associated with aerobic capacity [22], whereas 30-15IFT is more related to aerobic power [22] and YYIRT also presents a high aerobic component [23]. Owing to the specificities of the VAMEVAL test (e.g. performed on a 400-m circle track, 20-m shuttles), it can be used to increase total distance and low-speed walking/running distances, while both 30-15IFT and YYIRT are more intermittent and develop more high-intensity running measures and acceleration/deceleration variables, including other characteristics, such as explosive power of lower limbs when changing direction, aerobic capacity, and ability to recover between exercise bouts [5, 12].

With reference to the second aim of the present study, from the 3 progressive multistage tests applied, it was found that total distance covered or distances covered at Z1 and Z2 did not reach the total values for any training session. This means that all tests can be performed in any training session if only these variables are taken into account. Moreover, the intensity training variables include the high-intensity running speed (e.g. > 15 km/h) and accelerometry-based variables [24]. In this sense, the scenario for distance covered at Z3 and Z4 presented opposite results because both variables exceeded the typical training values. Indeed, only these variables exceeded match data in VAMEVAL (Z4) and 30-15IFT (Z5), respectively.

Even so, from all tests, the data of distance covered at Z5 in MD-3, or accelerations, decelerations, and peak speed (during MD-3, MD-2, or MD-1) were not even close to the usual training data, which clearly denotes that regardless of the test applied, the distance of running at a speed higher than 19 km/h or the number of accelerations/decelerations are not matched through these tests when compared with usual training sessions. From the data observed in Figures 1 and 2, it is possible to notice that when applying any of these tests, MD-3 seems to be the day with the highest difference to the typical data from training sessions (although there are some exceptions, e.g., distance covered at Z3). In this perspective and depending on the specific goal of MD-3 sessions proposed by coaches (more technical/

tactical or more analytical), it seems that VAMEVAL, 30-15IFT, or YYIRT could be applied on this day without causing excessive training demands.

The reason to support the application of the tests in MD-3 is related to the minimum time suggested to recover until the match [25]. Considering that there are 2 more training sessions until the match, the proper weekly periodization could be adjusted to avoid fatigue. Despite the small sample size analysed in this study, our MD-3 suggestion is partially supported by a recent systematic review conducted in young soccer players that found range values for total distance of 3800–4800 m (MD-1) and 4400–5372 m (MD-3), while the distance at > 18 km/h was 20–40 m (MD-3) and 60–90 m (MD-1) [26]. Once more, the data for total distance were higher in comparison with the results from the cardiorespiratory tests of the present study, while data for the distance covered at > 19 km/h presented some difference, including the defined threshold. Despite the difference, the values seem to corroborate the data from this study.

In addition, the same systematic review could not indicate any similar threshold for accelerations and decelerations [26]. Nonetheless, our findings are extremely relevant because while VAMEVAL does not present a change of direction during the test, both YYIRT and 30-15IFT have this characteristic. Since none of the tests exceeded the data from a typical training session, it seems that they can be performed not only as a test, but also as a complementing exercise. Therefore, more studies are required to confirm the results.

Still, the results from this study suggest that when higher distances are required for training sessions, VAMEVAL could be applied, and when higher running speeds are required (> 15 km/h), 30-15IFT could be performed. Overall, it seems that all tests can be used in the context of training without provoking any excessive fatigue.

Our study presents some limitations. The results come from a case study, with a convenience sample. Thus, generalization is limited, and more research should be performed. Additionally, variations in the period of the seasons should be considered. As an example, our study was conducted after 16 weeks of the season commencement. If some other time of assessments had been used (e.g. pre-season or end-season), the data obtained could have been different, which would interfere with the data interpretation. For those reasons, future studies should be conducted with larger sample sizes, considering other periods for testing. In addition, we suggest performing similar studies in other age categories, as well as in professional soccer players. Furthermore, only weeks with 3 consecutive training sessions were analysed, and different weekly routines could provide different results. Finally, physiological variables would be useful to better interpret the results and to avoid fatigue questions.

The practical application of this study suggests that despite the differences in the field tests, it seems that they can be applied in training sessions without exceeding the usual training or match data, although some caution must be taken into consideration regarding the limitations of the study.

Conclusions

The study suggests that 30-15IFT is more demanding with reference to high-intensity locomotor activities, while YYIRT and VAMEVAL impose more moderate locomotor demands. Moreover, and considering the players analysed, MD-3 seems to be proper to apply one of these tests for cardiorespiratory assessment and/or a training complement. Specific adjustments in training sessions must be conducted, especially when introducing 30-15IFT and YYIRT, since they may exceed the typical doses of distances covered at 11.00–14.99 km/h and at 15.00–18.99 km/h.

Disclosure statement

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Conflict of interest

The authors state no conflict of interest.

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